

## Clonal evolution in relapsed acute myeloid leukemia revealed by whole genome sequencing

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## Table of Contents

A. Supplementary Materials and Methods (pp 3-28)

B. Supplementary Figures and Legends (pp 29-48)

C. Supplementary Tables (pp 49-189)

D. Supplementary References (pp 190-191)

## **Supplementary Materials and Methods**

## Clinical reports for the 8 AML cases in this study

### UPN 933124

A previously healthy Caucasian female in her late 50s presented with a sudden onset of sore throat and easy bruising. The patient's family history was positive for late onset cancers in her mother and several of her mother's siblings, including a maternal uncle with a reported case of AML that was confirmed by death certificate. The patient's sister has Essential Thrombocythemia (*JAK2 V617F* negative). The patient was found to have a peripheral blood white blood cell count of 105,000 cells/ mcl with 85% blasts on presentation. The hemoglobin was 12.1 gm/dl, and platelet count was 20,000/mcl. A bone marrow biopsy and aspirate revealed 100% blasts, and confirmed the diagnosis of AML, FAB M1 subtype. Flow cytometry revealed a single population of myeloblasts with cell surface expression of CD-13, -33 and -117, and absent expression of CD-34 and HLA-DR. Cytogenetic analysis of tumor cells revealed a normal 46 XX karyotype. After informed consent was obtained, she was enrolled in a cooperative group protocol for treatment of AML in adults less than age 60 (Cancer and Leukemia Group B (CALGB) #19808). After emergent leukopheresis, she underwent induction chemotherapy with cytarabine, daunorubicin, and etoposide. A bone marrow biopsy repeated 2 weeks later demonstrated ablation. After myeloid recovery, a repeat bone marrow biopsy demonstrated first complete remission. On the basis of her intermediate risk cytogenetics, she was assigned to undergo consolidation chemotherapy with high dose cytarabine and etoposide, followed by filgrastim to facilitate autologous hematopoietic stem cell mobilization and collection. She subsequently underwent dose- intensive busulfan and etoposide conditioning, followed by autologous hematopoietic stem cell rescue. Upon recovery from autologous stem cell transplantation, she was assigned to receive maintenance immunotherapy with IL-2. Despite these multiple therapies, she relapsed 11 months after her initial diagnosis. After failing to respond to a salvage regimen of mitoxantrone, etoposide, and cytarabine, she received fludarabine, high dose Ara-C, idarubicin and gemtuzumab ozogamicin. 10 days later she received high dose cyclophosphamide conditioning (60 mg/kg daily x 2) and then single dose total body irradiation (550 cGy; 30 cGy/min) followed by allogeneic hematopoietic stem cell transplantation from an HLA-matched sibling donor. A bone marrow biopsy performed one month after transplantation confirmed second complete remission. Her disease relapsed four months later. Gemtuzumab ozogamicin was again administered, followed by two donor lymphocyte infusions, without clearance of circulating blasts. She was then successively treated with azacytidine, low dose cytarabine, and decitabine, again without appreciable response, and expired 24 months after her initial diagnosis.

### UPN 400220

A 34 year old Caucasian female with a prior history of cervical carcinoma in situ (treated with LEEP procedure), mitral valve prolapse, and endometriosis, presented with fatigue, allergy symptoms and chest pain. A CBC demonstrated WBC 14,500 cells/mcl, hemoglobin 11.5 g/dl, platelets 139,000 cells/mcl, with 58% circulating blasts. A bone marrow biopsy demonstrated 90% cellularity, with 71% myeloblasts (MPX +, NSE -, CD13/33/34/117/HLA-DR+), consistent with a diagnosis of AML M4. Cytogenetics showed a 46 XX karyotype.

Molecular diagnostic studies demonstrated a *FLT3* internal tandem duplication. Initial therapy consisted of 7 + 3 induction regimen with infusional cytarabine and idarubicin. A mid-cycle bone marrow biopsy revealed ablation, and a subsequent biopsy documented first complete remission. Post-remission therapy consisted of 3 cycles of high dose cytarabine. Relapse was documented 8 months after initial diagnosis. The patient underwent salvage chemotherapy with mitoxantrone, etoposide, and high dose cytarabine (MEC) with concurrent plerixafor, but did not achieve remission. She was subsequently treated with fludarabine, high dose cytarabine, idarubicin, and gemtuzumab with concurrent filgrastim, and subsequently underwent matched unrelated donor stem cell transplantation with active disease. She expired at day +7 post transplant, 10 months from initial diagnosis.

#### UPN 426980

A 69 year old Caucasian male, with a prior history of hypothyroidism, hyperlipidemia, and pneumonia, presented with low grade fever and cough. A CBC demonstrated WBC 6000 cells/mcl, hemoglobin 7.4 g/dl, platelets 102,000 cells/mcl, with 29% circulating blasts. A bone marrow biopsy demonstrated 50% cellularity, with 64% myeloblasts (MPX +, NSE -, CD13/33/117+), consistent with a diagnosis of AML M2. Cytogenetics showed a 46 XY karyotype. Initial therapy consisted of 7 + 3 induction with infusional cytarabine, daunorubicin, and concurrent oblimersen (Genasense, a *BCL2* antisense molecule). A mid-cycle bone marrow biopsy revealed ablation, and a subsequent biopsy documented first complete remission. Post-remission therapy consisted of 2 cycles of high dose cytarabine with concurrent oblimersen. Relapse was documented 26 months from diagnosis. Salvage chemotherapy regimens were administered sequentially with no or minimal response including decitabine, high dose cytarabine, mitoxantrone and etoposide, azacytidine, and palliative hydroxyurea. He expired from progressive disease 48 months following his initial diagnosis.

#### UPN 452198

A 55 year old Caucasian male, previously healthy, presented with fatigue, subjective fevers, and sinus congestion. A CBC demonstrated: WBC 72,600 cells/mcl, hemoglobin 8.2 g/dl, platelets 17,000 cells/mcl, with 8% circulating blasts and 50% monocytes. A bone marrow biopsy was inevaluable for cellularity. The aspirate demonstrated 97 % monoblasts (MPX -, NSE +, CD13/33/64+), consistent with a diagnosis of AML M5. Cytogenetics showed a 46 XY karyotype. Initial therapy consisted of hydroxyurea for two days, followed by 7 + 3 induction with infusional cytarabine and idarubicin. A mid-cycle bone marrow biopsy revealed ablation, and a subsequent biopsy documented first complete remission. Post-remission therapy consisted of 4 cycles of high dose cytarabine. Relapse was documented 16 months from diagnosis, and treated with mitoxantrone, etoposide, and high dose cytarabine (MEC) with concurrent plerixafor; the patient achieved a second complete remission. He underwent matched sibling donor stem cell transplantation following busulfan/cyclophosphamide conditioning, and remains alive and in complete remission 56 months from initial diagnosis.

#### UPN 573988

A 67 year old Caucasian female with a prior history of hyperthyroidism (treated with radioactive iodine), hypertension, pancreatitis, and breast intraductal carcinoma in situ (treated with excision), presented with syncope. A CBC demonstrated WBC 15,200 cells/mcl, hemoglobin 8.2 g/dl, platelets 79 cells/mcl, with 10% circulating blasts and 30% monocytes. A bone marrow biopsy demonstrated hypercellularity, with 17% myeloblasts an (MPX +, NSE -, CD13/33/117+), and 58 % monoblasts (MPX -, NSE +, CD13/33/64+) consistent with a diagnosis of AML M4. Cerebrospinal fluid was negative for malignant cells. Cytogenetics showed a 46 XX karyotype. Initial therapy consisted of 7 + 3 induction with infusional cytarabine and idarubicin. A mid-cycle bone marrow biopsy revealed ablation, and a subsequent biopsy following marrow recovery documented first complete remission. Post-remission therapy consisted of a single cycle of 5 + 2 infusional cytarabine and idarubicin. Relapse (skin and bone marrow) was documented 12 months from diagnosis and was treated with decitabine without response. She expired from progressive disease 20 months from initial diagnosis.

#### UPN 869586

A previously healthy 23 year old Caucasian male presented with abdominal pain and was found to have a ruptured appendix. A CBC demonstrated WBC 27,100 cells/mcl, hemoglobin 12.0 g/dl, platelets 23,000 cells/mcl, with 63% circulating blasts. A bone marrow biopsy demonstrated was inevaluable for cellularity. The aspirate demonstrated 51% myeloblasts (sparse MPX+, NSE low, CD13/33/34/56/117+), consistent with a diagnosis of AML M4. Cytogenetics showed a 46 XY karyotype. Initial therapy consisted of 7 + 3 + 3 induction with infusional cytarabine, daunorubicin, and etoposide. A mid-cycle bone marrow biopsy was ablated, and a subsequent biopsy following marrow recovery documented first complete remission. Post-remission therapy consisted of high dose cytarabine and etoposide, followed by autologous stem cell transplantation with busulfan/cyclophosphamide conditioning. Relapse was documented seven months from diagnosis, and treated with fludarabine, high dose cytarabine, idarubicin, and gemtuzumab with concurrent filgrastim, resulting in second complete remission. He subsequently underwent matched sibling donor allogeneic stem cell transplant 12 months from initial diagnosis, but relapsed two months later. Subsequent treatment included: clofarabine and high dose cytarabine; decitabine; and cladribine, high dose cytarabine, and imatinib, as well as serial donor lymphocyte infusions, without achieving remission. He expired from progressive disease 19 months from initial diagnosis.

#### UPN 758168

A previously healthy 25 year old Caucasian female presented with fatigue, nausea, vomiting, and decreased visual acuity in her left eye. A CBC demonstrated WBC 3,500 cells/mcl, hemoglobin 5.9 g/dl, platelets 24,000 cells/mcl, with circulating promyelocytes. Diffuse intravascular coagulation (DIC) was present (INR of 3.2 and fibrinogen 88 mg/dl). A bone marrow biopsy demonstrated hypercellularity, with 93% promyelocytes (MPX +, NSE -, CD13/33+), consistent with a diagnosis of AML M3. Cytogenetics showed a t(15;17) translocation. Ophthalmologic evaluation demonstrated retinal hemorrhage, detachment, and acute glaucoma, resulting in

irreversible loss of vision and eventual enucleation. Initial therapy consisted of 7 + 3 induction with infusional cytarabine, idarubicin, and concurrent ATRA, complicated by headaches attributed to pseudotumor cerebri (CSF negative for malignancy). A bone marrow biopsy following marrow recovery documented first complete remission. Following induction, additional ATRA was withheld because it was presumed to be the cause of her pseudotumor cerebri. Post-remission therapy consisted of 3 cycles of “anthracycline” administered by the referring oncologist, followed by planned arsenic trioxide maintenance (prematurely aborted due to non-compliance). Relapse was documented 32 months from diagnosis, and was treated with arsenic trioxide, resulting in second complete remission. She subsequently underwent matched unrelated donor stem cell transplantation 4 months later, complicated by acute and chronic graft vs host disease and recurrent infection. She expired while in remission 50 months from initial diagnosis (14 months post transplant) from infectious complications of her transplant.

#### UPN 804168

A 53 year old Caucasian male with a history of hyperlipidemia, hypertension, and coronary artery disease (treated with stent), presented with a syncopal episode. A CBC demonstrated WBC 88,100 cells/mcl, hemoglobin 8.8 g/dl, platelets 30,000 cells/mcl, with 52% circulating blasts. A bone marrow biopsy demonstrated >90% cellularity, with 86% myeloblasts (MPX+, NSE -, CD13/33/117+), consistent with a diagnosis of AML M1. Cytogenetics showed a 46 XY karyotype. Initial therapy consisted of 7 + 3 + 3 induction with infusional cytarabine, daunorubicin, and etoposide. A mid-cycle bone marrow biopsy revealed ablation, and a subsequent biopsy following marrow recovery documented first complete remission. Post-remission therapy consisted of 2 cycles of high dose cytarabine. Relapse was documented 8 months from diagnosis, and was treated with mitoxantrone, etoposide, and high dose cytarabine with concurrent plerixafor, following which residual disease was documented (5-7% blasts). He subsequently underwent matched sibling donor allogeneic stem cell transplant following conditioning with single dose total body irradiation and high dose cyclophosphamide, but relapsed 1 month post transplant. Subsequent salvage therapy included decitabine, which yielded a third remission. He subsequently developed extramedullary relapse that was treated with radiation, and died of progressive disease 30 months from initial diagnosis.

#### **Illumina library construction and sequencing**

We followed the procedure described by Mardis *et al*<sup>1</sup> for library construction and sequencing. We used Illumina DNA sequencing to generate 98.6, 102.8, and 116.4 billion base pairs of sequence data for the skin, primary tumor, and relapse samples from UPN 933124, respectively, with corresponding haploid coverages of 26.2X, 28.1X, and 34.2X (Supplementary Table 1). Comparison of SNVs detected in the whole genome sequencing data with SNPs genotyped using arrays confirmed bi-allelic detection of 99.41%, 99.46%, and

99.62% of the heterozygous array SNPs in the skin, primary tumor, and relapse sequence datasets, respectively. Detailed coverages for all 8 AML cases are included in Supplementary Table 1.

### **Mutation detection pipeline**

We aligned all reads using BWA 0.5.5<sup>2</sup> by lane, merged all lanes and deduplicated using Picard 1.07 (<http://picard.sourceforge.net>) and then called variants using Samtools (svn rev 454)<sup>3</sup>. We detected somatic single nucleotide variants as described before<sup>4</sup>, but using a program that directly accesses a bam file called SomaticSniper (Larson *et al.* manuscript in revision). We defined high quality somatic predictions as those sites with a somatic score greater than 40 and an average mapping quality greater than 40. This is a slight modification of our previous categorization, which required a minimum average mapping quality of 70, since we had aligned our reads using BWA and BWA calculates its mapping qualities differently than MAQ.

Indels in all 8 primary tumors and the relapse tumor from UPN 933124 were called using a modified version of Samtools to identify indel mutations that were more likely to have occurred in the tumor than the normal. Since we knew that the skin sample used as the matched normal for this experiment contained tumor cells, we implemented the following scheme to identify putative somatic indels. Analogous to our approach for SNVs, we performed a comparison of the Samtools likelihoods of the indel in tumor and normal reads to generate a somatic score representing the Phred scaled probability that each indel is somatic. We then removed indels where any of the following conditions was true: the somatic score was 0, the Samtools tumor and normal consensus calls were the same, the Samtools call in normal was not wildtype, or the number of reads was greater than 100. Furthermore, for predictions of 1-2 base pairs in size, we performed a one-sided Fisher's Exact test on the read counts supporting the indel in tumor and normal to test if the indel occurred at a lower frequency in the normal. We removed 1-2 bp indels where this p-value was greater than 0.01. Finally, we removed predictions found to be contained or adjacent to runs of base quality 2 bases as these are set to indicate a failure in base calling during the Illumina Base Calling Pipeline and we found that many indel predictions arose solely from these reads.

Pindel<sup>5</sup> was used for calling tier 1 indels in 7 primary tumors except for UPN 933124. GATK<sup>6</sup> and Pindel were used for detecting indels in 7 relapse tumors except for UPN 933124.

Indels and SNVs were grouped into tiers based on genome annotation as described previously<sup>1,4</sup>. Calls falling on the Y chromosome were removed for female patients. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

### **Structural variant detection**



Structural variants (SVs) in all samples were predicted by BreakDancer<sup>7</sup> and SquareDancer (unpublished). Then, all predictions were assembled using TIGRA (Chen et al, in preparation). We followed the same procedure as described in Ding et al.<sup>4</sup> for selecting somatic SVs.

### **Capture array design**

In UPN 933124, we have selected 6,332 raw predictions, including 1,203 SNVs (496 passed filters) and 5,155 small indels from non-repetitive regions of the genome (tiers 1-3) and 154 SVs (including 16 predicted translocations) genome-wide for capture validation design. A large number of predicted low-confidence sites were included in this validation experiment to reach the optimal size of territories ( $\geq 1$ Mbp) required for the capture chip and ensure the sensitivity of our discovery. Nimblegen was able to successfully design capture oligos for 96% of targets.

We used custom sequence capture arrays from Roche Nimblegen to validate our mutations. We requested  $>200$ bp target regions centered on the variant of interest. For small insertions and for SNVs the targeted regions were exactly 200bp. For small indels, we requested regions beginning 100bp upstream of the beginning of the prediction and 100bp downstream of the end of the predicted deletion and thus these regions were slightly longer.

For structural variants, we requested probes tiled across the predicted breakpoint and buffered on 100bp of each side of the, possibly ambiguous, predicted breakpoint. Thus, for insertions a single region is requested, but for translocations, deletions, inversions etc, we requested two regions, one for each breakpoint. Since BreakDancer reports regions of ambiguity around the breakpoints, we buffered 100bp upstream and downstream of these regions and requested probes for the entire region. Rather than limit the probes to strictly unique sequences, we requested that Roche Nimblegen include probes that matched up to five other places in the genome as well as the unique probes during probe design.

The same strategy was used for capture validation design and analysis for the 7 other AML cases.

### **Tumor content estimation**

As a result of validation of predicted mutations via solid phase capture, we obtained read counts with deep coverage ( $>30$  reads) of valid somatic mutations in the tumor and relapse samples. To estimate the sample purity and clonality, we used the proportion of reads supporting the variant allele for each mutation and performed clustering on this value in the tumor and normal to estimate the tumor content. We first removed sites on sex chromosomes and then defined clusters using the DBSCAN (Ester, Kriegel, Sander and Xu, 1996), a density-based algorithm for discovering clusters in large spatial databases with noise. DBSCAN

functions by defining a maximum distance between points that a point can have to belong to a cluster and a minimum number of points to define a cluster. Clusters are then defined recursively, beginning with random seeds. For our clustering, we used the default settings of 2 for maximum distance and 5 for minimum number of points. This yielded reasonable results with manual review, though it does not take into account the differences in depth between each data point. To calculate the frequency of each sample, we took the median of the variant allele frequency of each point in the cluster, and assuming that these represent heterozygous mutations, we multiplied the resulting number by two to generate an estimated purity. We repeated this calculation for the variant allele frequency in the normal for these clusters to obtain an estimate of the normal sample purity as well. Utilizing the mutant allele frequencies of mutations from two major clusters, we estimated the malignant cellular content of the AML samples (UPN 933124) at 29.46% for the skin, 93.7% for the primary tumor sample and 84.5% for the relapse sample. These numbers are very consistent with the kernel density analysis which estimated 29.4%, 93.6%, and 84.2% tumor contents for the skin, primary tumor, and relapse samples, respectively (See below “Kernel density analysis for identifying clusters and estimating allele frequencies for each cluster” section), as well as the bone marrow morphology, which revealed 100% myeloblasts in the primary sample, and 78% myeloblasts in the relapse sample. In this study, we performed deep resequencing for tier 1-3 mutations in the tumor, relapse, and matched skin samples of AML1 using three approaches: 1) solid phase capture followed by Illumina sequencing; 2) PCR amplification of mutations followed by 454 sequencing; and 3) PCR amplification of mutations followed by Illumina sequencing. We not only obtained high concordance across three experiments, but also obtained high depth of coverage for each site. We are much more confident about the 29% tumor content estimation than we were with the original estimate of 5-13% tumor contamination of skin reported in our initial report<sup>8</sup>, since it is based on deep reads from three experiments and a much larger number of mutation sites. Only solid phase capture followed by Illumina sequencing was used for all 8 cases and we have obtained an average of combined coverage of 1,946 reads for the skin, primary tumor, and relapse samples across all cases.

### **Solid phase capture validation for mutation predictions in the skin, primary tumor, and relapse tumor samples**

Whole genome amplified (WGA) DNA samples (3ug) were constructed into Illumina libraries according to the manufacturer’s protocol (Illumina Inc, San Diego, CA) with the following modifications: 1) DNA was fragmented using Covaris S2 DNA Sonicator (Covaris, Inc. Woburn, MA). Fragment sizes ranged between 100 and 500bp. 2) Illumina adapter-ligated DNA was amplified in a single 50µl PCR for five cycles. 3) Solid Phase Reversible Immobilization (SPRI) bead cleanup was used to purify the PCR and select for 300-500bp fragments.

One microgram of the size-fractionated Illumina library was hybridized to the probe set synthesized on the Nimblegen HD2 array according to the manufacturer’s protocol (Nimblegen, Madison, WI). After the 72 hour,

42 °C hybridization, the array was removed from the hybridization station, washed, and the capture library fragments were PCR amplified according to the manufacturer's protocol with the exception: we used 16 cycles in the PCR as opposed the stated 20.

Illumina library quantification was completed using the KAPA SYBR FAST qPCR Kit (KAPA Biosystems, Woburn, MA). The qPCR result was used to determine the quantity of library necessary to produce 180,000 clusters on a single lane of the Illumina GAIIx. One lane of 100bp Paired-End data was generated for each captured sample. Specific details are below.

### Paired-end library preparation

Genomic DNA (50 ng) was sent to QIAGEN for whole genome amplification (QIAGEN, Germantown, MD). Whole genome amplified (WGA) DNA samples (3 µg) were suspended in 1X DNATerminator® End Repair Buffer (Lucigen Corp., Madison, WI) and fragmented in MicroTube (6x16mm), AFA Fiber with Snap-Cap tubes (Covaris™) using the Covaris S2 DNA Sonicator (Covaris, Inc. Woburn, MA). Fragmentation conditions were in 50 µl reaction volumes and performed at 4°C. The S2 parameters were set to the frequency sweeping mode using two successive, 60 second, acoustic treatments of: 1) duty cycle=20%, intensity=5, cycle/bursts=500. The DNA fragments were end repaired by directly adding 2 µL of the DNATerminator® End Repair Enzyme cocktail (Lucigen Corp. Madison, WI) to the MicroTube and incubating at room temperature for 30 minutes. The end-repair reactions were purified using Solid Phase Reversible Immobilization (SPRI) by adding 90 µL (1.8X sample volume) of AMPureXP beads (Agencourt Bioscience, Beverly, MA) to the end-repair reaction. The bead milieu was incubated for 5 minutes at room temperature, allowing the DNA to bind to the beads. The beads were then immobilized against a magnetic particle collector (MPC; Invitrogen, Carlsbad, CA), washed twice with 500 µl of 70% ethanol, and air dried for 5 minutes. DNA fragments were released by adding 32 µl of 10 mM Tris-HCl (pH 8.0).

End-repaired DNA fragments were tailed with 0.2 mM deoxyadenosine triphosphate in the presence of 15U Klenow exo<sup>-</sup> (New England Biolabs, Worcester, MA) at 37° for 30 minutes. Each 50 µL reaction was mixed with 90 µl AMPureXP beads, as described above (Agencourt Bioscience, Beverly, MA). DNA was eluted in 20 µL of 10 mM Tris-HCl (pH 8.0). Illumina adapters were ligated to A-tailed DNA fragments per the manufacturers protocol (Illumina Inc, San Diego, CA) in the presence of 1X Quick Ligase Buffer and 10,000U Quick Ligase (New England Biolabs, Worcester, MA) at 25° C for 15 minutes. Small fragments less than 100 base pairs and unligated adapters were removed from the mix by AMPureXP bead purification (as reported above). The adapter-ligated DNA samples were eluted in 20 µL of 10 mM Tris-HCl (pH 8.0).

### Illumina library amplification

A PCR amplification master mix was prepared using 160 nM of the Illumina paired-end oligonucleotides 1.0 (PE1.0: 5'-AATGATACGGCGACCACCGAGATCTACACTCTTTCCCTACACGACGCTCTTCCGATCT) and 2.0 (PE2.0: 5'-CAAGCAGAAGACGGCATAACGAGATCGGTCTCGGCATTCCTGCTGAACCGCTCTTCCGATCT) in 1X Phusion™ High Fidelity PCR Master Mix with HF Buffer (New England Biolabs, Beverly, MA). Four reactions per sample were prepared using 5 µl of adapter-ligated DNA in 45 µl of PCR amplification master mix and PCR amplified with an initial thermal denaturing step of 98° C for 30 seconds followed by 5 rounds of amplification: 98° C, 15 seconds, 60° C, 30 seconds, and 72° C, 30 seconds. After PCR amplification, we enriched for DNA fragments in the 300-500 bp range using two SPRI isolation procedures. Firstly, to remove DNA fragments > 500bp, we added 0.6X volumes (30 µl) of AmpureXP beads and incubated for 5 minutes at room temperature allowing the DNA to bind to the beads. The beads were then immobilized, and the PCR supernatant was aspirated and transferred to the second sizing solution.

A second sizing solution was used to remove DNA fragments less than 300 bp. We aliquoted 60 µL AmpureXP beads into a new 1.7 ml microfuge tube, incubated the bead solutions on the MPC for 3 minutes, aspirated and discarded the supernatant. To the bound beads, we mixed an additional 0.2X volume of AmpureXP beads to the existing beads on the MPC, creating the second sizing solution.

After incubating the PCR supernatant with second sizing solution for 5 minutes, the SPRI beads were bound using the MPC, the supernatant aspirated and discarded leaving magnetic particles coated with 300-500 bp DNA fragments. The beads were washed twice with 500 µL of 70% ethanol, allowed to air dry and eluted in 20 µL of Nuclease-Free Water (Ambion, Austin, TX). The sample was then quantified on the NanoDrop (NanoDrop Products, Wilmington, DE).

### Solid phase capture

300 µl (1µg/µl) of C<sub>0</sub>t-1 DNA (Invitrogen, Carlsbad, CA) was mixed with 1µg of the PCR amplified Illumina library and completely desiccated in a SpeedVac set on 60°C for 1 hour. The sample was then hydrated with 9.2 µl of Nuclease-Free Water (Ambion, Austin, TX) and incubated at 70°C for 10 minutes. Following incubation, 18.5 µl of 2X Hybridization Buffer, 7.3 µl of Hybridization Component A (Nimblegen, Madison, WI), and 1 µl of 1mM PE1.0 and 1mM PE2.0 were added to the sample. The mixture was then denatured at 95°C for 10 minutes and incubated at 42°C until ready for loading.

The Nimblegen HD2 array (Nimblegen, Madison, WI), was prepared by placing the array face-up in the Precision Mixer Alignment Tool (PMAT) (Nimblegen, Madison, WI). A Nimblegen HX1 mixer was snapped into place on the top of the PMAT with the adhesive gasket removed. The PMAT was closed, concomitantly aligning the HX1 mixer onto the HD2 array. The array was placed into a Nimblegen Hybridization System 4 (Nimblegen, Madison, WI), and using a Microman 100 Pipette with CP100 tips (Gilson, Middleton, WI), 37 µl of

hybridization solution was loaded into the fill port. After loading, exposed sample at the fill and vent ports was removed with a clean tissue. The two ports were then closed with port seals (Nimblegen, Madison, WI). The hybridization bay clamp was then closed, the Mixing Panel was set on mix mode B, and library was hybridized to the array for 72 hours at 42°C.

After hybridization, the array-mixer was disassembled in a reservoir containing 100 ml of pre-heated Nimblegen Wash Buffer 2 (47°C) followed by subsequent washes to minimize non-specific carry-over. These washes included: 1) 32 ml of Nimblegen Wash Buffer 2 pre-heated to 47°C, inverting the wash tube 10 times at a rate of 1 inversion per second, 2) Two consecutive washes with 32 ml of Nimblegen Stringent Wash Buffer pre-heated to 47°C, inverting 10 times at a rate of 1 inversion per second and incubating at 47°C for 5 minutes, 3) 32 ml of Nimblegen Wash Buffer 1 at room temperature, inverting for 2 minutes at a rate of 1 inversion per second, 4) 32 ml of Nimblegen Wash Buffer 2 at room temperature, inverting for 1 minute at a rate of 1 inversion per second, and 5) 32 ml of Nimblegen Wash Buffer 3 at room temperature, inverting the wash tube 10 times at a rate of 1 inversion per second.

The array was then placed in an Elution System (Nimblegen, Madison, WI), and covered with the EL1 Elution Chamber (Nimblegen, Madison, WI). Captured library fragments were released from the probe array by adding 900 µl of 0.125 N sodium hydroxide and incubating for 10 minutes at room temperature. The eluant was pipetted from the EL1 Elution Chamber, neutralized by splitting the material into two tubes (~450 µl) containing 16 µl of 20% acetic acid in 500 µl of Buffer PB (QIAGEN, Germantown, MD), and finally purified using MinElute columns (QIAGEN, Germantown, MD). Captured DNA was recovered from MinElute columns in 20 µl of 10 mM Tris-HCl (pH 8.0).

The captured fragments were amplified in the PCR consisting of 25 µl 2X Phusion HF Master Mix (Finnzymes, Woburn, MA), 20 µl captured DNA, 1 µl each 8 µM PE1.0 and PE2.0, and 3 µl of water. Amplification used the following parameters: initial denaturation, 98°C for 30 seconds followed by 16 cycles of denaturation at 98°C for 10 seconds, primer annealing at 60°C for 30 seconds, and extension at 72°C for 30 seconds. After a final elongation at 72°C for 2 minutes, the reactions were pooled and purified with 1.8X volume (360 µl) of AMPure XP beads, washed twice with 500 µl 70% ethanol, and air dried for 5 minutes. The capture libraries were released from the beads with 20 µl of 10 mM Tris-HCl (pH 8.0).

Illumina library quantification was completed using the KAPA SYBR FAST qPCR Kit (KAPA Biosystems, Woburn, MA). The qPCR consisted of 12 µl of KAPA SYBR FAST Master mix (KAPA Biosystems, Woburn, MA), 4 µl of Nuclease-Free Water (Ambion, Austin, TX), and 4 µl of captured library diluted 1:1000 with 10 mM Tris-HCl (pH 8.0). The qPCR result was used to determine the quantity of library necessary to produce ~180,000 clusters on a single lane of the Illumina GAIIx. One lane of 100bp Paired-End data was generated for each captured sample.

## **Analysis of solid phase capture validation data**

We generated 1 Illumina GAllx lane for the normal and 2 Illumina GAllx lanes for the primary tumor and relapse each. Illumina reads were mapped to the Hs36 reference sequence (BWA v0.5.5), merged into BAM files (SAMtools v0.1.9 r783), and marked for duplicates (Picard v1.17). Coverage of target sequences was assessed using RefCov software (T. Wylie et al, unpublished). With respect to the targeted 6,332 variations predicted in the whole genome sequencing data of the relapse, we have obtained greater than 20X coverage for 5,785, 5,598, and 5,512 sites in the skin, primary tumor, and relapse, respectively, and 5,474 sites common to all three samples (Supplementary Table 3).

## **Validation of point and dinucleotide mutations**

Single nucleotide and dinucleotide variants were identified, and their somatic status determined, by VarScan 2 (<http://varscan.sourceforge.net>) with the following parameters:

*-min-coverage 8*

*-min-var-freq 0.15*

*-normal-purity 0.75*

*-p-value 0.10*

*-somatic-p-value 0.01*

*-validation 1*

The provision of a normal purity less than 1 (in this case, 0.75) allows VarScan to adjust the observed allele frequencies based on an expected ~25% contamination of normal (skin) DNA by cancerous blood cells. By comparing the allele frequency and read count between tumor and normal, VarScan classifies each position as Reference (wildtype), Germline, Somatic, or LOH. Sites called Somatic are processed with an additional filter that removes false positives suggested by strand bias, read position bias, or poorly mapped reads. Potentially ambiguous sites were resolved by visualization and manual review.

## **Validation of indels**

*Small Indel Validation with Solid-Phase Capture Validation Data*

In order to validate putative somatic small (1-2 bp) indels in the capture dataset, GATK re-alignment was performed for each sample. Specifically, indels were called in the primary alignment BAM for the primary tumor by VarScan 2 using a relaxed set of parameters:

```
--min-coverage 4  
  
--min-var-freq 0.01  
  
--p-value 0.10
```

Putative indels meeting these criteria were converted to BED format and provided as the target intervals for the GATK IndelRealigner algorithm. BAM files for the primary tumor, relapse, and matched normal were re-aligned independently using this set of target intervals. Next, putative somatic and relapse-specific small indels were identified in pairwise comparisons of the re-aligned BAMs by VarScan 2 with the following parameters:

```
--min-coverage 8  
  
--min-var-freq 0.15  
  
--normal-purity 0.75  
  
--p-value 0.10  
  
--somatic-p-value 0.01  
  
--validation 1
```

To validate the original predictions, we developed a matching algorithm that attempts to match VarScan validation calls with the original indel predictions. Specifically, the algorithm searched for a validated indel of same type (insertion or deletion) and similar size (within 1 bp). To allow for differences in gapped alignments, the algorithm allowed matches at slightly different genomic positions, so long as the validated indel mapped within (indel\_size + 2) base pairs of the original prediction. Matched indels called “Somatic” in the primary tumor and/or relapse were manually reviewed in the re-aligned BAM files using IGV. Small indels that passed manual review underwent primer design for orthogonal validation by PCR and 3730/454 sequencing.

#### Medium Indel Validation with Solid-Phase Capture Validation Data

Validation of indels of at least 3 bp, but less than 100bp, in size proceeded by first assembling the capture data for each predicted indel, in each sample, using the TIGRA assembler (Chen et al unpublished) and followed our standard identification of a best contig containing a variant complete with identification of microhomology and variant sequence established for structural variants using Crossmatch (Green unpublished). We then sized the chosen contigs to 150 bp length by trimming excess sequence or padding from the reference sequence

and compared overlapping contigs using the dpAlign module of BioPerl ([http://www.bioperl.org/wiki/Main\\_Page](http://www.bioperl.org/wiki/Main_Page)) to generate an “Ends-free” alignment between the two pairs. If an alignment contained no gaps, had at least 98% identity and had a length of at least 95 bp then the leftmost contig on the reference was arbitrarily retained as the other contig was considered a duplicate. Contigs that remained after merging were concatenated as individual reference sequences to the NCBI build36 reference sequence and the reads mapped back to this expanded reference using BWA<sup>2</sup> and deduplicated using Picard (<http://sourceforge.net/apps/mediawiki/picard>). Once reads were mapped back to the expanded reference support for the reference and variant alleles was counted as the number of reads with mapping quality greater than 0 that completely spanned the range of valid locations for the placement of each variant or reference allele without any gaps in the alignment within the range. Sites with greater than 30 reads aligning to either the reference or the variant and a variant allele frequency difference of greater than 10% between any two samples were manually reviewed and selected for orthogonal validation via 3730 and 454.

#### Orthogonal Validation by 454 Sequencing

Selected primary-specific SNVs, small (1-2 bp) indels, and larger ( $\geq 3$  bp) indels in UPN 933124 were further validated by PCR and deep 454 sequencing. Roche/454 reads were aligned to the Hs36 reference sequence using SSAHA2 v2.5 with the parameters “-454 -best 1 -udiff 1 -output sam”. Read counts for SNVs and indels were determined in the SSAHA2 alignments by VarScan 2 as described above. Only bases with phred-scaled quality of 20 or higher from uniquely mapped, non-duplicate reads were used. To resolve indels  $>11$  bp, we aligned 454 reads to the Hs36 (hg18) reference sequence using BLAT v34, and determined read counts using VarScan. All validated 26 indels are included in Supplementary Table 5b.

#### **Validation of structural variants**

All BWA-aligned capture reads and their mates that map within 500 bp of the structural variant breakpoints were realigned by cross\_match (version 1.080721) to the assembled SV contigs and to the reference. The threshold for an acceptable alignment is  $\leq 1$  unaligned base at either end,  $\leq 1\%$  substitutions,  $\leq 1\%$  indels and a cross\_match score  $\geq 50$ . An SV-supporting read is required to span the breakpoint on the SV contig, covering an additional 10 bases on each side and cannot have an alignment to the reference that meets the minimum alignment criteria. We validated one somatic translocation  $t(10;12)(28864148;870062)$  in AML1 (UPN 933124) and a reciprocal translocation of  $t(15;17)(72113517,35756958)$  and  $t(15;17)(72113430,35756718)$  in AML15 (UPN 758168). The validated events listed in Supplementary Table 8 were predicted by breakdancer and have 10 or more SV-supporting reads in at least one of the tissues or have supporting cytogenetic evidence. In UPN 804168 cytogenetic analysis of seventeen of twenty relapse metaphases contained clonal aberrations including translocation between long arms of chromosome X and 6; and a four way translocation



involving chromosomes 1, 12, 17 and 3 that was evaluated by FISH. None of these clonal aberrations are known to be characteristic of any particular type of tumor. Chromosome analysis was performed at a level of 400 bands or greater.

### **Structural variant analysis**

We assembled two translocations in the 8 cases. One was a known reciprocal t(15;17) translocation, leading to an in-frame *PML-RARA* fusion, in both the primary tumor and relapse samples from UPN 758168 (Supplementary Table 8). The other was a previously unreported relapse-specific translocation, a t(10;12)(28864148;870062) in-frame fusion that involves the *WNK1* and *WAC* genes; it was present in all metaphases at relapse in UPN 933124 (Supplementary Fig. 5a and Supplementary Table 8). This translocation results in a 546 amino acid truncation of the *WNK1* protein, with the introduction of two novel amino acids at the C terminus (V1837fs\_GTX; NM\_018979) that are derived from *WAC* (Supplementary Fig. 5b). Using an extremely sensitive assay that could detect the *WNK1-WAC* fusion gene in as few as 4 cells from the relapse sample, we could not detect the fusion in the primary tumor sample from as many as 75,000 cells (Supplementary Fig. 6). This translocation was confirmed by FISH analysis, but it was not detected in 20 additional, randomly selected AML samples (Supplementary Fig. 7 and Supplementary Information). Both *WNK1* and *WAC* were highly expressed in most AML samples, and the fusion cDNA was detected by RT-PCR in the relapse sample (Supplementary Fig. 8, Supplementary Fig. 9, and Supplementary Table 9). To investigate the functional relevance of the *WNK1-WAC* fusion in relapse, we expressed the full length rat *WNK1* cDNA (kindly provided by Dr. R. Lifton) and its *WNK1-WAC* fusion counterpart in K562 cells. The overexpression of the full length wild-type *WNK1* protein caused significant growth inhibition of these cells. Similar overexpression of the *WNK1-WAC* fusion protein had no effect on K562 cell growth (Supplementary Fig. 10), suggesting the growth inhibition caused by *WNK1* was released by the *WNK1-WAC* fusion, which truncates the C terminus of *WNK1*.

UPN 804168 had normal cytogenetics in the primary tumor, but complex cytogenetics at relapse, with multiple translocations present in 17/20 metaphases. A translocation involving chromosomes X and 6 was detected in the whole genome analysis, and was consistent with the cytogenetic finding of t(X;6)(q22;q23) (Supplementary Information, Supplementary Table 2b, and Supplementary Table 8). However, a very complex rearrangement involving at least four chromosomes (1,12,17,3) suggested by cytogenetics and confirmed by FISH, was not clearly resolved and will require additional study to confirm its precise organization. None of these translocations involve recurrently translocated loci in AML samples, and their relevance for relapse pathogenesis is unknown.

### **Deep sequencing of validated mutations in the primary tumor, relapse, and matched normal samples**

Validated somatic point and dinucleotide mutations identified in UPN 933124 were selected for deep digital sequencing in the tumor, relapse, and matched normal samples. Mutations were amplified by PCR individually, pooled together on a per-sample basis. Sample pools were divided in half for deep digital sequencing on both the Roche/454 and Illumina (GAIIx) platforms. We also performed 3730 sequencing and 454 sequencing of candidate validated indels and primary tumor specific mutations to obtain allele frequency and finalize their somatic status.

### **Analysis of deep sequencing data**

Roche/454 reads were aligned to the Hs36 reference sequence using SSAHA2 v2.5 with the parameters “-454 -best 1 -udiff 1 -output sam”. Illumina reads were aligned to the Hs36 reference sequence using BWA v0.5.5 with soft trimming (-q 5). Following alignment, BAM and pileup files were generated for both platforms using SAMtools v0.1.9 (r783). Illumina BAM files were further analyzed with Picard v.1.17 to remove duplicates.

For both Roche/454 and Illumina/GAIIx datasets, read counts for SNVs were determined by VarScan 2. Only bases with phred-scaled quality of 20 or higher from uniquely mapped, non-duplicate reads were used. For indels, we aligned 454 reads to the human build36 (hg18) reference sequence using BLAT v34, and determined read counts using VarScan.

### **Cross-platform allele frequency analysis**

To calculate the cross-platform SNV allele frequency correlation coefficients, we limited the dataset to the 305 SNVs in UPN 933124 that were not removed by the homopolymer filter. Then, we concatenated the allele frequencies into a single column per platform (i.e. 454-normal, 454-tumor, 454-relapse). That provides three columns (454, Illumina/PCR, and Illumina-Capture) each with 915 data points. Then, we calculated the Pearson correlation coefficient for the data points where both platforms provided a frequency (Supplementary Figure 1).

The correlation coefficients were as follows:

PLATFORM1	PLATFORM2	CORRELATION
PCR/454	PCR/Illumina	0.9825126
PCR/454	Capture/Illumina	0.9581463

PCR/Illumina	Capture/Illumina	0.970673
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### Tier 1 relapse-specific mutations in UPN 933124

Among the three tier 1 relapse-specific mutations (Supplementary Table 4b), we detected an *ETV6* mutation (R105P), residing in the N-terminal pointed (PNT) domain that is involved in protein-protein interactions. A missense mutation (A2317T) was identified in the *MYO18B* in the relapse genome. Reduced expression of *MYO18B* has been implicated in ovarian cancer<sup>9</sup> and in addition, mutations in *MYO18B* have been associated with lung cancer<sup>10</sup>. The third tier 1 mutation is an eleven base pair insertion (A461fs GARGLSEKPHGK\*) in *STK4*, a cytoplasmic kinase that is structurally similar to the yeast Ste20p kinase. The latter acts upstream of the stress-induced mitogen-activated protein kinase cascade<sup>11</sup>. This mutation was only found in a rare transcript (ENST00000372801). We screened all coding exons of *STK4* and did not detect any additional mutation in 94 AML samples (Data not shown). In addition, mutations in *ETV6*, *STK4*, and *MYO18B* identified in the relapse genome in this study were not detected in 21 additional AML relapse genomes.

### Novel recurring Tier 1 mutations (found in 8 cases) using 200 AML cases whose exomes were sequenced as part of the TCGA AML project

Mutations in two novel genes, *SMC3* and *DAXX* (both involved in chromatin remodeling) were discovered in this study. *SMC3* encodes a component of the cohesin complex, responsible for sister chromatid segregation<sup>12</sup>. UPN 933124 harbors a missense mutation (G662C) in *SMC3*; a total of 6 *SMC3* mutations were found in 200 AML cases, including one nonsense and one splice site mutation. Two missense mutations, including a R371W mutation in UPN 869586, were found in *DAXX*, a death-domain-associated protein. *DAXX* encodes an H3.3 histone chaperone; it co-localizes and cooperates with ATRX (a centromeric heterochromatin component) in replication-independent chromatin assembly at telomeres<sup>13</sup>.

*DIS3* and *DDX41* are both involved in RNA processing. *DIS3* encodes a conserved RNA exonuclease, which is part of the exosome complex<sup>14</sup>. A missense *DIS3* (D488N) mutation<sup>14</sup> was found in UPN 758168, and two missense mutations (M667V and R514K) were found in other AML samples. *DIS3* mutations were recently reported in multiple myeloma<sup>15</sup>. *DDX41* is a putative ATP-dependent RNA helicase, probably involved in pre-mRNA splicing. We identified a splice site (e11+1) mutation in *DDX41* in UPN 426980 (Table 2, Supplementary Table 4b, and Supplementary Fig. 3).

One of the 13 relapse-specific tier 1 mutations was in *ETV6* (R105P), a gene frequently involved in translocations in AML cells, and which also can be mutated or deleted<sup>16,17</sup>; the R105P mutation in UPN 933124

falls in the N-terminal pointed (PNT) domain and is caused by a G->C transversion. An R105Q mutation previously reported in a primary AML case was caused by a G->A transition<sup>17</sup>. The mutant *ETV6* allele was detected in the relapse of UPN 933124, but neither in the primary tumor, nor in any of the 6 remission bone marrow DNA samples collected at successive times after disease presentation (Supplementary Fig. 4 and Supplementary Table 7). Four other relapse-specific missense mutations were found to be recurrently mutated in other AML samples (*MYO18B*, *DAGLA*, *GBP4*, and *DCLK1*; Table 2, Supplementary Table 4b, and Supplementary Fig. 3).

### **Constructing mutation clusters in UPN 933124**

To cluster the frequency data, we used the Mclust algorithm (<http://www.stat.washington.edu/mclust/>; Fraley and Raftery, 2002 and Fraley and Raftery 2006). Mclust uses a normal mixture model combined with Bayesian Information Criteria (BIC) to identify the optimal number of clusters and model of variance and mean. We applied an iterative clustering approach on all (386) point and dinucleotide mutations using the default parameters. This generated 3 clusters, one of which appeared to consist of outliers or small numbers of variants. We took this third cluster and used Mclust a second time to identify the small clusters within this cluster of outliers. The results of both clustering runs are reported in Supplementary Table 5a. More specifically, we identified five distinct mutation clusters, including two major clusters with 305 (cluster 1) and 63 (cluster 5) mutations each and three minor clusters with five (cluster 2), three (cluster 3), and three (cluster 4) mutations respectively (Figure 1 and Figure 2). We discarded 5 low-level mutations, residing in known copy number variable regions (Supplementary Table 5d), as well as considered 2 singletons as outliers. Based on the clustering result, we inferred four clones with distinct mutation compositions in the primary AML sample. Clone 1 contains cluster 1 mutations. Clones 2 and 3 are derived from clone 1 and acquired mutations from clusters 2 and 3, respectively. Subsequently, likely a single cell within clone 3 gained mutations in cluster 4 to form clone 4: the clone that survived chemotherapy regimen and moved forward to become the dominant clone in relapse. One tier 2 mutation in cluster 4 resides in ORegAnno (open regulatory annotation)<sup>18</sup> and regPotential7X (regulatory potential computed from 7 species alignment)<sup>19,20</sup>, provided by the UCSC Genome Browser, indicating a possible relevance to chemotherapy resistance.

### **Kernel density analysis for identifying clusters and estimating allele frequencies for each cluster in all 8 AML cases**

Tumor clonality estimates were determined using the mutation allele frequencies from deep readcount validation data. To minimize the effect of coverage on allele frequency estimations, only mutations with >100x coverage in the normal, tumor and relapse validation data were included in this analysis. Because genomic copy number can influence the observed allele frequency of a mutation, mutations were segregated according

to their segmented copy number states from cnvHMM (2, 3, or 4), and analyzed separately. For each copy number state in the normal, tumor, we draw a kernel density estimate (KDE) plot for tumor variant allele frequencies using the density function in R. A customized R function evaluated each KDE plot to determine the number of significant peaks at the diploid copy number (CN=2), which serves as an estimation of the number and relative composition of clones present in each tumor.

### **Analysis of relapse-specific mutations**

Mutations with variant allele frequency < 2% were classified as relapse-specific (Supplementary Figure 1b). Based on binomial distribution, we tested if the variant frequency of relapse-specific mutations from each sample is different from 1% error rate. One sample (UPN 426980) showed no significant difference from expected based 1% error rate, but the other 7 were non-randomly skewed towards 0% variant reads (p values all <4.89e-12).

AML1 (UPN 933124) p-value= 1.4821e-323  
AML15 (UPN 758168) p-value= 1.2014e-171  
AML27 (UPN 400220) p-value= 4.7412e-63  
AML28 (UPN 426980) p-value= 0.26108  
AML31 (UPN 452198) p-value= 4.8943e-12  
AML35 (UPN 573988) p-value= 9.432e-28  
AML40 (UPN 804168) p-value= 2.0802e-149  
AML43 (UPN 869586) p-value= 6.0977e-18

To define relapse-specific mutations, we identified all validated mutations in the relapse samples, and compared the variant allele frequencies to the primary AML sample from the same individual. We defined mutations as relapse-specific if the variant allele frequency was <2% in the primary sample, based on established error frequency estimates of Illumina sequencing<sup>21,22</sup> (Supplementary Figure 1b and Supplementary Table 4a). However, we explored the actual readcounts for the relapse-specific mutations in all 8 primary tumor samples to see whether the variant reads were distributed randomly below 2%, or whether they were significantly skewed within the 0-2% range. For the 472 relapse-specific mutations, we obtained a median of ~600x coverage (and a mean of ~2,500x coverage because of extra coverage for UPN 933124) in the primary AML samples. A total of 1,195,650 reads were evaluable; of these, only 1,601 (0.13%) were variant in the primary AML samples. Moreover, when we evaluated the variant allele frequency for each of the 472 mutations independently, 45% (213/472) had no variant reads at all in the primary tumor samples (see Supplementary Figure 1b). Seven of the 8 samples were non-randomly skewed towards 0% variant reads (P values all <4.89E-12), but one was not (UPN 426980). Although some variant reads are clustered just above 0% in several samples (suggesting that very rare cells in the primary AML samples may contain these

mutations), these data strongly suggest that cells containing many of the mutations classified as relapse-specific were truly absent in the primary tumor sample, but arose later in the course of the disease.

### **Effects of high tumor content in skin sample on mutation detection**

Two patients (UPNs: 573988 and 452198) had only 7 and 11 tier 1 mutations, respectively. The small number of detected mutations in these two patients is probably due to the high tumor content in the skin samples (28.2% for UPN 573988 and 40.8% for UPN 452198) and low tumor content in the relapse samples (28.6% for UPN 573988 and 36% for UPN 452198), which both reduce variant detection sensitivity (Supplementary Table 4b and Supplementary Table 6). Skin samples were frequently found to have significant tumor contamination if the peripheral white blood cell count was >30,000 ul at the time of banking, a problem that has subsequently been rectified by banking skin in first remission.

### **Stable and transient expression of WNK1 and WNK1/WAC in K562 cells**

K562 cells were cultured to a density of  $1 \times 10^6$  cells/mL and nucleofected (Lonza, Kit V, Program T-16) with 2 (stable) or 5 (transient) ug of empty MSCV, MSCV-WNK1 or MSCV-WNK1-WAC plasmids, all containing an IRES-GFP cassette. Rat WNK1 cDNA in the pcDNA3.1 (-) vector was kindly provided by Dr. Richard Lifton. Full length WNK1 was cloned out of the vector by PCR with primers to insert a Kozak sequence (Forward 5' GAATTCGCCGCCACCATGTCTGACGGCACCGCAGAGAAGCAGAGC 3'; Reverse 5' CTCGAGGCCTAAGCGTAATCTGGAACATCATATGGGTAGGTG 3'). To create the WNK1-WAC fusion, the 8 bp of WAC sequence were added to the reverse primer (Forward – same as above, Reverse 5' GCCTCGAGGCTTAAGTGCCACCCTTCTGAGGTTCACTTCCTGCTTCTGTAAGT 3'). After sequencing, both PCR products were cloned as EcoR1/Xho1 fragments into an MSCV IRES-GFP vector (empty vector control shown as 'IRES GFP' in Supplementary Fig. 6).

### **Screening for recurrently mutated genes in additional AML tumors**

We screened the coding exons for *WNK1* and *WAC* genes in 187 AML tumors to identify additional mutations. Matched normals were sequenced to determine somatic status. We have also detected a *WNK4* mutation (R669W) in an M7 AML case (UPN 509754) with an event free survival of 70 months. We found three additional somatic mutations in *WAC*, including a 5 bp frameshift insertion (GGGCA, p.E88fs, UPN 869586, a patient who relapsed after 7.7 months, and expired at 19 months with progressive disease) and two splice site mutations (e12+1, UPN 321258, an M3 AML patient who is alive and in remission at >64 months, and e10-2, UPN 301733, a patient with M2 AML who relapsed at 13.7 months, and died of progressive disease at 19.3

months). Although the function of *WAC* is unknown, the translocation, insertion, and point mutations all have translational consequences for this gene, suggesting its relevance for AML pathogenesis.

### In silico screening for recurrently mutated genes using 200 AML tumors

To determine if genes with mutations from the 8 AML cases identified in this study are recurrently mutated in AML, we compared our results to the mutations found in TCGA AML project (T.J. Ley, R.K. Wilson, and the Cancer Genome Atlas working group on AML, unpublished) and also an in-house M1 and M3 AML genome project (J.S. Welch, T.J. Ley, unpublished). Mutations without validation status are required to have 20X coverage in both normal and tumor samples to be included in the analysis (Table 2, Supplementary Table 4b, and Supplementary Fig. 3)

### Mutation expression by 454 cDNA sequencing

Primers were used for evaluating the expression of mutations in *MYO18B*, *ETV6*, *STK4*, and *DNMT3A* are below.

Gene	Name	Sequence	Genomic position (hg18)
MYO18B	tvi.t/MYO18B_24752889_f1	CTCTCCCCATTTACCAGACG	chr22:24752770-24752789
MYO18B	tvi.t/MYO18B_24752889_r1	CGACTTTTCGGGGAGTAGG	chr22:24752953 -24752972
ETV6	ETV6_11883491_F20	TGTAGCATTAAGCAGGAACGAA	chr12:11694350-11694361,chr12:11796651-11796660
ETV6	ETV6_11883491_R20	TCATGGTTCTGATGCAGTATGA	chr12:11897736-11897757
STK4	tvi.t/STK4_43115216_F_TV	GATCAACAGCTTTGGCAAGAGT	chr20:43087101-43087122
STK4	tvi.t/STK4_43115216_R_TV	GGAGAGACGACAGAGCAGAAGT	chr20:43137314-43137335
DNMT3A	DNMT3A_25317018_F20	GTCTCTCTTTGATGGAATCGCT	chr2:25320275-25320296
DNMT3A	DNMT3A_25317018_R20	CACTTCTTTGGCATCAATCATC	chr2:25315556-25315577

Full cDNA sequences were generated based on the Hs36 reference sequence and gene structure information obtained from the UCSC Genome Browser Database (refGene.txt). Roche/454 reads were mapped to cDNA sequences using SSAHA2 v2.5.3 with the parameters: -454 -best 1-udiff 1 -output sam. BAM and pileup files were generated using SAMtools v0.1.9 (r783). Read counts and allele frequencies for each mutation were determined by VarScan 2.

RT-PCR of tumor and relapse samples was performed separately using MID-tailed primers, and then pooled for a one-quarter (1/4) run of 454 sequencing. Some 350,626 reads were generated, with an average read length of 305 bp. In-house algorithms were used to assign reads to tumor or relapse based on the MID primer sequences. Of these, 177,463 reads (50.61%) and 172,289 reads (49.14%) were assigned to tumor and relapse, respectively. The remaining 874 reads (0.25%) had missing or incomplete MID sequences and were discarded.

To assess expression of SNVs, reads were aligned to the Hs36 (hg18) reference sequence using BWA-SW<sup>2</sup>. BAM and pileup files were generated using SAMtools. Read counts for each allele were determined using VarScan 2. Only bases with phred-scaled quality of 20 or higher from uniquely mapped 454 reads were used.

To avoid alignment bias while assessing indel expression, reads were aligned to the Hs36 (hg18) reference sequence using BLAT v34. Indels were detected in the BLAT alignments and read counts generated using VarScan. For sites where no indel was present, reference-supporting reads were determined from the Q>20 read depth of BWA-SW alignment BAM files. Expression of tier 1 mutations is included in Supplementary Table 4b.

We performed RT-PCR amplification of the target regions using RNAs from the primary tumor and relapse from UPN 933124 and sequenced the products using the Roche 454 (Supplementary Table 4b). Mutant allele expressions for all three mutations (*ETV6*, *MYO18B*, and *STK4*) in the primary tumor are below the error rate, consistent with their absence in the primary tumor genome. In the relapse tumor, we detected 28.6% (800/2797) and 66.6% (317/476) of mutant allele expression in *ETV6* and *STK4*, respectively, while no expression of the *MYO18B* mutation was detected (Table 1). The latter observation is consistent with *MYO18B*'s predicted tumor suppressor functionality. As expected, the expression of the *DNMT3A* mutant allele was detected in both the primary tumor (38.9%) and relapse (29.8%).

### **WNK1-WAC RT-PCR**

Transcript specific primer pairs to validate the *WNK1/WAC* fusion were designed using Primer-BLAST (<http://www.ncbi.nlm.nih.gov/tools/primer-blast/>). The BLAST results are used to rank primer pairs to help avoid pairs that may produce amplification products other than the intended target. Parameters for design included limiting the design space to ensure that no primer aligned closer than 75 base pairs to any of the intended targets and all spanned at least one intron. Primers were designed specific to *WNK1*, *WAC*, and the proposed *WNK1/WAC* fusion.

PCR reactions were assembled with the Amplitaq Gold PCR Master Mix (Applied Biosystems). The manufacturer's protocol (see below for cycling parameters) was followed for the KAPA kit using 2µL of the cDNA product. The Amplitaq protocol combined 2µL of the cDNA product with 1µL of 1.2 µM gene-specific primers, 1.6µL 50% Glycerol, and 5µL of Amplitaq Gold PCR Master Mix (Applied Biosystems). The reactions



were then centrifuged to ensure all reaction components were collected at the bottom of the well and cycled with the corresponding parameters:

Amplitaq Parameters:

- Step 1: 96.0°C for 5 minutes
- Step 2: 94.0°C for 30 seconds
- 60.0°C for 45 seconds
- 72.0°C for 45 seconds
- Repeat Step 2 for 39 additional cycles
- Step 3: 72.0°C for 10 min.
- Step 4: 4.0°C Hold

The resulting PCR products were imaged on 1.5% Agarose gel with Ethidium Bromide. The primer sequences used are below. Both primer sets produced products validating the fusion.

Name	Sequence	Genomic position (hg18)
WAC/WNK1_F8 (set 1)	GGAGTGAAACCTGGAAGTGC	chr12:865461-865480
WAC_R2 (set 1)	CTGCAGAATCATAAGGTGCAT	chr10:28918671-28918687,chr10:28912436-28912440
WNK1_F1 (set 2)	AACAGTTGCTTTGCCAGTTACA	chr12:865388-865409
WAC_R1 (set 2)	GAGCAAACACTACTGGCATCACTG	chr10:28924684-28924705

The 3730 trace data for the fusion product are shown in Supplementary Figure 9.

### Detecting the *WNK1-WAC* fusion using interphase and metaphase FISH

FISH experiments were done to confirm a rearrangement in the *WNK1* gene (chr12: 732486-890879) in UPN 933124 using standard techniques. The RP11-60J20 (chr12: 620933-775520) and RP11-359B12 (chr12: 858584-1084640) BAC clones were obtained from Empire Genomics in the form of DNA. 500 ng of RP11-60J20 DNA was labeled with Spectrum Green dUTP and 500 ng of RP11-359B12 was labeled with Spectrum Orange by nick translation (Vysis), following the manufacturer's instructions. The two BAC clones were then mixed together in equal proportions resulting in a break-apart probe mixture. A normal signal pattern would show a yellow signal where a rearrangement would display two separate signals, one green, one orange.

Slides were analyzed using a fluorescence microscope, and images recorded using Cytovision software. Quantitative FISH analysis was used to confirm a normal signal pattern (2 yellow signals) versus a *WNK1* gene rearrangement (1 yellow/1 green/1 red signal) (Supplementary Figure 7). This procedure was carried out for 100 interphase cells and 20 metaphase cells in each probe experiment.

### **Deep sequencing of mutations in FFPE samples from UPN 933124**

Selected mutations were selected for deep resequencing in the time course experiment. Individual PCR amplifications with MID-tailed primers were performed so that samples could be pooled for sequencing on the Roche/454 platform. In-house algorithms were used to assign reads to each sample based on the MID primer sequences. Read counts were generated as described above (see Analysis of deep resequencing data). The results are included in Supplementary Table 7.

### **Time course analysis using FFPE samples from UPN 933124**

To determine when the relapse-specific mutations first appeared during the course of the disease in UPN 933124, we quantified the variant alleles using deep digital sequencing for 3 relapse-specific coding mutations (in *ETV6*, *MYO18B*, and *STK4*), and a subset of mutations found in both the *de novo* and relapse genomes (including mutations in *DNMT3A*, *NPM1*, *FLT3*, and *PTPRT*) using 7 bone marrow DNA samples collected at different time points after presentation: day 0 (*de novo* tumor, initial diagnosis), day 43 (1<sup>st</sup> remission), day 121 (continued 1<sup>st</sup> remission), day 170 (30 days post auto transplant), day 338 (1<sup>st</sup> relapse, the sample that underwent whole genome sequencing), day 422 (2<sup>nd</sup> remission, day 30 post allogeneic stem cell transplantation), and day 501 (continued 2<sup>nd</sup> remission). None of the mutations could be detected in any of the remission samples. Most importantly, none of the relapse-specific mutations were detected before the 1<sup>st</sup> relapse. Since deep digital sequencing has a sensitivity of about 1 in 50 cells (because of the inherent error rates of the 454 and Illumina platforms), these data do not allow us to conclude whether the relapse-specific mutations were present in rare cells in the *de novo* sample, or whether they were acquired during disease progression (Supplementary Fig. 4 and Supplementary Table 7). We therefore evaluated the timing of the *WNK1-WAC* fusion appearance, using PCR linked to Southern blotting to increase sensitivity and specificity (Supplementary Fig. 6). We were able to reproducibly detect the *WNK1-WAC* fusion DNA from 4 cell equivalents of the relapse DNA sample. We did not detect any signal using 1000 ng of the genomic DNA from the *de novo* tumor (which represents more than 150,000 cell equivalents of DNA). These data suggest that fewer than 4 cells in 150,000 (1/37,500) contain the *WNK1-WAC* fusion in the *de novo* tumor. These data support the idea that the translocation was not present in the *de novo* AML cells, but occurred later. One or more of the relapse-specific mutations presumably conferred a critical growth advantage, since a single dominant clone was present at relapse.

## High sensitivity qPCR-Southern blot analysis of the *WNK1-WAC* fusion

Genomic and WGA DNA were quantified by Quanti-iT dsDNA HS and Qubit (Invitrogen, Eugene, OR) and analyzed by qPCR using QuantiTect SYBR-Green (Qiagen, Valencia, CA) and 7300 Real Time PCR (Applied Biosystems, Foster City, CA) per manufacturer specifications. The following primers were used: *WNK1* primer 4 caatcacagaagcaggaacaca, *WAC* primer 2 atctataaaccaccttgacac, *WNK1* primer 3 tactaccaatgctcctcagttat, *WNK1* primer 6 tgtgttctgctctgtgattg, *WNK1* primer 7 aagaccataggaaaggcaacga. *WNK1* primer 4-*WAC* primer 2 were used to assess the *WNK1-WAC* fusion; *WNK1* primer 4-*WNK1* primer 3 and *WNK1* primer 6-*WNK1* primer 7 were used as controls to assess the quantity of genomic *WNK1* DNA. The annealing temperature was 59 degrees and we performed 40 cycles of PCR. PCR products were loaded into a 1% agarose gel. Following electrophoresis, the gel was washed with 0.5 M NaOH + 1.5 M NaCl and then with 0.5 M Tris pH 7.5 + 1.5 M NaCl and transferred to Hybond-XL (Amersham, GE Healthcare, Piscataway, NJ) in 20x SSC. DNA was fixed with a UV Stratalinker 2400 (Stratagene, La Jolla, CA). A sequence-validated probe was generated that spanned the *WNK1-WAC* fusion using two primers (cctaccgtagttgattcagg, atctataaaccaccttgacac), Random Primers DNA Labeling system (Invitrogen), and MicroSpin S-200 HR columns (GE Healthcare). Southern hybridization was performed with QuickHyb (Stratagene) and 12.5 x 10<sup>6</sup> probe cpm and visualized by x-ray radiography. Data analysis was performed using Applied Biosystems 7300 software, Excel (Microsoft, Seattle, WA) and GraphPad (Prism, La Jolla, CA).

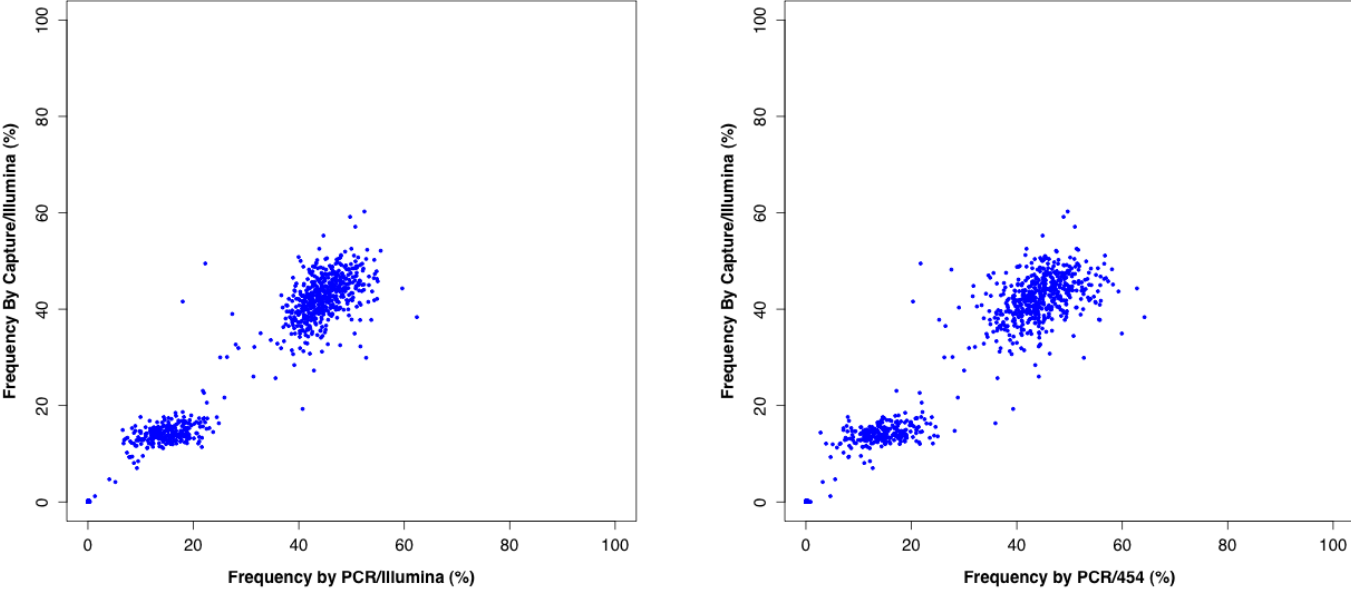
## Gene ontology analysis for nonsynonymous mutations in 8 cases

Gene set analyses were performed using the GO Enrichment tool of Gene Set Analysis Toolkit V2<sup>23</sup> (<http://bioinfo.vanderbilt.edu/webgestalt>). Gene-level GO analyses were performed using GeneCodis 2.0<sup>24</sup> (<http://genecodis.dacya.ucm.es>). We analyzed the mutations in all 8 genomes for recurring pathway mutations that could explain the relapse phenotype, but none was identified. Specifically, gene ontology (GO) analysis revealed no significant enrichment for mutations in drug transport or metabolism processes; however, gene-level analysis revealed that seven genes associated with “transmembrane transport” (GO: 0055085) contained mutations with translational consequences in five of the AML samples (**Supplementary Table 12**); six mutations were detected in both the primary and relapse samples, and one (*SLC25A12*, R603W) was relapse-specific. Three members of the *SLC* gene family contained mutations (*SLC25A12*, *SLA15A1*, and *SLC30A6*); importantly, biallelic mutations in a related family member, *SLC29A1*, have been implicated in cytarabine resistance in a human leukemia cell line<sup>25</sup>. None of these genes had non-synonymous mutations in 28 AML cases with long first remissions (>36 months), and only 6 of these 28 samples contained mutations in the *SLC*, ABC transporter, potassium channel, or GABA receptor gene families. Although the importance of these

mutations for chemotherapy resistance and/or relapse is impossible to assess in this small series, further evaluation of these genes is warranted as additional data becomes available.

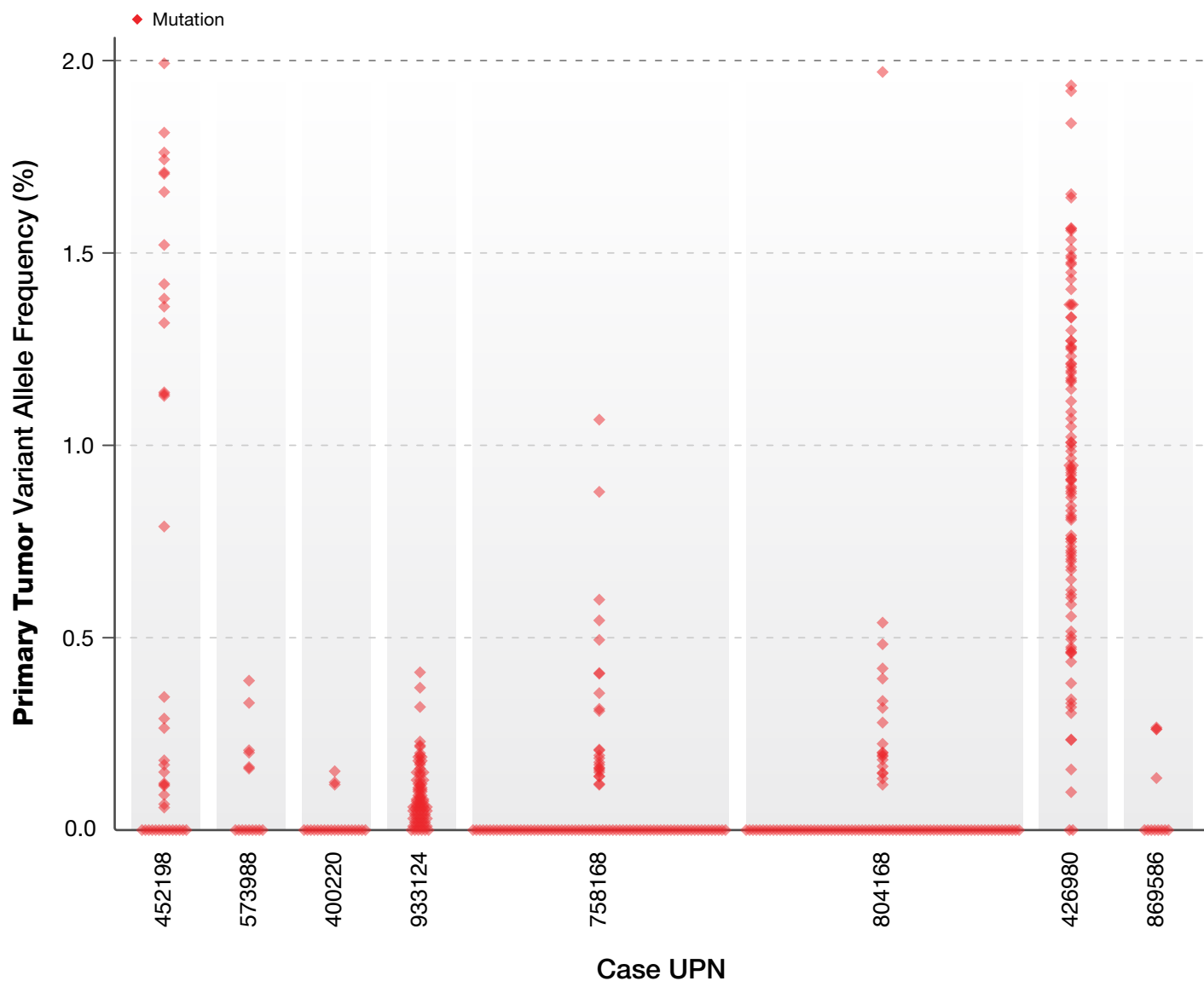
## **Supplementary Figures and Legends**

Supplementary Figure 1a



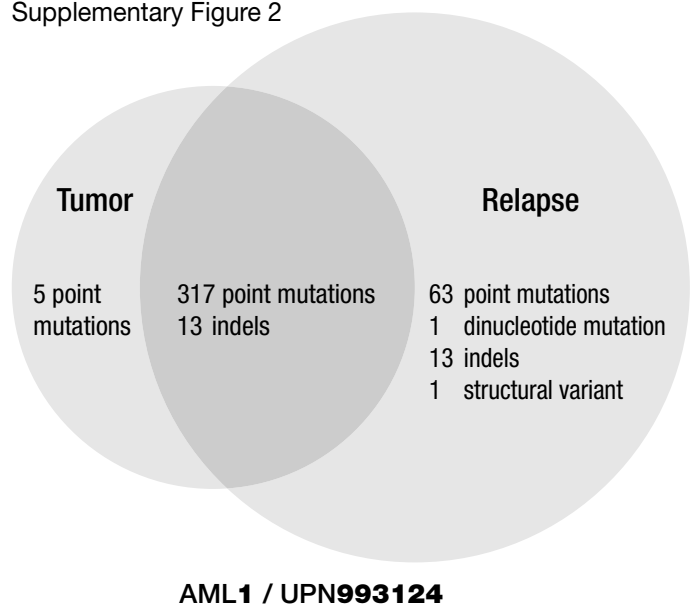
**Supplementary Figure 1a.** The resulting allele frequencies of mutations in the *de novo* tumor and relapse from PCR/Illumina (left) and PCR/454 (right) in comparison to the frequencies obtained from capture validation (capture/Illumina).

Supplementary Figure 1b



**Supplementary Figure 1b.** Mutations that occur at the same frequency are displayed next to one another, so that the width corresponds to the number of mutations measured. Although a handful of mutations approach the frequency cutoff of 2%, the vast majority of data points occur on or near the x-axis, indicating their near- or complete absence in the primary tumors.

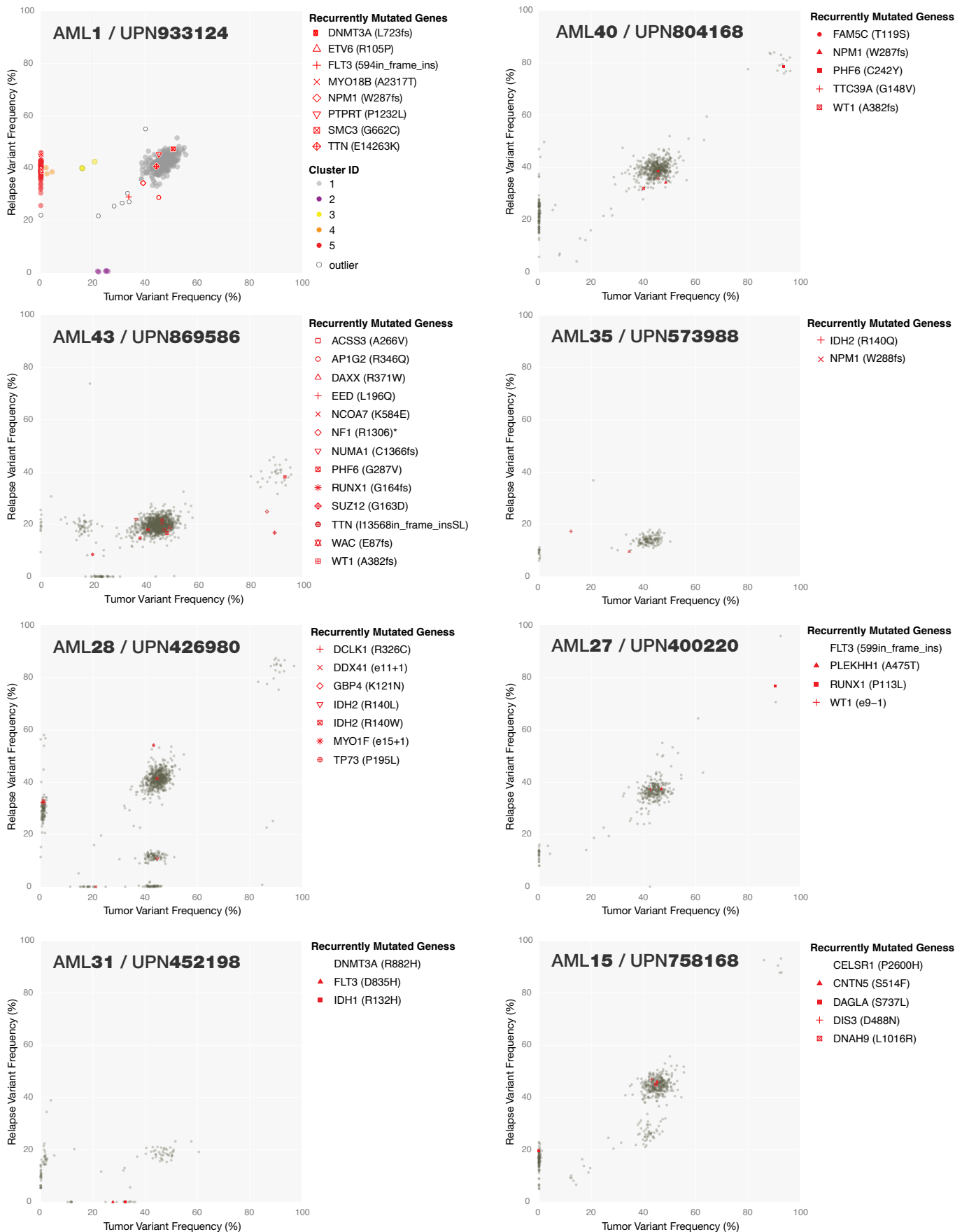
Supplementary Figure 2



**Supplementary Figure 2.** Venn diagram of mutations found in primary tumor and relapse.



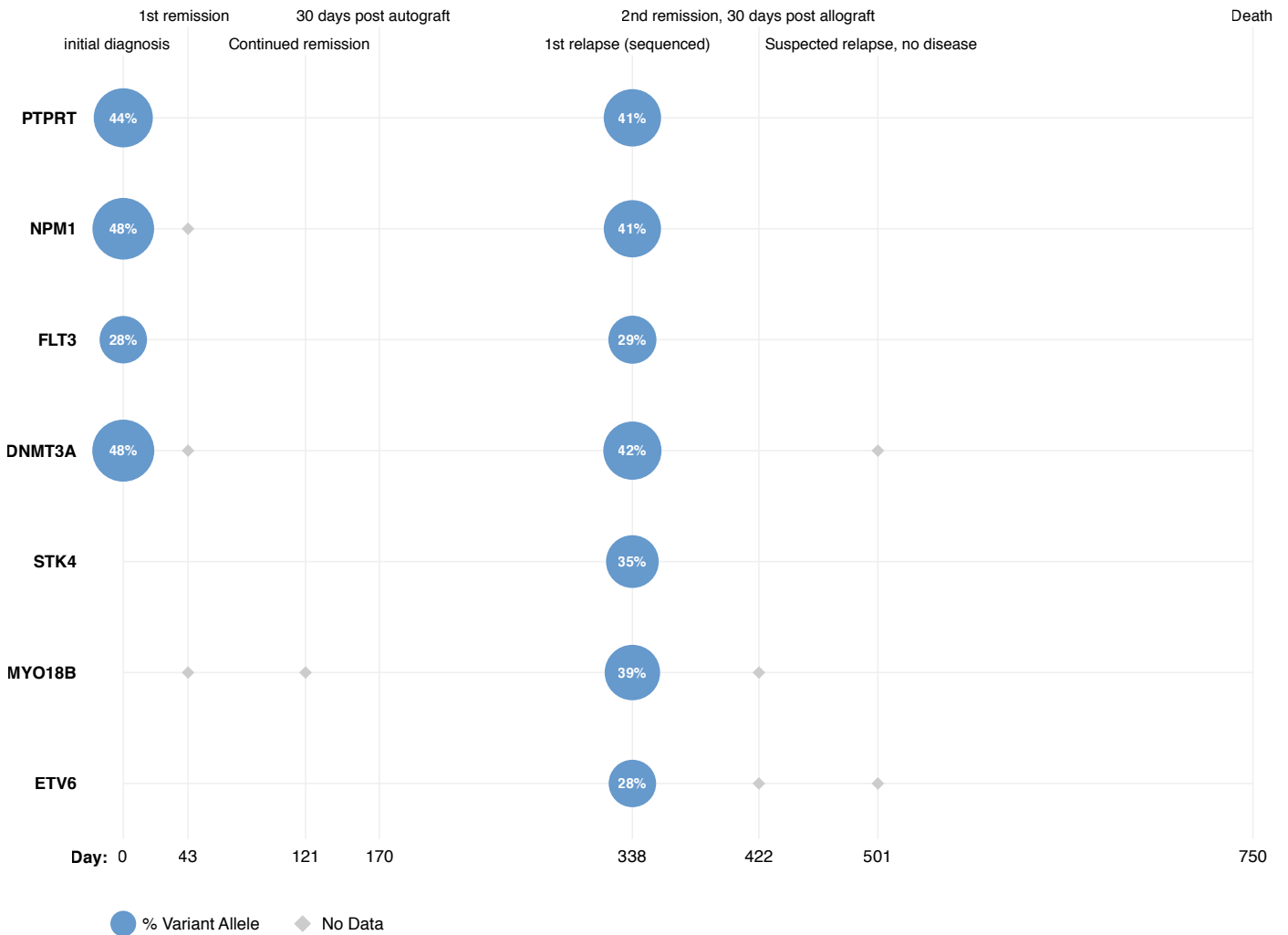
Supplementary Figure 3



**Supplementary Figure 3.** Clonality scatterplots with gene annotations for 8 primary tumor and relapse pairs. Nonsynonymous mutations from recurrently mutated genes are highlighted in red.

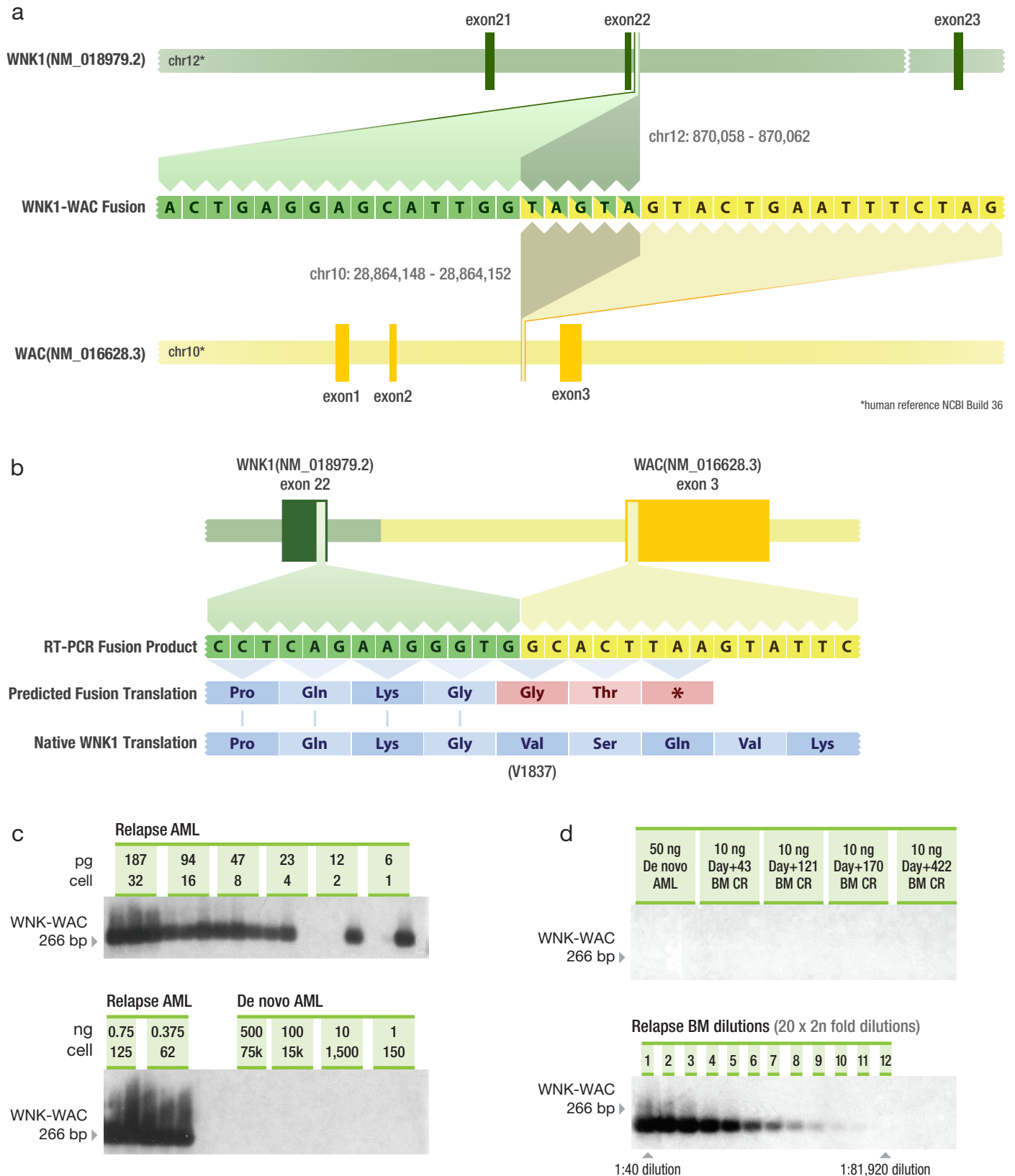
Supplementary Figure 4

AML1 / UPN933124



**Supplementary Figure 4.** Deep readcounts for key mutations in progressive samples from UPN 933124. Variant allele frequencies for disease-initiation mutations (*DNMT3A*, *NPM1*, *FLT3*, and *PTPRT*) and disease-progression mutations (*ETV6*, *MYO18B*, and *STK4*) were obtained by 454 sequencing of 7 bone marrow DNA samples collected during the course of disease progression. While some sites could not be amplified in intermediate time point samples due to limited FFPE DNAs, the average depth for sites that did amplify was very high (~8,500x). Only sites achieving 10x coverage or greater in a given sample are shown.

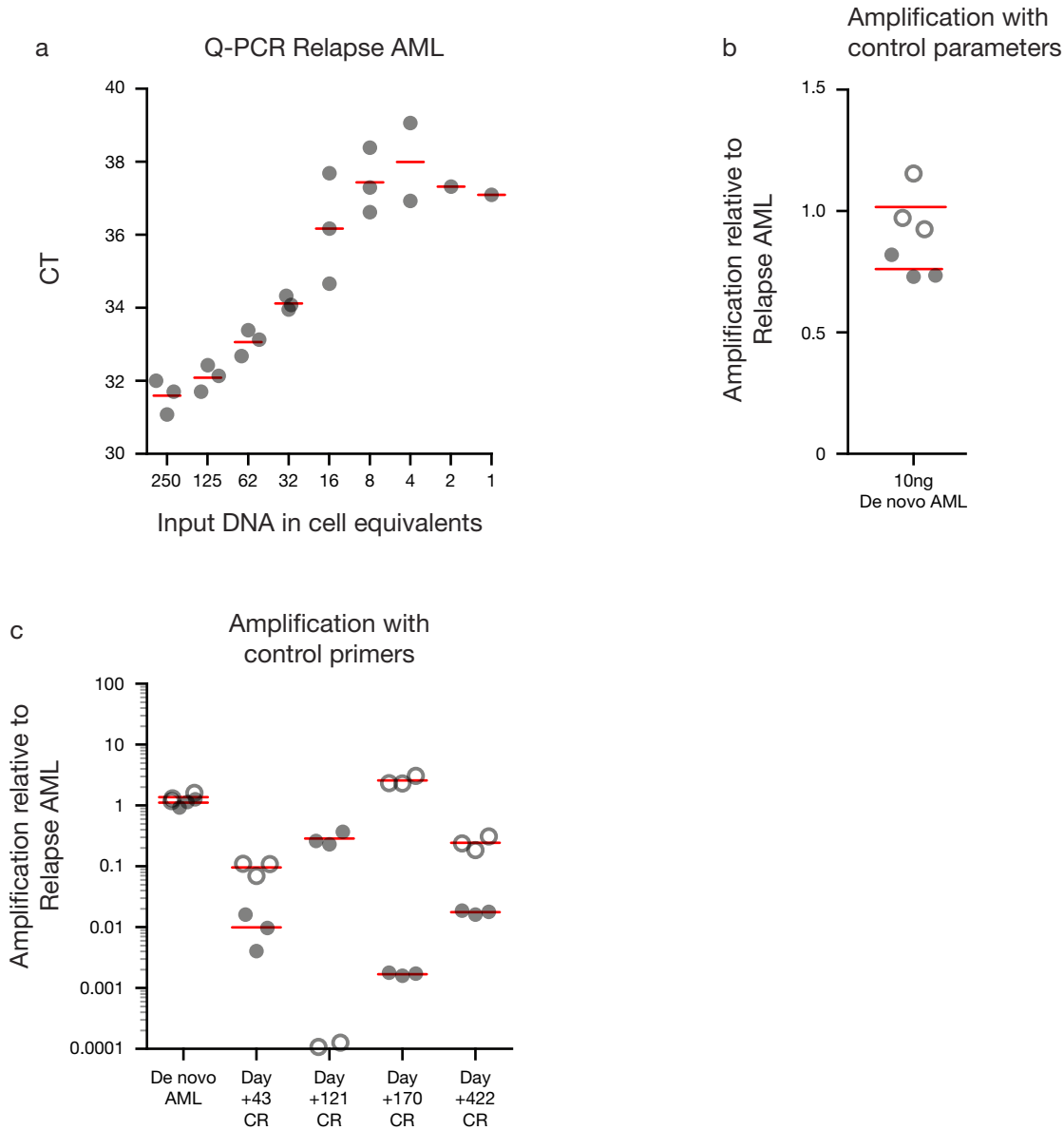
Supplementary Figure 5



**Supplementary Figure 5. Relapse-specific t(10;12)(28864148;870062) translocation involving WNK1 and WAC genes in UPN 933124.** a) A graph of gene structures flanking Chromosome 10 (chr10: 28,864,148 - 28,864,152) and Chromosome 12 (chr12: 870,058 - 870,062) breakpoints in *WAC* and *WNK1* genes. The 5 base pairs (TAGTA) of microhomology at the breakpoints are highlighted in yellow and green mosaic squares. b) This translocation results in a 546 amino acid truncation of the *WNK1* protein with the introduction of two novel amino acids (Gly and Thr) at the

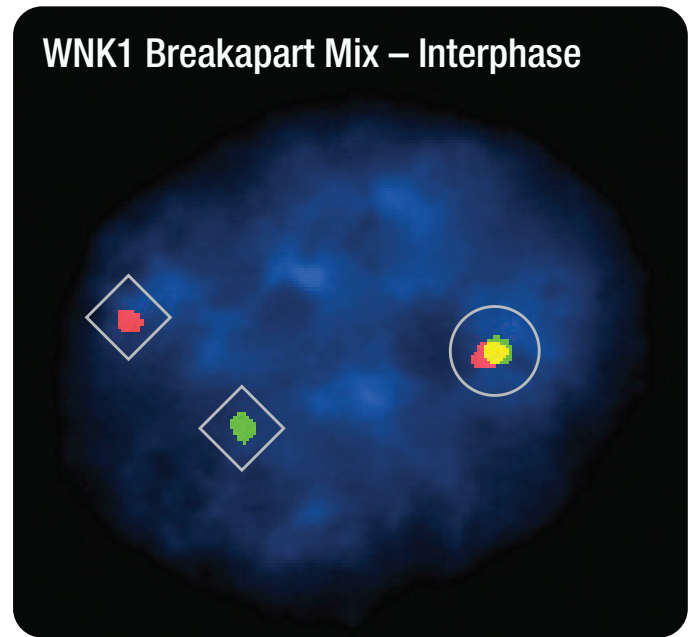
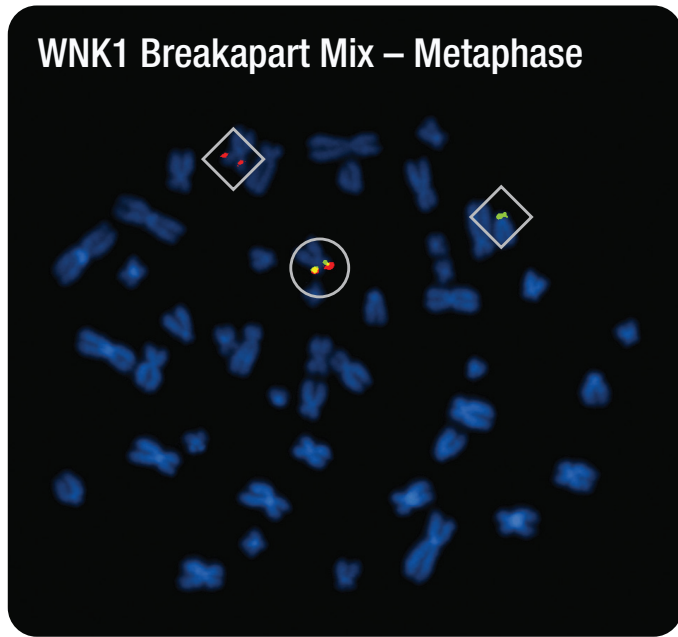
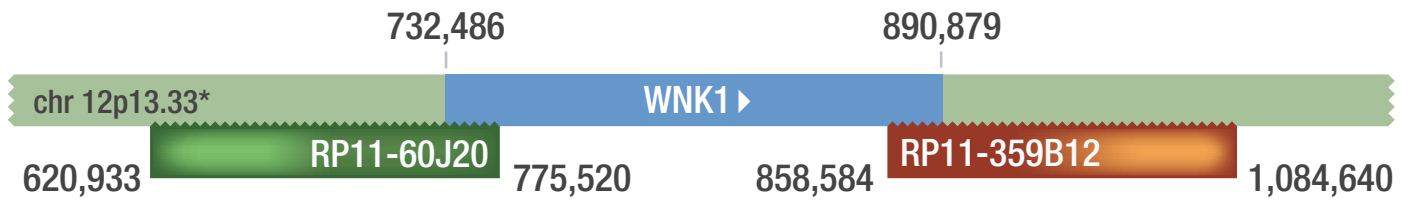
c-terminus of *WNK1*. No reciprocal translocation was identified by paired end reads. c) QPCR of the *WNK1-WAC* junctional fusion followed by Southern blot analysis. PCR amplification (40 cycles) was followed by *WNK1-WAC* verification by Southern blotting. Three independent serial dilutions of 1.5 ng of relapse AML WGA DNA and indicated concentrations of *de novo* AML genomic DNA. The two panels represent separate areas of the same Southern blot exposed for the same amount of time. Ct values for each PCR reaction and amplification of each sample using control primers are presented in Supplementary Figure 6. d) PCR amplification (40 cycles) with 1.5 ng relapse AML WGA DNA, 50 ng *de novo* AML WGA DNA, or 10 ng WGA DNA obtained from DNA extracted from bone marrow biopsy FFPE samples (during routine monitoring in complete remission prior to relapse) followed by Southern blotting. Amplifications were done in triplicate. Similar results were obtained with three independent WGA preparations from each FFPE sample. The two panels represent separate areas of the same Southern blot. Amplification results from these samples with control primers is presented in Supplemental Figure 6.

Supplementary Figure 6



**Supplementary Figure 6.** qPCR of the *WNK1-WAC* junctional fusion followed by Southern blot analysis. a). Ct observed during qPCR of relapse AML WGA DNA from Figure 5c assessed by Sybr Green. b). Relative amplification of *de novo* AML genomic DNA compared with relapse AML WGA DNA using two control primer pairs in *WNK1*. PCR reactions used identical concentrations of DNA and were run concurrently with those shown in Supplementary Figure 5c. c). Relative amplification of DNA samples in Figure 5b compared with relapsed AML WGA DNA using two control primer pairs in *WNK1*. PCR reactions used identical concentrations of DNA and were run concurrently with those shown in Figure 5d. The Day +510 sample did not amplify with either primer pair and was removed from the PCR/Southern analysis.

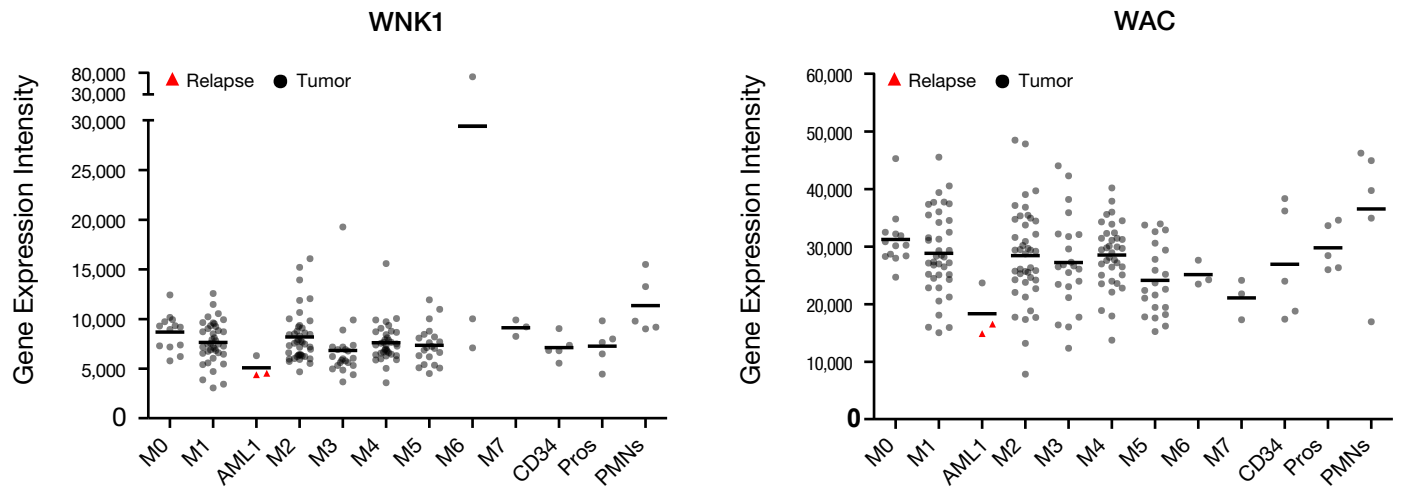
Supplementary Figure 7



\*human reference NCBI Build 36

**Supplementary Figure 7.** Metaphase FISH images using a *WNK1* break-apart probe mix (Supplementary Information). RP11-60J20 was labeled green and RP11-359B12 was labeled red, both of which hybridize to the short arm of chromosome 12. These metaphase and interphase images display a break in the *WNK1* gene, indicative of rearrangement of *WNK1*.

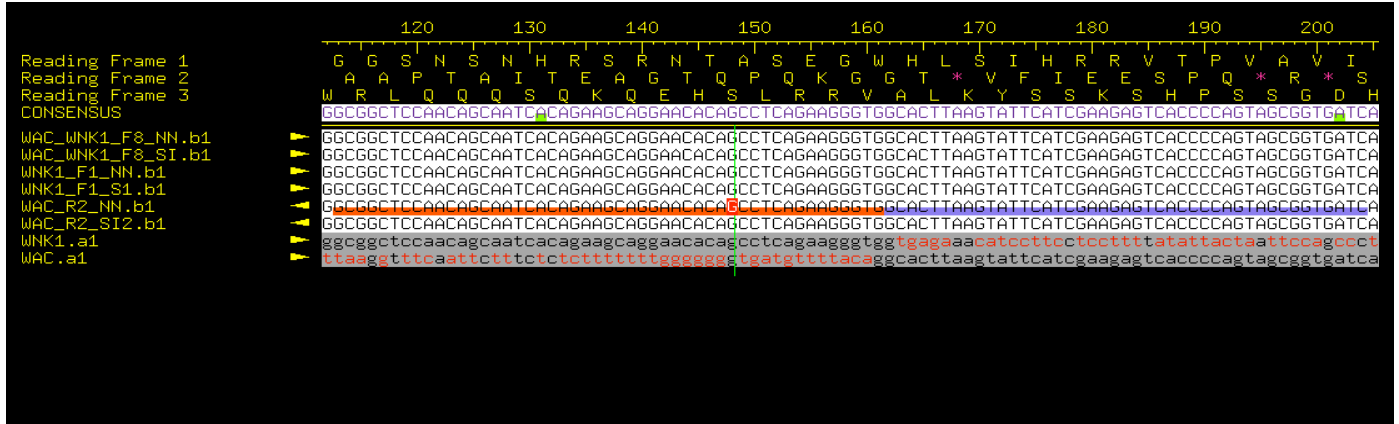
Supplementary Figure 8



**Supplementary Figure 8.** Expression levels of *WNK1* and *WAC* genes in the *de novo* tumor, relapse, and 180 additional AML cases from 8 FAB subtypes reported in Ley et al. NEJM December 16, 20109. The most representative *WNK1* and *WAC* probe sets from the U133 Plus 2 array were used for plotting. Data from the *de novo* tumor and relapse is plotted independently. The black dots are from the *de novo* tumor and the red ones are from the relapse sample, performed in duplicate.

Supplementary Figure 9

AML1 Relapse RT-PCR WNK1:WAC fusion sequence



Red highlighted sequence is chr12; Build36 genomic positions: 12 + 869892 - 869940  
 Purple highlight sequence is chr10; Build36 genomic positions: 10 + 28864497 - 28864530

Translation sequence included as Reading Frames 1-3

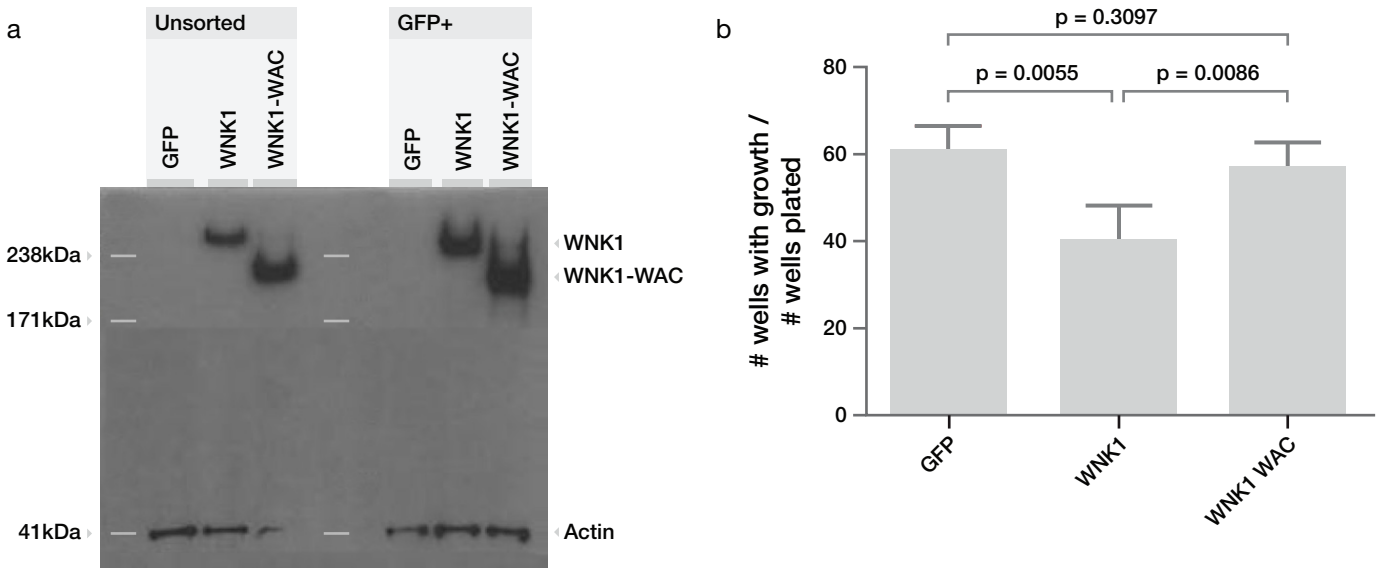
WNK1.a1 = reference sequence from chr12 (red bases designate beginnings of divergence from chr12)  
 WAC.a1 = reference sequence from chr10 (red bases designate beginnings of divergence from chr10)

p.V1837fs\_GTX GGC-ACT-TAA  
 Fusion resides after WNK1 Exon22 and introduces a stop codon in WAC Exon3.

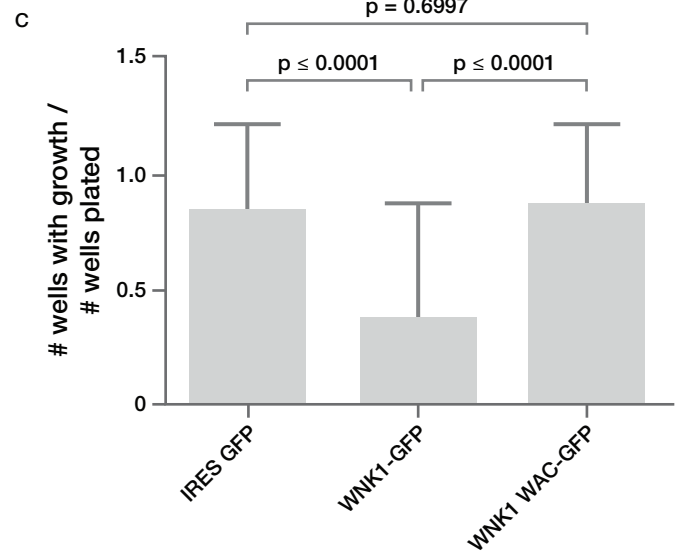
**Supplementary Figure 9.** Detection of the *WNK1-WAC* fusion gene in the relapse tumor sample. Transcript specific *WNK1* and *WAC* primer pairs were used to amplify and validate the *WNK1/WAC* fusion. RT-PCR products from relapse sample were sequenced using ABI 3730. The 3730 trace data is shown. Sequences from chromosome 12 were highlighted in red and sequences from chromosome 10 are highlighted in purple.



Supplementary Figure 10

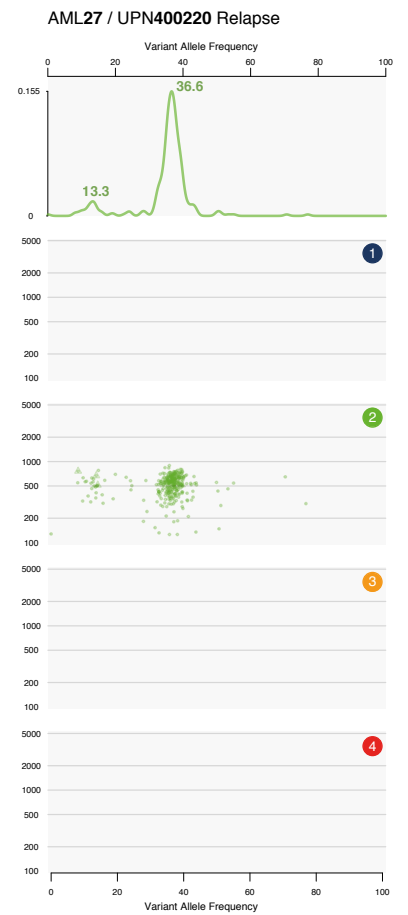
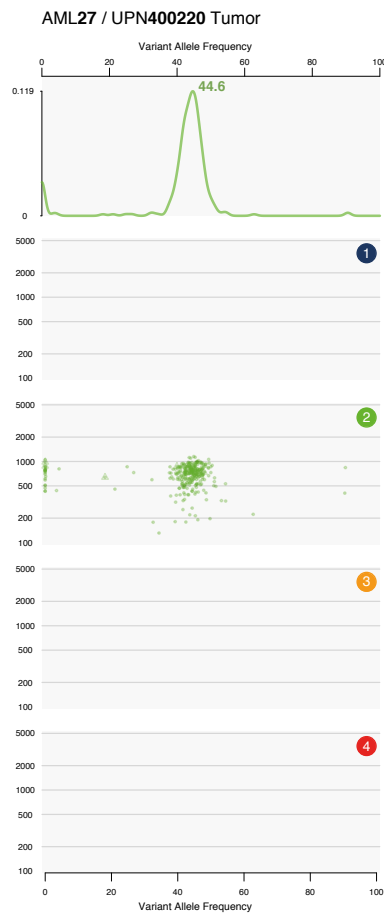
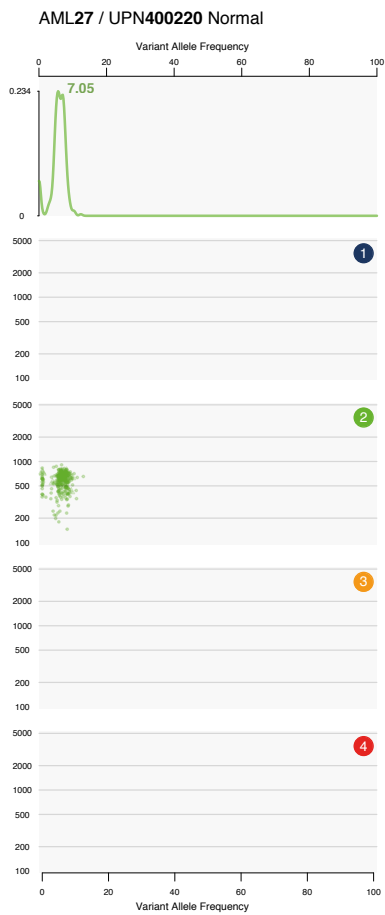
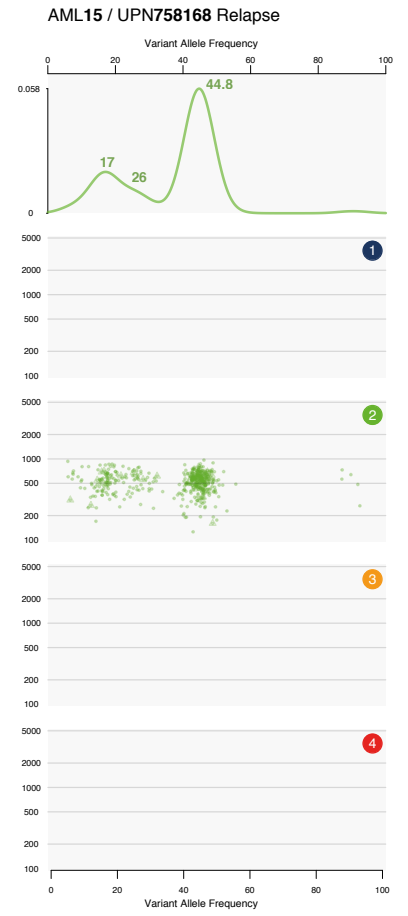
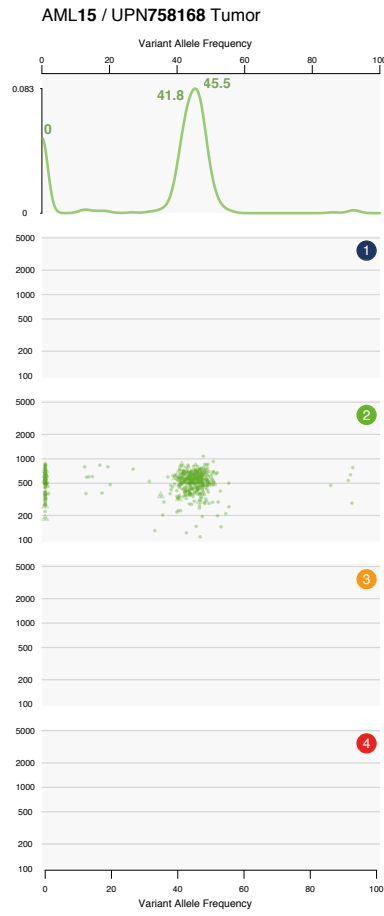
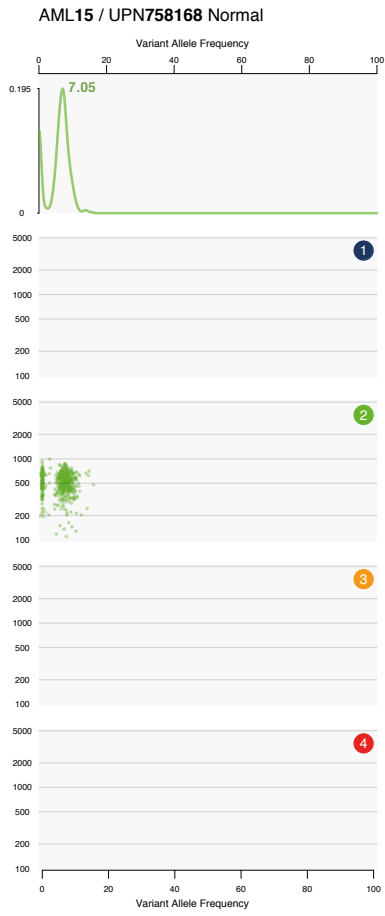


**Supplementary Figure 10.** Stable and transient expression of *WNK* and *WNK/WAC* in K562 cells. K562 cells were cultured to a density of  $1 \times 10^6$  cells/mL and nucleofected (Lonza, Kit V, Program T-16) with 2 (stable) or 5 (transient)  $\mu$ g of empty MSCV, MSCV-*WNK* or MSCV-*WNK wac* plasmids, all containing an IRES-GFP cassette. Rat *WNK1* cDNA in the pcDNA3.1 (-) vector was kindly provided by Richard Lifton. Full length *WNK1* was cloned out of the vector by PCR with primers to insert a Kozak sequence (Forward 5' GAATTCGCCGC-CACCATGTCTGACGGCACCAGAGAAAGCAGAGC 3'; Reverse 5' CTCGAGGCCTAAGCGTAATCTGGAA-CATCATATGGGTAGGTG 3'). To create the *WNK/WAC* fusion the 8 bp of *WAC* were added to the reverse primer (Forward – same as above, Reverse 5' GCCTCGAG-GCTTAAGTGCCACCCTTCTGAGGTTCACTTCT-GCTTCTGTAAGT 3'). After sequencing, both PCR products were cloned as EcoR1/Xho1 fragments into an MSCV IRES-GFP vector (empty vector control shown as 'IRES GFP' in the figure).

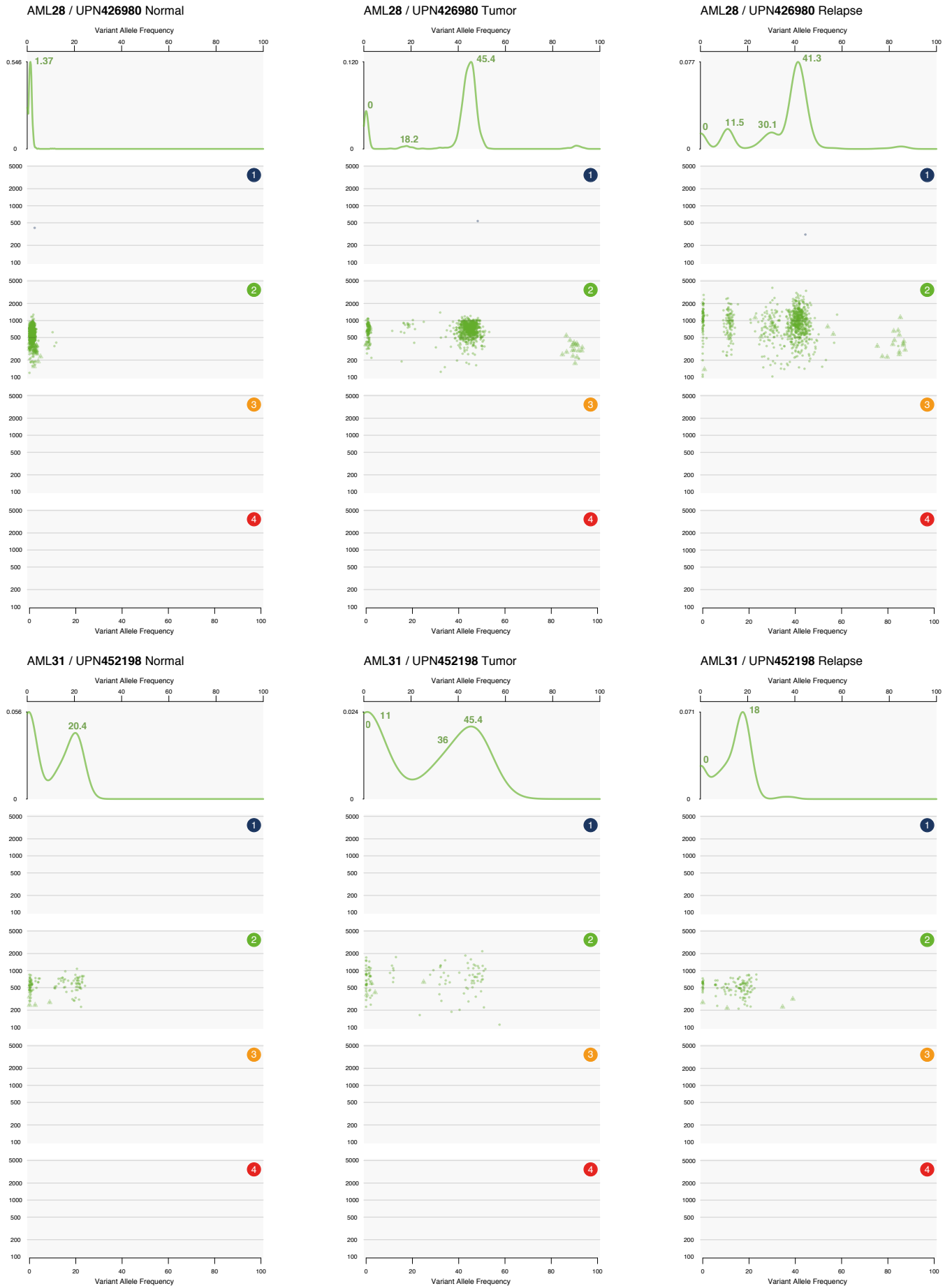


a) Western blot analysis of transiently transfected K562 cells. Cells were sorted (MoFlo) 48 hours post-transfection. "Unsorted" samples were sorted for live cells as high FSC vs. high SSC; "GFP +" cells were sorted by high FSC vs. high SSC and GFP positivity. Western blots were probed with anti-*WNK* primary antibody (1:200 dilution; R&D Systems, AF2849) and HRP-conjugated rabbit anti-goat IgG secondary antibody (1:10,000 dilution; Santa Cruz, sc2768). Anti-actin primary antibody (1:2,000 dilution; Millipore, mab1501) with HRP-conjugated rabbit anti-mouse IgG secondary antibody (1:10,000 dilution; GE NXA931) was used as a loading control. b) Cloning efficiency of transiently transfected cells. Cells were sorted as in a) for "GFP +" as single cells into at least 2 96-well plates. Cells were allowed to grow for 3 weeks and then wells were visually scored for wells containing viable cells. Data is from 2 independent transfections. P-values shown are based on two-tailed t tests. c) Cloning efficiency of stably transfected cells. Transfected cells were cultured for 2 weeks without selection then GFP positive cells from each construct were single cell sorted (MoFlo) into 3 96-well plates. Cells were allowed to grow for 2 weeks post-sort and visually scored for growth as in b).

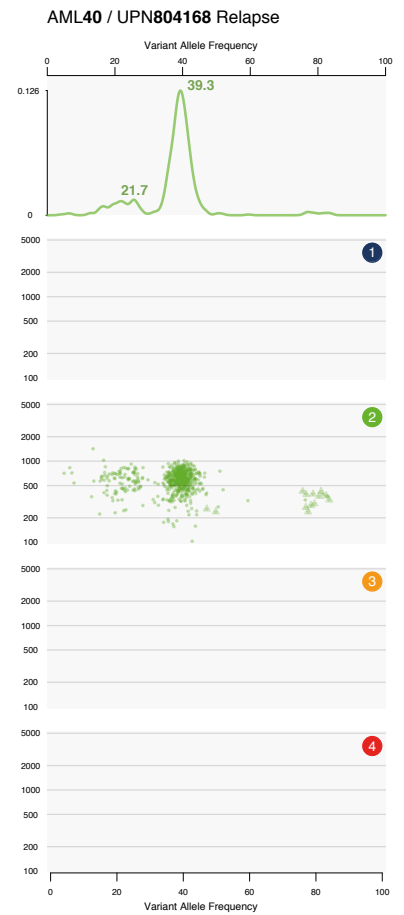
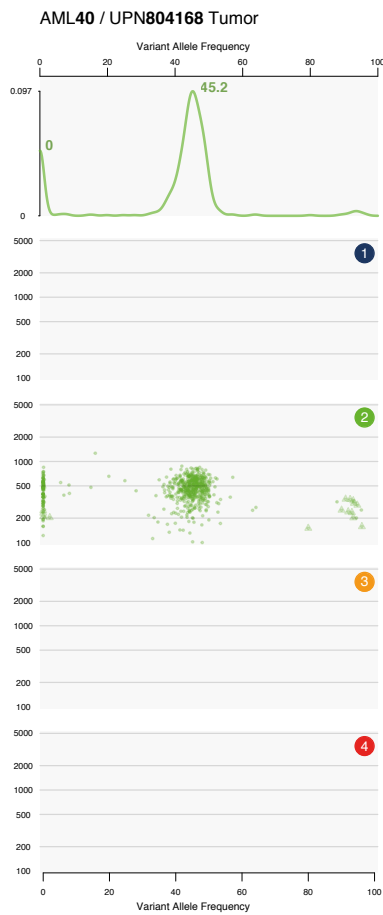
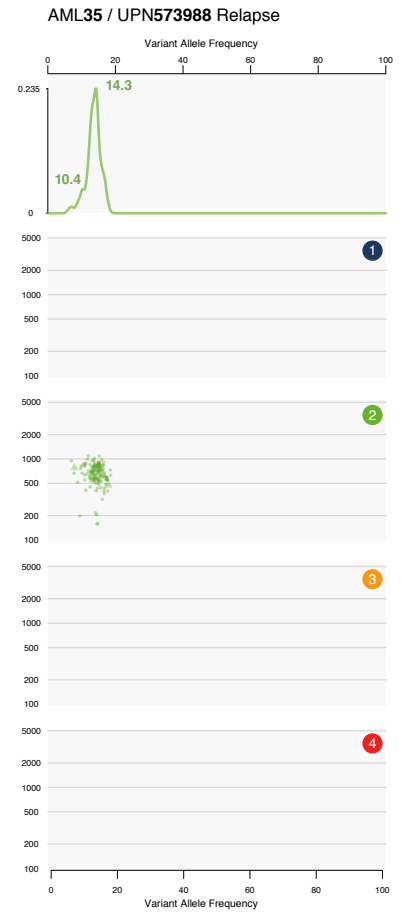
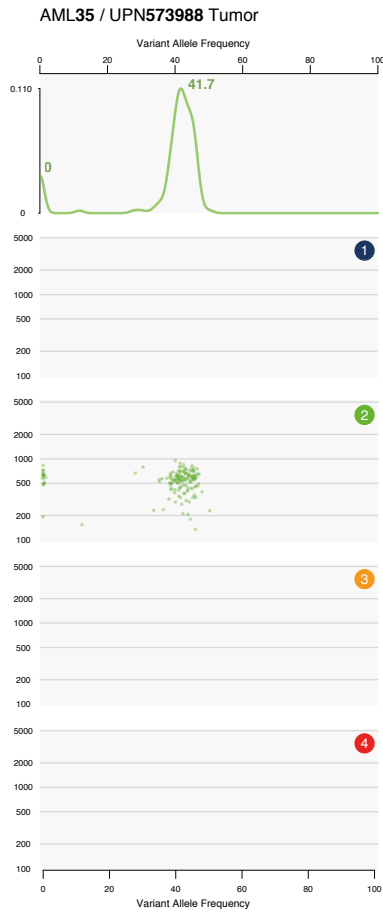
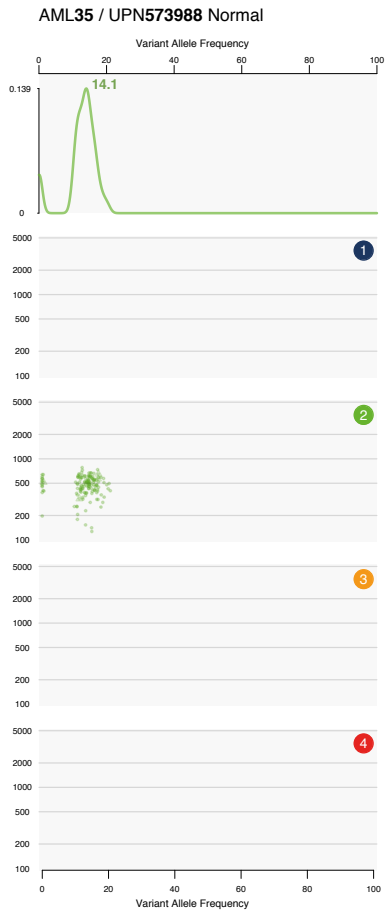
Supplementary Figure 11



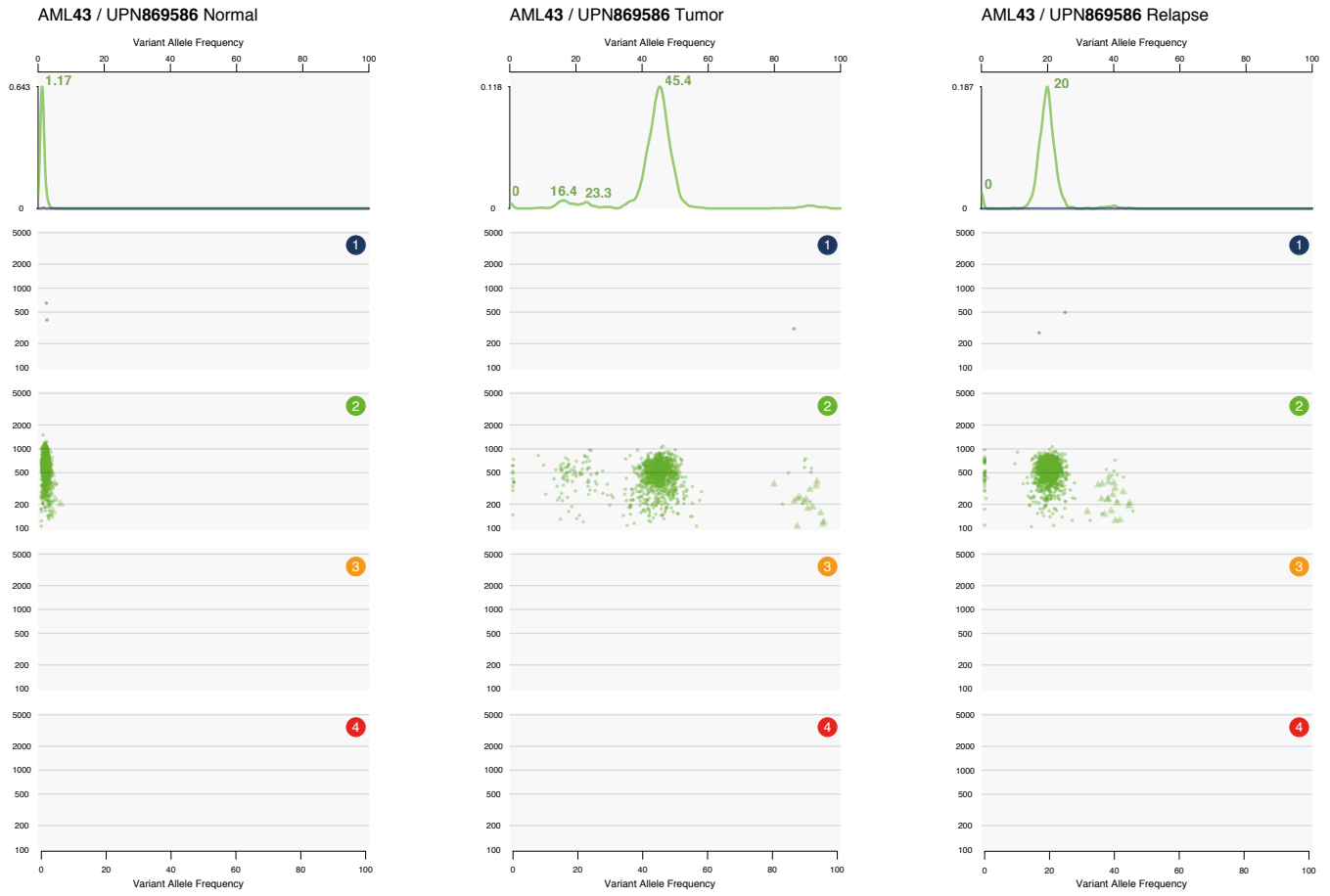
Supplementary Figure 11



Supplementary Figure 11



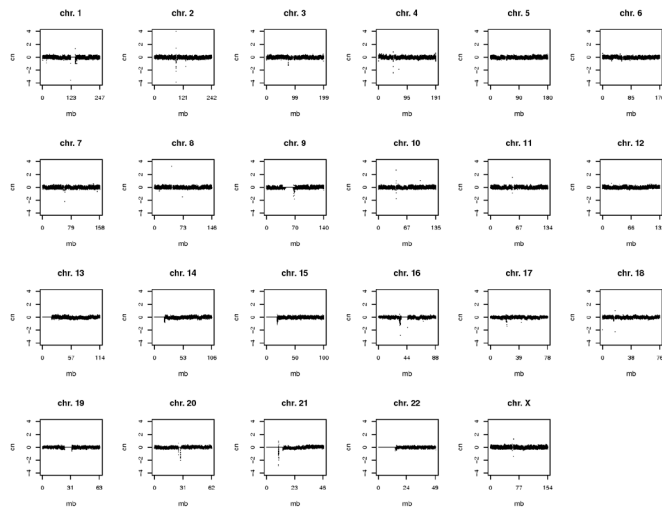
Supplementary Figure 11



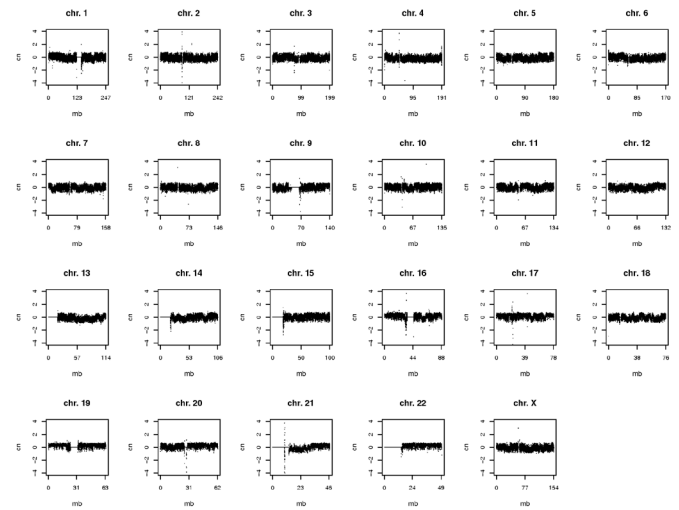
**Supplementary Figure 11.** Kernel density estimation of subclones in 7 primary tumor and relapse pairs. Five plots are shown for each sample: kernel density (top), followed by plots of tumor variant allele frequency by sequence depth for four copy number bins (labeled as 1, 2, 3, and 4+). Triangle represents mutation from X chromosome.

Supplementary Figure 12

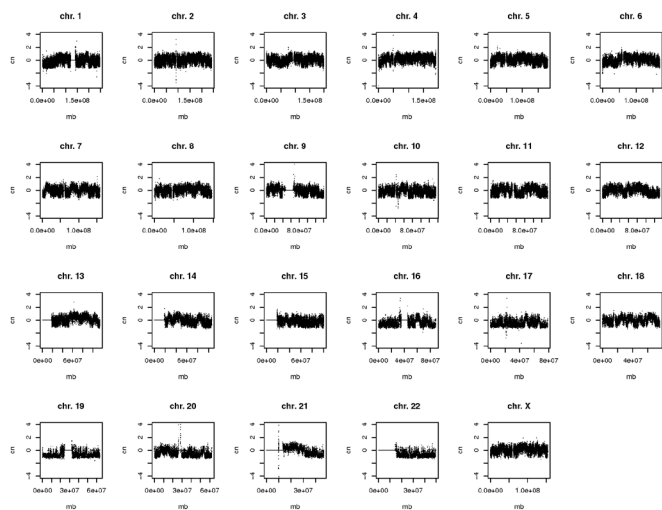
AML1 / UPN993124 relapse vs normal



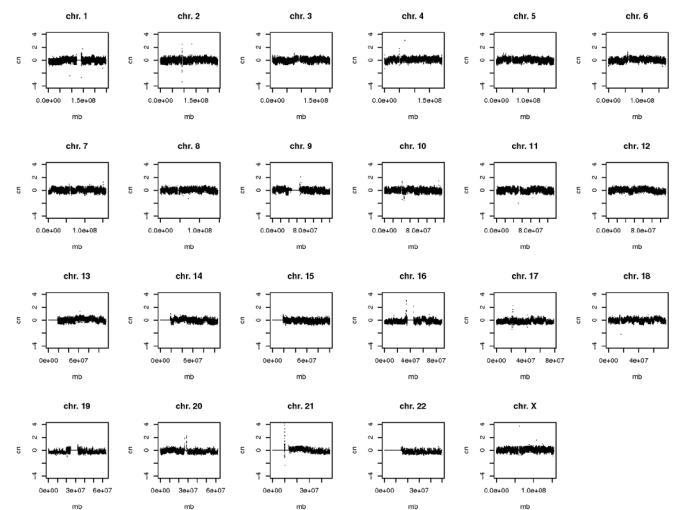
AML1 / UPN993124 relapse vs tumor



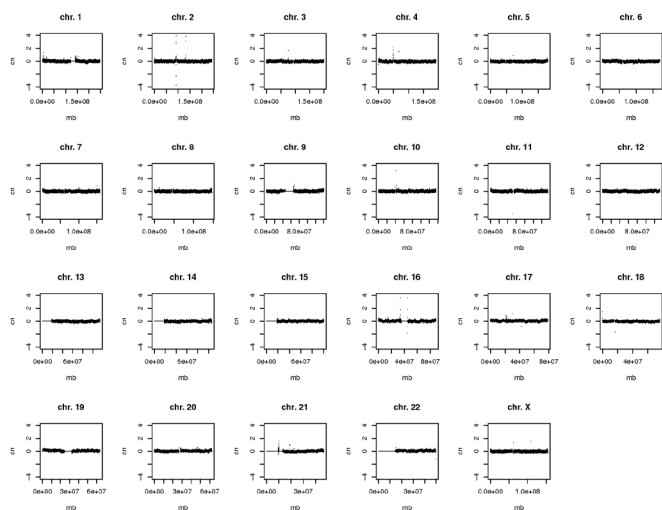
AML15 / UPN758168 relapse vs normal



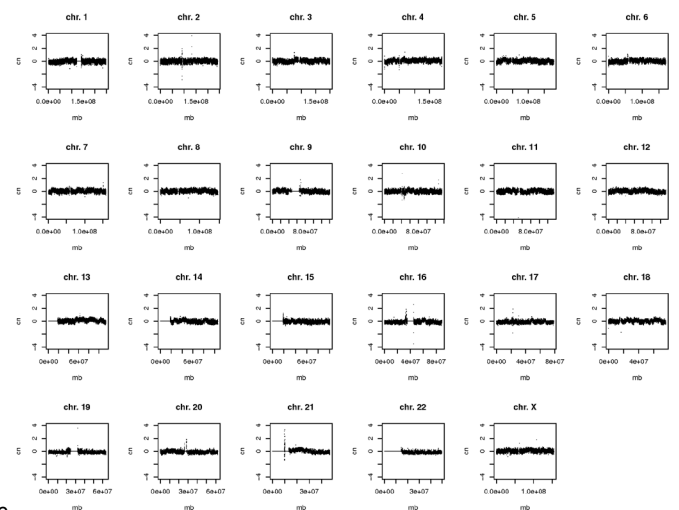
AML15 / UPN758168 relapse vs tumor



AML27 / UPN400220 relapse vs normal

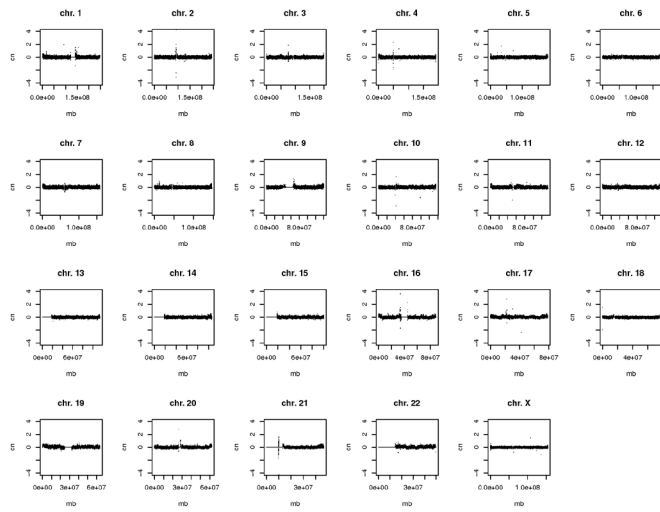


AML27 / UPN400220 relapse vs tumor

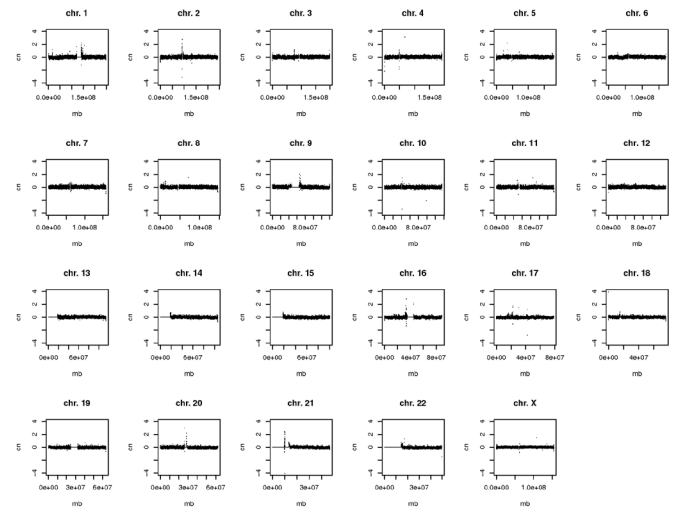


Supplementary Figure 12

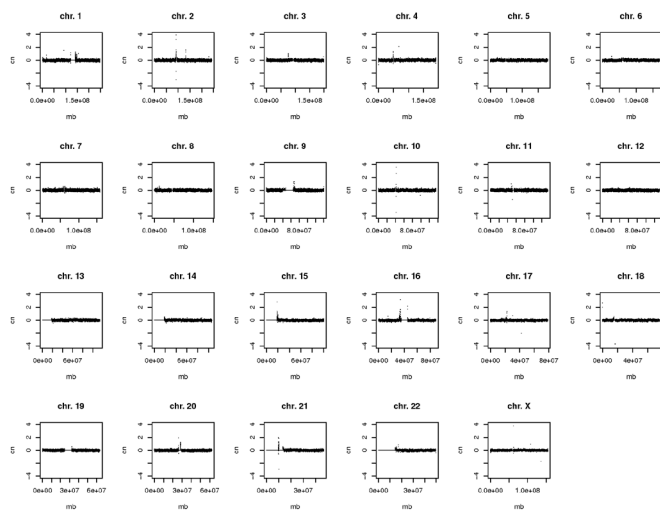
AML28 / UPN426980 relapse vs normal



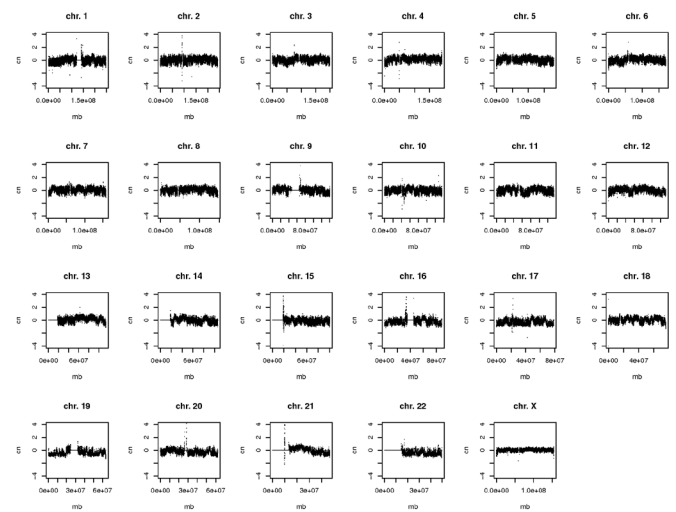
AML28 / UPN426980 relapse vs tumor



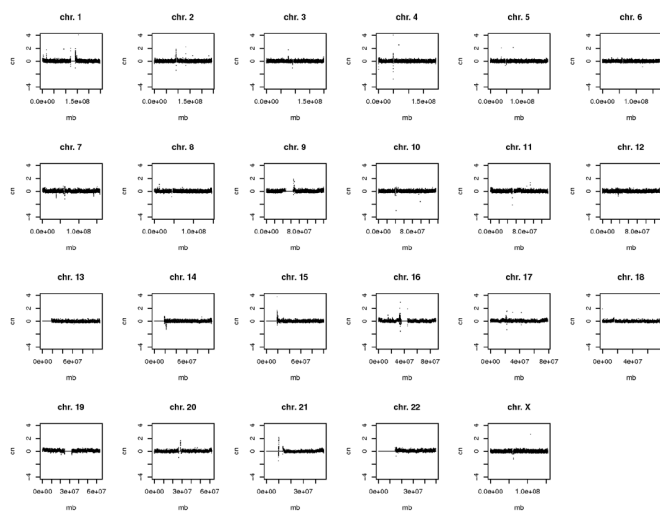
AML31 / UPN452198 relapse vs normal



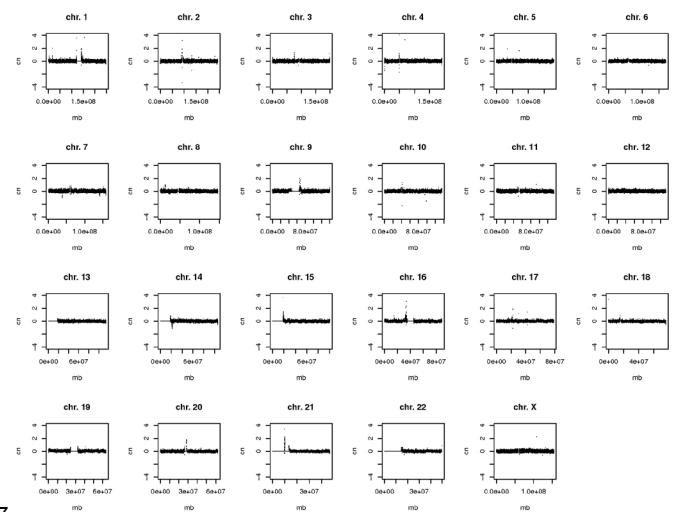
AML31 / UPN452198 relapse vs tumor



AML35 / UPN573988 relapse vs normal

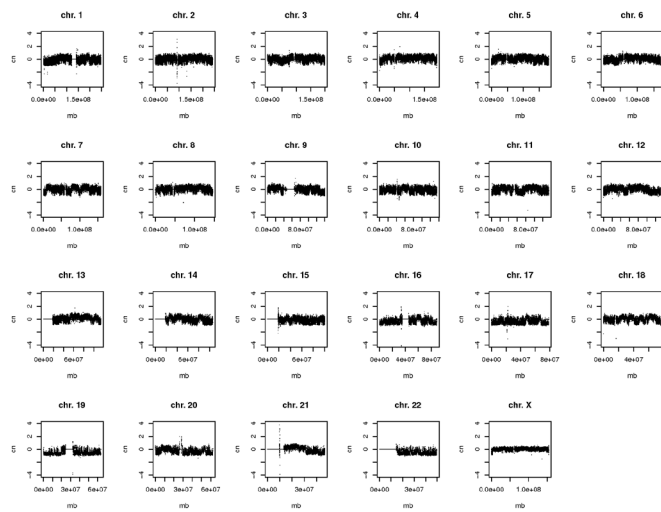


AML35 / UPN573988 relapse vs tumor

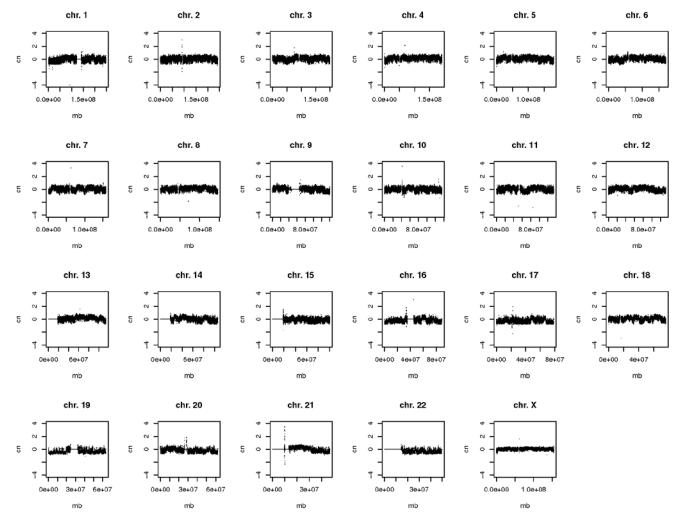


Supplementary Figure 12

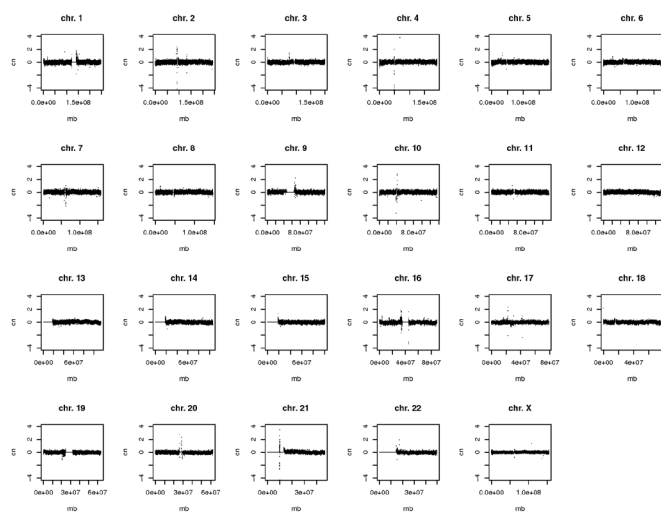
AML40 / UPN804168 relapse vs normal



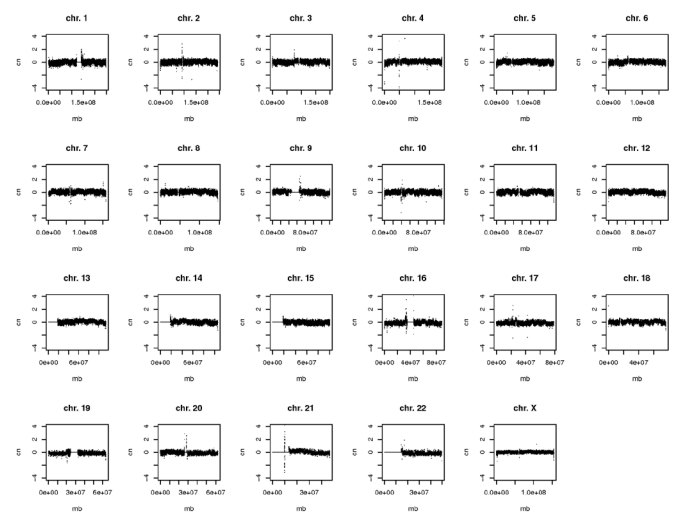
AML40 / UPN804168 relapse vs tumor



AML43 / UPN869586 relapse vs normal



AML43 / UPN869586 relapse vs tumor



Supplementary Figure 12. Copy number landscape for the primary tumor and relapse samples for the 8 AML patients.



## Supplementary Tables

**Supplementary Table 1.** Haploid and diploid coverages for normal, primary tumor, and relapse samples from 8 AML cases.

ID	UPN	Type	Sample Name	Haploid Coverage	Sequenced Kilobases	Heterozygous SNP concordance (%)
AML1	933124	Normal	H_GV-933124G-S.9017	26.203	98,618,377	99.71
AML1	933124	Relapse	H_GV-933124G-S.17384	34.158	116,351,939	99.86
AML1	933124	Tumor	H_GV-933124G-S.9043	28.058	102823346	99.73
AML15	758168	normal	H_KA-758168-S.22139	25.322	94,587,302	97.16
AML15	758168	relapse	H_KA-758168-0912815	26.741	130,327,761	99.58
AML15	758168	tumor	H_KA-758168-0816987	28.841	102,684,539	99.44
AML27	400220	normal	H_KA-400220-0802127	28.282	108,973,221	99.62
AML27	400220	relapse	H_KA-400220-0912813	33.867	140,098,694	99.78
AML27	400220	tumor	H_KA-400220-0814727	31.791	104,743,936	99.70
AML28	426980	normal	H_KA-426980-S.14770	29.125	115,598,195	99.52
AML28	426980	relapse	H_KA-426980-0912807	31.528	116,656,787	99.65
AML28	426980	tumor	H_KA-426980-S.15631	26.684	98,629,314	99.53
AML31	452198	normal	H_KA-452198-S.22477	31.956	140,742,228	99.64
AML31	452198	relapse	H_KA-452198-0912806	38.425	152,932,430	99.74
AML31	452198	tumor	H_KA-452198-0814719	24.876	89,784,635	99.46
AML35	573988	normal	H_KA-573988-0815176	37.795	125,860,910	99.74
AML35	573988	relapse	H_KA-573988-0926957	34.482	130,758,235	99.80
AML35	573988	tumor	H_KA-573988-0814941	33.397	110,602,908	99.77

AML40	804168	normal	H_KA-804168-0802136	28.404	92,084,078	99.68
AML40	804168	relapse	H_KA-804168-0912812	36.245	146,986,837	99.81
AML40	804168	tumor	H_KA-804168-0814948	26.938	86,887,308	99.65
AML43	869586	normal	H_KA-869586G-S.16508	28.991	108,320,784	99.52
AML43	869586	relapse	H_KA-869586G-0926998	30.318	133,794,242	99.77
AML43	869586	tumor	H_KA-869586G-S.16427	30.709	106,243,864	99.58

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**Supplementary Table 2a.** Clinical summaries.

UPN	Sex	Race	FAB	Age	Time to relapse in days	%BM Blasts/primary	Cytogenetics/primary	%BM Blasts/relapse	Cytogenetics/relapse	OS months	Induction	Consolidation
452198	M	W	M5	55	505	97	Normal	20	normal	56+ (alive)	7+3I	HDAC
573988	F	W	M4	67	365	75	Normal	54	normal (4 metaphases)	20.5	7+3I	5+2I
804168	M	W	M1	53	235	86	Normal	81	complex	30.0	7+3D+3E	HDAC
933124	F	W	M1	57	338	100	Normal	78	t(10;12)	24.6	7+3D+3E	HDAC+E+AutoTx
400220	F	W	M4	34	252	71	Normal	60	normal	10.7	7+3I	HDAC
426980	M	W	M2	68	805	64	Normal	12	normal	46.8	7+3D	HDAC
758168	F	W	M3	25	961	93	t(15;17)	92	t(15;17)	49.8	7+3D+ATRA	Arsenic/Mito
869586	M	W	M4	23	235	51	Normal	54	normal (3 metaphases)	19.0	7+3D+3E	HDAC+E+AutoTx

I=idarubicin, D=daunorubicin, E=etoposide, Arsenic=arsenic trioxide and M=mitoxantrone.

HDAC= High dose cytarabine.

7+3= 7 days of standard dose cytarabine and 3 days of an anthracycline.

7+3+3= the same, plus 3 days of etoposide.

5+2= 5 days of standard dose cytarabine and 2 days of anthracycline.

AutoTx= autologous stem cell transplantation.

Time to relapse refers to the time between the original diagnostic tissue banking (usually within 24 hours of starting therapy) and the time to the banking the relapse sample.

**Supplementary Table 2b.** Clinical data, cytogenetics, and key known mutations for the 8 AML patients in this study.

UPN	Sex	Race	FAB	%BM Blast	WBC	%PB Blast	Cytogenetics primary	Cytogenetics relapse	Prior MDS	Previous tumor	EFS months (3.31-'10)	Days from collection to first Relapse	OS months (3.31-'10)	ATRA	Hydroxyurea	day 0	day -1	day -2	day -3	DNMT3A	FLT3	IDH1	IDH2	KRAS	NPM1	NRAS	TET2	
400220	F	W	M4	71	19.6	58	46,XX[20]	46,XX[20]	N	early stage cervical, surgery, 11 years prior to AML	8.3	252	10.7	N	N	0	0	0	0	-	ITD	-	-	-	-	-	-	-
426980	M	W	M2	64	5.5	48	46,XY[20]	46,XY[19]	N		26.2	795	46.8	N	N	0	0	0	0	-	-	-	p.R140L	-	-	-	-	-
452198	M	W	M5	97	72.6	8	46,XY[15]	46,XY[20]	N		16.6	505	41.4	N	N	0	0	0	0	p.R882H	p.D835H	p.R132H	-	-	p.W288fs	-	-	
573988	F	W	M4	75	15.2	10	46,XX[16]	46,XX[4]	N		12	365	20.5	N	N	0	0	0	0	-	-	-	p.R140Q	-	p.W288fs	-	-	
758168	F	W	M3	93	16.3	40	46,XX,t(15;17)(q22;q21)[20]	46,XX,t(15;17)(q22;q21.1)[13]/46,XX[7]	N		31.6	961	43.4	Y	N	0	90mg	0	0	-	-	-	-	-	-	-	-	-
804168	M	W	M1	86	88.1	52	46,XX[20]	46,Y,t(X;6)(q22;q23),?t(1;12;17;3)(p36.1,q13;p11.2;p21)[17]/46,XY[3]	N		7.7	235	30	N	Y	1gm x1	1gm x1	0	0	-	ITD	-	-	-	p.W288fs	-	-	
869586	M	W	M4	51	27.1	63	46,XY[20]	46,XY[3]	N		7.7	235	19	N	N	0	0	0	0	-	-	-	-	-	-	-	-	
933124	F	W	M1	100	102.5	91	46,XX[20]	46,XX,t(10;12)(p12;p13)[20]	N		11.1	338	24.6	N	Y	1.5gm x1	1.5gm x2	0	0	p.L723fs	ITD	-	-	-	p.W288fs	-	-	

UPN	Induction AraC	Induction Idarubicin	Methotrexate IT Prophylaxis	Induction Daunorubicin	Induction Genasense	Induction ATRA	Induction Etoposide	Consolidation Ara C	Consolidation Genasense	Consolidation Idarubicin	Consolidation Mitoxantrone	Consolidation Etoposide	Consolidation G-CSF	Maintenance Arsenic	Auto Transplant Conditioning Busulfan	Auto Transplant Conditioning Etoposide
400220	100mg/m2/day x 7 days	12mg/m2/day x 3 days	12mg x 1 dose					3g/m2/q 12 hours every other day x 6 doses								
426980	100mg/m2/day x 7 days			60mg/m2/day x 3 days	7mg/kg/day x 10 days			2g/m2/day x 5 days	7mg/kg/day x 8 days							
452198	100mg/m2/day x 7 days	12mg/m2/day x 3 days						1.5g/m2/q 12 hours every other day x 6 doses								
573988	100mg/m2/day x 7 days	12mg/m2/day x 3 days						100mg/m2/day x 5 days		12mg/m2/day x 2 days						
758168	200mg/m2/day x 7 days			60mg/m2/day x 3 days		45mg/m2/day x 21 days				(1)5mg/m2/day x 4 days, (3)10mg/m2/day x 1 day after count recovery from course 2	(2)10mg/m2/day x 5 days after count recovery from course 1			10mg x 10 days M-F, 2 wks per month x 3 mos		
804168	100mg/m2/day x 7 days			90mg/m2/day x 3 days			100mg/m2/day x 3 days	3g/m2/q 12 hours every other day x 6 doses								
869586	100mg/m2/day x 7 days			90mg/m2/day x 3 days			100mg/m2/day x 3 days	2g/m2/q 12 hours x 4 days				10mg/kg/day x 4 days	10ug/kg/day until collection complete		0.8mg/kg/q 6 hours x 16 doses start day -7	60mg/kg x 1 dose day -3
933124	100mg/m2/day x 7 days			90mg/m2/day x 3 days			100mg/m2/day x 3 days	2g/m2/q 12 hours x 4 days				10mg/kg/day x 4 days	10ug/kg/day until collection complete		0.8mg/kg/q 6 hours x 16 doses start day -7	60mg/kg x 1 dose day -3

**Supplementary Table 3.** Target coverage from capture validation for 8 AML cases.

ID	UPN	Type	Sample Name	Total Target Base	1x Coverage (%)	10x Coverage (%)	20x Coverage (%)
AML27	400220	normal	H_KA-400220-0802127	8848098	98.287	95.482	94.196
AML27	400220	relapse	H_KA-400220-0912813	8848098	98.222	95.073	93.651
AML27	400220	tumor	H_KA-400220-0814727	8848098	97.68	94.919	93.7
AML28	426980	normal	H_KA-426980-S.14770	9995683	98.551	95.625	94.165
AML28	426980	relapse	H_KA-426980-0912807	9995683	98.398	95.232	93.736
AML28	426980	tumor	H_KA-426980-S.15631	9995683	99.32	95.554	92.333
AML31	452198	normal	H_KA-452198-S.22477	12888032	98.414	95.438	93.914
AML31	452198	relapse	H_KA-452198-0912806	12888032	98.612	96.351	95.115
AML31	452198	tumor	H_KA-452198-0814719	12888032	98.266	95.252	93.768
AML35	573988	normal	H_KA-573988-0815176	11602023	98.33	95.399	93.802
AML35	573988	relapse	H_KA-573988-0926957	11602023	98.197	94.906	93.297
AML35	573988	tumor	H_KA-573988-0814941	11602023	98.334	95.704	94.324
AML15	758168	normal	H_KA-758168-S.22139	13153054	98.579	95.857	94.457
AML15	758168	relapse	H_KA-758168-0912815	13153054	98.462	95.754	94.319
AML15	758168	tumor	H_KA-758168-0816987	13153054	99.446	97.066	94.64
AML40	804168	normal	H_KA-804168-0802136	9805652	99.681	99.285	98.865
AML40	804168	relapse	H_KA-804168-0912812	9805652	98.046	94.847	93.208
AML40	804168	tumor	H_KA-804168-0814948	9805652	97.794	93.974	91.987
AML43	869586	normal	H_KA-869586G-S.16508	13707322	98.36	95.152	93.657
AML43	869586	relapse	H_KA-869586G-0926998	13707322	98.668	95.939	94.361
AML43	869586	tumor	H_KA-869586G-S.16427	13707322	98.739	94.771	92.959
AML01	933124	normal	H_GV-933124G-S.9017	1110517	99.595	98.53	97.665
AML01	933124	relapse	H_GV-933124G-S.17384	1110517	99.057	95.772	93.175
AML01	933124	tumor	H_GV-933124G-S.9043	1110517	99.372	96.854	94.587

**Supplementary Table 4a.** Summary of mutations identified in 8 patients including tier classification.

ID	UPN	Total Mutations	SNVs and DNPs	Indels	Relapse Specific SNVs and DNPs	Relapse Specific Indels	Total Primary Tumor Mutations	Total Relapse Mutations	Tier1 Primary Tumor Mutations	Tier1 Relapse Mutations	Tier1 Primary Tumor Specific Mutations	Tier1 Relapse Specific Mutations	Tier2 Primary Tumor Specific Mutations	Tier2 Relapse Specific Mutations	Tier3 Primary Tumor Specific Mutations	Tier3 Relapse Specific Mutations	Total Tier1 Mutations	Total Tier2 Mutations	Total Tier3 Mutations	Total Tier4 Mutations	Total Primary Tumor Specific Mutations	Total Relapse Specific Mutations	Mutations Common to Primary and Relapse Tumor	Tumor variant allele frequency at relapse-specific sites	Relapse variant allele frequency at relapse-specific sites
AML1	933124	412	386	26	64	13	335	407	16	19	0	3	0	17	5	57	20	71	321	0	5	77	330	0.1085%	38.5166%
AML15	758168	496	471	25	99	0	397	496	15	19	0	4	0	13	0	82	19	66	411	0	0	99	397	0.0735%	16.0335%
AML27	400220	307	290	17	22	0	285	306	12	13	0	1	0	6	1	15	13	57	237	0	1	22	284	0.0191%	12.1951%
AML28	426980	882	843	39	103	2	777	816	32	35	3	6	9	15	54	84	38	139	705	0	66	105	711	0.9515%	29.8999%
AML31	452198	118	117	1	42	0	76	99	9	9	3	3	4	7	12	32	12	16	90	0	19	42	57	0.6384%	12.6498%
AML35	573988	150	148	2	15	0	135	150	6	8	0	2	0	1	0	12	8	36	106	0	0	15	135	0.0908%	9.0446%
AML40	804168	658	622	36	99	1	558	658	22	26	0	4	0	10	0	86	26	93	539	0	0	100	558	0.0582%	22.1737%
AML43	869586	1292	1169	123	12	0	1280	1254	51	50	1	0	5	2	32	10	51	214	1027	0	38	12	1242	0.0752%	19.1987%



**Supplementary Table 4b.** All Tier 1 coding point mutations and Indels in 8 AML cases and their associated annotations.

In UPN 933124, the skin sample was contaminated with an estimated 29% AML cells; the peripheral white blood cell count was 105,000/mm<sup>3</sup> when the skin sample was collected. *EBI2* (A338V) and *PCLKC* (P1004L) mutations previously reported<sup>8</sup> are shown as *GPR183* (A338V) and *PCDH24* (P1004L) respectively in Supplementary Table 4b due to change in nomenclature. In addition, due to the change of transcript structure, *KNDC1* (L799F) and *GRINL1B* (R176H) previously reported<sup>8</sup> are no longer coding mutations.

UPN	Chr	Start (NCBI 36)	Start (GRCh37)	Reference	Variant	Gene	Transcript	Amino Acid Change	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Classification	# of samples recurrent (out of 200)
933124	2	179184790	179476545	C	T	TTN*	ENST00000375038	p.E12813K	10721	2174	15.75%	8955	7039	43.57%	8281	5562	39.28%	2	2	2	shared	13
933124	5	175948939	176016333	C	T	PCDH24	NM_017675	p.P1004L	8521	794	8.66%	5120	5094	47.81%	4566	3204	40.70%	2	2	2	shared	0
933124	10	105228735	105238745	C	T	CALHM3	ENST00000369783	p.S15	11285	3078	20.52%	9204	7466	44.19%	498	353	41.48%	2	2	2	shared	1
933124	10	112346166	112356176	G	T	SMC3*	NM_005445	p.G662C	8761	2734	21.80%	9082	7834	50.28%	6104	5969	49.13%	2	2	2	shared	6
933124	10	134734535	134884545	C	T	GPR123	ENST00000368577	p.T38I	8148	2276	20.13%	6337	7481	49.96%	5488	4940	41.57%	2	2	2	shared	1
933124	12	11883491	11992224	G	C	ETV6*	NM_001987	p.R105P	13413	1	0.01%	15113	3	0.02%	6202	4086	38.80%	2	2	2	relapse-specific	5
933124	13	98176393	99378392	C	T	SLC15A1	NM_005073	p.W77*	9390	1998	15.68%	8439	9910	51.50%	6296	5829	45.90%	2	2	2	shared	1
933124	13	98745388	99947387	G	A	GPR183	NM_004951	p.A338V	7168	1857	20.42%	4671	3872	47.16%	5318	4371	44.85%	2	2	2	shared	2
933124	14	22588266	23518426	G	T	CDH24	NM_022478	p.Y590*	4577	1166	15.62%	4405	5022	46.87%	2943	2660	46.73%	2	2	2	shared	1
933124	16	15030292	15122791	G	A	PDXDC1*	NM_015027	p.E421K	8684	778	8.48%	12623	4597	28.09%	8962	3098	25.45%	2	2	2	shared	1
933124	20	40164254	40730840	G	A	PTPRT	NM_133170	p.P1232L	7222	1981	20.25%	6478	5396	45.24%	5145	4738	45.31%	2	2	2	shared	3
933124	21	40336315	41414445	A	G	DSCAM	NM_001389	p.L1847	8549	1538	14.97%	7622	7923	50.64%	6711	5011	42.88%	2	2	2	shared	1
933124	22	24752889	26422889	G	A	MYO18B*	NM_032608	p.A2317T	10667	10	0.10%	11287	14	0.19%	6009	4785	45.71%	2	2	2	relapse-specific	2
933124	2	25317018	25463514	A	-	DNMT3A*	NM_022552	p.L723fs	1162	204	14.93%	415	398	48.95%	623	358	36.49%	0	0	0	shared	49
933124	5	170770150	170837545	-	TGCA GAAATCAACGCTAGA AGTACTCATTATCTGA	NPM1	NM_002520	p.W287fs	463	55	10.62%	21	14	40.00%	26	12	31.58%	0	0	0	shared	53
933124	13	27506273	28608273	-	GAGCGCGGGGC	FLT3	NM_004119	p.594in_frame_ins	1907	239	11.14%	721	413	36.42%	690	317	31.48%	0	0	0	shared	52
933124	20	43115216	43681802	-	GAGCGCGGGGC	STK4*	ENST00000372801	p.A461fs	2205	0	0.00%	1586	0	0.00%	967	256	20.93%	0	0	0	relapse-specific	0
758168	11	1229284	1272708	C	T	MUC5B	NM_002458	p.T4869	210	33	13.58%	21	263	92.61%	18	246	93.18%	2	1.28	1.25	shared	3
758168	11	61267618	61511042	C	T	DAGLA	NM_006133	p.S737L	325	0	0.00%	365	0	0.00%	313	76	19.54%	2	2	1.38	relapse-specific	1
758168	11	64146939	64390363	G	A	NRXN2	NM_015080	p.S1345	310	0	0.00%	365	2	0.54%	302	55	15.41%	2	2	1.37	relapse-specific	2
758168	11	99450197	99944987	C	T	CNTN5	NM_014361	p.S514F	566	46	7.52%	352	290	45.17%	305	260	46.02%	2	2	2	shared	2
758168	13	18910252	20012252	C	T	TPTE2	NM_199254	p.E339K	381	32	7.75%	213	165	43.65%	198	191	49.10%	2	2	2	shared	1
758168	13	72244339	73346338	C	T	DIS3	NM_014953	p.D488N	561	43	7.12%	330	251	43.20%	324	285	46.80%	2	2	2	shared	3
758168	15	84063349	86262345	AAGATCA	-	AKAP13	NM_006738	p.K2018fs	735	61	7.66%	411	336	44.98%	420	317	43.01%	2	2	2	shared	2
758168	17	11513530	11572805	T	G	DNAH9	NM_001372	p.L1016R	503	50	9.04%	321	260	44.75%	313	256	44.99%	2	2	2	shared	5

758168	17	3004064	3057314	G	A	ENSG00000180144	ENST00000324144	p.A261V	467	0	0.00%	525	0	0.00%	436	106	19.56%	2	2	2	relapse-specific	0	
758168	19	48131669	43439829	G	T	PSG7	NM_002783	p.L53I	142	8	5.33%	95	103	52.02%	113	77	40.53%	2	2	2	shared	1	
758168	2	225157935	225449691	C	A	CUL3	NM_003590	p.K12N	199	16	7.44%	102	92	47.42%	88	88	50.00%	2	2	2	shared	1	
758168	2	32298967	32445463	A	G	SLC30A6	NM_017964	p.H356R	545	46	7.78%	352	344	49.43%	383	285	42.66%	2	2	2	shared	1	
758168	20	41777325	42343911	G	A	MYBL2	NM_002466	p.T654	362	40	9.95%	232	187	44.63%	256	200	43.86%	2	2	2	shared	1	
758168	22	45144326	46765662	G	T	CELSR1	NM_014246	p.P2600H	352	24	6.38%	234	181	43.61%	290	199	40.70%	2	2	1.34	shared	1	
758168	4	183840022	183603028	C	T	ODZ3	NM_001080477	p.C632	386	0	0.00%	435	0	0.00%	401	39	8.86%	2	2	2	relapse-specific	2	
758168	7	6727252	6760727	A	G	LOC100134687	XM_001725648	p.W105R	188	15	7.39%	96	115	54.50%	127	85	40.09%	2	2	2	shared	1	
758168	8	21825961	21770015	G	A	DOK2	NM_003974	p.R24C	218	17	7.23%	165	135	45.00%	153	129	45.74%	2	2	2	shared	1	
400220	1	202854975	204588352	G	A	LRRN2	NM_006338	p.L257	481	36	6.96%	324	258	44.33%	246	161	39.56%	2	2	2	shared	1	
400220	11	32370187	32413611	C	T	WT1	NM_024426	e9-1	549	33	5.67%	394	292	42.57%	327	195	37.36%	2	2	2	shared	13	
400220	13	27506258	28608258	-	-	GGCGATATTCATATTCTCT GAAATCAACGTAGAAGTAC TCATTATCTGAGGAGCCGG	FLT3	NM_004119	p.599in_frame_ins	228	39	14.61%	145	226	60.92%	108	196	64.47%	2	2	2	shared	52
400220	14	67106471	68036718	G	A	PLEKHH1	NM_020715	p.A475T	563	38	6.32%	397	350	46.85%	331	198	37.43%	2	2	2	shared	2	
400220	21	35181023	36259153	G	A	RUNX1	NM_001754	p.P113L	312	36	10.34%	39	368	90.42%	70	233	76.90%	2	2	2	shared	17	
400220	6	136639071	136597378	G	A	BCLAF1	NM_014739	p.R429W	623	18	2.81%	535	195	26.71%	561	135	19.40%	2	2	2	shared	1	
400220	6	35320457	35212479	C	T	SCUBE3	NM_152753	p.R764	618	54	8.04%	403	342	45.91%	331	197	37.31%	2	2	2	shared	1	
400220	8	16022443	15978072	G	A	MSR1	NM_138715	p.H359	397	27	6.37%	239	254	51.52%	199	118	37.22%	2	2	2	shared	1	
400220	X	39818802	39933858	C	-	BCOR	NM_017745	p.P248fs	539	52	8.80%	407	412	50.31%	389	214	35.49%	2	2	2	shared	1	
426980	1	1105467	1115604	C	T	TTL10	NM_153254	p.A57	315	38	10.76%	162	120	42.55%	36	40	52.63%	2	1.25	1.38	shared	1	
426980	1	154189110	155922486	G	T	ARHGEF2	NM_004723	p.G611	455	10	2.15%	301	189	38.57%	326	191	36.94%	2	2	2	shared	1	
426980	1	204839488	206772865	T	C	LGTN	NM_006893	p.Y385C	399	7	1.72%	257	259	50.19%	424	360	45.92%	2	2	2	shared	1	
426980	1	3628599	3638739	C	T	TP73	NM_005427	p.P195L	473	7	1.46%	272	207	43.22%	11	13	54.17%	2	2	2	shared	1	
426980	1	89433568	89660980	C	A	GBP4	NM_052941	p.K121N	572	1	0.17%	650	9	1.37%	461	218	32.11%	2	2	2	relapse-specific	2	
426980	11	112788535	113283325	G	A	DRD2	NM_000795	p.S364F	661	8	1.20%	483	353	42.22%	838	121	12.62%	2	2	2	shared	3	
426980	11	72623244	72945596	G	T	P2RY2	NM_002564	p.R131L	605	10	1.63%	340	291	46.12%	316	40	11.24%	2	2	2	shared	2	
426980	12	127744443	129178490	G	A	TMEM132C	ENST00000315208	p.W138*	488	8	1.61%	330	241	42.21%	598	85	12.45%	2	2	2	shared	1	
426980	12	49922439	51636172	A	G	DAZAP2	NM_014764	p.N146S	434	4	0.91%	268	247	47.96%	301	214	41.55%	2	2	2	shared	1	
426980	13	35326695	36428695	G	A	DCLK1	NM_004734	p.R326C	399	0	0.00%	537	3	0.56%	367	174	32.16%	2	2	2	relapse-specific	1	
426980	15	88432938	90631934	C	A	IDH2	NM_002168	p.R140L	740	12	1.60%	381	307	44.62%	553	67	10.81%	2	2	2	shared	19	
426980	15	88432939	90631935	G	A	IDH2	NM_002168	p.R140W	742	0	0.00%	678	7	1.02%	414	202	32.79%	2	2	2	relapse-specific	19	
426980	16	31290499	31382998	C	T	ITGAX	NM_000887	p.R685C	604	7	1.15%	270	281	51.00%	285	286	50.09%	2	2	2	shared	1	
426980	19	41696897	37005057	A	G	ZNF260	NM_001012756	p.C362R	501	0	0.00%	582	7	1.19%	326	129	28.35%	2	2	2	relapse-specific	0	
426980	19	50958451	46266611	C	T	LOC388553	XM_373809	p.T518	395	2	0.50%	222	203	47.76%	259	25	8.80%	2	2	2	shared	1	
426980	19	60109826	55418014	C	T	NCR1	NM_004829	p.A68	723	0	0.00%	821	10	1.20%	933	323	25.72%	2	2	2	relapse-specific	1	
426980	19	8512789	8606789	C	T	MYO1F	NM_012335	e15+1	542	8	1.45%	319	257	44.62%	24	17	41.46%	2	2	2	shared	2	
426980	2	15674817	15757366	A	G	DDX1	NM_004939	e15-2	547	10	1.80%	383	335	46.66%	284	232	44.96%	2	2	2	shared	1	
426980	2	233837397	234172658	C	T	ATG16L1	NM_030803	p.D112	637	10	1.55%	366	297	44.80%	299	198	39.84%	2	2	2	shared	2	
426980	2	234415280	234750541	G	A	HJURP	NM_018410	p.S295	675	4	0.59%	450	331	42.38%	521	327	38.56%	2	2	2	shared	2	
426980	20	61515246	62044802	C	T	KCNQ2	NM_172107	e15+1	251	9	3.46%	132	117	46.99%	62	9	12.68%	2	1.41	1.42	shared	2	
426980	5	127725400	127697501	G	A	FBN2	NM_001999	p.N823	1154	9	0.77%	640	498	43.76%	2824	11	0.39%	2	2	2	tumor-specific	1	





869586	2	169488496	169780250	G	A	ABCB11	NM_003742	p.A1283V	813	10	1.22%	324	287	46.97%	408	114	21.84%	2	2	2	shared	1
869586	2	179181002	179472757	-	GAC	TTN	ENST00000375038	p.I13568in_frame_ins	844	6	0.71%	512	127	19.87%	667	62	8.50%	2	2	2	shared	13
869586	20	33485469	34022055	A	T	GDF5	NM_000557	p.T386	256	4	1.54%	114	86	43.00%	130	37	22.16%	2	2	2	shared	1
869586	21	35174739	36252869	-	GGCTA	RUNX1	NM_001754	p.G164fs	532	6	1.12%	306	188	38.06%	437	76	14.81%	2	2	2	shared	17
869586	3	170003465	168520771	C	T	LOC253820	XM_001726233	p.P108	899	6	0.66%	642	125	16.30%	492	116	19.08%	2	2	2	shared	1
869586	3	50268699	50293695	G	A	GNAI2	NM_002070	p.R179H	621	2	0.32%	310	94	23.27%	391	0	0.00%	2	2	2	tumor-specific	1
869586	3	9761731	9786731	T	C	BRPF1	NM_001003694	p.V987A	492	8	1.60%	282	223	44.16%	355	82	18.76%	2	2	2	shared	1
869586	6	117234348	117127655	C	A	GPRC6A	NM_148963	p.D405Y	463	9	1.91%	238	204	46.15%	344	68	16.50%	2	2	2	shared	2
869586	6	126252643	126210950	A	G	NCOA7	NM_181782	p.K584E	656	12	1.80%	222	190	46.12%	413	113	21.48%	2	2	2	shared	2
869586	6	33396275	33288297	G	A	DAXX	NM_001350	p.R371W	746	9	1.19%	353	344	49.35%	466	107	18.67%	2	2	2	shared	2
869586	6	39977212	39869234	C	T	DAAM2	NM_015345	p.R989C	211	8	3.65%	131	107	44.96%	157	36	18.65%	2	2	2	shared	1
869586	6	44351654	44243676	G	A	TMEM151B	ENST00000388811	p.T371	249	1	0.40%	98	71	42.01%	120	32	21.05%	2	2	2	shared	1
869586	6	75917701	75860981	G	A	COL12A1	NM_004370	p.V134I	628	3	0.48%	210	133	38.78%	416	108	20.61%	2	2	2	shared	4
869586	6	89948418	89891699	C	T	GABRR1	NM_002042	p.A286T	440	5	1.12%	220	191	46.47%	314	73	18.86%	2	2	2	shared	1
869586	7	90733681	90895745	G	A	FZD1	NM_003505	p.R517H	576	8	1.37%	242	201	45.37%	316	71	18.35%	2	2	2	shared	1
869586	8	100274306	100205130	C	A	VPS13B	NM_017890	p.T787N	959	13	1.34%	401	267	39.97%	541	130	19.37%	2	2	2	shared	1
869586	8	105436497	105367321	C	T	TM7SF4	NM_030788	p.R416C	706	12	1.67%	315	241	43.35%	413	102	19.81%	2	2	2	shared	1
869586	8	143622650	143625648	C	T	BAI1	NM_001702	p.T1542M	448	4	0.88%	160	178	52.66%	242	70	22.44%	2	2	2	shared	2
869586	8	143691876	143694874	C	G	ARC	NM_015193	p.W253C	577	14	2.37%	304	229	42.96%	371	87	19.00%	2	2	2	shared	1
869586	8	145639466	145668658	G	A	NFKBIL2	ENST00000409379	p.T104M	588	9	1.51%	301	238	44.16%	356	92	20.54%	2	2	2	shared	0
869586	8	98358079	98288903	C	A	TSPYL5	NM_033512	p.E390D	549	6	1.08%	313	237	43.09%	365	87	19.25%	2	2	2	shared	1
869586	X	133378890	133551224	G	T	PHF6	NM_001015877	p.G287V	449	15	3.23%	22	316	93.49%	235	145	38.16%	2	0.97	0.99	shared	6

\*Relative expression levels of select mutant alleles in 933124 based on cDNA sequence data: TTN (31.44% tumor, 18.44% relapse), SMC3 (49.65% tumor, 40.76% relapse), PDXDC1 (49.21% tumor, 44.43% relapse), DNMT3A (38.91% tumor, 29.77% relapse), ETV6 (0.07% tumor, 28.60% relapse), MYO18B (0.38% tumor, 0.54% relapse), STK4 (0.00% tumor, 66.60% relapse)























Supplementary Table 5b. Deep readcounts for somatic indels in UPN 933124.

Tier	Chr	Start (NCBI 36)	Stop (NCBI 36)	Chr	(Start GRCh37)	Stop (GRCh37)	Reference allele	Variant allele	454.nrm.reads.ref	454.nrm.reads.var	454.nrm.var.freq	454.tum.reads.ref	454.tum.reads.var	454.tum.var.freq	454.rel.reads.ref	454.rel.reads.var	454.rel.var.freq	ill.nrm.reads.ref	ill.nrm.reads.var	ill.nrm.var.freq	ill.tum.reads.ref	ill.tum.reads.var	ill.tum.var.freq	ill.rel.reads.ref	ill.rel.reads.var	ill.rel.var.freq	cap.nrm.reads.ref	cap.nrm.reads.var	cap.nrm.var.freq	cap.tum.reads.ref	cap.tum.reads.var	cap.tum.var.freq	cap.rel.reads.ref	cap.rel.reads.var	cap.rel.var.freq	avg.nrm.var.freq	avg.tum.var.freq	avg.rel.var.freq	
1	2	25317018	25317018	2	25463514	25463514	A	-	1873	383	0.17	776	549	0.41	1750	466	0.21	-	-	-	-	-	-	-	-	-	1162	204	0.15	415	398	0.49	623	358	0.36	0.16	0.45	0.29	
2	3	37458956	37458956	3	37483952	37483952	C	-	1550	69	0.04	2077	278	0.12	2983	1978	0.40	-	-	-	-	-	-	-	-	-	2015	2	0.00	845	1	0.00	512	395	0.44	0.02	0.06	0.42	
2	11	28542151	28542151	11	28585575	28585575	T	-	715	169	0.19	373	337	0.47	662	553	0.46	-	-	-	-	-	-	-	-	-	2534	431	0.15	513	417	0.45	448	396	0.47	0.17	0.46	0.46	
2	12	91063778	91063778	12	92539647	92539647	C	-	2008	178	0.08	900	531	0.37	730	425	0.37	-	-	-	-	-	-	-	-	-	660	90	0.12	246	227	0.48	504	349	0.41	0.10	0.43	0.39	
2	17	34068941	34068942	17	36815415	36815416	-	T	1004	2	0.00	1100	1	0.00	566	336	0.37	-	-	-	-	-	-	-	-	-	3297	2	0.00	2202	4	0.00	1335	834	0.38	0.00	0.00	0.38	
3	2	109230419	109230420	2	109863987	109863988	-	A	4098	5	0.00	2446	5	0.00	5535	3571	0.39	-	-	-	-	-	-	-	-	-	3707	2	0.00	3423	2	0.00	1881	1096	0.37	0.00	0.00	0.38	
3	2	143692014	143692015	2	143975544	143975545	-	G	5406	86	0.02	3850	66	0.02	3985	1039	0.21	-	-	-	-	-	-	-	-	-	1888	1	0.00	2205	1	0.00	1316	532	0.29	0.01	0.01	0.25	
3	3	72575849	72575850	3	72493159	72493160	-	T	2328	2	0.00	1617	2	0.00	1555	1066	0.41	-	-	-	-	-	-	-	-	-	2097	1	0.00	821	1	0.00	625	457	0.42	0.00	0.00	0.41	
3	4	39379194	39379195	4	39702799	39702800	-	G	1819	386	0.18	402	518	0.56	849	745	0.47	-	-	-	-	-	-	-	-	-	324	61	0.16	12	14	0.54	-	-	-	0.17	0.55	0.47	
3	4	154576734	154576734	4	154357284	154357284	A	0	834	7	0.01	293	1	0.00	414	138	0.25	-	-	-	-	-	-	-	-	-	2334	3	0.00	1073	4	0.00	626	386	0.38	0.00	0.00	0.32	
3	7	121412639	121412640	7	121625403	121625404	-	T	1000	24	0.02	872	51	0.06	332	54	0.14	-	-	-	-	-	-	-	-	-	521	2	0.00	87	0	0.00	33	23	0.41	0.01	0.03	0.28	
3	9	97963721	97963722	9	98923900	98923901	-	A	3355	3	0.00	1757	1	0.00	2438	1683	0.41	-	-	-	-	-	-	-	-	-	3710	0	0.00	2249	5	0.00	1068	766	0.42	0.00	0.00	0.41	
3	13	42312208	42312208	13	43414208	43414208	T	-	604	224	0.27	508	678	0.57	290	410	0.59	-	-	-	-	-	-	-	-	-	1342	244	0.15	516	403	0.44	455	325	0.42	0.21	0.51	0.50	
3	15	91592526	91592527	15	93791522	93791523	-	A	3496	961	0.22	3648	2758	0.43	2449	1492	0.38	-	-	-	-	-	-	-	-	-	1200	198	0.14	707	513	0.42	735	403	0.35	0.18	0.43	0.37	
3	X	5661876	5661876	X	5651876	5651876	T	-	352	30	0.08	178	174	0.49	574	439	0.43	-	-	-	-	-	-	-	-	-	1648	247	0.13	170	140	0.45	126	90	0.42	0.10	0.47	0.43	
3	X	14461078	14461078	X	14551157	14551157	T	-	690	82	0.11	335	240	0.42	481	352	0.42	-	-	-	-	-	-	-	-	-	292	42	0.13	37	22	0.37	16	17	0.52	0.12	0.40	0.47	
3	X	130987641	130987642	X	131159960	131159961	-	A	2946	236	0.07	1594	100	0.06	1367	906	0.40	-	-	-	-	-	-	-	-	-	950	0	0.00	218	0	0.00	109	77	0.41	0.04	0.03	0.41	
3	4	163130129	163130132	4	162910679	162910682	ACTA	-	3545	1	0.00	1773	1	0.00	3008	1820	0.38	-	-	-	-	-	-	-	-	-	1002	115	0.10	280	137	0.33	294	92	0.24	0.05	0.16	0.31	
3	5	169060195	169060196	5	169127617	169127618	-	TAGTTTT	1238	138	0.10	507	377	0.43	541	223	0.29	-	-	-	-	-	-	-	-	-	698	74	0.10	84	47	0.36	70	35	0.33	0.10	0.39	0.31	
1	5	170770150	170770151	5	170837545	170837546	-	TGCA	1794	142	0.07	742	463	0.38	1206	2	0.00	-	-	-	-	-	-	-	-	-	463	55	0.11	21	14	0.40	26	12	0.32	0.09	0.39	0.16	
2	7	115412686	115412698	7	115625450	115625462	TATTTACTGTGCT	GGGA	6004	0	0.00	2702	0	0.00	3085	0	0.00	-	-	-	-	-	-	-	-	-	909	0	0.00	448	0	0.00	206	89	0.30	0.00	0.00	0.15	
3	11	57364966	57364967	11	57608390	57608391	-	AGTCCC GAAATCAACGTAGAA GTACTCATTATCTGA	1228	0	0.00	2350	0	0.00	1145	665	0.37	-	-	-	-	-	-	-	-	-	-	1095	0	0.00	235	0	0.00	129	83	0.39	0.00	0.00	0.20
1	13	27506273	27506274	13	28608273	28608274	-	GTACTCATTATCTGA	5220	0	0.00	2998	0	0.00	4198	0	0.00	-	-	-	-	-	-	-	-	-	1907	239	0.11	721	413	0.36	690	317	0.31	0.06	0.18	0.16	
3	16	57198624	57198634	16	58641123	58641133	ATATGGATAGT	CCCC	8413	0	0.00	6845	0	0.00	6152	0	0.00	-	-	-	-	-	-	-	-	-	2054	0	0.00	688	1	0.00	338	147	0.30	0.00	0.00	0.15	
1	20	43115216	43115217	20	43681802	43681803	-	GAGCGCGGGGC	3017	0	0.00	3271	0	0.00	1757	569	0.24	-	-	-	-	-	-	-	-	-	-	2205	0	0.00	1586	0	0.00	967	256	0.21	0.00	0.00	0.23
3	21	45384952	45384953	21	46560524	46560525	-	GTA	7791	1882	0.19	3408	3305	0.49	3658	2297	0.39	-	-	-	-	-	-	-	-	-	-	1459	157	0.10	681	279	0.29	929	293	0.24	0.15	0.39	0.31



**Supplementary Table 5c.** Summary information for clusters in primary tumor and relapse samples in UPN 933124.

ID	UPN	Cluster	Primary Tumor Variant Allele Frequency(%)	Relapse Variant Allele Frequency(%)	Normal Variant Allele Frequency (%)
AML1	933124	Cluster1	46.86	42.23	14.73
AML1	933124	Cluster2	24.89	0.24	-
AML1	933124	Cluster3	16	40.04	-
AML1	933124	Cluster4	2.39	38.53	-
AML1	933124	Cluster5	0.04	39.65	-

**Supplementary Table 5d.** Existing copy number annotation for five low-level mutations found in 933124.

Tier	Chr	Start (NCBI 36)	Stop (NCBI 36)	Chr	Start (GRCh37)	Stop (GRCh37)	Reference allele	Variant allele	Classification	Normal copy number	Tumor copy number	Relapse copy number	Annotation Notes
1	16	15030292	15030292	16	15122791	15122791	G	A	Low-level	2	2	2	Segmental duplication. Multiple CNPs in UCSC.
2	X	135056937	135056937	X	135229271	135229271	C	G	Low-level	2	2	2	In HgSV discordant track for CEPH individual as a deletion. No other annotation
3	16	69454209	69454209	16	70896708	70896708	A	G	Low-level	4.07	3.95	4.17	Known copy number polymorphism; in DGV according to UCSC Segmental duplication. Multiple CNPs in UCSC.
3	17	22336285	22336285	17	25312158	25312158	G	T	Low-level	24.85	21.67	19.69	
3	X	12406196	12406196	X	12496275	12496275	G	T	Low-level	2	2	2	Copy number deletion reported in two Encode cancer cell lines

**Supplementary Table 6a.** Somatic point mutations and indels from UPN 400220 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	105196784	105395261	A	C	571	41	0.07	350	305	0.47	299	219	0.42	2	2	2	tier3	shared	1
1	105905196	106103673	C	A	393	0	0.00	470	0	0.00	280	38	0.12	2	2	2	tier3	relapse-specific	1
1	107653116	107851593	C	A	578	36	0.06	493	329	0.40	358	204	0.36	2	2	2	tier3	shared	1
1	114603068	114801545	C	T	670	55	0.08	522	462	0.47	447	260	0.37	2	2	2	tier3	shared	1
1	117954113	118152590	-	CTT	468	21	0.04	341	222	0.39	273	117	0.30	2	2	2	tier3	shared	0
1	158409868	160143244	T	C	589	40	0.06	378	316	0.46	387	228	0.37	2	2	2	tier3	shared	0
1	164924681	166658057	T	C	610	49	0.07	516	452	0.47	418	224	0.35	2	2	2	tier3	shared	0
1	167212445	168945821	G	T	674	45	0.06	526	449	0.46	470	263	0.36	2	2	2	tier3	shared	0
1	174612237	176345614	T	G	628	38	0.06	513	344	0.40	401	249	0.38	2	2	2	tier3	shared	0
1	175056645	176790022	A	G	739	59	0.07	479	451	0.48	434	282	0.39	2	2	2	tier2	shared	2
1	175979341	177712718	A	G	506	30	0.06	363	295	0.45	323	190	0.37	2	2	2	tier3	shared	1
1	189339598	191072975	A	G	557	32	0.05	389	271	0.41	304	170	0.36	2	2	2	tier3	shared	0
1	195382470	197115847	C	T	448	35	0.07	276	288	0.51	223	125	0.36	2	2	2	tier2	shared	0
1	199100456	200833833	C	T	473	39	0.08	353	264	0.43	276	147	0.35	2	2	2	tier3	shared	0
1	202854975	204588352	G	A	481	36	0.07	324	258	0.44	246	161	0.40	2	2	2	tier1	shared	1
1	207486021	209419398	G	A	628	38	0.06	413	301	0.42	383	205	0.35	2	2	2	tier3	shared	0
1	213073767	215007144	G	A	487	36	0.07	364	291	0.44	282	153	0.35	2	2	2	tier3	shared	0
1	22173237	22300650	G	A	820	29	0.03	648	213	0.25	495	145	0.23	2	2	2	tier2	shared	0
1	244551235	246484612	C	T	573	55	0.09	446	326	0.42	347	199	0.36	2	2	2	tier3	shared	0
1	30665401	30892814	C	T	589	31	0.05	384	312	0.45	324	188	0.37	2	2	2	tier3	shared	1
1	41737443	41964856	G	A	568	31	0.05	443	330	0.43	312	227	0.42	2	2	2	tier3	shared	0
1	49957752	50185165	G	A	682	49	0.07	541	418	0.44	473	278	0.37	2	2	2	tier3	shared	0
1	5687865	5765278	G	A	373	25	0.06	232	152	0.40	185	94	0.34	2	2	2	tier2	shared	1
1	70152592	70380004	G	A	583	41	0.07	390	325	0.45	318	199	0.38	2	2	2	tier2	shared	2
1	8042643	8120056	G	A	572	43	0.07	415	333	0.45	361	206	0.36	2	2	2	tier3	shared	0
1	80774045	81001457	T	C	546	46	0.08	412	345	0.46	372	204	0.35	2	2	2	tier3	shared	0
1	97674645	97902057	G	C	693	52	0.07	520	438	0.46	445	265	0.37	2	2	2	tier3	shared	0
10	109432943	109442953	A	T	580	35	0.06	433	318	0.42	368	211	0.36	2	2	2	tier3	shared	1

10	112925930	112935940	T	G	615	47	0.07	525	390	0.43	397	228	0.36	2	2	2	tier3	shared	1
10	119239116	119249126	T	C	685	37	0.05	497	451	0.48	469	278	0.37	2	2	2	tier1	shared	0
10	14343374	14303368	C	T	512	45	0.08	385	341	0.47	371	218	0.37	2	2	2	tier3	shared	0
10	15469409	15429403	C	T	606	49	0.07	412	309	0.43	355	194	0.35	2	2	2	tier3	shared	1
10	21723192	21683186	G	A	396	29	0.07	226	194	0.46	233	116	0.33	2	2	2	tier2	shared	0
10	2310893	2320893	C	T	411	21	0.05	261	219	0.46	234	134	0.36	2	2	2	tier3	shared	1
10	24317005	24276999	C	T	373	20	0.05	233	142	0.38	194	96	0.33	2	2	2	tier3	shared	2
10	36300363	36260357	C	T	612	0	0.00	759	0	0.00	511	61	0.11	2	2	2	tier3	relapse-specific	1
10	445252	455252	C	T	439	23	0.05	281	200	0.42	248	135	0.35	2	2	2	tier2	shared	2
10	53994688	54324682	G	-	500	24	0.05	364	252	0.41	300	170	0.36	2	2	2	tier3	shared	1
10	69053381	69383375	C	A	536	36	0.06	404	323	0.44	358	210	0.37	2	2	2	tier3	shared	1
10	73351816	73681810	C	T	595	31	0.05	493	310	0.39	357	200	0.36	2	2	2	tier3	shared	0
10	83385703	83395723	A	T	480	32	0.06	317	287	0.48	271	155	0.36	2	2	2	tier3	shared	1
11	124756282	125251072	-	TGACCA	542	23	0.04	355	247	0.41	315	135	0.30	2	2	2	tier2	shared	0
11	127853905	128348695	A	G	698	52	0.07	552	387	0.41	477	243	0.34	2	2	2	tier3	shared	0
11	12871691	12915115	G	A	532	20	0.04	280	203	0.42	236	142	0.38	2	2	2	tier3	shared	0
11	130217645	130712435	T	G	578	38	0.06	368	303	0.45	340	174	0.34	2	2	2	tier3	shared	0
11	13467397	13510821	G	A	503	0	0.00	696	0	0.00	436	65	0.13	2	2	2	tier3	relapse-specific	0
11	28296404	28339828	G	A	313	25	0.07	230	158	0.41	203	106	0.34	2	2	2	tier3	shared	0
11	32370187	32413611	C	T	549	33	0.06	394	292	0.43	327	195	0.37	2	2	2	tier1	shared	12
11	34548817	34592241	C	A	585	43	0.07	365	365	0.50	300	197	0.40	2	2	2	tier3	shared	1
11	35949062	35992486	G	-	543	51	0.09	382	316	0.45	336	182	0.35	2	2	2	tier2	shared	1
11	69669846	69992198	C	T	657	56	0.08	468	361	0.44	327	214	0.40	2	2	2	tier3	shared	1
11	75568902	75891254	T	A	394	45	0.10	242	289	0.54	246	184	0.43	2	2	2	tier3	shared	0
11	83201983	83524335	C	T	687	40	0.06	556	423	0.43	455	267	0.37	2	2	2	tier3	shared	0
11	90731004	91091356	C	T	504	23	0.04	400	247	0.38	274	167	0.38	2	2	2	tier2	shared	1
11	9088726	9132150	G	A	702	37	0.05	504	352	0.41	388	230	0.37	2	2	2	tier3	shared	1
11	92651150	93011502	C	A	457	36	0.07	312	244	0.44	245	153	0.38	2	2	2	tier3	shared	1
12	10043169	10151902	T	C	604	41	0.06	476	436	0.48	413	237	0.36	2	2	2	tier3	shared	0
12	104412753	105888623	G	T	714	44	0.06	452	423	0.48	442	280	0.39	2	2	2	tier3	shared	1
12	104628978	106104848	G	T	624	39	0.06	476	446	0.48	441	262	0.37	2	2	2	tier3	shared	1
12	16142063	16250796	C	G	645	39	0.06	454	377	0.45	400	217	0.35	2	2	2	tier3	shared	1
12	18881529	18990262	T	G	640	46	0.07	503	399	0.44	416	259	0.38	2	2	2	tier2	shared	0
12	23767511	23876244	G	A	507	27	0.05	380	254	0.40	287	138	0.32	2	2	2	tier3	shared	1
12	36181843	37895576	C	A	365	0	0.00	429	0	0.00	329	60	0.15	2	2	2	tier3	relapse-specific	1
12	41180619	42894352	G	A	584	36	0.06	385	358	0.48	316	187	0.37	2	2	2	tier3	shared	0
12	48009870	49723603	G	T	674	53	0.07	428	414	0.49	416	216	0.34	2	2	2	tier2	shared	1
12	5273188	5402927	G	T	646	50	0.07	494	365	0.42	432	244	0.36	2	2	2	tier3	shared	0
12	67316409	69030142	A	G	648	0	0.00	846	1	0.00	504	44	0.08	2	2	2	tier2	relapse-specific	1
12	70956260	72669993	C	G	664	44	0.06	444	451	0.50	359	206	0.36	2	2	2	tier2	shared	0

12	72731206	74444939	-	GATGAAGT	474	33	0.07	333	213	0.39	294	125	0.30	2	2	2	tier3	shared	1
12	80233010	81708879	C	G	441	29	0.06	304	223	0.42	252	151	0.37	2	2	2	tier3	shared	0
12	95491709	96967578	C	T	670	47	0.07	492	367	0.43	437	265	0.38	2	2	2	tier3	shared	0
13	112600111	113552110	G	A	556	48	0.08	402	295	0.42	382	123	0.24	2	2	2	tier3	shared	1
13	18521192	19623192	C	T	208	9	0.04	117	97	0.45	73	75	0.51	2	2	2	tier3	shared	0
13	27294628	28396628	C	T GGCGATATTCATATT CTCTGAAATCAACG TAGAAGTACTCATTA TCTGAGGAGCCGG	448	13	0.03	387	234	0.38	340	108	0.24	2	2	2	tier2	shared	0
13	27506258	28608258	-		228	39	0.15	145	226	0.61	108	196	0.64	2	2	2	tier1	shared	50
13	30620781	31722781	T	C	404	21	0.05	278	200	0.42	240	93	0.28	2	2	2	tier3	shared	0
13	52627792	53729791	G	A	594	46	0.07	410	366	0.47	277	276	0.50	2	2	2	tier3	shared	0
13	57520872	58622871	G	T	502	24	0.05	336	304	0.48	215	218	0.50	2	2	2	tier3	shared	1
13	63492022	64594021	G	A	557	37	0.06	379	339	0.47	244	299	0.55	2	2	2	tier3	shared	0
13	77038729	78140728	T	G	559	0	0.00	773	0	0.00	551	77	0.12	2	2	2	tier3	relapse-specific	1
13	81847267	82949266	G	A	565	32	0.05	453	272	0.38	417	167	0.29	2	2	2	tier3	shared	1
13	89301744	90503743	A	C	529	40	0.07	307	321	0.51	215	246	0.53	2	2	2	tier3	shared	0
13	89576015	90778014	G	T	640	33	0.05	445	299	0.40	441	139	0.24	2	2	2	tier3	shared	0
13	89768066	90970065	A	G	414	37	0.08	154	175	0.53	140	147	0.51	2	2	2	tier3	shared	1
13	91491784	92693783	A	G	610	1	0.00	755	0	0.00	475	65	0.12	2	2	2	tier3	relapse-specific	0
14	24812988	25743148	G	A	591	43	0.07	498	374	0.43	433	252	0.37	2	2	2	tier3	shared	0
14	25372740	26302900	C	T	584	48	0.08	413	353	0.46	363	219	0.38	2	2	2	tier3	shared	0
14	36242523	37172772	G	C	638	35	0.05	474	392	0.45	383	190	0.33	2	2	2	tier2	shared	0
14	41568235	42498485	G	A	584	31	0.05	521	371	0.42	405	228	0.36	2	2	2	tier3	shared	1
14	50644101	51574351	T	C	637	34	0.05	421	351	0.45	388	223	0.36	2	2	2	tier3	shared	0
14	65694596	66624843	C	A	519	26	0.05	420	275	0.40	360	203	0.36	2	2	2	tier3	shared	0
14	67106471	68036718	G	A	563	38	0.06	397	350	0.47	331	198	0.37	2	2	2	tier1	shared	2
14	91744188	92674435	C	A	536	25	0.04	358	324	0.48	318	205	0.39	2	2	2	tier3	shared	0
14	99476952	100407199	G	A	728	58	0.07	525	440	0.46	482	298	0.38	2	2	2	tier3	shared	0
15	24251354	26700261	C	A	767	55	0.07	617	483	0.44	575	319	0.36	2	2	2	tier2	shared	1
15	25047792	27465046	C	T	733	44	0.06	537	389	0.42	423	236	0.36	2	2	2	tier3	shared	1
15	25824399	28150804	C	T	457	35	0.07	326	274	0.46	289	186	0.39	2	2	2	tier3	shared	0
15	27767329	29980037	C	A	492	32	0.06	334	271	0.45	250	149	0.37	2	2	2	tier3	shared	0
15	35693981	37906689	G	A	587	1	0.00	653	1	0.00	420	65	0.13	2	2	2	tier3	relapse-specific	1
15	37389389	39602097	C	T	756	41	0.05	550	474	0.46	433	253	0.37	2	2	2	tier3	shared	1
15	43014382	45227090	G	T	543	41	0.07	446	273	0.38	359	199	0.36	2	2	2	tier3	shared	1
15	47931525	50144233	C	-	275	23	0.08	197	126	0.39	145	80	0.36	2	2	2	tier2	shared	0
15	49479651	51692359	C	A	638	41	0.06	491	380	0.44	406	266	0.40	2	2	2	tier3	shared	0
15	56011723	58224431	C	T	470	24	0.05	394	290	0.42	354	165	0.32	2	2	2	tier3	shared	0
15	58437648	60650356	C	T	590	38	0.06	400	306	0.43	302	175	0.37	2	2	2	tier2	shared	0
15	62822332	65035279	G	A	594	39	0.06	353	258	0.42	282	156	0.36	2	2	2	tier3	shared	1
15	68511669	70724615	T	G	616	59	0.09	431	431	0.50	397	241	0.38	2	2	2	tier3	shared	1

15	89955134	92154130	G	A	654	60	0.08	432	359	0.45	400	230	0.37	2	2	2	tier3	shared	1
15	94882853	97081849	C	T	745	39	0.05	472	347	0.42	376	187	0.33	2	2	2	tier2	shared	1
15	96495601	98678078	C	T	688	0	0.00	799	0	0.00	531	78	0.13	2	2	2	tier2	relapse-specific	0
16	30039332	30131831	A	-	302	23	0.07	197	202	0.51	167	143	0.46	2	2	2	tier2	shared	0
16	59035934	60478433	A	T	557	28	0.05	415	323	0.44	354	170	0.32	2	2	2	tier3	shared	1
16	63669317	65111816	G	C	671	46	0.06	499	414	0.45	415	235	0.36	2	2	2	tier3	shared	0
16	9862551	9955050	G	A	493	27	0.05	357	300	0.46	315	197	0.38	2	2	2	tier3	shared	0
17	17733750	17793025	C	T	359	20	0.05	230	211	0.48	236	132	0.36	2	2	2	tier3	shared	0
17	2582250	2635500	C	T	389	23	0.06	284	240	0.46	268	149	0.36	2	2	2	tier3	shared	0
17	61881559	64451097	C	T	416	22	0.05	291	211	0.42	262	143	0.35	2	2	2	tier3	shared	0
17	73286340	75774745	G	A	503	38	0.07	355	241	0.40	261	144	0.36	2	2	2	tier3	shared	1
18	13420874	13430874	C	A	268	23	0.08	148	177	0.54	123	87	0.41	2	2	2	tier3	shared	1
18	3829146	3839146	T	C	550	31	0.05	435	348	0.44	393	189	0.32	2	2	2	tier3	shared	0
18	38616423	40362425	G	A	513	18	0.03	192	137	0.42	193	142	0.42	2	2	2	tier2	shared	0
18	47832910	49578912	G	T	631	37	0.06	488	316	0.39	376	224	0.37	2	2	2	tier3	shared	1
18	5127130	5137130	C	A	735	55	0.07	529	438	0.45	446	287	0.39	2	2	2	tier3	shared	0
18	54996149	56845169	G	A	511	40	0.07	310	287	0.48	304	145	0.32	2	2	2	tier2	shared	0
18	60822336	62671356	G	A	449	36	0.07	239	172	0.42	217	102	0.32	2	2	2	tier3	shared	1
18	67016988	68866008	G	C	499	0	0.00	590	0	0.00	356	56	0.14	2	2	2	tier3	relapse-specific	1
18	67500844	69349864	G	A	713	46	0.06	554	395	0.42	473	287	0.38	2	2	2	tier3	shared	1
18	74862688	76761700	C	T	359	4	0.01	423	15	0.03	258	48	0.16	2	2	2	tier3	shared	0
19	11013955	11152955	G	A	653	47	0.07	421	348	0.45	385	211	0.35	2	2	2	tier3	shared	0
19	15919303	16058303	C	G	555	2	0.00	779	0	0.00	438	71	0.14	2	2	2	tier3	relapse-specific	1
19	2461036	2510036	C	-	491	24	0.05	394	260	0.40	301	155	0.34	2	2	2	tier3	shared	0
19	3935873	3984873	G	A	676	49	0.07	419	408	0.49	379	218	0.37	2	2	1.37	tier2	shared	0
19	55429652	50737840	C	T	301	14	0.04	173	164	0.49	159	105	0.40	2	2	2	tier3	shared	1
19	59835082	55143270	A	T	317	15	0.05	222	168	0.43	168	110	0.40	2	2	2	tier3	shared	1
2	103478832	104112400	C	A	384	1	0.00	432	0	0.00	308	48	0.13	2	2	2	tier2	relapse-specific	1
2	114539392	114822922	G	A	574	39	0.06	437	372	0.46	391	212	0.35	2	2	2	tier2	shared	1
2	121434942	121718472	G	-	462	35	0.07	306	229	0.43	244	134	0.35	2	2	2	tier3	shared	0
2	126663892	126947422	G	T	639	24	0.04	461	364	0.44	383	248	0.39	2	2	2	tier2	shared	1
2	132963412	133246942	C	T	271	14	0.05	149	106	0.42	139	74	0.35	2	2	2	tier2	shared	0
2	133246731	133530261	A	G	649	41	0.06	450	403	0.47	433	245	0.36	2	2	2	tier3	shared	1
2	135287366	135570896	C	T	543	27	0.05	355	312	0.47	307	157	0.34	2	2	2	tier2	shared	0
2	167372682	167664436	G	A	434	26	0.06	296	209	0.41	233	141	0.38	2	2	2	tier3	shared	1
2	205704415	205996170	G	T	663	39	0.06	499	386	0.44	373	223	0.37	2	2	2	tier3	shared	0
2	20689966	20826485	C	T	532	39	0.07	360	302	0.46	289	166	0.36	2	2	2	tier3	shared	0
2	212759483	213051238	G	A	601	31	0.05	453	359	0.44	359	212	0.37	2	2	2	tier3	shared	0
2	223664729	223956485	G	A	754	50	0.06	538	524	0.49	483	314	0.39	2	2	2	tier3	shared	0
2	236277472	236612733	G	A	525	1	0.00	614	0	0.00	408	57	0.12	2	2	2	tier3	relapse-specific	0

2	236651869	236987130	-	CT	587	34	0.05	429	318	0.43	358	191	0.35	2	2	2	tier3	shared	0
2	26593335	26739831	G	A	618	53	0.08	426	312	0.42	345	217	0.39	2	2	2	tier2	shared	2
2	29044813	29191309	G	A	403	31	0.07	310	218	0.41	268	163	0.38	2	2	2	tier3	shared	0
2	30465534	30612030	G	A	491	24	0.05	336	266	0.44	279	174	0.38	2	2	2	tier3	shared	0
2	31191770	31338266	G	C	640	68	0.10	508	455	0.47	388	258	0.40	2	2	2	tier3	shared	0
2	41102181	41248677	C	T	686	55	0.07	482	472	0.49	440	253	0.37	2	2	2	tier2	shared	0
2	4688780	4710905	A	-	637	40	0.06	499	355	0.42	379	197	0.34	2	2	2	tier3	shared	0
2	48298360	48444856	A	G	405	20	0.05	279	190	0.41	219	128	0.37	2	2	2	tier1	shared	1
2	65852014	65998510	C	A	577	36	0.06	497	343	0.41	418	228	0.35	2	2	2	tier3	shared	1
2	71775215	71921707	T	A	544	41	0.07	305	269	0.47	254	167	0.40	2	2	2	tier3	shared	4
2	77025856	77172348	C	T	627	28	0.04	443	303	0.41	330	184	0.36	2	2	2	tier3	shared	0
2	79485391	79631883	G	T	616	43	0.07	379	320	0.46	358	176	0.33	2	2	2	tier2	shared	1
2	81686313	81832802	A	T	538	52	0.09	401	308	0.43	330	205	0.38	2	2	2	tier3	shared	0
2	86918974	87065463	C	T	339	31	0.08	211	199	0.49	181	97	0.35	2	1.25	2	tier3	shared	0
20	11130236	11182236	T	C	260	22	0.08	148	118	0.44	115	71	0.38	2	2	2	tier3	shared	1
20	15271865	15323865	G	A	659	58	0.08	495	421	0.46	470	231	0.33	2	2	2	tier3	shared	0
20	43334043	43900629	T	A	543	30	0.05	344	267	0.44	312	168	0.35	2	2	2	tier3	shared	0
20	46462856	47029449	C	T	509	42	0.08	329	264	0.45	299	177	0.37	2	2	2	tier3	shared	1
20	51492752	52059345	G	A	629	31	0.05	536	324	0.38	387	258	0.40	2	2	2	tier3	shared	0
20	58825522	59392127	G	A	855	53	0.06	635	516	0.45	538	296	0.35	2	2	2	tier3	shared	1
20	61150611	61680166	C	T	358	27	0.07	217	179	0.45	190	108	0.36	2	2	2	tier3	shared	0
21	16218382	17296511	T	C	572	81	0.12	79	762	0.91	190	458	0.71	2	2	2	tier2	shared	0
21	24493749	25571878	G	T	318	26	0.08	191	124	0.39	151	89	0.37	2	2	2	tier3	shared	1
21	35181023	36259153	G	A	312	36	0.10	39	368	0.90	70	233	0.77	2	2	2	tier1	shared	16
22	40742783	42412837	T	C	656	52	0.07	469	381	0.45	404	255	0.39	2	2	2	tier3	shared	0
22	43706552	45327888	G	T	426	33	0.07	279	249	0.47	212	119	0.36	2	2	2	tier3	shared	0
22	46504211	48125547	G	A	395	0	0.00	504	0	0.00	295	31	0.10	2	2	2	tier3	relapse-specific	1
22	47104940	48726276	C	T	568	67	0.11	354	276	0.44	296	178	0.38	2	2	2	tier3	shared	1
3	117821246	116338556	C	T	611	38	0.06	420	336	0.44	312	203	0.39	2	2	2	tier3	shared	0
3	137858004	136375314	C	T	366	31	0.08	277	230	0.45	270	129	0.32	2	2	2	tier2	shared	0
3	140894661	139411971	T	G	561	49	0.08	417	375	0.47	342	188	0.35	2	2	2	tier3	shared	0
3	144167201	142684511	C	G	372	31	0.08	311	234	0.43	254	146	0.37	2	2	2	tier3	shared	1
3	157519440	156036746	T	A	451	34	0.07	350	284	0.45	286	156	0.35	2	2	2	tier3	shared	0
3	160816053	159333359	A	G	708	41	0.05	498	443	0.47	466	263	0.36	2	2	2	tier2	shared	0
3	166118808	164636114	G	A	345	23	0.06	228	190	0.45	206	125	0.38	2	2	2	tier3	shared	1
3	16741744	16766740	T	C	579	42	0.07	506	383	0.43	404	279	0.41	2	2	2	tier3	shared	1
3	21285104	21310100	G	A	644	37	0.05	423	369	0.47	332	194	0.37	2	2	2	tier3	shared	1
3	47267043	47292039	G	A	367	32	0.08	284	238	0.46	224	140	0.38	2	2	2	tier1	shared	0
3	55812597	55837557	-	T	280	39	0.12	230	123	0.35	160	54	0.25	2	2	2	tier3	shared	0
3	62186142	62211102	C	A	427	36	0.08	247	256	0.51	306	169	0.36	2	2	2	tier3	shared	1

3	62667097	62692057	C	T	727	55	0.07	542	430	0.44	449	283	0.39	2	2	2	tier2	shared	3
3	78453063	78370373	C	A	615	36	0.06	511	351	0.41	436	239	0.35	2	2	2	tier3	shared	1
3	80944362	80861672	G	A	231	13	0.05	124	96	0.44	114	67	0.37	2	2	2	tier3	shared	0
3	83012162	82929472	G	A	611	53	0.08	438	346	0.44	367	202	0.36	2	2	2	tier3	shared	1
3	84524853	84442163	C	T	236	8	0.03	99	98	0.50	89	43	0.33	2	2	2	tier3	shared	1
3	84703230	84620540	A	T	713	49	0.06	512	417	0.45	372	282	0.43	2	2	2	tier3	shared	1
3	8577158	8602158	C	A	344	20	0.05	238	190	0.44	193	135	0.41	2	2	2	tier3	shared	0
4	103771667	103552619	C	T	590	38	0.06	341	263	0.44	285	170	0.37	2	2	2	tier3	shared	0
4	128375877	128156427	C	T	559	35	0.06	352	245	0.41	292	179	0.38	2	2	2	tier3	shared	1
4	138437576	138218126	A	C	615	51	0.08	432	392	0.48	420	236	0.36	2	2	2	tier2	shared	1
4	149854954	149635504	C	T	484	25	0.05	363	241	0.40	293	148	0.34	2	2	2	tier3	shared	1
4	159757814	159538364	G	A	573	36	0.06	478	348	0.42	360	179	0.33	2	2	2	tier2	shared	0
4	163972670	163753220	G	A	321	20	0.06	197	143	0.42	172	70	0.29	2	2	2	tier3	shared	1
4	182241806	182004812	G	A	605	38	0.06	399	314	0.44	345	192	0.36	2	2	2	tier3	shared	0
4	42878328	43183571	G	A	510	30	0.06	373	235	0.39	286	138	0.33	2	2	2	tier3	shared	1
4	57086890	57392133	T	A	625	35	0.05	431	369	0.46	359	207	0.37	2	2	2	tier3	shared	0
4	57892553	58197796	G	A	397	11	0.03	360	96	0.21	282	65	0.19	2	2	2	tier3	shared	1
4	59692624	60010029	G	T	573	54	0.09	441	356	0.45	346	201	0.37	2	2	2	tier3	shared	1
4	95813425	95594402	G	A	672	56	0.08	479	395	0.45	453	247	0.35	2	2	2	tier2	shared	0
4	9996433	10387335	C	T	764	45	0.06	540	457	0.46	451	278	0.38	2	2	2	tier3	shared	1
5	10128058	10075058	G	A	171	9	0.05	110	71	0.39	132	51	0.28	2	2	2	tier3	shared	1
5	117968777	117940878	C	T	520	0	0.00	725	0	0.00	430	69	0.14	2	2	2	tier3	relapse-specific	1
5	120072505	120044606	C	A	363	30	0.08	330	233	0.41	250	149	0.37	2	2	2	tier3	shared	0
5	133094851	133066952	G	A	670	41	0.06	491	387	0.44	427	259	0.38	2	2	2	tier3	shared	1
5	144608757	144628564	A	G	560	25	0.04	425	377	0.47	351	194	0.36	2	2	2	tier3	shared	0
5	151603256	151623063	G	A	584	40	0.06	454	334	0.42	402	238	0.37	2	2	2	tier3	shared	1
5	152414334	152434141	G	A	615	43	0.07	437	331	0.43	376	213	0.36	2	2	2	tier3	shared	1
5	15604235	15551235	C	T	560	56	0.09	397	324	0.45	289	226	0.44	2	2	2	tier3	shared	1
5	163388728	163456150	C	T	440	37	0.08	308	245	0.44	252	123	0.33	2	2	2	tier2	shared	1
5	180444238	180511632	G	A	492	31	0.06	311	220	0.41	231	135	0.37	2	2	2	tier3	shared	0
5	18609048	18573291	C	T	510	43	0.08	340	280	0.45	364	189	0.34	2	2	2	tier3	shared	0
5	21019091	20983334	G	A	329	25	0.07	240	191	0.44	192	125	0.39	2	2	2	tier3	shared	1
5	26999460	26963703	G	A	564	41	0.07	374	320	0.46	306	182	0.37	2	2	2	tier2	shared	0
5	33822985	33787228	G	T	754	39	0.05	544	413	0.43	472	262	0.36	2	2	2	tier3	shared	2
5	51307451	51271694	G	A	460	23	0.05	404	192	0.32	267	142	0.35	2	2	2	tier3	shared	1
5	58678318	58642561	G	A	611	36	0.06	431	318	0.42	355	234	0.40	2	2	2	tier3	shared	0
5	7054382	7001382	G	A	682	53	0.07	515	352	0.41	420	244	0.37	2	2	2	tier3	shared	0
6	102435823	102329130	A	G	214	17	0.07	83	140	0.63	76	59	0.44	2	2	2	tier3	shared	3
6	102637676	102530983	G	T	642	33	0.05	423	280	0.40	376	210	0.36	2	2	2	tier3	shared	3
6	108659871	108553178	T	C	390	35	0.08	288	243	0.46	256	167	0.39	2	2	2	tier3	shared	0



6	112111782	112005089	A	G	672	33	0.05	431	348	0.45	374	201	0.35	2	2	2	tier3	shared	0
6	117330941	117224248	C	T	602	0	0.00	865	0	0.00	570	61	0.10	2	2	2	tier3	relapse-specific	0
6	129651674	129609981	C	G	532	41	0.07	448	350	0.44	384	239	0.38	2	2	2	tier3	shared	1
6	133869595	133827902	C	A	603	37	0.06	440	347	0.44	347	215	0.38	2	2	2	tier3	shared	1
6	136639071	136597378	G	A	623	18	0.03	535	195	0.27	561	135	0.19	2	2	2	tier1	shared	1
6	138073427	138031734	-	TTAAGGAGGGCGGCAC	652	34	0.05	526	286	0.35	503	178	0.26	2	2	2	tier3	shared	0
6	140834440	140792747	C	T	566	31	0.05	437	284	0.39	300	160	0.35	2	2	2	tier3	shared	1
6	144959652	144917959	G	T	638	49	0.07	452	416	0.48	386	210	0.35	2	2	2	tier3	shared	0
6	148467197	148425504	G	C	613	0	0.00	788	0	0.00	505	58	0.10	2	2	2	tier2	relapse-specific	1
6	155039699	154998007	C	G	388	21	0.05	295	213	0.42	224	118	0.35	2	2	2	tier3	shared	0
6	170584453	170742528	C	A	467	47	0.09	351	306	0.47	301	189	0.39	2	2	2	tier3	shared	0
6	25534026	25426047	C	T	476	30	0.06	372	264	0.42	279	156	0.36	2	2	2	tier3	shared	0
6	35320457	35212479	C	T	618	54	0.08	403	342	0.46	331	197	0.37	2	2	2	tier1	shared	1
6	39215608	39107630	C	T	618	31	0.05	423	382	0.47	387	233	0.38	2	2	2	tier3	shared	0
6	42172380	42064402	G	T	728	45	0.06	533	452	0.46	468	244	0.34	2	2	2	tier3	shared	0
6	43917751	43809773	T	C	440	33	0.07	296	219	0.43	251	132	0.34	2	2	2	tier2	shared	1
6	48934792	48826833	C	T	498	23	0.04	338	289	0.46	283	164	0.37	2	2	2	tier3	shared	0
6	50327431	50219472	C	T	597	2	0.00	777	34	0.04	490	71	0.13	2	2	2	tier3	shared	1
6	54584891	54476932	A	T	445	34	0.07	253	203	0.45	273	134	0.33	2	2	2	tier3	shared	0
6	62769565	62711606	C	T	520	31	0.06	338	329	0.49	318	181	0.36	2	2	2	tier3	shared	0
6	69657302	69600581	A	C	571	43	0.07	411	353	0.46	307	239	0.44	2	2	2	tier2	shared	0
6	72286158	72229437	G	T	508	42	0.08	378	321	0.46	344	209	0.38	2	2	2	tier3	shared	0
6	74131215	74074494	C	T	539	36	0.06	363	331	0.48	305	200	0.40	2	2	2	tier3	shared	0
6	87528255	87471536	C	A	573	38	0.06	426	307	0.42	352	209	0.37	2	2	2	tier3	shared	0
6	91777441	91720720	G	A	540	29	0.05	426	310	0.42	314	171	0.35	2	2	2	tier3	shared	1
7	11736619	11770094	G	A	221	11	0.05	120	58	0.33	81	45	0.36	2	2	2	tier3	shared	1
7	120243306	120456070	G	A	462	0	0.00	512	0	0.00	334	42	0.11	2	2	2	tier2	relapse-specific	0
7	125947995	126160759	G	A	451	35	0.07	278	189	0.40	272	167	0.38	2	2	2	tier3	shared	2
7	134071389	134420849	C	T	663	51	0.07	459	376	0.45	417	248	0.37	2	2	2	tier3	shared	1
7	134484051	134833511	T	C	657	42	0.06	493	406	0.45	398	271	0.41	2	2	2	tier3	shared	0
7	141400429	141753960	C	A	831	0	0.00	1054	0	0.00	667	111	0.14	2	2	2	tier3	relapse-specific	1
7	153522252	153891319	G	T	655	29	0.04	460	318	0.41	374	249	0.40	2	2	2	tier2	shared	2
7	34575612	34609087	C	A	617	46	0.07	436	347	0.44	386	246	0.39	2	2	2	tier3	shared	0
7	36164668	36198143	T	C	691	52	0.07	534	416	0.44	459	301	0.40	2	2	2	tier3	shared	0
7	53419185	53451691	A	G	425	36	0.08	286	247	0.46	240	167	0.41	2	2	2	tier3	shared	0
7	55021646	55054152	C	T	642	31	0.05	527	380	0.42	415	224	0.35	2	2	2	tier3	shared	2
7	57590107	57586165	G	A	528	42	0.07	396	286	0.42	383	220	0.36	2	2	2	tier3	shared	1
7	57788624	57784682	A	C	343	15	0.04	220	168	0.43	194	107	0.36	2	2	2	tier3	shared	1
7	61075177	61071235	T	A	190	8	0.04	103	88	0.46	105	48	0.31	2	2	2	tier3	shared	1
7	63378125	63740690	C	T	554	32	0.05	391	316	0.45	304	232	0.43	2	2	2	tier2	shared	0

7	77408266	77570330	G	A	375	30	0.07	274	242	0.47	208	156	0.43	2	2	2	tier3	shared	0
7	79502966	79665030	A	G	743	44	0.06	617	510	0.45	489	313	0.39	2	2	2	tier2	shared	1
8	107021016	106951840	G	A	545	31	0.05	430	290	0.40	360	188	0.34	2	2	2	tier3	shared	0
8	136135323	136066141	C	T	627	48	0.07	428	374	0.47	315	218	0.41	2	2	2	tier2	shared	1
8	137761297	137692115	G	A	835	37	0.04	632	486	0.43	552	289	0.34	2	2	2	tier3	shared	1
8	139534894	139465712	A	G	480	28	0.06	289	223	0.44	286	138	0.33	2	2	2	tier2	shared	0
8	16022443	15978072	G	A	397	27	0.06	239	254	0.52	199	118	0.37	2	2	2	tier1	shared	1
8	23156984	23101039	T	C	382	24	0.06	267	200	0.43	198	138	0.41	2	2	2	tier2	shared	0
8	35701905	35582363	G	A	634	57	0.08	479	371	0.44	384	229	0.37	2	2	2	tier3	shared	1
8	41907838	41788681	G	C	696	47	0.06	532	409	0.43	445	292	0.40	2	2	2	tier2	shared	0
8	65301702	65139148	C	A	530	47	0.08	412	325	0.44	343	184	0.35	2	2	2	tier2	shared	1
8	6610082	6622672	T	C	630	0	0.00	805	1	0.00	492	95	0.16	2	2	2	tier3	relapse-specific	0
8	70296360	70133806	T	A	615	42	0.06	482	349	0.42	382	241	0.39	2	2	2	tier3	shared	1
9	103397767	104357946	C	T	682	63	0.08	543	460	0.46	461	279	0.38	2	2	2	tier3	shared	1
9	120838579	121798758	G	A	709	42	0.06	433	338	0.44	373	196	0.34	2	2	2	tier2	shared	1
9	136294980	137155159	-	GTCTGT	465	35	0.07	332	219	0.40	268	127	0.32	2	2	2	tier3	shared	1
9	25406366	25416366	G	T	338	9	0.03	227	165	0.42	190	111	0.37	2	2	2	tier3	shared	1
9	44704024	44764028	C	T	211	8	0.04	103	76	0.42	128	0	0.00	2	1.35	2	tier3	tumor-specific	0
9	72996586	73806766	C	T	426	24	0.05	306	236	0.44	242	153	0.39	2	2	2	tier3	shared	1
9	82162464	82972644	C	T	577	42	0.07	358	324	0.48	330	210	0.39	2	2	2	tier3	shared	0
9	98933679	99893858	C	T	135	11	0.08	86	45	0.34	78	48	0.38	2	2	2	tier3	shared	0
X	110529928	110643272	G	T	666	42	0.06	523	345	0.40	382	241	0.39	2	2	2	tier3	shared	0
X	125965730	126138049	C	T	657	50	0.07	415	320	0.44	399	253	0.39	2	2	2	tier3	shared	1
X	132149351	132321685	G	A	702	44	0.06	489	375	0.43	422	241	0.36	2	2	2	tier3	shared	0
X	138598168	138770502	C	A	573	40	0.07	371	304	0.45	313	204	0.39	2	2	2	tier2	shared	0
X	139300091	139472425	C	G	632	48	0.07	382	351	0.48	366	212	0.37	2	2	2	tier3	shared	0
X	14703698	14793777	C	A	547	42	0.07	405	344	0.46	363	192	0.35	2	2	2	tier3	shared	0
X	149619579	149868921	T	C	706	56	0.07	462	374	0.45	430	257	0.37	2	2	2	tier3	shared	2
X	20146561	20236640	A	G	386	37	0.09	321	245	0.43	229	128	0.36	2	2	2	tier3	shared	0
X	21650360	21740439	C	T	573	57	0.09	391	274	0.41	343	176	0.34	2	2	2	tier3	shared	0
X	26806418	26896497	G	A	529	38	0.07	376	331	0.47	317	186	0.37	2	2	2	tier3	shared	1
X	27321309	27411388	AAAACATATTCCAAA	-	503	53	0.10	433	336	0.44	339	188	0.36	2	2	2	tier3	shared	0
X	27677257	27767336	C	T	530	17	0.03	522	115	0.18	440	72	0.14	2	2	2	tier3	shared	0
X	37616787	37731843	T	C	604	34	0.05	406	322	0.44	341	209	0.38	2	2	2	tier3	shared	0
X	39818802	39933858	C	-	539	52	0.09	407	412	0.50	389	214	0.35	2	2	2	tier1	shared	0
X	41959339	42074395	C	T	652	36	0.05	448	352	0.44	403	208	0.34	2	2	2	tier3	shared	0
X	7138841	7128841	G	A	57	9	0.14	3	37	0.93	1	24	0.96	2	2	2	tier3	shared	0
X	7449501	7439501	C	A	715	1	0.00	877	0	0.00	577	91	0.14	2	2	2	tier2	relapse-specific	1
X	89105562	89218906	G	T	485	27	0.05	352	258	0.42	273	153	0.36	2	0.9	1.1	tier3	shared	0
X	89181903	89295247	C	T	740	0	0.00	982	0	0.00	699	62	0.08	2	2	2	tier1	relapse-specific	1

**Supplementary Table 6b.** Somatic point mutations and indels from UPN 426980 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI_36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	101393361	101620773	C	T	688	7	0.01	414	326	0.44	735	515	0.41	2	2	2	tier2	shared	0
1	105143735	105342212	C	G	905	14	0.02	532	443	0.45	973	692	0.42	2	2	2	tier3	shared	1
1	1105467	1115604	C	T	315	38	0.11	162	120	0.43	36	40	0.53	2	1.25	1.38	tier1	shared	0
1	118156398	118354875	C	T	444	7	0.02	310	260	0.46	421	369	0.47	2	2	2	tier2	shared	0
1	119892131	120090608	G	T	451	0	0.00	551	4	0.01	716	226	0.24	2	2	2	tier3	relapse-specific	0
1	145465273	146998649	A	C	379	4	0.01	318	249	0.44	636	479	0.43	2	2	2	tier3	shared	0
1	145742928	147276304	G	A	595	7	0.01	414	338	0.45	780	585	0.43	2	2	2	tier3	shared	0
1	151632796	153366172	G	A	520	7	0.01	394	291	0.42	880	112	0.11	2	2	2	tier3	shared	0
1	154189110	155922486	G	T	455	10	0.02	301	189	0.39	326	191	0.37	2	2	2	tier1	shared	1
1	162390535	164123911	A	G	655	9	0.01	424	355	0.46	805	600	0.43	2	2	2	tier3	shared	1
1	164527242	166260618	C	T	594	0	0.00	764	7	0.01	955	410	0.30	2	2	2	tier3	relapse-specific	0
1	168963347	170696723	G	A	570	7	0.01	352	283	0.45	461	286	0.38	2	2	2	tier3	shared	0
1	175508370	177241747	C	T	622	4	0.01	431	320	0.43	651	434	0.40	2	2	2	tier3	shared	0
1	181141559	182874936	C	T	547	9	0.02	366	237	0.39	511	360	0.41	2	2	2	tier3	shared	0
1	182353408	184086785	G	C	646	6	0.01	365	314	0.46	640	462	0.42	2	2	2	tier3	shared	0
1	184219659	185953036	A	G	657	16	0.02	437	359	0.45	381	304	0.44	2	2	2	tier3	shared	4
1	185120932	186854309	G	A	731	11	0.01	465	399	0.46	1703	1189	0.41	2	2	2	tier2	shared	0
1	18730737	18858150	C	T	413	1	0.00	578	3	0.01	675	326	0.33	2	2	2	tier3	relapse-specific	1
1	187595261	189328638	T	C	523	8	0.02	318	282	0.47	445	327	0.42	2	2	2	tier3	shared	1
1	187909251	189642628	G	A	622	8	0.01	378	313	0.45	341	262	0.43	2	2	2	tier3	shared	1
1	199529289	201262666	G	A	445	7	0.02	310	249	0.45	236	168	0.42	2	2	2	tier3	shared	0
1	201235198	202968575	G	A	566	12	0.02	366	298	0.45	255	160	0.39	2	2	2	tier2	shared	0
1	204839488	206772865	T	C	399	7	0.02	257	259	0.50	424	360	0.46	2	2	2	tier1	shared	1
1	207753849	209687226	G	T	480	8	0.02	303	255	0.46	724	538	0.43	2	2	2	tier2	shared	1
1	211654724	213588101	T	C	185	5	0.03	119	77	0.39	246	124	0.34	2	2	2	tier3	shared	0
1	212037538	213970915	C	T	757	0	0.00	861	7	0.01	801	401	0.33	2	2	2	tier2	relapse-specific	1
1	21472135	21599548	C	T	521	4	0.01	319	296	0.48	170	114	0.40	2	2	2	tier2	shared	0
1	214814537	216747914	G	A	642	8	0.01	434	364	0.46	432	271	0.39	2	2	2	tier3	shared	0
1	214823009	216756386	-	A	415	14	0.03	369	217	0.37	411	234	0.36	2	2	2	tier3	shared	0

1	215053873	216987250	G	A	886	13	0.01	594	357	0.38	1184	5	0.00	2	2	2	tier2	tumor-specific	0
1	216303921	218237298	T	C	745	4	0.01	592	399	0.40	976	647	0.40	2	2	2	tier2	shared	1
1	220229180	222162557	A	C	846	22	0.03	582	422	0.42	1236	813	0.40	2	2	2	tier3	shared	0
1	224891642	226825019	G	A	440	9	0.02	262	256	0.49	210	157	0.43	2	2	2	tier2	shared	0
1	22831628	22959041	C	T	726	2	0.00	770	12	0.02	430	187	0.30	2	2	2	tier3	relapse-specific	0
1	231376911	233310288	T	A	403	4	0.01	284	245	0.46	338	243	0.42	2	2	2	tier3	shared	0
1	231645734	233579111	G	A	826	13	0.02	559	421	0.43	638	465	0.42	2	2	2	tier3	shared	1
1	234870833	236804210	A	G	1247	21	0.02	941	443	0.32	1729	777	0.31	2	2	2	tier3	shared	0
1	235735186	237668563	G	A	951	1	0.00	1068	7	0.01	1262	474	0.27	2	2	2	tier3	relapse-specific	0
1	236046085	237979462	C	T	753	12	0.02	422	361	0.46	539	422	0.44	2	2	2	tier2	shared	0
1	238987024	240920401	G	A	641	13	0.02	421	314	0.43	392	313	0.44	2	2	2	tier3	shared	0
1	240678783	242612160	G	A	809	12	0.01	476	366	0.43	1466	180	0.11	2	2	2	tier3	shared	1
1	24106057	24233470	C	T	920	10	0.01	588	470	0.44	494	343	0.41	2	2	2	tier2	shared	0
1	246896247	248829624	G	A	403	6	0.01	266	172	0.39	436	258	0.37	2	2	2	tier3	shared	0
1	27746319	27873732	C	T	602	7	0.01	420	312	0.43	339	263	0.44	2	2	2	tier3	shared	0
1	29998919	30226332	G	T	356	6	0.02	221	228	0.51	229	147	0.39	2	2	2	tier3	shared	1
1	32266340	32493753	G	T	485	4	0.01	343	244	0.42	261	0	0.00	2	2	2	tier3	tumor-specific	0
1	34313330	34540743	G	A	610	15	0.02	370	338	0.48	532	453	0.46	2	2	2	tier3	shared	0
1	3628599	3638739	C	T	473	7	0.01	272	207	0.43	11	13	0.54	2	2	2	tier1	shared	0
1	38002399	38229812	C	T	349	3	0.01	203	175	0.46	260	161	0.38	2	2	2	tier2	shared	3
1	41706896	41934309	T	C	216	1	0.00	272	189	0.41	482	69	0.13	2	2	2	tier3	shared	0
1	44238718	44466131	C	T	427	5	0.01	257	223	0.46	396	290	0.42	2	2	2	tier3	shared	3
1	46486887	46714300	G	A	397	4	0.01	309	221	0.42	103	88	0.46	2	2	2	tier3	shared	0
1	49353893	49581306	G	A	496	5	0.01	433	309	0.42	653	492	0.43	2	2	2	tier3	shared	0
1	57959013	58186425	G	A	522	6	0.01	378	299	0.44	716	566	0.44	2	2	2	tier3	shared	0
1	58062591	58290003	G	A	585	15	0.03	387	303	0.44	815	101	0.11	2	2	2	tier3	shared	0
1	62517067	62744479	T	C	781	7	0.01	470	391	0.45	826	609	0.42	2	2	2	tier3	shared	0
1	64758033	64985445	A	G	505	11	0.02	346	289	0.46	467	313	0.40	2	2	2	tier3	shared	1
1	66455603	66683015	C	T	825	12	0.01	510	449	0.47	1329	849	0.39	2	2	2	tier3	shared	0
1	68003365	68230777	T	G	545	8	0.01	332	279	0.46	340	274	0.45	2	2	2	tier3	shared	0
1	70011661	70239073	G	C	458	3	0.01	416	313	0.43	1315	981	0.43	2	2	2	tier3	shared	2
1	70313793	70541205	C	T	570	7	0.01	498	358	0.42	1214	24	0.02	2	2	2	tier3	tumor-specific	2
1	72971329	73198741	T	G	245	4	0.02	174	176	0.50	143	134	0.48	2	2	2	tier3	shared	0
1	76285296	76512708	C	T	411	2	0.00	338	294	0.47	708	528	0.43	2	2	2	tier3	shared	0
1	78098735	78326147	G	A	659	13	0.02	378	350	0.48	438	336	0.43	2	2	2	tier3	shared	0
1	80262063	80489475	C	A	445	7	0.02	338	288	0.46	567	1	0.00	2	2	2	tier3	tumor-specific	1
1	82981466	83208878	T	G	330	2	0.01	292	208	0.42	244	185	0.43	2	2	2	tier3	shared	1
1	8610857	8688270	C	A	825	9	0.01	461	378	0.45	751	591	0.44	2	2	2	tier3	shared	1
1	87284832	87512244	C	A	603	12	0.02	334	288	0.46	506	348	0.41	2	2	2	tier2	shared	0
1	89433568	89660980	C	A	572	1	0.00	650	9	0.01	461	218	0.32	2	2	2	tier1	relapse-specific	2

1	91498853	91726265	C	T	480	7	0.01	282	198	0.41	295	179	0.38	2	2	2	tier2	shared	0
1	96777968	97005380	G	A	826	11	0.01	510	444	0.47	1198	854	0.42	2	2	2	tier3	shared	0
1	99828834	100056246	G	A	910	13	0.01	475	422	0.47	1526	191	0.11	2	2	2	tier3	shared	1
10	100679446	100689456	A	C	729	0	0.00	761	9	0.01	635	274	0.30	2	2	2	tier2	relapse-specific	0
10	106329053	106339063	G	A	530	0	0.00	692	11	0.02	487	199	0.29	2	2	2	tier2	relapse-specific	1
10	106427870	106437880	C	T	733	11	0.01	436	351	0.45	721	513	0.42	2	2	2	tier3	shared	1
10	106961580	106971590	C	A	585	6	0.01	397	328	0.45	389	262	0.40	2	2	2	tier3	shared	1
10	107464815	107474825	A	G	381	5	0.01	250	199	0.44	1067	735	0.41	2	2	2	tier3	shared	0
10	112425052	112435062	G	A	538	8	0.01	397	329	0.45	492	392	0.44	2	2	2	tier3	shared	0
10	113939543	113949553	C	-	695	4	0.01	505	350	0.41	611	390	0.39	2	2	2	tier3	shared	0
10	119569098	119579108	C	A	490	6	0.01	333	276	0.45	479	270	0.36	2	2	2	tier3	shared	1
10	120068920	120078930	T	C	570	5	0.01	369	271	0.42	356	306	0.46	2	2	2	tier3	shared	0
10	122869500	122879510	G	A	845	8	0.01	541	412	0.43	1579	4	0.00	2	2	2	tier3	tumor-specific	0
10	129477518	129587528	A	T	546	0	0.00	661	15	0.02	152	60	0.28	2	2	2	tier2	shared	0
10	131267265	131377275	G	A	580	12	0.02	361	296	0.45	238	170	0.42	2	2	2	tier3	shared	0
10	131606443	131716453	G	A	522	11	0.02	348	302	0.46	196	133	0.40	2	2	2	tier3	shared	0
10	133030953	133140963	G	A	660	0	0.00	621	7	0.01	361	294	0.45	2	2	2	tier3	relapse-specific	1
10	133123730	133233740	G	A	548	5	0.01	295	244	0.45	370	248	0.40	2	2	2	tier3	shared	1
10	134689001	134839011	C	T	595	7	0.01	353	248	0.41	102	0	0.00	2	1.36	2	tier3	tumor-specific	1
10	14197973	14157967	C	T	780	11	0.01	485	397	0.45	904	608	0.40	2	2	2	tier3	shared	0
10	16571520	16531514	T	-	498	7	0.01	398	281	0.41	644	437	0.40	2	2	2	tier3	shared	0
10	21774153	21734147	C	G	602	0	0.00	788	7	0.01	523	203	0.28	2	2	2	tier2	relapse-specific	0
10	24053538	24013532	T	A	461	0	0.00	588	5	0.01	632	274	0.30	2	2	2	tier3	relapse-specific	2
10	35053174	35013168	A	G	579	11	0.02	318	337	0.51	583	508	0.47	2	2	2	tier2	shared	1
10	36520796	36480790	C	A	453	5	0.01	325	290	0.47	736	536	0.42	2	2	2	tier3	shared	1
10	37158144	37118138	C	T	325	0	0.00	418	4	0.01	287	93	0.24	2	2	2	tier3	relapse-specific	1
10	37641146	37601140	C	T	583	4	0.01	445	417	0.48	1363	188	0.12	2	2	2	tier2	shared	0
10	49813619	50143613	C	T	644	6	0.01	450	324	0.42	533	342	0.39	2	2	2	tier3	shared	0
10	52992328	53322322	C	A	742	2	0.00	880	3	0.00	868	384	0.31	2	2	2	tier2	relapse-specific	0
10	5825694	5785688	A	C	606	15	0.02	416	305	0.42	313	249	0.44	2	2	2	tier3	shared	1
10	58352080	58682074	C	T	594	7	0.01	449	304	0.40	789	106	0.12	2	2	2	tier3	shared	1
10	58951851	59281845	C	T	702	8	0.01	410	312	0.43	342	253	0.43	2	2	2	tier3	shared	0
10	6072229	6032223	T	C	580	11	0.02	399	312	0.44	241	196	0.45	2	2	2	tier3	shared	0
10	6189881	6149875	G	A	493	10	0.02	282	203	0.42	334	251	0.43	2	2	2	tier3	shared	0
10	63067047	63397041	A	G	373	3	0.01	224	186	0.45	254	191	0.43	2	2	2	tier3	shared	0
10	65525766	65855760	C	T	643	6	0.01	365	282	0.44	431	267	0.38	2	2	2	tier3	shared	1
10	65586533	65916527	T	-	510	6	0.01	322	243	0.43	551	333	0.38	2	2	2	tier3	shared	0
10	79512024	79842018	G	A	816	14	0.02	454	361	0.44	984	681	0.41	2	2	2	tier2	shared	0
10	79693537	80023531	C	T	606	10	0.02	402	369	0.48	576	391	0.40	2	2	2	tier3	shared	1
10	7974199	7934193	G	A	557	9	0.02	315	257	0.45	458	268	0.37	2	2	2	tier3	shared	0

10	81829774	81839794	C	T	737	13	0.02	445	383	0.46	435	328	0.43	2	2	2	tier2	shared	0
10	84233189	84243209	T	C	742	6	0.01	500	349	0.41	1467	939	0.39	2	2	2	tier3	shared	1
10	84773201	84783221	C	G	631	3	0.00	686	151	0.18	1443	1	0.00	2	2	2	tier3	tumor-specific	1
10	87275037	87285057	A	-	734	13	0.02	480	342	0.42	632	437	0.41	2	2	2	tier2	shared	0
10	89666645	89676665	T	C	620	9	0.01	438	335	0.43	1980	6	0.00	2	2	2	tier3	tumor-specific	0
10	90135755	90145775	C	G	618	13	0.02	412	322	0.44	742	99	0.12	2	2	2	tier3	shared	0
10	91687622	91697642	C	T	604	5	0.01	354	306	0.46	788	476	0.38	2	2	2	tier3	shared	0
10	97380898	97390908	T	C	775	14	0.02	484	426	0.47	474	342	0.42	2	2	2	tier3	shared	0
11	101052879	101547669	A	G	648	9	0.01	358	322	0.47	564	411	0.42	2	2	2	tier3	shared	1
11	105019563	105514353	T	C	682	10	0.01	481	400	0.45	527	391	0.43	2	2	2	tier3	shared	0
11	107076075	107570865	C	G	578	10	0.02	328	304	0.48	392	298	0.43	2	2	2	tier3	shared	0
11	111880324	112375114	C	T	385	4	0.01	251	246	0.49	401	316	0.44	2	2	2	tier3	shared	0
11	11195136	11238560	G	A	503	9	0.02	350	248	0.41	880	633	0.42	2	2	2	tier2	shared	1
11	112163120	112657910	C	T	694	6	0.01	484	411	0.46	584	486	0.45	2	2	2	tier2	shared	1
11	112700960	113195750	A	T	300	4	0.01	247	211	0.46	604	387	0.39	2	2	2	tier3	shared	0
11	112788535	113283325	G	A	661	8	0.01	483	353	0.42	838	121	0.13	2	2	2	tier1	shared	3
11	113654890	114149680	G	A	407	7	0.02	305	266	0.47	579	402	0.41	2	2	2	tier3	shared	0
11	114673288	115168078	G	A	655	13	0.02	450	358	0.44	677	448	0.40	2	2	2	tier2	shared	0
11	115268684	115763474	C	T	794	10	0.01	486	385	0.44	1592	1164	0.42	2	2	2	tier2	shared	0
11	126198932	126693722	G	T	440	2	0.00	535	95	0.15	1462	0	0.00	2	2	2	tier3	tumor-specific	0
11	131387313	131882103	C	T	546	3	0.01	370	298	0.45	874	553	0.39	2	2	2	tier2	shared	0
11	132379291	132874081	A	G	561	5	0.01	388	346	0.47	674	418	0.38	2	2	2	tier3	shared	0
11	132852036	133346826	C	T	723	9	0.01	383	328	0.46	828	584	0.41	2	2	2	tier3	shared	0
11	132950129	133444919	T	A	589	12	0.02	417	376	0.47	294	208	0.41	2	2	2	tier3	shared	0
11	133896437	134391227	C	A	684	8	0.01	367	335	0.48	348	288	0.45	2	2	2	tier3	shared	1
11	134163837	134658627	G	A	692	12	0.02	475	347	0.42	829	634	0.43	2	2	2	tier3	shared	1
11	23229336	23272760	G	A	420	8	0.02	253	183	0.42	236	147	0.38	2	2	2	tier3	shared	1
11	25378975	25422399	G	A	654	6	0.01	426	302	0.41	979	139	0.12	2	2	2	tier2	shared	1
11	25798017	25841441	C	A	343	3	0.01	218	126	0.37	230	125	0.35	2	2	2	tier3	shared	1
11	26915201	26958625	G	A	780	0	0.00	766	15	0.02	1046	478	0.31	2	2	2	tier3	relapse-specific	1
11	27181250	27224674	T	A	602	0	0.00	678	4	0.01	724	190	0.21	2	2	2	tier3	relapse-specific	1
11	29982645	30026069	G	A	581	0	0.00	594	7	0.01	557	236	0.30	2	2	2	tier3	relapse-specific	1
11	35240206	35283630	A	G	706	15	0.02	376	328	0.47	568	429	0.43	2	2	2	tier2	shared	1
11	36946532	36989956	G	A	640	1	0.00	428	358	0.46	1005	667	0.40	2	2	2	tier3	shared	1
11	39838693	39882117	TATT	-	297	7	0.02	174	211	0.55	243	249	0.51	2	2	2	tier3	shared	1
11	40908778	40952202	C	A	792	15	0.02	559	452	0.45	1083	160	0.13	2	2	2	tier3	shared	1
11	41590836	41634260	C	T	553	4	0.01	360	297	0.45	769	616	0.44	2	2	2	tier3	shared	1
11	42335523	42378947	G	A	610	9	0.01	443	364	0.45	639	451	0.41	2	2	2	tier3	shared	1
11	42653124	42696548	C	T	704	6	0.01	459	279	0.38	1379	136	0.09	2	2	2	tier3	shared	1
11	44434800	44478224	A	T	466	8	0.02	290	236	0.45	363	246	0.40	2	2	2	tier2	shared	1

11	45926741	45970165	C	T	514	7	0.01	392	279	0.42	559	323	0.37	2	2	2	tier3	shared	1
11	54809368	55052792	A	-	386	3	0.01	240	171	0.42	367	218	0.37	2	2	2	tier3	shared	1
11	56001745	56245169	T	A	648	7	0.01	349	299	0.46	393	311	0.44	2	2	2	tier3	shared	1
11	58285661	58529085	C	G	715	13	0.02	459	419	0.48	1126	138	0.11	2	2	2	tier3	shared	1
11	61231163	61474587	C	T	279	0	0.00	315	4	0.01	133	58	0.30	2	2	2	tier3	relapse-specific	1
11	64708652	64952076	A	G	400	8	0.02	237	162	0.41	243	171	0.41	2	2	2	tier2	shared	1
11	71927795	72250147	C	A	475	4	0.01	274	229	0.46	758	461	0.38	2	2	2	tier3	shared	1
11	72603052	72925404	G	A	256	4	0.02	221	192	0.46	171	128	0.43	2	2	2	tier2	shared	1
11	72623244	72945596	G	T	605	10	0.02	340	291	0.46	316	40	0.11	2	2	2	tier1	shared	2
11	75643493	75965845	A	G	496	4	0.01	337	282	0.46	475	384	0.45	2	2	2	tier3	shared	1
11	81152507	81474859	C	T	730	9	0.01	486	376	0.44	1163	153	0.12	2	2	2	tier3	shared	1
11	81336777	81659129	A	G	637	7	0.01	452	318	0.41	1008	126	0.11	2	2	2	tier3	shared	1
11	84939643	85261995	C	A	791	6	0.01	477	374	0.44	865	530	0.38	2	2	2	tier3	shared	1
11	90823611	91183963	A	T	409	7	0.02	252	250	0.50	232	224	0.49	2	2	2	tier3	shared	1
11	93400566	93760918	C	T	888	11	0.01	494	397	0.45	1122	804	0.42	2	2	2	tier3	shared	1
11	94446918	94807270	G	A	819	9	0.01	508	421	0.45	689	514	0.43	2	2	2	tier3	shared	1
11	95840778	96201130	A	G	747	14	0.02	549	410	0.43	1233	937	0.43	2	2	2	tier3	shared	1
11	9755975	9799399	C	T	662	7	0.01	392	324	0.45	387	273	0.41	2	2	2	tier2	shared	1
11	98865252	99360042	C	T	926	12	0.01	558	394	0.41	609	382	0.39	2	2	2	tier3	shared	1
12	103709935	105185805	C	T	835	6	0.01	498	347	0.41	673	471	0.41	2	2	2	tier3	shared	0
12	103754970	105230840	C	A	569	9	0.02	443	326	0.42	543	339	0.38	2	2	2	tier3	shared	0
12	113791667	115307284	G	A	435	8	0.02	277	271	0.49	709	427	0.38	2	2	2	tier3	shared	1
12	11544130	11652863	C	A	330	6	0.02	220	146	0.40	381	54	0.12	2	2	2	tier3	shared	0
12	115524734	117040351	G	C	858	18	0.02	479	351	0.42	629	442	0.41	2	2	2	tier3	shared	0
12	117878438	119394055	C	T	651	4	0.01	687	159	0.19	1907	1	0.00	2	2	2	tier3	tumor-specific	0
12	117977733	119493350	C	T	815	1	0.00	882	6	0.01	1310	624	0.32	2	2	2	tier2	relapse-specific	0
12	118090574	119606191	G	A	492	10	0.02	377	307	0.45	549	433	0.44	2	2	2	tier3	shared	0
12	118985298	120500915	T	C	527	12	0.02	392	326	0.45	580	377	0.39	2	2	2	tier3	shared	0
12	125587394	127021441	A	T	753	12	0.02	506	432	0.46	655	457	0.41	2	2	2	tier3	shared	0
12	127744443	129178490	G	A	488	8	0.02	330	241	0.42	598	85	0.12	2	2	2	tier1	shared	1
12	17634611	17743344	G	A	612	2	0.00	463	357	0.44	867	104	0.11	2	2	2	tier3	shared	1
12	22501031	22609764	A	G	349	3	0.01	186	166	0.47	246	219	0.47	2	2	2	tier3	shared	0
12	38252047	39965780	C	T	426	8	0.02	248	197	0.44	293	212	0.42	2	2	2	tier3	shared	0
12	39750696	41464429	T	C	549	9	0.02	315	219	0.41	474	59	0.11	2	2	2	tier3	shared	0
12	40738362	42452095	T	C	760	5	0.01	318	253	0.44	369	249	0.40	2	2	2	tier3	shared	0
12	45726711	47440444	T	G	470	6	0.01	411	314	0.43	843	575	0.41	2	2	2	tier3	shared	0
12	49922439	51636172	A	G	434	4	0.01	268	247	0.48	301	214	0.42	2	2	2	tier1	shared	1
12	52469557	54183290	-	A	608	9	0.01	381	258	0.40	846	502	0.37	2	2	2	tier2	shared	0
12	52630115	54343848	G	A	330	2	0.01	190	140	0.42	111	0	0.00	2	2	2	tier2	tumor-specific	0
12	60459060	62172793	T	A	761	14	0.02	391	353	0.47	985	704	0.42	2	2	2	tier3	shared	0

12	6107212	6236951	-	A	365	3	0.01	224	152	0.40	116	74	0.39	2	2	2	tier3	shared	2
12	61776966	63490699	C	T	893	2	0.00	1053	10	0.01	2651	1140	0.30	2	2	2	tier3	relapse-specific	0
12	65872532	67586265	G	A	796	13	0.02	430	343	0.44	1738	233	0.12	2	2	2	tier2	shared	1
12	67318219	69031952	G	T	421	7	0.02	288	236	0.45	338	206	0.38	2	2	2	tier3	shared	1
12	69743439	71457172	T	C	668	6	0.01	465	390	0.46	562	375	0.40	2	2	2	tier3	shared	1
12	70646308	72360041	T	A	509	12	0.02	353	266	0.43	556	397	0.42	2	2	2	tier3	shared	0
12	72126530	73840263	G	A	324	6	0.02	203	138	0.40	233	151	0.39	2	2	2	tier3	shared	1
12	72620513	74334246	T	C	533	0	0.00	696	5	0.01	448	211	0.32	2	2	2	tier3	relapse-specific	0
12	76312842	77788711	A	G	606	13	0.02	378	306	0.45	501	332	0.40	2	2	2	tier3	shared	1
12	76334367	77810236	T	C	662	9	0.01	413	388	0.48	626	430	0.41	2	2	2	tier3	shared	1
12	78733687	80209556	A	T	628	8	0.01	454	309	0.40	503	334	0.40	2	2	2	tier3	shared	1
12	82184702	83660571	G	C	764	8	0.01	467	383	0.45	723	470	0.39	2	2	2	tier3	shared	1
12	82288736	83764605	G	C	747	0	0.00	846	6	0.01	827	342	0.29	2	2	2	tier3	relapse-specific	1
12	84100790	85576659	C	T	639	8	0.01	402	350	0.47	381	264	0.41	2	2	2	tier2	shared	0
12	85649382	87125251	A	T	521	4	0.01	344	274	0.44	498	358	0.42	2	2	2	tier3	shared	1
12	89300122	90775991	T	A	455	9	0.02	312	287	0.48	586	461	0.44	2	2	2	tier3	shared	1
13	100669487	101871486	C	T	411	6	0.01	323	258	0.44	949	661	0.41	2	2	2	tier3	shared	2
13	106731186	107933185	G	A	835	6	0.01	460	294	0.39	382	218	0.36	2	2	2	tier3	shared	1
13	107168273	108370272	T	A	682	6	0.01	381	338	0.47	726	483	0.40	2	2	2	tier3	shared	1
13	107421580	108623579	T	A	439	0	0.00	487	3	0.01	469	196	0.29	2	2	2	tier3	relapse-specific	1
13	20933001	22035001	G	C	694	12	0.02	438	343	0.44	482	424	0.47	2	2	2	tier3	shared	0
13	22408757	23510757	C	T	533	5	0.01	437	234	0.35	259	161	0.38	2	2	2	tier3	shared	0
13	26223165	27325165	G	A	642	4	0.01	351	282	0.45	281	206	0.42	2	2	2	tier3	shared	0
13	26668487	27770487	G	A	434	8	0.02	310	280	0.47	626	84	0.12	2	2	2	tier3	shared	0
13	27190634	28292634	T	C	505	10	0.02	291	255	0.47	814	616	0.43	2	2	2	tier3	shared	0
13	31988250	33090250	T	C	746	4	0.01	467	385	0.45	514	384	0.43	2	2	2	tier3	shared	0
13	35326695	36428695	G	A	399	0	0.00	537	3	0.01	367	174	0.32	2	2	2	tier1	relapse-specific	1
13	36859103	37961103	T	-	913	15	0.02	718	542	0.43	1362	955	0.41	2	2	2	tier3	shared	1
13	37195144	38297144	T	A	622	3	0.00	485	365	0.43	708	517	0.42	2	2	2	tier3	shared	0
13	39334932	40436932	A	G	595	7	0.01	413	370	0.47	883	580	0.40	2	2	2	tier3	shared	0
13	41995685	43097685	C	T	606	5	0.01	454	337	0.43	627	510	0.45	2	2	2	tier3	shared	0
13	45021967	46123966	C	T	696	18	0.03	429	370	0.46	922	590	0.39	2	2	2	tier3	shared	0
13	46200945	47302944	G	A	797	17	0.02	418	313	0.43	735	489	0.40	2	2	2	tier3	shared	0
13	48940144	50042143	TTC	-	359	2	0.01	245	63	0.20	242	46	0.16	2	2	2	tier3	shared	0
13	51283947	52385946	C	T	645	12	0.02	429	298	0.41	338	51	0.13	2	2	2	tier3	shared	1
13	52485031	53587030	A	G	626	12	0.02	386	317	0.45	978	768	0.44	2	2	2	tier3	shared	0
13	53087241	54189240	G	A	683	0	0.00	820	8	0.01	583	266	0.31	2	2	2	tier3	relapse-specific	1
13	54281740	55383739	T	A	789	12	0.01	474	408	0.46	496	332	0.40	2	2	2	tier3	shared	1
13	56387864	57489863	A	G	731	9	0.01	510	353	0.41	709	72	0.09	2	2	2	tier3	shared	0
13	56609499	57711498	C	T	374	1	0.00	320	84	0.21	440	0	0.00	2	2	2	tier3	tumor-specific	0



13	56856089	57958088	T	A	493	0	0.00	539	4	0.01	547	249	0.31	2	2	2	tier3	relapse-specific	1
13	60085869	61187868	C	T	510	5	0.01	328	262	0.44	591	456	0.44	2	2	2	tier2	shared	0
13	64007406	65109405	C	T	515	0	0.00	594	13	0.02	352	156	0.31	2	2	2	tier3	shared	1
13	65644339	66746338	G	A	752	3	0.00	545	351	0.39	970	0	0.00	2	2	2	tier2	tumor-specific	1
13	67847605	68949604	G	A	495	5	0.01	339	275	0.45	689	448	0.39	2	2	2	tier3	shared	0
13	69610861	70712860	A	G	455	7	0.02	259	263	0.50	323	258	0.44	2	2	2	tier3	shared	0
13	72336490	73438489	G	A	669	10	0.01	393	318	0.45	809	487	0.38	2	2	2	tier3	shared	0
13	73191726	74293725	C	T	533	5	0.01	356	245	0.41	573	360	0.39	2	2	2	tier3	shared	0
13	73478334	74580333	T	C	593	8	0.01	379	322	0.46	800	604	0.43	2	2	2	tier3	shared	0
13	81894222	82996221	C	T	162	4	0.02	84	40	0.32	72	31	0.30	2	2	2	tier3	shared	1
13	88659359	89861358	C	T	511	12	0.02	308	247	0.45	316	208	0.40	2	2	2	tier3	shared	0
13	90922867	92124866	T	G	455	6	0.01	285	218	0.43	411	292	0.42	2	2	2	tier3	shared	0
13	91524582	92726581	G	A	504	9	0.02	455	292	0.39	840	552	0.40	2	2	2	tier3	shared	0
13	92660004	93862003	C	G	720	6	0.01	481	340	0.41	883	116	0.12	2	2	2	tier3	shared	0
13	98449678	99651677	A	G	570	13	0.02	393	309	0.44	863	644	0.43	2	2	2	tier3	shared	1
14	104264418	105193373	CTGGT	-	400	0	0.00	233	155	0.40	55	28	0.34	2	2	2	tier3	shared	1
14	104906418	105835373	G	A	339	9	0.03	180	180	0.50	32	37	0.54	2	2	2	tier2	shared	0
14	26940065	27870225	A	T	459	3	0.01	370	269	0.42	772	490	0.39	2	2	2	tier3	shared	0
14	27025730	27955890	C	A	533	2	0.00	629	145	0.19	1059	1	0.00	2	2	2	tier3	tumor-specific	0
14	27882666	28812915	C	T	679	7	0.01	451	379	0.46	964	648	0.40	2	2	2	tier3	shared	1
14	28018404	28948653	A	T	750	3	0.00	816	12	0.01	685	338	0.33	2	2	2	tier3	relapse-specific	1
14	29564667	30494916	C	T	612	10	0.02	385	308	0.44	660	502	0.43	2	2	2	tier3	shared	1
14	37892347	38822596	A	G	800	8	0.01	519	419	0.45	738	419	0.36	2	2	2	tier3	shared	1
14	39052401	39982650	G	A	757	11	0.01	385	393	0.51	610	468	0.43	2	2	2	tier3	shared	1
14	39324126	40254375	G	T	731	9	0.01	441	334	0.43	1084	132	0.11	2	2	2	tier3	shared	1
14	42340455	43270705	G	A	559	62	0.10	405	376	0.48	812	670	0.45	2	2	2	tier3	shared	1
14	43332212	44262462	A	G	654	11	0.02	440	374	0.46	421	304	0.42	2	2	2	tier2	shared	1
14	51611289	52541539	C	T	457	6	0.01	378	302	0.44	387	297	0.43	2	2	2	tier3	shared	1
14	57443387	58373634	C	T	908	12	0.01	592	470	0.44	2100	0	0.00	2	2	2	tier3	tumor-specific	1
14	57455787	58386034	A	G	600	7	0.01	447	299	0.40	545	393	0.42	2	2	2	tier3	shared	1
14	68077979	69008226	C	A	493	8	0.02	310	275	0.47	677	456	0.40	2	2	2	tier3	shared	0
14	69464698	70394945	G	T	302	1	0.00	340	3	0.01	465	205	0.31	2	2	2	tier3	relapse-specific	0
14	82080398	83010645	C	A	929	13	0.01	515	436	0.46	1309	164	0.11	2	2	2	tier3	shared	1
14	82270165	83200412	A	G	633	6	0.01	393	338	0.46	1080	880	0.45	2	2	2	tier3	shared	0
14	83340615	84270862	C	A	616	9	0.01	378	295	0.44	545	341	0.38	2	2	2	tier3	shared	1
14	84412327	85342574	C	T	623	2	0.00	376	251	0.40	514	61	0.11	2	2	2	tier3	shared	1
14	84486691	85416938	T	C	834	12	0.01	457	375	0.45	930	717	0.44	2	2	2	tier3	shared	1
14	86134598	87064845	C	A	462	3	0.01	359	251	0.41	795	108	0.12	2	2	2	tier3	shared	1
14	88453068	89383315	A	G	753	13	0.02	512	472	0.48	1856	1497	0.45	2	2	2	tier3	shared	0
14	89541452	90471699	G	A	557	9	0.02	335	234	0.41	465	317	0.41	2	2	2	tier3	shared	0

14	90229295	91159542	TGGC	-	692	9	0.01	381	313	0.45	865	456	0.35	2	2	2	tier3	shared	0
14	93157337	94087584	G	A	522	1	0.00	608	12	0.02	940	490	0.34	2	2	2	tier2	relapse-specific	0
14	94649887	95580134	C	G	480	7	0.01	338	287	0.46	570	348	0.38	2	2	2	tier3	shared	0
14	98408503	99338750	A	G	667	15	0.02	446	381	0.46	974	691	0.42	2	2	2	tier3	shared	1
15	24514103	26963010	G	A	749	14	0.02	519	401	0.44	1574	1101	0.41	2	2	2	tier3	shared	0
15	35169607	37382315	T	A	382	6	0.02	236	180	0.43	163	103	0.39	2	2	2	tier3	shared	0
15	39166414	41379122	T	C	713	1	0.00	847	4	0.00	1030	309	0.23	2	2	2	tier3	relapse-specific	0
15	46164943	48377651	T	C	712	6	0.01	356	279	0.44	1141	820	0.42	2	2	2	tier3	shared	0
15	49315348	51528056	G	A	717	13	0.02	383	355	0.48	676	465	0.41	2	2	2	tier3	shared	1
15	51906137	54118845	C	T	570	8	0.01	447	328	0.42	451	317	0.41	2	2	2	tier3	shared	1
15	55462340	57675048	A	G	473	7	0.01	345	274	0.44	312	243	0.44	2	2	2	tier2	shared	0
15	56211412	58424120	C	A	616	8	0.01	478	370	0.44	934	668	0.42	2	2	2	tier3	shared	0
15	61140600	63353547	G	A	828	6	0.01	813	206	0.20	1359	0	0.00	2	2	2	tier3	tumor-specific	0
15	62677332	64890279	G	A	728	9	0.01	419	316	0.43	595	405	0.41	2	2	2	tier3	shared	1
15	64498952	66711898	ATTTT	-	662	6	0.01	483	322	0.40	688	494	0.42	2	2	2	tier3	shared	0
15	65312917	67525863	C	T	664	12	0.02	372	306	0.45	666	462	0.41	2	2	2	tier3	shared	0
15	81513464	83722460	C	T	542	8	0.01	266	227	0.46	262	160	0.38	2	2	2	tier3	shared	1
15	88432938	90631934	C	A	740	12	0.02	381	307	0.45	553	67	0.11	2	2	2	tier1	shared	21
15	88432939	90631935	G	A	742	0	0.00	678	7	0.01	414	202	0.33	2	2	2	tier1	relapse-specific	21
15	93527184	95726180	A	G	271	7	0.03	174	157	0.47	134	88	0.40	2	2	2	tier3	shared	1
15	94349247	96548243	G	A	482	4	0.01	294	239	0.45	592	345	0.37	2	2	2	tier3	shared	1
15	94782752	96981748	C	T	597	11	0.02	371	269	0.42	553	420	0.43	2	2	2	tier2	shared	0
15	97308324	99490801	C	T	463	4	0.01	314	219	0.41	375	204	0.35	2	2	2	tier3	shared	0
16	10721523	10814022	G	A	390	4	0.01	276	200	0.42	199	0	0.00	2	2	2	tier3	tumor-specific	0
16	19190727	19283226	G	A	522	3	0.01	341	282	0.45	1005	148	0.13	2	2	2	tier2	shared	0
16	22640933	22733432	C	T	185	1	0.01	214	5	0.02	210	109	0.34	2	2	2	tier3	shared	1
16	23026044	23118543	C	G	1157	16	0.01	661	543	0.45	1512	1027	0.40	2	2	2	tier3	shared	0
16	24173849	24266348	G	A	943	8	0.01	601	402	0.40	801	81	0.09	2	2	2	tier2	shared	0
16	26547638	26640137	G	T	510	0	0.00	650	3	0.00	933	427	0.31	2	2	2	tier3	relapse-specific	0
16	30758901	30851400	C	T	617	1	0.00	826	12	0.01	548	206	0.27	2	2	2	tier3	relapse-specific	0
16	31290499	31382998	C	T	604	7	0.01	270	281	0.51	285	286	0.50	2	2	2	tier1	shared	1
16	32090319	32182818	G	A	119	0	0.00	99	51	0.34	116	48	0.29	2	0.37	2	tier2	shared	1
16	3347262	3407261	A	C	798	11	0.01	499	378	0.43	719	509	0.41	2	2	2	tier3	shared	0
16	47728294	49170793	C	A	423	8	0.02	259	222	0.46	404	254	0.39	2	2	2	tier3	shared	1
16	50053507	51496006	G	A	755	8	0.01	430	371	0.46	1290	911	0.41	2	2	2	tier3	shared	1
16	51061458	52503957	G	A	728	10	0.01	423	354	0.46	1619	2	0.00	2	2	2	tier2	tumor-specific	1
16	51097779	52540278	C	T	687	16	0.02	490	369	0.43	579	474	0.45	2	2	2	tier3	shared	1
16	52416962	53859461	G	T	611	9	0.01	391	335	0.46	496	345	0.41	2	2	2	tier3	shared	0
16	54645012	56087511	C	T	493	3	0.01	377	257	0.41	1212	7	0.01	2	2	2	tier3	tumor-specific	1
16	56639569	58082068	C	T	305	4	0.01	178	177	0.50	74	79	0.52	2	2	2	tier3	shared	0

16	60206305	61648804	C	T	570	14	0.02	318	212	0.40	562	325	0.37	2	2	2	tier2	shared	1
16	60215077	61657576	A	T	790	9	0.01	458	425	0.48	982	644	0.40	2	2	2	tier3	shared	1
16	61457580	62900079	T	A	560	5	0.01	320	263	0.45	520	337	0.39	2	2	2	tier3	shared	0
16	6495209	6555208	T	C	795	8	0.01	478	406	0.46	744	543	0.42	2	2	2	tier3	shared	0
16	6654431	6714430	G	A	926	13	0.01	499	485	0.49	1448	1026	0.41	2	2	2	tier3	shared	0
16	70613693	72056192	C	T	577	0	0.00	637	7	0.01	427	154	0.27	2	2	2	tier3	relapse-specific	0
16	75360773	76803272	T	G	471	10	0.02	344	253	0.42	820	590	0.42	2	2	2	tier3	shared	1
16	75496799	76939298	T	-	637	3	0.00	430	309	0.42	806	489	0.38	2	2	2	tier3	shared	1
16	76093122	77535621	G	A	884	0	0.00	971	8	0.01	1011	370	0.27	2	2	2	tier3	relapse-specific	1
16	80961258	82403757	C	T	812	0	0.00	864	11	0.01	956	450	0.32	2	2	2	tier3	relapse-specific	1
16	84568369	86010868	G	A	649	11	0.02	398	342	0.46	309	268	0.46	2	2	2	tier3	shared	1
16	84779125	86221624	C	T	518	5	0.01	411	237	0.37	761	432	0.36	2	2	2	tier3	shared	1
16	84887353	86329852	G	A	381	7	0.02	297	185	0.38	199	125	0.39	2	2	2	tier3	shared	0
16	88525341	89997840	C	T	382	0	0.00	456	6	0.01	90	49	0.35	2	2	2	tier3	relapse-specific	1
17	10874727	10934002	C	T	307	0	0.00	414	5	0.01	515	240	0.32	2	2	2	tier2	relapse-specific	0
17	10930752	10990027	G	A	513	14	0.03	343	291	0.46	724	505	0.41	2	2	2	tier3	shared	0
17	11228967	11288242	C	T	717	16	0.02	490	411	0.46	604	482	0.44	2	2	2	tier3	shared	0
17	12827463	12886738	G	T	876	10	0.01	560	397	0.41	681	92	0.12	2	2	2	tier3	shared	0
17	1405588	1458838	G	A	509	9	0.02	365	290	0.44	466	378	0.45	2	2	2	tier2	shared	0
17	17336440	17395715	C	T	866	8	0.01	525	370	0.41	496	1	0.00	2	2	2	tier3	tumor-specific	0
17	27591454	30567341	G	T	257	7	0.03	141	121	0.46	179	143	0.44	2	2	2	tier3	shared	0
17	27701282	30677169	C	A	320	0	0.00	361	5	0.01	121	55	0.31	2	2	2	tier1	relapse-specific	0
17	29083093	32058980	A	G	455	9	0.02	354	274	0.44	863	565	0.40	2	2	2	tier3	shared	0
17	34007774	36754248	C	T	325	0	0.00	444	6	0.01	232	103	0.31	2	2	2	tier3	relapse-specific	1
17	35242270	37988744	-	TA	369	21	0.05	171	29	0.15	260	14	0.05	2	2	2	tier3	shared	1
17	39474680	42119154	TTTG	-	895	13	0.01	557	409	0.42	747	506	0.40	2	2	2	tier3	shared	0
17	3989565	4042816	C	T	1030	14	0.01	572	535	0.48	874	655	0.43	2	2	2	tier3	shared	0
17	44439434	47084435	T	C	605	6	0.01	366	292	0.44	532	348	0.40	2	2	2	tier3	shared	0
17	48725946	51370947	C	T	614	12	0.02	396	311	0.44	579	379	0.40	2	2	2	tier3	shared	1
17	53499170	56144171	G	C	467	2	0.00	328	294	0.47	367	267	0.42	2	2	2	tier3	shared	0
17	53763621	56408622	C	G	369	9	0.02	241	180	0.43	138	117	0.46	2	2	2	tier1	shared	2
17	53763624	56408625	T	C	340	7	0.02	236	180	0.43	220	25	0.10	2	2	2	tier1	shared	2
17	55959266	58604484	G	A	845	7	0.01	554	423	0.43	697	93	0.12	2	2	2	tier2	shared	0
17	57103456	59748674	C	A	649	0	0.00	889	12	0.01	1076	458	0.30	2	2	2	tier2	relapse-specific	0
17	58109959	60756227	G	A	496	7	0.01	316	268	0.46	235	190	0.45	2	2	2	tier3	shared	1
17	6183218	6242494	G	T	801	16	0.02	448	412	0.48	886	666	0.43	2	2	2	tier3	shared	1
17	67169186	69657591	-	T	598	2	0.00	370	246	0.40	811	449	0.36	2	2	2	tier3	shared	0
17	67336579	69824984	C	A	181	1	0.01	102	78	0.43	139	96	0.41	2	2	2	tier3	shared	1
17	68135164	70623569	G	A	357	5	0.01	170	131	0.44	137	92	0.40	2	2	2	tier2	shared	0
17	69391987	71880392	C	T	486	10	0.02	291	263	0.47	242	162	0.40	2	2	2	tier3	shared	1

17	7334949	7394225	T	-	314	0	0.00	590	6	0.01	275	105	0.28	2	2	2	tier3	relapse-specific	1
17	75712847	78098252	G	A	566	0	0.00	569	4	0.01	113	58	0.34	2	2	2	tier3	relapse-specific	0
17	75761724	78147129	G	A	449	8	0.02	337	177	0.34	337	200	0.37	2	2	2	tier3	shared	0
17	78537248	80943959	C	A	296	5	0.02	215	169	0.44	216	180	0.45	2	2	2	tier3	shared	0
18	11523657	11533657	C	T	439	6	0.01	255	206	0.45	389	1	0.00	2	2	2	tier2	tumor-specific	0
18	21636245	23382247	C	T	536	12	0.02	303	217	0.42	603	460	0.43	2	2	2	tier3	shared	0
18	23266563	25012565	G	C	535	0	0.00	655	5	0.01	584	252	0.30	2	2	2	tier3	relapse-specific	0
18	25819633	27565635	A	G	760	8	0.01	408	355	0.47	560	385	0.41	2	2	2	tier3	shared	1
18	26755043	28501045	C	T	778	14	0.02	487	367	0.43	1154	833	0.42	2	2	2	tier3	shared	1
18	29671467	31417469	T	A	821	2	0.00	712	236	0.25	1051	0	0.00	2	2	2	tier3	tumor-specific	0
18	3244246	3254246	T	G	609	8	0.01	381	323	0.46	268	218	0.45	2	2	2	tier3	shared	0
18	35741493	37487495	C	T	661	10	0.01	453	371	0.45	786	547	0.41	2	2	2	tier3	shared	1
18	36665237	38411239	C	A	645	0	0.00	726	5	0.01	729	252	0.26	2	2	2	tier3	relapse-specific	1
18	44444522	46190524	C	T	510	9	0.02	281	258	0.48	1192	851	0.42	2	2	2	tier2	shared	0
18	48158679	49904681	A	-	406	29	0.07	339	278	0.45	486	334	0.41	2	2	2	tier3	shared	0
18	48597561	50343563	T	G	473	1	0.00	424	1	0.00	403	165	0.29	2	2	2	tier3	relapse-specific	0
18	51856664	53705666	C	T	737	12	0.02	448	432	0.49	525	418	0.44	2	2	2	tier2	shared	0
18	52300165	54149167	C	G	796	6	0.01	508	377	0.43	971	580	0.37	2	2	2	tier2	shared	1
18	52601661	54450663	A	T	653	2	0.00	371	313	0.46	613	394	0.39	2	2	2	tier3	shared	0
18	53076425	54925427	C	T	786	7	0.01	492	341	0.41	1249	8	0.01	2	2	2	tier3	tumor-specific	0
18	5752087	5762087	C	A	682	12	0.02	428	359	0.46	999	880	0.47	2	2	2	tier3	shared	0
18	65731094	67580114	T	A	629	10	0.02	444	382	0.46	826	577	0.41	2	2	2	tier3	shared	1
18	68062568	69911588	C	A	529	2	0.00	414	266	0.39	341	219	0.39	2	2	2	tier3	shared	1
18	68910507	70759527	G	A	531	10	0.02	390	313	0.45	466	282	0.38	2	2	2	tier3	shared	1
18	71709126	73580138	G	A	501	9	0.02	276	257	0.48	460	327	0.42	2	2	2	tier3	shared	1
18	71875808	73746820	G	A	770	10	0.01	471	424	0.47	625	466	0.43	2	2	2	tier3	shared	1
18	74063167	75962179	G	A	603	7	0.01	397	312	0.44	598	434	0.42	2	2	2	tier3	shared	1
18	8081041	8091041	T	A	761	9	0.01	417	338	0.45	768	521	0.40	2	2	2	tier3	shared	0
19	12640297	12779297	T	C	420	2	0.00	376	302	0.45	454	314	0.41	2	2	2	tier2	shared	0
19	12722617	12861617	G	A	464	5	0.01	380	313	0.45	592	471	0.44	2	2	2	tier3	shared	0
19	32989705	28297865	G	A	436	0	0.00	491	5	0.01	315	165	0.34	2	2	2	tier3	relapse-specific	0
19	33202551	28510711	C	T	765	6	0.01	450	402	0.47	493	373	0.43	2	2	2	tier3	shared	1
19	34054026	29362186	G	A	613	18	0.03	397	325	0.45	359	290	0.45	2	2	2	tier2	shared	1
19	34208171	29516331	A	T	775	8	0.01	492	426	0.46	287	180	0.39	2	2	2	tier3	shared	0
19	41696897	37005057	A	G	501	0	0.00	582	7	0.01	326	129	0.28	2	2	2	tier1	relapse-specific	0
19	42899759	38207919	T	C	737	6	0.01	446	338	0.43	667	0	0.00	2	2	2	tier3	tumor-specific	0
19	45027351	40335511	A	G	812	11	0.01	462	391	0.46	785	91	0.10	2	2	2	tier3	shared	0
19	50958451	46266611	C	T	395	2	0.01	222	203	0.48	259	25	0.09	2	2	2	tier1	shared	1
19	60109826	55418014	C	T	723	0	0.00	821	10	0.01	933	323	0.26	2	2	2	tier1	relapse-specific	1
19	8512789	8606789	C	T	542	8	0.01	319	257	0.45	24	17	0.41	2	2	2	tier1	shared	2

19	8878800	9017800	C	T	540	2	0.00	342	277	0.45	2356	12	0.01	2	2	2	tier3	tumor-specific	9
2	100847570	101481138	A	G	461	5	0.01	300	313	0.51	831	610	0.42	2	2	2	tier3	shared	1
2	103280182	103913750	C	T	714	9	0.01	393	373	0.49	708	523	0.42	2	2	2	tier3	shared	1
2	104101578	104735146	C	G	673	5	0.01	367	303	0.45	588	371	0.39	2	2	2	tier3	shared	0
2	10820130	10902679	C	T	776	8	0.01	525	385	0.42	495	319	0.39	2	2	2	tier3	shared	0
2	114769762	115053292	G	A	711	0	0.00	756	12	0.02	527	238	0.31	2	2	2	tier3	relapse-specific	0
2	115512252	115795782	T	A	389	1	0.00	271	239	0.47	164	156	0.49	2	2	2	tier3	shared	0
2	116413903	116697433	A	G	737	4	0.01	515	374	0.42	696	488	0.41	2	2	2	tier3	shared	1
2	117169781	117453311	C	T	679	8	0.01	412	259	0.39	467	312	0.40	2	2	2	tier3	shared	1
2	117243344	117526874	T	A	546	8	0.01	360	257	0.42	358	203	0.36	2	2	2	tier3	shared	1
2	117285122	117568652	C	T	437	2	0.00	276	188	0.41	206	132	0.39	2	2	2	tier3	shared	1
2	118858220	119141750	G	A	728	12	0.02	467	406	0.47	1267	184	0.13	2	2	2	tier2	shared	1
2	118907970	119191500	C	T	184	3	0.02	151	108	0.42	479	8	0.02	2	2	2	tier3	tumor-specific	1
2	121245170	121528700	G	A	541	8	0.01	309	232	0.43	272	194	0.42	2	2	2	tier3	shared	0
2	125456109	125739639	T	C	903	7	0.01	479	432	0.47	506	55	0.10	2	2	2	tier3	shared	0
2	130861607	131145137	C	A	579	8	0.01	391	310	0.44	313	245	0.44	2	2	2	tier3	shared	0
2	135984521	136268051	G	A	676	11	0.02	394	379	0.49	773	573	0.43	2	2	2	tier3	shared	0
2	137572784	137856314	C	T	537	4	0.01	384	319	0.45	613	431	0.41	2	2	2	tier3	shared	0
2	137663285	137946815	C	T	666	1	0.00	803	4	0.00	861	318	0.27	2	2	2	tier2	relapse-specific	0
2	137781520	138065050	C	T	771	12	0.02	513	381	0.43	2164	247	0.10	2	2	2	tier3	shared	0
2	142683503	142967033	T	C	596	14	0.02	511	378	0.43	683	477	0.41	2	2	2	tier3	shared	1
2	143270836	143554366	G	A	456	0	0.00	713	16	0.02	665	330	0.33	2	2	2	tier3	shared	1
2	150797796	151089550	G	C	647	13	0.02	427	339	0.44	768	534	0.41	2	2	2	tier3	shared	1
2	153951142	154242896	T	C	794	9	0.01	526	368	0.41	1158	155	0.12	2	2	2	tier3	shared	0
2	154172284	154464038	T	G	569	5	0.01	394	299	0.43	580	390	0.40	2	2	2	tier2	shared	1
2	15628354	15710903	A	G	768	6	0.01	432	394	0.48	646	420	0.39	2	2	2	tier3	shared	1
2	15674817	15757366	A	G	547	10	0.02	383	335	0.47	284	232	0.45	2	2	2	tier1	shared	1
2	163820542	164112296	C	T	813	8	0.01	605	450	0.43	1368	4	0.00	2	2	2	tier3	tumor-specific	0
2	164530487	164822241	C	T	895	13	0.01	673	476	0.41	1463	1	0.00	2	2	2	tier3	tumor-specific	1
2	165928971	166220725	G	A	836	17	0.02	496	372	0.43	1120	129	0.10	2	2	2	tier2	shared	0
2	172605263	172897017	T	A	388	7	0.02	349	273	0.44	408	347	0.46	2	2	2	tier2	shared	0
2	176491050	176782804	-	T	786	9	0.01	491	375	0.43	486	301	0.38	2	2	2	tier3	shared	0
2	183982209	184273964	G	A	607	11	0.02	390	309	0.44	717	609	0.46	2	2	2	tier3	shared	1
2	185544371	185836126	T	G	520	10	0.02	358	273	0.43	349	48	0.12	2	2	2	tier3	shared	0
2	18760057	18896576	G	A	291	1	0.00	359	6	0.02	647	239	0.27	2	2	2	tier3	relapse-specific	1
2	189386034	189677789	T	C	656	7	0.01	421	363	0.46	718	494	0.41	2	2	2	tier2	shared	0
2	196389158	196680913	C	T	570	5	0.01	333	227	0.41	415	289	0.41	2	2	2	tier3	shared	1
2	196910181	197201936	G	A	478	9	0.02	334	231	0.41	704	0	0.00	2	2	2	tier3	tumor-specific	0
2	210309605	210601360	C	T	635	12	0.02	436	387	0.47	777	565	0.42	2	2	2	tier3	shared	0
2	212678019	212969774	G	A	621	0	0.00	668	10	0.01	560	229	0.29	2	2	2	tier3	relapse-specific	0

2	215281284	215573039	C	T	702	10	0.01	411	368	0.47	698	568	0.45	2	2	2	tier2	shared	0
2	215847666	216139421	C	T	548	8	0.01	340	285	0.46	344	264	0.43	2	2	2	tier3	shared	0
2	217491643	217783398	G	T	542	9	0.02	387	307	0.44	653	489	0.43	2	2	2	tier3	shared	1
2	21961328	22107823	C	T	544	9	0.02	387	338	0.47	919	771	0.46	2	2	2	tier3	shared	0
2	219997497	220289253	C	T	619	16	0.03	328	311	0.49	367	333	0.48	2	2	2	tier3	shared	0
2	22214628	22361123	G	A	708	6	0.01	419	269	0.39	772	525	0.40	2	2	2	tier3	shared	1
2	224034377	224326133	G	A	690	10	0.01	412	303	0.42	522	350	0.40	2	2	2	tier3	shared	1
2	229682363	229974119	T	C	722	11	0.02	472	356	0.43	1161	161	0.12	2	2	2	tier2	shared	0
2	233837397	234172658	C	T	637	10	0.02	366	297	0.45	299	198	0.40	2	2	2	tier1	shared	2
2	234415280	234750541	G	A	675	4	0.01	450	331	0.42	521	327	0.39	2	2	2	tier1	shared	2
2	234881052	235216313	T	G	739	1	0.00	918	7	0.01	742	295	0.28	2	2	2	tier3	relapse-specific	1
2	235085997	235421258	G	T	331	2	0.01	267	248	0.48	217	152	0.41	2	2	2	tier3	shared	1
2	239854071	240189134	T	A	686	1	0.00	714	12	0.02	832	216	0.21	2	2	2	tier3	relapse-specific	1
2	24234854	24381350	G	A	608	11	0.02	432	345	0.44	325	266	0.45	2	2	2	tier3	shared	1
2	2694285	2715278	G	A	785	19	0.02	465	427	0.48	894	661	0.43	2	2	2	tier3	shared	1
2	31964830	32111326	C	T	685	8	0.01	381	317	0.45	359	286	0.44	2	2	2	tier3	shared	0
2	35393942	35540438	G	C	603	4	0.01	330	289	0.47	596	482	0.45	2	2	2	tier3	shared	1
2	35447877	35594373	G	A	672	17	0.02	412	352	0.46	485	334	0.41	2	2	2	tier3	shared	1
2	3907608	3929733	G	A	751	12	0.02	433	377	0.47	849	672	0.44	2	2	2	tier2	shared	1
2	39866687	40013183	A	C	432	5	0.01	303	264	0.47	472	338	0.42	2	2	2	tier3	shared	0
2	41983085	42129581	A	C	581	0	0.00	699	9	0.01	622	259	0.29	2	2	2	tier3	relapse-specific	0
2	43412218	43558714	C	G	846	18	0.02	528	439	0.45	1344	909	0.40	2	2	2	tier2	shared	0
2	45349654	45496150	C	G	380	6	0.02	327	245	0.43	474	366	0.44	2	2	2	tier3	shared	0
2	4771422	4793547	C	T	481	7	0.01	258	232	0.47	473	384	0.45	2	2	2	tier3	shared	1
2	4951026	4973151	G	T	540	0	0.00	650	9	0.01	562	203	0.27	2	2	2	tier3	relapse-specific	0
2	50855382	51001878	C	T	786	3	0.00	744	145	0.16	1351	1	0.00	2	2	2	tier3	tumor-specific	1
2	51590347	51736843	T	C	876	7	0.01	544	394	0.42	1399	179	0.11	2	2	2	tier3	shared	0
2	52337923	52484419	G	A	644	0	0.00	783	12	0.02	625	269	0.30	2	2	2	tier3	relapse-specific	0
2	53366757	53513253	G	A	632	0	0.00	688	6	0.01	522	251	0.32	2	2	2	tier3	relapse-specific	1
2	57473570	57620066	T	G	776	6	0.01	349	304	0.47	495	336	0.40	2	2	2	tier3	shared	1
2	59919013	60065509	G	A	787	12	0.02	555	443	0.44	753	581	0.44	2	2	2	tier3	shared	0
2	680769	690769	C	A	754	13	0.02	495	345	0.41	985	128	0.12	2	2	2	tier2	shared	2
2	73389479	73535971	G	A	492	10	0.02	297	260	0.47	906	559	0.38	2	2	2	tier2	shared	0
2	7652223	7734772	A	T	725	15	0.02	516	491	0.49	658	471	0.42	2	2	2	tier3	shared	0
2	77814007	77960499	G	A	641	12	0.02	376	287	0.43	510	330	0.39	2	2	2	tier3	shared	1
2	79379094	79525586	C	T	601	7	0.01	383	318	0.45	890	531	0.37	2	2	2	tier3	shared	0
2	95091162	95727435	C	T	546	13	0.02	331	241	0.42	906	102	0.10	2	2	2	tier3	shared	0
2	95145242	95781515	T	C	735	9	0.01	560	407	0.42	598	71	0.11	2	2	2	tier3	shared	0
20	15271349	15323349	A	G	542	9	0.02	410	330	0.45	510	324	0.39	2	2	2	tier3	shared	0
20	15545992	15597992	G	A	477	13	0.03	321	244	0.43	529	72	0.12	2	2	2	tier2	shared	0

20	17900146	17952146	T	A	714	0	0.00	836	8	0.01	355	159	0.31	2	2	2	tier3	relapse-specific	0
20	20853777	20905777	G	C	566	13	0.02	382	364	0.49	843	576	0.41	2	2	2	tier2	shared	1
20	22014823	22066823	A	T	571	7	0.01	339	297	0.47	431	285	0.40	2	2	2	tier3	shared	1
20	2709619	2761619	C	T	667	9	0.01	389	372	0.49	550	420	0.43	2	2	2	tier2	shared	0
20	37620741	38187327	T	A	405	7	0.02	244	241	0.50	511	357	0.41	2	2	2	tier3	shared	1
20	37764465	38331051	G	T	627	6	0.01	447	347	0.44	1411	167	0.11	2	2	2	tier3	shared	1
20	40268312	40834898	A	T	793	12	0.01	473	419	0.47	1399	922	0.40	2	2	2	tier3	shared	3
20	42143829	42710415	C	G	284	4	0.01	191	163	0.46	319	236	0.43	2	2	2	tier3	shared	1
20	49730834	50297427	C	T	529	0	0.00	690	8	0.01	565	250	0.31	2	2	2	tier3	relapse-specific	0
20	52026411	52593004	G	A	561	10	0.02	356	311	0.47	559	419	0.43	2	2	2	tier2	shared	0
20	53475223	54041816	G	T	513	5	0.01	306	213	0.41	296	172	0.37	2	2	2	tier3	shared	1
20	61515246	62044802	C	T	251	9	0.03	132	117	0.47	62	9	0.13	2	1.41	1.42	tier1	shared	1
20	7450754	7502754	T	-	790	10	0.01	559	420	0.43	861	505	0.37	2	2	2	tier3	shared	1
21	14058883	15137012	C	T	341	6	0.02	230	182	0.44	153	111	0.42	2	1.19	2	tier1	shared	1
21	21894381	22972510	G	A	551	9	0.02	375	251	0.40	431	303	0.41	2	2	2	tier3	shared	0
21	26930860	28008989	A	G	328	0	0.00	312	1	0.00	171	59	0.26	2	2	2	tier3	relapse-specific	1
21	27215461	28293590	C	T	483	1	0.00	605	2	0.00	318	115	0.27	2	2	2	tier3	relapse-specific	0
21	30506811	31584940	G	A	640	0	0.00	795	12	0.01	549	248	0.31	2	2	2	tier3	relapse-specific	0
21	36612009	37690139	A	-	835	8	0.01	560	434	0.44	1119	136	0.11	2	2	2	tier3	shared	1
21	40928109	42006239	G	C	576	7	0.01	325	281	0.46	650	492	0.43	2	2	2	tier3	shared	1
21	41098119	42176249	G	A	542	7	0.01	360	281	0.44	826	591	0.42	2	2	2	tier3	shared	1
21	43023406	44150337	G	A	707	13	0.02	442	424	0.49	360	246	0.41	2	2	2	tier3	shared	0
21	44100552	45276124	C	T	296	7	0.02	156	157	0.50	129	110	0.46	2	2	2	tier2	shared	0
21	44111210	45286782	G	A	330	11	0.03	214	187	0.47	162	120	0.43	2	2	2	tier3	shared	0
21	44766031	45941603	G	T	413	3	0.01	305	228	0.43	116	70	0.38	2	2	2	tier3	shared	0
22	16635285	18255285	C	T	448	8	0.02	234	211	0.47	114	99	0.46	2	2	2	tier3	shared	0
22	18266604	19886604	C	G	569	0	0.00	646	3	0.00	257	98	0.28	2	2	2	tier3	relapse-specific	0
22	24107592	25777592	T	-	524	4	0.01	317	223	0.41	195	107	0.35	2	2	2	tier3	shared	1
22	46314184	47935520	G	T	637	0	0.00	790	4	0.01	798	358	0.31	2	2	2	tier3	relapse-specific	1
22	46343957	47965293	G	A	628	10	0.02	365	318	0.47	1356	903	0.40	2	2	2	tier3	shared	1
3	104548908	103066218	G	A	742	13	0.02	517	293	0.36	897	110	0.11	2	2	2	tier3	shared	1
3	108073672	106590982	C	A	680	13	0.02	407	342	0.46	609	431	0.41	2	2	2	tier3	shared	0
3	110361937	108879247	G	A	730	9	0.01	405	311	0.43	721	106	0.13	2	2	2	tier2	shared	0
3	111975407	110492717	C	T	864	12	0.01	548	427	0.44	1104	1	0.00	2	2	2	tier3	tumor-specific	0
3	116601690	115119000	G	A	781	12	0.02	472	382	0.45	565	351	0.38	2	2	2	tier2	shared	1
3	117888511	116405821	C	T	863	16	0.02	574	419	0.42	786	511	0.39	2	2	2	tier3	shared	0
3	118569453	117086763	C	T	426	8	0.02	258	257	0.50	431	302	0.41	2	2	2	tier2	shared	1
3	124283786	122801096	C	T	529	6	0.01	348	269	0.44	1837	5	0.00	2	2	2	tier3	tumor-specific	0
3	128201638	126718948	G	A	176	3	0.02	142	112	0.44	25	19	0.43	2	2	2	tier3	shared	1
3	128213011	126730321	C	T	427	6	0.01	248	207	0.45	94	48	0.34	2	2	2	tier3	shared	1

3	132386205	130903515	A	G	583	8	0.01	420	317	0.43	321	250	0.44	2	2	2	tier3	shared	0
3	14810375	14835371	A	G	350	5	0.01	249	208	0.46	332	248	0.43	2	2	2	tier3	shared	0
3	148403134	146920444	G	A	674	6	0.01	420	325	0.44	489	316	0.39	2	2	2	tier3	shared	1
3	148730059	147247369	C	G	659	1	0.00	737	11	0.01	1060	406	0.28	2	2	2	tier3	relapse-specific	0
3	153189049	151706359	G	T	690	20	0.03	441	385	0.47	419	302	0.42	2	2	2	tier3	shared	1
3	153463724	151981034	T	C	458	4	0.01	297	271	0.48	365	275	0.43	2	2	2	tier3	shared	0
3	153491359	152008669	T	A	706	9	0.01	513	496	0.49	658	508	0.44	2	2	2	tier3	shared	0
3	153678808	152196118	A	T	727	6	0.01	410	343	0.46	496	362	0.42	2	2	2	tier3	shared	0
3	165792039	164309345	C	T	914	11	0.01	511	395	0.44	788	512	0.39	2	2	2	tier3	shared	1
3	166025067	164542373	T	C	588	4	0.01	582	74	0.11	721	0	0.00	2	2	2	tier2	tumor-specific	1
3	168161221	166678527	C	T	540	12	0.02	419	285	0.40	468	347	0.43	2	2	2	tier2	shared	1
3	168374413	166891719	G	A	609	6	0.01	667	149	0.18	615	0	0.00	2	2	2	tier3	tumor-specific	1
3	174114325	172631631	G	A	479	0	0.00	648	5	0.01	417	186	0.31	2	2	2	tier2	relapse-specific	0
3	175409328	173926634	G	A	826	0	0.00	1075	9	0.01	960	370	0.28	2	2	2	tier3	relapse-specific	0
3	176132596	174649902	G	A	636	7	0.01	315	294	0.48	591	392	0.40	2	2	2	tier3	shared	1
3	188452065	186969371	C	T	499	8	0.02	335	270	0.45	543	64	0.11	2	2	2	tier2	shared	1
3	192957721	191475027	G	A	843	14	0.02	500	429	0.46	1218	4	0.00	2	2	2	tier2	tumor-specific	1
3	197927554	196443157	C	G	685	10	0.01	450	352	0.44	218	166	0.43	2	2	2	tier3	shared	0
3	198619945	197135548	C	T	498	5	0.01	303	246	0.45	619	401	0.39	2	2	2	tier3	shared	1
3	22266290	22291286	T	G	590	10	0.02	363	290	0.44	445	300	0.40	2	2	2	tier3	shared	1
3	26130020	26155016	G	A	765	13	0.02	541	483	0.47	1110	868	0.44	2	2	2	tier3	shared	1
3	262560	287560	G	C	796	7	0.01	696	141	0.17	1062	0	0.00	2	2	2	tier3	tumor-specific	1
3	26421838	26446834	C	A	738	6	0.01	762	147	0.16	1083	1	0.00	2	2	2	tier2	tumor-specific	1
3	26492879	26517875	G	A	561	4	0.01	348	270	0.44	348	259	0.43	2	2	2	tier3	shared	1
3	3039744	3064744	G	T	744	8	0.01	497	378	0.43	940	127	0.12	2	2	2	tier2	shared	0
3	42451811	42476807	T	A	591	9	0.02	404	333	0.45	547	381	0.41	2	2	2	tier2	shared	1
3	45063478	45088474	G	A	533	1	0.00	305	277	0.48	325	198	0.38	2	2	2	tier3	shared	0
3	48451865	48476861	G	T	507	7	0.01	294	260	0.47	211	197	0.48	2	2	2	tier2	shared	0
3	61788317	61813277	TCTA	-	780	7	0.01	495	360	0.42	935	617	0.40	2	2	2	tier3	shared	1
3	6235039	6260039	G	A	439	11	0.02	317	282	0.47	447	312	0.41	2	2	2	tier3	shared	1
3	63494420	63519380	G	A	714	9	0.01	398	316	0.44	870	588	0.40	2	2	2	tier3	shared	0
3	64963656	64988616	T	C	274	8	0.03	170	178	0.51	415	53	0.11	2	2	2	tier3	shared	1
3	65861094	65886054	G	A	1045	20	0.02	680	505	0.43	1488	1146	0.44	2	2	2	tier3	shared	2
3	74634133	74551443	A	C	491	5	0.01	329	272	0.45	444	357	0.45	2	2	2	tier3	shared	0
3	76207102	76124412	G	A	588	4	0.01	374	261	0.41	406	280	0.41	2	2	2	tier3	shared	2
3	77104007	77021317	C	G	509	9	0.02	360	281	0.44	360	222	0.38	2	2	2	tier3	shared	2
3	77340936	77258246	T	C	520	10	0.02	308	263	0.46	360	275	0.43	2	2	2	tier3	shared	2
3	79101379	79018689	T	C	733	12	0.02	477	344	0.42	954	0	0.00	2	2	2	tier3	tumor-specific	0
3	79270545	79187855	A	G	339	3	0.01	236	197	0.45	424	58	0.12	2	2	2	tier3	shared	0
3	79386961	79304271	G	A	841	9	0.01	525	448	0.46	1321	896	0.40	2	2	2	tier3	shared	0



3	79742487	79659797	G	A	423	17	0.04	284	255	0.47	500	361	0.42	2	2	2	tier2	shared	0
3	80681007	80598317	A	C	680	16	0.02	522	446	0.46	714	492	0.41	2	2	2	tier3	shared	1
3	81690458	81607768	C	T	642	7	0.01	382	313	0.45	655	405	0.38	2	2	2	tier3	shared	0
3	8239084	8264084	C	-	568	6	0.01	392	283	0.42	441	210	0.32	2	2	2	tier3	shared	1
3	85130818	85048128	G	C	568	6	0.01	343	251	0.42	392	261	0.40	2	2	2	tier2	shared	2
3	86508462	86425772	C	G	918	10	0.01	604	459	0.43	1472	1	0.00	2	2	2	tier3	tumor-specific	0
3	96034176	94551486	G	A	561	10	0.02	407	307	0.43	545	442	0.45	2	2	2	tier3	shared	1
3	96785074	95302384	G	A	599	8	0.01	389	283	0.42	805	2	0.00	2	2	2	tier3	tumor-specific	1
3	96825543	95342853	A	C	612	4	0.01	395	293	0.43	398	300	0.43	2	2	2	tier3	shared	1
3	97423737	95941047	G	A	693	0	0.00	794	8	0.01	673	282	0.30	2	2	2	tier3	relapse-specific	1
4	103369618	103150595	G	A	500	1	0.00	652	6	0.01	651	286	0.31	2	2	2	tier3	relapse-specific	0
4	105253495	105034046	G	A	887	11	0.01	499	452	0.48	929	675	0.42	2	2	2	tier3	shared	1
4	107761470	107542021	T	G	783	11	0.01	495	388	0.44	827	4	0.00	2	2	2	tier3	tumor-specific	1
4	112311957	112092508	G	A	837	16	0.02	535	497	0.48	971	754	0.44	2	2	2	tier3	shared	1
4	112377379	112157930	G	A	880	9	0.01	494	437	0.47	677	394	0.37	2	2	2	tier3	shared	1
4	114555521	114336072	G	T	539	4	0.01	406	296	0.42	852	588	0.41	2	2	2	tier2	shared	0
4	115824855	115605406	A	G	690	13	0.02	443	336	0.43	666	442	0.40	2	2	2	tier3	shared	0
4	116027622	115808173	G	A	735	5	0.01	383	368	0.49	859	612	0.42	2	2	2	tier3	shared	0
4	117029317	116809868	G	A	437	7	0.02	257	233	0.48	300	206	0.41	2	2	2	tier3	shared	1
4	126378916	126159466	C	T	825	11	0.01	513	426	0.45	507	368	0.42	2	2	2	tier3	shared	1
4	126390388	126170938	C	G	724	7	0.01	476	432	0.48	571	536	0.48	2	2	2	tier2	shared	1
4	12642388	13033290	G	-	672	5	0.01	424	342	0.45	916	641	0.41	2	2	2	tier3	shared	1
4	128107864	127888414	C	T	709	11	0.02	372	364	0.49	531	352	0.40	2	2	2	tier3	shared	1
4	130405903	130186453	T	G	681	21	0.03	389	340	0.47	1010	836	0.45	2	2	2	tier2	shared	1
4	131202373	130982923	G	A	801	19	0.02	439	369	0.46	452	304	0.40	2	2	2	tier3	shared	1
4	132134033	131914583	T	A	341	0	0.00	410	3	0.01	171	62	0.27	2	2	2	tier2	relapse-specific	1
4	132401736	132182286	G	A	436	1	0.00	611	5	0.01	340	113	0.25	2	2	2	tier3	relapse-specific	0
4	133674094	133454644	A	C	717	0	0.00	695	11	0.02	579	215	0.27	2	2	2	tier3	relapse-specific	1
4	134412099	134192649	G	A	404	7	0.02	251	216	0.46	574	403	0.41	2	2	2	tier2	shared	1
4	134645746	134426296	G	A	638	5	0.01	449	337	0.43	784	528	0.40	2	2	2	tier3	shared	1
4	137282440	137062990	G	A	324	0	0.00	234	101	0.30	247	29	0.11	2	2	2	tier3	shared	1
4	154497736	154278286	A	T	566	1	0.00	281	222	0.44	397	246	0.38	2	2	2	tier3	shared	0
4	156877020	156657570	C	T	579	7	0.01	454	378	0.45	610	447	0.42	2	2	2	tier3	shared	2
4	167831999	167595424	A	G	763	7	0.01	461	378	0.45	1028	2	0.00	2	2	2	tier2	tumor-specific	1
4	177146700	176909706	C	A	699	8	0.01	468	367	0.44	1396	166	0.11	2	2	2	tier3	shared	1
4	17783989	18174891	C	T	467	0	0.00	544	5	0.01	413	142	0.26	2	2	2	tier2	relapse-specific	1
4	182792991	182555997	A	C	456	4	0.01	311	245	0.44	472	323	0.41	2	2	2	tier3	shared	1
4	184474803	184237809	G	A	331	3	0.01	246	217	0.47	471	318	0.40	2	2	2	tier2	shared	0
4	187184304	186947310	A	G	657	13	0.02	385	338	0.47	531	379	0.42	2	2	2	tier2	shared	0
4	187238379	187001385	C	A	274	10	0.04	190	131	0.41	87	62	0.42	2	2	2	tier3	shared	0

4	1877350	1907552	C	T	375	8	0.02	293	230	0.44	437	322	0.42	2	2	2	tier2	shared	0
4	188332814	188095820	C	T	687	6	0.01	521	391	0.43	633	394	0.38	2	2	2	tier3	shared	1
4	188720336	188483342	G	A	809	10	0.01	544	406	0.43	800	535	0.40	2	2	2	tier3	shared	1
4	18912208	19303110	G	T	848	0	0.00	1013	1	0.00	1640	294	0.15	2	2	2	tier3	relapse-specific	1
4	20642343	21033245	C	T	655	7	0.01	428	369	0.46	510	343	0.40	2	2	2	tier2	shared	0
4	22759171	23150073	G	A	550	0	0.00	656	2	0.00	834	336	0.29	2	2	2	tier3	relapse-specific	1
4	23099928	23490830	G	A	721	12	0.02	383	327	0.46	410	306	0.43	2	2	2	tier3	shared	1
4	23343723	23734625	C	T	564	11	0.02	295	253	0.46	1203	930	0.44	2	2	2	tier2	shared	1
4	23465614	23856516	T	C	439	11	0.02	237	181	0.43	295	197	0.40	2	2	2	tier3	shared	0
4	24719341	25110243	C	T	548	9	0.02	382	317	0.45	1095	171	0.14	2	2	2	tier3	shared	0
4	25787928	26178830	C	A	988	15	0.01	507	429	0.46	838	609	0.42	2	2	2	tier3	shared	0
4	29251450	29642352	C	A	896	12	0.01	554	452	0.45	831	108	0.12	2	2	2	tier3	shared	1
4	29705492	30096394	C	T	423	5	0.01	331	234	0.41	666	75	0.10	2	2	2	tier3	shared	1
4	29990099	30381001	C	T	532	6	0.01	271	194	0.42	413	244	0.37	2	2	2	tier3	shared	1
4	30058524	30449426	A	T	430	11	0.02	294	253	0.46	417	326	0.44	2	2	2	tier3	shared	1
4	31370390	31761292	A	C	362	2	0.01	276	257	0.48	436	306	0.41	2	2	2	tier2	shared	1
4	31779477	32135579	G	C	527	0	0.00	634	1	0.00	513	228	0.31	2	2	2	tier3	relapse-specific	0
4	32281806	32637908	G	C	587	13	0.02	369	297	0.45	992	112	0.10	2	2	2	tier3	shared	1
4	33004111	33327716	A	G	652	6	0.01	374	308	0.45	612	497	0.45	2	2	2	tier3	shared	1
4	34925832	35249437	T	A	550	3	0.01	355	229	0.39	486	302	0.38	2	2	2	tier3	shared	1
4	58848996	59154239	G	A	790	15	0.02	504	363	0.42	363	211	0.37	2	2	2	tier3	shared	1
4	59326070	59631313	G	T	914	17	0.02	537	402	0.43	656	470	0.42	2	2	2	tier3	shared	1
4	59788820	60106225	C	T	449	2	0.00	293	202	0.41	414	296	0.42	2	2	2	tier3	shared	1
4	61451246	61768651	G	T	865	16	0.02	492	421	0.46	1142	136	0.11	2	2	2	tier3	shared	1
4	61457317	61774722	C	T	877	20	0.02	441	362	0.45	1000	3	0.00	2	2	2	tier3	tumor-specific	1
4	65237776	65555181	A	G	720	10	0.01	422	321	0.43	782	0	0.00	2	2	2	tier3	tumor-specific	1
4	66830014	67147419	C	G	421	7	0.02	348	266	0.43	380	237	0.38	2	2	2	tier3	shared	0
4	70035031	70000442	C	T	417	3	0.01	257	214	0.45	376	312	0.45	2	2	2	tier3	shared	0
4	71031857	70997268	T	C	616	6	0.01	347	313	0.47	362	308	0.46	2	2	2	tier3	shared	0
4	76113412	75894388	C	A	517	8	0.02	320	261	0.45	744	538	0.42	2	2	2	tier3	shared	0
4	86249628	86030604	A	C	228	3	0.01	173	128	0.43	227	124	0.35	2	2	2	tier3	shared	0
4	92575664	92356641	T	C	616	2	0.00	402	306	0.43	758	102	0.12	2	2	2	tier3	shared	1
4	99611966	99392943	T	G	738	9	0.01	459	413	0.47	515	351	0.41	2	2	2	tier3	shared	0
5	101210016	101182117	A	T	718	11	0.02	478	368	0.43	1709	241	0.12	2	2	2	tier3	shared	1
5	104600196	104572297	C	T	522	8	0.02	297	264	0.47	288	209	0.42	2	2	2	tier2	shared	1
5	106172064	106144165	C	T	839	13	0.02	494	393	0.44	749	566	0.43	2	2	2	tier3	shared	1
5	106766017	106738118	G	A	786	15	0.02	468	412	0.47	1097	720	0.40	2	2	2	tier3	shared	0
5	111269099	111241200	T	G	736	12	0.02	447	378	0.46	915	657	0.42	2	2	2	tier3	shared	1
5	118953335	118925436	T	C	728	5	0.01	467	353	0.43	665	530	0.44	2	2	2	tier3	shared	0
5	1190263	1137263	T	A	347	5	0.01	217	166	0.43	137	104	0.43	2	2	1.45	tier3	shared	0

5	120450322	120422423	T	C	679	6	0.01	404	326	0.45	480	324	0.40	2	2	2	tier3	shared	1
5	120894390	120866491	A	T	663	15	0.02	459	393	0.46	664	502	0.43	2	2	2	tier2	shared	0
5	12123636	12070636	A	G	820	15	0.02	433	396	0.48	937	662	0.41	2	2	2	tier3	shared	1
5	121905027	121877128	C	T	728	3	0.00	426	333	0.44	629	417	0.40	2	2	2	tier3	shared	1
5	127725400	127697501	G	A	1154	9	0.01	640	498	0.44	2824	11	0.00	2	2	2	tier1	tumor-specific	1
5	127832888	127804989	G	T	260	2	0.01	257	205	0.44	460	63	0.12	2	2	2	tier3	shared	1
5	128418437	128390538	A	G	610	7	0.01	345	258	0.43	889	123	0.12	2	2	2	tier3	shared	0
5	133383451	133355552	G	A	676	2	0.00	463	345	0.43	1101	140	0.11	2	2	2	tier3	shared	1
5	140243210	140263026	G	A	758	11	0.01	446	379	0.46	799	103	0.11	2	2	2	tier1	shared	1
5	140846278	140866094	C	G	930	15	0.02	540	360	0.40	1803	226	0.11	2	2	2	tier1	shared	1
5	147406379	147426186	C	G	717	10	0.01	488	375	0.43	710	469	0.40	2	2	2	tier3	shared	0
5	149649049	149668856	G	T	465	11	0.02	369	299	0.45	500	79	0.14	2	2	2	tier3	shared	0
5	152422952	152442759	C	T	509	14	0.03	330	322	0.49	523	365	0.41	2	2	2	tier2	shared	1
5	154221315	154241122	T	C	406	0	0.00	566	6	0.01	431	155	0.26	2	2	2	tier3	relapse-specific	0
5	154835142	154854949	A	G	701	0	0.00	802	10	0.01	996	471	0.32	2	2	2	tier3	relapse-specific	1
5	155690400	155757822	G	A	686	5	0.01	428	373	0.47	1283	922	0.42	2	2	2	tier3	shared	0
5	157859403	157926825	G	A	844	11	0.01	516	420	0.45	885	118	0.12	2	2	2	tier2	shared	1
5	165198112	165265534	G	A	331	3	0.01	210	213	0.50	340	222	0.40	2	2	2	tier3	shared	1
5	176872959	176940353	C	T	675	3	0.00	556	149	0.21	342	0	0.00	2	2	2	tier1	tumor-specific	2
5	19051007	19015250	G	T	792	15	0.02	530	407	0.43	483	282	0.37	2	2	2	tier3	shared	1
5	23381427	23345670	T	C	728	5	0.01	493	377	0.43	1052	142	0.12	2	2	2	tier2	shared	2
5	2494675	2441675	G	A	702	15	0.02	459	369	0.45	658	88	0.12	2	2	2	tier3	shared	1
5	26672053	26636296	C	T	546	10	0.02	326	297	0.48	413	295	0.42	2	2	2	tier3	shared	1
5	27542961	27507204	C	T	254	0	0.00	261	1	0.00	110	39	0.26	2	2	2	tier3	relapse-specific	1
5	39916942	39881185	C	T	549	4	0.01	400	314	0.44	787	556	0.41	2	2	2	tier2	shared	0
5	43169431	43133674	A	T	845	10	0.01	632	450	0.42	473	322	0.41	2	2	2	tier3	shared	0
5	45672335	45636578	C	T	918	8	0.01	509	434	0.46	1073	714	0.40	2	2	2	tier3	shared	1
5	4717258	4664258	G	A	722	11	0.02	498	376	0.43	1186	168	0.12	2	2	2	tier3	shared	1
5	5067699	5014699	G	A	872	10	0.01	545	467	0.46	433	379	0.47	2	2	2	tier3	shared	0
5	51522290	51486533	A	T	584	5	0.01	317	248	0.44	421	269	0.39	2	2	2	tier3	shared	1
5	52867999	52832242	C	T	804	7	0.01	540	468	0.46	1039	864	0.45	2	2	2	tier3	shared	0
5	65807411	65771655	A	G	737	11	0.01	486	373	0.43	855	630	0.42	2	2	2	tier3	shared	0
5	6918384	6865384	T	A	676	8	0.01	410	362	0.47	625	440	0.41	2	2	2	tier3	shared	0
5	73528567	73492811	T	G	679	8	0.01	517	435	0.46	836	609	0.42	2	2	2	tier3	shared	0
5	73771482	73735726	T	C	726	0	0.00	925	10	0.01	1477	610	0.29	2	2	2	tier2	relapse-specific	1
5	74136616	74100860	C	T	933	8	0.01	608	480	0.44	1270	0	0.00	2	2	2	tier3	tumor-specific	0
5	77267867	77232111	A	G	907	16	0.02	541	450	0.45	894	580	0.39	2	2	2	tier2	shared	0
5	7851544	7798544	C	A	425	8	0.02	321	260	0.45	486	342	0.41	2	2	2	tier3	shared	1
5	7904871	7851871	C	T	753	7	0.01	423	391	0.48	253	217	0.46	2	2	2	tier3	shared	0
5	8283992	8230992	A	-	549	10	0.02	345	287	0.45	443	348	0.44	2	2	2	tier2	shared	1

5	83283802	83248046	C	T	549	14	0.02	441	395	0.47	735	470	0.39	2	2	2	tier3	shared	1
5	8621917	8568917	A	T	469	4	0.01	264	226	0.46	402	238	0.37	2	2	2	tier3	shared	0
5	87095961	87060205	G	C	662	8	0.01	431	379	0.47	633	435	0.41	2	2	2	tier3	shared	1
5	90039982	90004226	G	T	419	1	0.00	290	216	0.43	445	370	0.45	2	2	2	tier3	shared	2
5	90067397	90031641	G	C	226	4	0.02	197	170	0.46	316	233	0.42	2	2	2	tier2	shared	2
5	93059323	93033567	G	A	426	2	0.00	222	153	0.41	219	31	0.12	2	2	2	tier3	shared	0
5	95272060	95246304	T	C	450	1	0.00	635	6	0.01	503	173	0.26	2	2	2	tier3	relapse-specific	0
5	95502445	95476689	A	G	789	18	0.02	528	488	0.48	697	507	0.42	2	2	2	tier3	shared	0
5	97334538	97308782	C	A	652	9	0.01	368	266	0.42	355	182	0.34	2	2	2	tier3	shared	1
5	98396322	98368422	T	C	506	11	0.02	426	357	0.46	1186	761	0.39	2	2	2	tier3	shared	1
6	103079820	102973127	G	A	494	1	0.00	683	3	0.00	369	144	0.28	2	2	2	tier3	relapse-specific	0
6	104504284	104397591	A	C	770	1	0.00	905	9	0.01	1598	689	0.30	2	2	2	tier3	relapse-specific	1
6	10480723	10372737	C	T	390	7	0.02	233	228	0.49	262	206	0.44	2	2	2	tier3	shared	0
6	11556067	11448081	A	G	537	0	0.00	637	4	0.01	546	188	0.26	2	2	2	tier3	relapse-specific	0
6	117095855	116989162	C	T	465	3	0.01	301	293	0.49	205	141	0.41	2	2	2	tier3	shared	0
6	118632756	118526063	G	A	875	3	0.00	735	160	0.18	1341	1	0.00	2	2	2	tier3	tumor-specific	0
6	120261348	120219649	A	G	894	18	0.02	546	390	0.42	1573	5	0.00	2	2	2	tier3	tumor-specific	1
6	125783681	125741982	C	T	693	14	0.02	413	347	0.46	890	709	0.44	2	2	2	tier3	shared	1
6	12712962	12604976	G	A	545	7	0.01	352	271	0.43	515	345	0.40	2	2	2	tier3	shared	0
6	129212144	129170451	T	C	610	15	0.02	384	357	0.48	740	554	0.43	2	2	2	tier3	shared	1
6	131347700	131306007	T	G	638	8	0.01	293	333	0.53	696	568	0.45	2	2	2	tier3	shared	0
6	1343264	1398265	T	C	599	10	0.02	340	310	0.48	268	38	0.12	2	2	2	tier3	shared	0
6	13811863	13703884	A	C	895	9	0.01	554	433	0.44	602	476	0.44	2	2	2	tier3	shared	0
6	140005900	139964207	G	A	783	9	0.01	509	351	0.41	1353	3	0.00	2	2	2	tier3	tumor-specific	0
6	141372185	141330492	A	G	811	7	0.01	478	332	0.41	766	116	0.13	2	2	2	tier2	shared	1
6	149337323	149295630	G	A	717	7	0.01	435	318	0.42	809	618	0.43	2	2	2	tier3	shared	0
6	15097734	14989755	G	A	771	11	0.01	477	412	0.46	745	523	0.41	2	2	2	tier3	shared	0
6	159108034	159188046	T	C	597	12	0.02	315	292	0.48	511	438	0.46	2	2	2	tier1	shared	1
6	160376110	160456120	C	T	848	16	0.02	501	371	0.43	877	127	0.13	2	2	2	tier3	shared	0
6	165990044	166070054	G	A	548	6	0.01	340	284	0.46	343	272	0.44	2	2	2	tier3	shared	0
6	19459891	19351912	G	A	424	10	0.02	288	241	0.46	490	322	0.40	2	2	2	tier3	shared	0
6	20771810	20663831	G	A	660	6	0.01	455	353	0.44	1333	1031	0.44	2	2	2	tier3	shared	0
6	3174084	3229085	A	-	384	1	0.00	238	155	0.39	112	71	0.39	2	2	2	tier2	shared	0
6	31834161	31726182	G	A	361	8	0.02	334	287	0.46	262	177	0.40	2	2	2	tier3	shared	0
6	44096637	43988659	A	G	342	4	0.01	284	233	0.45	459	277	0.38	2	2	2	tier3	shared	0
6	476579	531579	A	G	595	12	0.02	438	295	0.40	572	58	0.09	2	2	2	tier3	shared	1
6	492728	547728	C	T	641	7	0.01	348	296	0.46	503	417	0.45	2	2	2	tier3	shared	1
6	54282157	54174198	A	T	658	11	0.02	440	339	0.44	1833	1247	0.40	2	2	2	tier3	shared	0
6	54919658	54811699	T	-	650	4	0.01	424	361	0.46	523	342	0.40	2	2	2	tier3	shared	0
6	55539300	55431341	C	T	676	0	0.00	781	7	0.01	453	196	0.30	2	2	2	tier3	relapse-specific	0

6	57841439	57733480	C	T	622	6	0.01	382	340	0.47	857	636	0.43	2	1.43	2	tier3	shared	0
6	58021696	57913737	G	T	356	4	0.01	289	202	0.41	219	151	0.41	2	1.43	2	tier3	shared	1
6	58720816	58612857	AGA	-	491	3	0.01	473	142	0.23	709	173	0.20	2	2	2	tier3	shared	1
6	70346833	70290112	C	A	502	4	0.01	269	201	0.43	336	236	0.41	2	2	2	tier3	shared	1
6	70717771	70661050	A	G	496	9	0.02	314	280	0.47	203	161	0.44	2	2	2	tier3	shared	1
6	8223953	8278954	A	T	560	10	0.02	340	298	0.47	954	670	0.41	2	2	2	tier3	shared	1
6	85368291	85311572	C	T	544	8	0.01	318	239	0.43	359	196	0.35	2	2	2	tier3	shared	1
6	87301445	87244726	G	A	622	2	0.00	416	331	0.44	921	2	0.00	2	2	2	tier3	tumor-specific	1
6	87483810	87427091	T	A	456	7	0.02	355	285	0.45	709	486	0.41	2	2	2	tier3	shared	0
6	89788729	89732010	A	-	718	4	0.01	426	1	0.00	871	582	0.40	2	2	2	tier3	relapse-specific	0
6	93048600	92991879	T	G	440	4	0.01	324	226	0.41	497	65	0.12	2	2	2	tier3	shared	1
6	93341535	93284814	G	A	494	9	0.02	335	308	0.48	481	282	0.37	2	2	2	tier3	shared	1
6	93615117	93558396	C	T	777	12	0.02	454	396	0.47	695	460	0.40	2	2	2	tier3	shared	0
6	94679810	94623089	C	T	743	0	0.00	927	7	0.01	887	362	0.29	2	2	2	tier3	relapse-specific	1
6	94702338	94645617	T	A	519	9	0.02	355	287	0.45	405	317	0.44	2	2	2	tier3	shared	1
6	94982255	94925534	C	T	619	14	0.02	465	361	0.44	966	122	0.11	2	2	2	tier3	shared	1
6	98935123	98828402	A	G	711	0	0.00	752	7	0.01	683	293	0.30	2	2	2	tier3	relapse-specific	1
7	101384020	101597300	C	G	450	3	0.01	278	223	0.45	308	264	0.46	2	2	2	tier3	shared	0
7	101609893	101823173	G	A	447	0	0.00	491	7	0.01	382	141	0.27	2	2	2	tier3	relapse-specific	0
7	101701575	101914855	C	A	302	1	0.00	320	3	0.01	162	77	0.32	2	2	2	tier3	relapse-specific	0
7	104071491	104284255	T	G	496	10	0.02	310	264	0.46	595	433	0.42	2	2	2	tier3	shared	0
7	104521958	104734722	A	G	594	13	0.02	417	371	0.47	490	371	0.43	2	2	2	tier2	shared	0
7	107318832	107531596	G	A	440	3	0.01	311	209	0.40	214	25	0.10	2	2	2	tier2	shared	1
7	111790453	112003217	G	A	674	18	0.03	450	411	0.48	816	551	0.40	2	2	2	tier3	shared	0
7	113249295	113462059	A	T	40	0	0.00	37	26	0.41	46	42	0.48	2	2	2	tier3	shared	1
7	116559358	116772122	A	T	316	0	0.00	474	6	0.01	501	212	0.30	2	2	2	tier3	relapse-specific	0
7	123044780	123257544	G	A	768	4	0.01	691	175	0.20	894	0	0.00	2	2	2	tier3	tumor-specific	1
7	124764287	124977051	C	T	582	6	0.01	390	332	0.46	608	417	0.41	2	2	2	tier3	shared	0
7	126570628	126783392	G	T	895	9	0.01	552	477	0.46	974	682	0.41	2	2	2	tier3	shared	2
7	133740407	134089867	G	C	384	4	0.01	292	245	0.46	464	388	0.46	2	2	2	tier3	shared	0
7	134053260	134402720	C	T	565	9	0.02	356	273	0.43	699	485	0.41	2	2	2	tier3	shared	0
7	13405534	13439009	T	C	477	0	0.00	589	7	0.01	316	129	0.29	2	2	2	tier3	relapse-specific	1
7	135602031	135951491	C	T	775	10	0.01	465	426	0.48	927	651	0.41	2	2	2	tier3	shared	0
7	137103410	137452870	C	A	568	5	0.01	444	335	0.43	910	641	0.41	2	2	2	tier2	shared	0
7	142295830	142585708	G	A	490	6	0.01	269	205	0.43	457	281	0.38	2	2	2	tier3	shared	0
7	147221246	147590313	G	T	542	5	0.01	506	100	0.17	1170	1	0.00	2	2	2	tier3	tumor-specific	0
7	1488902	1522376	G	C	489	10	0.02	251	218	0.46	61	28	0.31	2	1.34	1.39	tier3	shared	0
7	155190566	155497805	C	T	636	6	0.01	378	330	0.47	504	364	0.42	2	2	2	tier3	shared	0
7	155941697	156248936	C	T	634	7	0.01	449	362	0.45	624	395	0.39	2	2	2	tier3	shared	1
7	156275264	156582503	G	C	671	4	0.01	449	314	0.41	924	90	0.09	2	2	2	tier2	shared	0

7	157517592	157824831	C	T	478	6	0.01	267	209	0.44	132	121	0.48	2	2	2	tier3	shared	2
7	157881758	158188997	A	C	748	10	0.01	431	358	0.45	94	107	0.53	2	2	2	tier3	shared	2
7	158142951	158450190	G	A	651	0	0.00	658	4	0.01	450	168	0.27	2	2	2	tier3	relapse-specific	0
7	25018068	25051543	T	A	690	0	0.00	837	4	0.00	498	229	0.31	2	2	2	tier3	relapse-specific	0
7	30364283	30397758	G	A	569	9	0.02	380	284	0.43	321	213	0.40	2	2	2	tier3	shared	0
7	36118095	36151570	G	A	528	7	0.01	326	315	0.49	579	470	0.45	2	2	2	tier3	shared	0
7	37373027	37406502	A	T	654	4	0.01	456	378	0.45	888	132	0.13	2	2	2	tier3	shared	0
7	4033084	4066558	A	G	673	10	0.01	391	328	0.46	403	325	0.45	2	2	2	tier3	shared	2
7	4129053	4162527	G	A	647	4	0.01	430	332	0.44	295	213	0.42	2	2	2	tier3	shared	2
7	42112266	42145741	A	G	596	15	0.02	401	311	0.44	580	413	0.42	2	2	2	tier3	shared	0
7	51341655	51374161	G	A	605	11	0.02	318	326	0.51	251	213	0.46	2	2	2	tier3	shared	0
7	57222145	57218203	G	A	190	2	0.01	85	77	0.48	36	21	0.37	2	2	2	tier3	shared	0
7	6179392	6212867	A	C	646	8	0.01	504	335	0.40	648	1	0.00	2	2	2	tier3	tumor-specific	0
7	62817336	63179901	A	G	621	8	0.01	399	296	0.43	411	235	0.36	2	0.43	0.66	tier2	shared	0
7	83555809	83717873	A	G	559	9	0.02	314	318	0.50	325	261	0.45	2	2	2	tier3	shared	2
7	86027626	86189690	G	A	758	11	0.01	403	357	0.47	880	522	0.37	2	2	2	tier3	shared	1
7	90612944	90775008	T	C	573	7	0.01	397	276	0.41	992	563	0.36	2	2	2	tier3	shared	0
7	95042761	95204825	G	A	769	7	0.01	511	388	0.43	823	3	0.00	2	2	2	tier3	tumor-specific	1
8	10506675	10469265	G	A	338	4	0.01	187	146	0.44	110	63	0.36	2	2	2	tier1	shared	3
8	112237114	112167938	C	T	403	7	0.02	293	200	0.41	219	144	0.40	2	2	2	tier2	shared	1
8	113969221	113900045	A	C	569	2	0.00	426	370	0.46	608	421	0.41	2	2	2	tier3	shared	2
8	114061517	113992341	C	A	207	0	0.00	160	29	0.15	90	0	0.00	2	2	2	tier3	tumor-specific	2
8	115392566	115323390	G	A	497	13	0.03	280	272	0.49	239	176	0.42	2	2	2	tier2	shared	1
8	118042077	117972896	C	G	875	12	0.01	567	396	0.41	1122	3	0.00	2	2	2	tier3	tumor-specific	0
8	122275659	122206478	T	A	618	12	0.02	386	322	0.45	813	529	0.39	2	2	2	tier2	shared	0
8	123028149	122958968	A	T	404	7	0.02	363	290	0.44	518	410	0.44	2	2	2	tier3	shared	1
8	128036043	127966861	T	C	762	13	0.02	500	478	0.49	1190	911	0.43	2	2	2	tier3	shared	1
8	131174594	131105412	T	C	702	9	0.01	392	302	0.44	1055	754	0.42	2	2	2	tier3	shared	0
8	132097125	132027943	A	-	434	6	0.01	264	192	0.42	290	175	0.38	2	2	2	tier3	shared	0
8	134943869	134874687	C	G	360	47	0.12	294	216	0.42	666	428	0.39	2	2	2	tier3	shared	1
8	135796003	135726821	A	G	922	12	0.01	569	401	0.41	503	69	0.12	2	2	2	tier3	shared	0
8	137034741	136965559	T	C	456	12	0.03	297	278	0.48	504	376	0.43	2	2	2	tier3	shared	1
8	137468026	137398844	A	G	41	0	0.00	32	34	0.52	28	24	0.46	2	2	2	tier3	shared	1
8	138290660	138221478	G	A	612	13	0.02	366	311	0.46	476	338	0.42	2	2	2	tier3	shared	1
8	140518544	140449362	C	T	646	4	0.01	439	333	0.43	658	493	0.43	2	2	2	tier3	shared	1
8	15851312	15806941	G	A	811	14	0.02	408	347	0.46	637	449	0.41	2	2	2	tier3	shared	1
8	17462562	17418270	C	T	632	1	0.00	614	135	0.18	939	0	0.00	2	2	2	tier3	tumor-specific	0
8	18259595	18215315	G	A	640	6	0.01	401	325	0.45	719	513	0.42	2	2	2	tier3	shared	0
8	18423549	18379269	C	-	481	3	0.01	332	229	0.41	702	513	0.42	2	2	2	tier3	shared	1
8	19134873	19090593	G	A	628	6	0.01	503	439	0.47	491	413	0.46	2	2	2	tier3	shared	0

8	19797430	19753150	C	T	536	8	0.01	360	221	0.38	499	146	0.23	2	2	2	tier3	shared	0
8	23399978	23344033	G	A	642	7	0.01	392	311	0.44	294	185	0.39	2	2	2	tier3	shared	0
8	25223614	25167697	T	C	497	6	0.01	397	297	0.43	530	312	0.37	2	2	2	tier3	shared	1
8	26147194	26091277	-	AT	382	3	0.01	280	155	0.36	363	110	0.23	2	2	2	tier3	shared	1
8	37071774	36952616	C	T	413	5	0.01	196	170	0.46	700	98	0.12	2	2	2	tier3	shared	1
8	43485609	43366452	G	C	336	4	0.01	261	191	0.42	103	60	0.37	2	2	2	tier3	shared	0
8	52755739	52593186	T	C	382	4	0.01	274	199	0.42	321	265	0.45	2	2	2	tier3	shared	1
8	55700208	55537655	G	A	688	11	0.02	489	376	0.43	467	354	0.43	2	2	2	tier1	shared	1
8	56048319	55885765	G	A	783	10	0.01	399	357	0.47	949	558	0.37	2	2	2	tier3	shared	1
8	57570082	57407528	G	A	737	8	0.01	376	328	0.47	508	362	0.42	2	2	2	tier3	shared	1
8	58670535	58507981	G	A	725	8	0.01	477	409	0.46	636	463	0.42	2	2	2	tier3	shared	0
8	66169424	66006870	G	T	463	10	0.02	344	282	0.45	529	347	0.40	2	2	2	tier2	shared	1
8	72476284	72313730	G	A	769	4	0.01	712	158	0.18	1159	0	0.00	2	2	2	tier3	tumor-specific	0
8	72546076	72383522	A	T	625	5	0.01	391	296	0.43	419	282	0.40	2	2	2	tier3	shared	0
8	73514564	73352010	G	A	760	0	0.00	888	8	0.01	772	316	0.29	2	2	2	tier3	relapse-specific	0
8	75389062	75226507	G	A	924	12	0.01	532	483	0.48	395	267	0.40	2	2	2	tier3	shared	0
8	75738723	75576168	G	A	758	12	0.02	444	338	0.43	1135	778	0.41	2	2	2	tier3	shared	0
8	76476615	76314060	C	T	516	0	0.00	570	7	0.01	275	119	0.30	2	2	2	tier3	relapse-specific	1
8	76851577	76689022	C	-	545	6	0.01	372	308	0.45	376	281	0.43	2	2	2	tier3	shared	0
8	77816396	77653841	C	G	508	13	0.02	344	291	0.46	824	539	0.40	2	2	2	tier3	shared	1
8	85107492	84944937	C	T	966	14	0.01	559	412	0.42	845	126	0.13	2	2	2	tier2	shared	1
8	85843154	85680599	G	A	591	8	0.01	399	300	0.43	1108	715	0.39	2	2	2	tier3	shared	0
8	89286241	89217125	C	T	652	3	0.00	412	347	0.46	716	536	0.43	2	2	2	tier3	shared	0
8	89616994	89547878	T	C	718	9	0.01	392	346	0.47	932	543	0.37	2	2	2	tier3	shared	1
8	93370813	93301637	C	A	517	8	0.02	323	259	0.45	563	390	0.41	2	2	2	tier2	shared	1
8	9643212	9605802	C	G	664	9	0.01	394	316	0.45	517	369	0.42	2	2	2	tier2	shared	0
8	96685869	96616693	A	G	794	8	0.01	478	415	0.46	299	207	0.41	2	2	2	tier3	shared	0
8	99211320	99142144	A	C	772	8	0.01	510	378	0.43	497	328	0.40	2	2	2	tier3	shared	0
9	105869891	106830070	A	T	460	5	0.01	327	254	0.44	330	234	0.41	2	2	2	tier3	shared	0
9	108932860	109893039	G	A	484	6	0.01	354	218	0.38	351	221	0.39	2	2	2	tier3	shared	0
9	11173362	11183362	G	A	642	11	0.02	432	326	0.43	507	310	0.38	2	2	2	tier3	shared	1
9	11413168	11423168	G	T	721	0	0.00	860	4	0.00	795	282	0.26	2	2	2	tier2	relapse-specific	1
9	116084387	117044566	G	A	429	6	0.01	285	196	0.41	79	62	0.44	2	2	2	tier1	shared	1
9	120306397	121266576	A	T	713	12	0.02	464	396	0.46	673	521	0.44	2	2	2	tier2	shared	1
9	120330151	121290330	A	T	705	8	0.01	515	401	0.44	847	623	0.42	2	2	2	tier3	shared	1
9	121505224	122465403	C	T	654	15	0.02	399	316	0.44	2210	270	0.11	2	2	2	tier3	shared	1
9	121657474	122617653	C	T	383	6	0.02	317	270	0.46	1105	955	0.46	2	2	2	tier3	shared	0
9	123859764	124819943	A	G	635	4	0.01	383	299	0.44	682	100	0.13	2	2	2	tier3	shared	0
9	124312959	125273138	C	T	527	5	0.01	376	256	0.41	1394	2	0.00	2	2	2	tier1	tumor-specific	1
9	12504476	12514476	G	A	805	9	0.01	369	313	0.46	893	572	0.39	2	2	2	tier3	shared	1

9	125059195	126019374	C	T	777	9	0.01	490	447	0.48	580	415	0.42	2	2	2	tier3	shared	0
9	135505247	136515426	C	T	398	9	0.02	278	259	0.48	173	138	0.44	2	2	2	tier3	shared	0
9	17216283	17226283	C	T	386	6	0.02	257	226	0.47	166	117	0.41	2	2	2	tier1	shared	0
9	21738898	21748898	G	A	449	7	0.02	264	200	0.43	177	168	0.49	2	2	2	tier3	shared	0
9	24735941	24745941	G	A	551	4	0.01	354	298	0.46	458	313	0.41	2	2	2	tier2	shared	1
9	24757662	24767662	C	A	817	8	0.01	489	373	0.43	970	3	0.00	2	2	2	tier3	tumor-specific	1
9	26298028	26308028	G	C	747	15	0.02	512	445	0.46	677	483	0.42	2	2	2	tier3	shared	1
9	27997115	28007115	C	T	865	14	0.02	574	423	0.42	1975	5	0.00	2	2	2	tier3	tumor-specific	1
9	28164689	28174689	G	A	780	15	0.02	530	386	0.42	643	104	0.14	2	2	2	tier3	shared	1
9	28922586	28932586	G	A	518	4	0.01	322	279	0.46	486	300	0.38	2	2	2	tier3	shared	0
9	2900026	2910026	A	G	676	13	0.02	456	351	0.43	350	255	0.42	2	2	2	tier2	shared	0
9	30807342	30817342	T	C	495	11	0.02	358	297	0.45	377	265	0.41	2	2	2	tier3	shared	0
9	30956521	30966521	C	T	449	9	0.02	321	236	0.42	221	216	0.49	2	2	2	tier3	shared	0
9	31574972	31584972	T	-	564	18	0.03	360	265	0.42	452	66	0.13	2	2	2	tier3	shared	1
9	33588933	33598933	T	G	156	2	0.01	95	76	0.44	178	119	0.40	2	2	2	tier3	shared	1
9	4574855	4584855	C	T	790	7	0.01	525	425	0.45	2000	6	0.00	2	2	2	tier3	tumor-specific	1
9	6574961	6584961	C	T	719	12	0.02	462	351	0.43	552	369	0.40	2	2	2	tier3	shared	0
9	73195718	74005898	G	A	697	6	0.01	458	367	0.44	595	396	0.40	2	2	2	tier3	shared	1
9	77399619	78209799	G	A	623	7	0.01	361	277	0.43	980	1	0.00	2	2	2	tier3	tumor-specific	1
9	78323275	79133455	A	G	320	2	0.01	214	177	0.45	188	152	0.45	2	2	2	tier3	shared	0
9	7987216	7997216	G	A	587	0	0.00	660	10	0.01	764	322	0.30	2	2	2	tier3	relapse-specific	1
9	81024926	81835106	C	T	614	11	0.02	386	307	0.44	453	312	0.41	2	2	2	tier3	shared	1
9	84985243	85795423	A	G	529	5	0.01	327	293	0.47	464	324	0.41	2	2	2	tier3	shared	1
9	87569444	88379624	C	T	460	11	0.02	275	214	0.44	162	114	0.41	2	2	2	tier1	shared	1
9	92449569	93409749	C	T	728	5	0.01	486	396	0.45	637	438	0.41	2	2	2	tier3	shared	0
9	97039394	97999573	C	T	609	9	0.01	508	465	0.48	1294	879	0.40	2	2	2	tier3	shared	1
X	10294020	10334020	-	T	235	1	0.00	35	174	0.83	82	298	0.78	2	0.99	1	tier2	shared	1
X	105876728	105990072	G	A	343	10	0.03	40	342	0.90	56	372	0.87	2	0.97	0.99	tier2	shared	0
X	11680134	11770213	C	G	351	11	0.03	30	271	0.90	38	265	0.87	2	0.99	1	tier3	shared	0
X	117622824	117738796	G	A	319	9	0.03	36	337	0.90	166	971	0.85	2	0.97	0.99	tier3	shared	1
X	135789240	135961574	C	A	284	8	0.03	37	240	0.87	52	180	0.78	2	0.99	1.01	tier1	shared	1
X	141024741	141197075	G	T	401	0	0.00	372	0	0.00	251	325	0.56	2	0.97	1	tier3	relapse-specific	0
X	143123430	143295730	A	C	350	11	0.03	41	365	0.90	77	371	0.83	2	2	2	tier3	shared	1
X	144114037	144306345	T	A	264	6	0.02	20	205	0.91	87	267	0.75	2	0.99	1.01	tier3	shared	0
X	17368749	17458828	T	C	219	11	0.05	24	269	0.92	84	474	0.85	2	0.99	1	tier3	shared	0
X	24850996	24941075	G	A	316	0	0.00	383	0	0.00	438	56	0.11	2	0.99	1	tier3	relapse-specific	0
X	27447388	27537467	C	T	181	7	0.04	17	158	0.90	42	237	0.85	2	0.99	1	tier3	shared	0
X	29590698	29680777	C	T	301	8	0.03	35	356	0.91	49	319	0.87	2	0.99	1	tier3	shared	0
X	32121858	32211937	G	C	311	7	0.02	22	311	0.93	52	339	0.87	2	0.99	1	tier3	shared	1
X	33727134	33817213	C	T	349	0	0.00	408	5	0.01	358	420	0.54	2	0.99	1	tier3	relapse-specific	1



X	34820105	34910184	T	G	284	8	0.03	39	313	0.89	387	130	0.25	2	0.99	1	tier3	shared	1
X	35245727	35335806	T	C	462	9	0.02	53	393	0.88	104	564	0.84	2	0.99	1	tier3	shared	1
X	55215216	55198491	G	A	151	3	0.02	25	210	0.89	38	214	0.85	2	0.93	0.94	tier1	shared	1
X	6192868	6182868	G	A	290	6	0.02	32	264	0.89	46	181	0.80	2	0.99	1	tier3	shared	1
X	7410725	7400725	G	A	278	7	0.02	20	273	0.93	114	538	0.83	2	0.99	1	tier3	shared	1
X	81797394	81910738	G	T	463	8	0.02	73	467	0.86	871	255	0.23	2	0.98	0.95	tier3	shared	1
X	86716242	86829586	T	C	273	5	0.02	31	331	0.91	68	312	0.82	2	0.98	0.95	tier3	shared	1
X	97913227	98026571	G	T	249	8	0.03	38	212	0.85	136	1	0.01	2	0.97	0.95	tier3	tumor-specific	1
Y	16229629	17720235	G	T	412	5	0.01	337	161	0.32	741	0	0.00	2	2	2	tier3	tumor-specific	0
Y	16302321	17792927	G	A	340	0	0.00	388	5	0.01	534	739	0.58	2	2	2	tier3	relapse-specific	1
Y	5180662	5120662	TTAAGAGTTTAACTTACCAT	-	129	4	0.03	6	193	0.97	44	239	0.84	2	2	2	tier2	shared	0
Y	8195097	8135097	G	T	183	4	0.02	17	194	0.92	55	300	0.85	2	2	2	tier3	shared	0
Y	8487910	8427910	C	A	297	0	0.00	374	7	0.02	175	230	0.57	2	2	2	tier3	relapse-specific	1

**Supplementary Table 6c.** Somatic point mutations and indels from UPN 452198 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	107357719	107556196	C	T	512	3	0.01	576	2	0.00	420	43	0.09	2	2	2	tier3	relapse-specific	0
1	108346944	108545421	A	G	612	187	0.23	451	421	0.48	542	136	0.20	2	2	2	tier3	shared	1
1	147392656	149126032	C	A	468	61	0.12	126	38	0.23	412	54	0.12	2	3.18	2.93	tier3	shared	0
1	168399126	170132502	C	T	602	24	0.04	972	129	0.12	518	0	0.00	2	2	2	tier2	tumor-specific	0
1	179307551	181040928	A	G	566	6	0.01	805	14	0.02	458	78	0.15	2	2	2	tier3	relapse-specific	0
1	218018901	219952278	G	A	600	4	0.01	1139	13	0.01	362	99	0.21	2	2	2	tier3	relapse-specific	0
1	224145610	226078987	T	C	548	0	0.00	549	0	0.00	533	30	0.05	2	2	2	tier3	relapse-specific	0
1	230352346	232285723	G	A	623	183	0.23	682	594	0.47	647	123	0.16	2	2	2	tier3	shared	1
1	93246772	93474184	G	A	534	92	0.15	440	231	0.34	673	2	0.00	2	2	2	tier2	tumor-specific	1
10	19424827	19384821	C	T	693	32	0.04	892	120	0.12	601	0	0.00	2	2	2	tier3	tumor-specific	0
10	67480185	67810179	T	C	458	118	0.20	570	541	0.49	490	108	0.18	2	2	2	tier2	shared	1
10	73025816	73355810	T	A	403	113	0.22	326	274	0.46	415	77	0.16	2	2	2	tier3	shared	1
11	134164355	134659145	C	T	395	108	0.21	399	402	0.50	275	58	0.17	2	2	2	tier3	shared	1
11	20709294	20752718	G	T	578	153	0.21	517	550	0.52	536	162	0.23	2	2	2	tier3	shared	1
11	23583427	23626851	G	A	572	7	0.01	698	8	0.01	447	76	0.15	2	2	2	tier3	relapse-specific	1
11	40183906	40227330	C	A	522	0	0.00	551	1	0.00	523	32	0.06	2	2	2	tier3	relapse-specific	1
11	64821076	65064500	G	A	458	127	0.22	283	216	0.43	343	83	0.19	2	2	2	tier3	shared	1
11	81529767	81852119	G	A	644	1	0.00	589	1	0.00	515	65	0.11	2	2	2	tier2	relapse-specific	1
11	87110939	87433291	G	T	481	15	0.03	656	88	0.12	442	0	0.00	2	2	2	tier3	tumor-specific	1
12	126748215	128182262	G	A	411	2	0.00	353	9	0.02	354	71	0.17	2	2	2	tier3	shared	1
12	22283439	22392172	A	C	464	0	0.00	877	0	0.00	385	41	0.10	2	2	2	tier3	relapse-specific	0
12	32680434	32789167	G	T	373	107	0.22	359	302	0.46	235	53	0.18	2	2	2	tier2	shared	0
12	38373226	40086959	A	T	555	0	0.00	1091	1	0.00	541	32	0.06	2	2	2	tier3	relapse-specific	0
12	56144791	57858524	C	A	604	156	0.21	487	503	0.51	482	116	0.19	2	2	2	tier1	shared	2
12	57438067	59151800	G	A	696	29	0.04	1508	223	0.13	567	144	0.20	2	2	2	tier3	shared	1
12	9702101	9810834	A	G	450	0	0.00	663	1	0.00	400	56	0.12	2	2	2	tier1	relapse-specific	0
13	104876739	106078738	A	G	98	0	0.00	98	2	0.02	101	17	0.14	2	2	2	tier3	shared	1
13	21865814	22967814	C	A	473	105	0.18	602	611	0.50	405	89	0.18	2	2	2	tier3	shared	1

13	27490642	28592642	C	G	638	106	0.14	612	234	0.28	600	0	0.00	2	2	2	tier1	tumor-specific	50
13	60889651	61991650	C	G	498	1	0.00	438	0	0.00	470	47	0.09	2	2	2	tier3	relapse-specific	0
13	74029037	75131036	G	T	579	100	0.15	1001	519	0.34	618	0	0.00	2	2	2	tier3	tumor-specific	1
13	92398000	93599999	T	C	428	75	0.15	396	224	0.36	469	0	0.00	2	2	2	tier3	tumor-specific	1
13	92466026	93668025	G	A	848	0	0.00	1513	0	0.00	657	90	0.12	2	2	2	tier3	relapse-specific	1
14	47961450	48891700	T	C	436	4	0.01	435	6	0.01	372	62	0.14	2	2	2	tier3	relapse-specific	1
14	82608644	83538891	G	A	452	2	0.00	451	8	0.02	412	80	0.16	2	2	2	tier2	relapse-specific	1
15	23386323	25835230	G	A	438	53	0.11	607	307	0.34	413	0	0.00	2	2	2	tier3	tumor-specific	0
15	25337871	27664276	G	T	635	17	0.03	816	94	0.10	591	0	0.00	2	2	2	tier3	tumor-specific	1
15	29317077	31529785	G	A	538	141	0.21	391	294	0.43	388	78	0.17	2	2	2	tier3	shared	0
15	86528277	88727273	G	A	409	129	0.24	452	435	0.49	378	82	0.18	2	2	2	tier3	shared	2
15	88782837	90981833	G	A	359	94	0.21	228	167	0.42	351	84	0.19	2	2	2	tier2	shared	0
15	97047801	99230278	G	C	382	107	0.22	647	578	0.47	390	98	0.20	2	2	2	tier3	shared	0
16	10944428	11036927	A	G	643	107	0.14	197	95	0.33	641	0	0.00	2	2	2	tier2	tumor-specific	0
16	22599053	22691552	G	A	820	150	0.15	824	390	0.32	639	96	0.13	2	3.28	2.86	tier2	shared	1
16	34545748	34688247	G	C	432	54	0.11	261	121	0.32	326	45	0.12	2	2.73	2.98	tier3	shared	0
16	58050635	59493134	G	T	579	0	0.00	977	0	0.00	527	86	0.14	2	2	2	tier3	relapse-specific	1
16	60042403	61484902	T	A	265	66	0.20	320	280	0.47	314	75	0.19	2	2	2	tier3	shared	1
16	77431224	78873723	C	T	542	4	0.01	777	16	0.02	405	79	0.16	2	2	2	tier3	shared	0
16	7868630	7928629	C	T	719	19	0.03	1087	137	0.11	730	0	0.00	2	2	2	tier3	tumor-specific	0
16	7941529	8001528	T	A	446	0	0.00	480	0	0.00	323	53	0.14	2	2	2	tier3	relapse-specific	1
16	88321243	89793742	C	T	736	1	0.00	230	0	0.00	520	58	0.10	2	2	2	tier1	relapse-specific	0
17	49416138	52061139	C	T	494	145	0.23	589	508	0.46	537	117	0.18	2	2	2	tier3	shared	1
17	67861248	70349653	A	G	670	5	0.01	634	11	0.02	487	104	0.18	2	2	2	tier2	relapse-specific	0
18	13606633	13616633	C	T	434	79	0.15	110	114	0.51	271	68	0.20	2	2	2	tier3	shared	1
19	13231692	13370692	G	A	595	108	0.15	777	366	0.32	485	1	0.00	2	2	2	tier3	tumor-specific	2
19	806779	855779	G	T	363	91	0.20	15	23	0.61	194	46	0.19	2	2	1.24	tier1	shared	1
2	140418446	140701976	C	G	675	167	0.20	616	487	0.44	556	116	0.17	2	2	2	tier3	shared	0
2	184186967	184478722	G	T	567	5	0.01	903	13	0.01	378	109	0.22	2	2	2	tier3	relapse-specific	0
2	208821357	209113112	C	T	570	90	0.14	519	248	0.32	601	1	0.00	2	2	2	tier1	tumor-specific	22
2	213886052	214177807	G	T	657	5	0.01	1008	17	0.02	511	122	0.19	2	2	2	tier3	relapse-specific	0
2	23527066	23673561	T	C	463	57	0.11	389	181	0.32	505	0	0.00	2	2	2	tier3	tumor-specific	0
2	25310746	25457242	C	T	411	108	0.21	320	315	0.50	333	88	0.21	2	2	2	tier1	shared	53
2	77165972	77312464	G	A	237	57	0.19	159	126	0.44	208	46	0.18	2	2	2	tier3	shared	0
20	17261178	17313178	A	G	494	0	0.00	671	0	0.00	458	31	0.06	2	2	2	tier3	relapse-specific	1
20	58861532	59428137	G	C	563	4	0.01	777	12	0.02	505	105	0.17	2	2	2	tier3	relapse-specific	1
21	23370033	24448162	T	C	629	1	0.00	868	1	0.00	526	57	0.10	2	2	2	tier3	relapse-specific	0
21	30506365	31584494	T	C	477	126	0.21	353	306	0.46	477	94	0.16	2	2	2	tier3	shared	0
22	26004684	27674684	T	G	521	141	0.21	1054	792	0.43	590	157	0.21	2	2	2	tier3	shared	1
3	135449546	133966856	G	A	554	6	0.01	869	10	0.01	421	77	0.15	2	2	2	tier3	relapse-specific	0

3	182087434	180604740	G	C	586	157	0.21	341	318	0.48	613	111	0.15	2	2	2	tier3	shared	0
3	191103363	189620669	T	C	469	126	0.21	458	370	0.45	426	114	0.21	2	2	2	tier3	shared	0
3	192532267	191049573	C	T	412	104	0.20	348	354	0.50	442	105	0.19	2	2	2	tier3	shared	0
3	196997137	195512742	G	A	600	178	0.23	47	64	0.58	657	198	0.23	2	2	1.29	tier1	shared	2
3	21310708	21335704	C	A	630	3	0.00	1082	22	0.02	477	94	0.16	2	2	2	tier3	relapse-specific	1
3	43135962	43160958	G	A	769	1	0.00	570	0	0.00	630	43	0.06	2	2	2	tier3	relapse-specific	1
3	71109483	71026793	C	G	598	23	0.04	554	73	0.12	576	1	0.00	2	2	2	tier1	tumor-specific	1
3	85564094	85481404	C	T	627	97	0.13	837	398	0.32	553	1	0.00	2	2	2	tier3	tumor-specific	2
4	119477364	119257916	C	T	526	136	0.21	455	389	0.46	501	132	0.21	2	2	2	tier3	shared	0
4	186999154	186762160	T	G	242	66	0.21	217	214	0.50	313	72	0.19	2	2	2	tier3	shared	1
4	26362673	26753575	T	G	824	5	0.01	1123	15	0.01	659	165	0.20	2	2	2	tier3	relapse-specific	0
4	63345784	63663189	G	A	512	74	0.13	722	296	0.29	639	0	0.00	2	2	2	tier2	tumor-specific	0
4	72616906	72398042	T	C	487	2	0.00	561	14	0.02	475	91	0.16	2	2	2	tier3	shared	0
4	7394775	7343874	C	T	494	111	0.18	411	362	0.47	363	79	0.18	2	2	2	tier3	shared	0
5	170770148	170837543	-	TCTG	169	34	0.17	87	70	0.45	182	27	0.13	2	2	2	tier1	shared	55
5	22595465	22559708	T	G	376	2	0.01	325	6	0.02	312	69	0.18	2	2	2	tier3	relapse-specific	0
5	45880881	45845124	C	T	178	51	0.22	121	82	0.40	184	48	0.21	2	2	2	tier3	shared	1
5	67369605	67333849	C	T	538	127	0.19	345	345	0.50	410	78	0.16	2	2	2	tier3	shared	1
5	80124072	80088316	G	A	478	120	0.20	409	365	0.47	419	109	0.21	2	2	2	tier3	shared	0
5	93857376	93831620	C	G	322	1	0.00	344	1	0.00	279	54	0.16	2	2	2	tier3	relapse-specific	0
6	135462445	135420752	T	C	607	168	0.22	764	598	0.44	677	168	0.20	2	2	2	tier3	shared	0
6	40467367	40359389	C	A	649	0	0.00	846	1	0.00	446	52	0.10	2	2	2	tier2	relapse-specific	0
6	77123405	77066685	C	T	856	221	0.21	864	715	0.45	668	158	0.19	2	2	2	tier3	shared	1
6	95631430	95574709	T	A	694	5	0.01	1006	8	0.01	601	108	0.15	2	2	2	tier3	relapse-specific	1
7	120917535	121130299	C	A	434	3	0.01	821	1	0.00	456	41	0.08	2	2	2	tier3	relapse-specific	1
7	140451920	140805451	G	A	605	6	0.01	781	14	0.02	481	100	0.17	2	2	2	tier2	relapse-specific	0
7	157185399	157492638	A	T	576	142	0.20	182	164	0.47	482	111	0.19	2	2	2	tier2	shared	2
7	48632191	48661645	C	T	546	161	0.23	622	581	0.48	483	109	0.18	2	2	2	tier3	shared	1
7	57515887	57511945	C	T	241	57	0.19	118	69	0.37	252	53	0.17	2	2	2	tier3	shared	0
7	85476859	85638923	G	A	732	2	0.00	1428	20	0.01	506	107	0.17	2	2	2	tier3	relapse-specific	1
8	100665275	100596099	T	A	355	80	0.18	399	367	0.48	331	85	0.20	2	2	2	tier3	shared	1
8	115809334	115740158	G	A	547	0	0.00	852	0	0.00	529	30	0.05	2	2	2	tier3	relapse-specific	1
8	25022615	24966698	A	G	412	0	0.00	302	0	0.00	348	38	0.10	2	2	2	tier2	relapse-specific	1
8	34151385	34031843	G	A	353	67	0.16	384	200	0.34	335	20	0.06	2	2	2	tier3	shared	1
8	34167561	34048019	C	A	601	1	0.00	1706	1	0.00	551	85	0.13	2	2	2	tier3	relapse-specific	1
8	35476742	35357200	G	C	461	0	0.00	561	0	0.00	391	50	0.11	2	2	2	tier3	relapse-specific	1
8	51256369	51093816	A	G	688	0	0.00	1233	0	0.00	635	37	0.06	2	2	2	tier3	relapse-specific	1
8	66049865	65887311	C	T	289	1	0.00	245	5	0.02	180	33	0.15	2	2	2	tier3	shared	1
8	71467490	71304936	T	G	255	58	0.19	268	210	0.44	268	60	0.18	2	2	2	tier3	shared	1
9	100568848	101529027	A	T	445	123	0.22	274	233	0.46	368	74	0.17	2	2	2	tier3	shared	1

9	100720074	101680253	A	G	554	111	0.17	549	370	0.40	450	102	0.18	2	2	2	tier3	shared	0
9	108714159	109674338	C	T	629	90	0.13	521	286	0.35	633	0	0.00	2	2	2	tier3	tumor-specific	2
9	121538471	122498650	C	T	472	139	0.23	1096	1104	0.50	430	93	0.18	2	2	2	tier3	shared	1
9	137726092	138586271	G	A	451	7	0.02	91	5	0.05	272	59	0.18	2	2	1.26	tier1	shared	0
9	137816463	138676642	G	A	293	0	0.00	55	0	0.00	224	15	0.06	2	2	1.26	tier1	relapse-specific	1
9	36887024	36897024	C	A	543	0	0.00	1482	1	0.00	443	53	0.11	2	2	2	tier3	relapse-specific	0
X	105826475	105939819	T	C	240	6	0.02	589	14	0.02	150	79	0.34	2	0.97	1	tier3	shared	0
X	25476033	25566112	C	T	346	0	0.00	395	16	0.04	193	123	0.39	2	1	1.01	tier3	shared	0
X	86570002	86683346	G	A	246	0	0.00	376	1	0.00	195	23	0.11	2	0.88	0.98	tier2	relapse-specific	0
X	92941267	93054611	A	C	251	24	0.09	472	156	0.25	274	0	0.00	2	0.91	0.98	tier3	tumor-specific	1

**Supplementary Table 6d.** Somatic point mutations and indels from UPN 573988 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
15	88432938	90631934	C	T	367	49	0.12	136	18	0.12	454	93	0.17	2	2	2	tier1	shared	21
1	152866077	154599453	A	G	373	61	0.14	306	222	0.42	676	98	0.13	2	2	2	tier2	shared	1
1	156065861	157799237	G	T	402	79	0.16	327	268	0.45	507	97	0.16	2	2	2	tier3	shared	0
1	157079521	158812897	A	G	497	65	0.12	375	285	0.43	766	116	0.13	2	2	2	tier2	shared	1
1	170659983	172393360	A	G	432	71	0.14	350	252	0.42	616	105	0.15	2	2	2	tier3	shared	1
1	2047105	2057245	A	G	306	46	0.13	195	138	0.41	489	74	0.13	2	2	2	tier3	shared	0
1	232727616	234660993	C	G	334	67	0.17	247	191	0.44	493	99	0.17	2	2	2	tier2	shared	0
1	246890786	248824163	T	C	488	105	0.18	404	351	0.46	606	89	0.13	2	2	2	tier3	shared	0
1	26357620	26485033	G	A	346	65	0.16	244	206	0.46	594	82	0.12	2	2	2	tier3	shared	0
1	50546418	50773831	C	G	524	86	0.14	416	309	0.43	716	122	0.15	2	2	2	tier3	shared	0
1	68010042	68237454	A	T	274	63	0.19	239	192	0.45	461	76	0.14	2	2	2	tier3	shared	0
1	95228406	95455818	G	A	384	73	0.16	299	241	0.45	627	117	0.16	2	2	2	tier2	shared	0
1	97371514	97598926	T	C	160	19	0.11	114	115	0.50	187	29	0.13	2	2	2	tier3	shared	0
10	124028666	124038676	G	T	353	66	0.16	260	183	0.41	505	68	0.12	2	2	2	tier3	shared	1
10	128285031	128295041	A	C	575	0	0.00	572	0	0.00	607	63	0.09	2	2	2	tier3	relapse-specific	0
10	131080284	131190294	C	A	279	39	0.12	215	158	0.42	473	79	0.14	2	2	2	tier3	shared	1
10	132586707	132696717	C	T	465	85	0.15	366	252	0.41	741	124	0.14	2	2	2	tier3	shared	1
10	42920506	43600500	G	T	262	53	0.17	174	132	0.43	375	61	0.14	2	2	2	tier1	shared	1
10	56298782	56628776	C	T	541	88	0.14	420	320	0.43	705	131	0.16	2	2	2	tier3	shared	1
10	72563148	72893142	G	A	382	53	0.12	327	217	0.40	701	113	0.14	2	2	2	tier3	shared	1
10	78837968	79167962	C	T	350	70	0.17	274	203	0.43	640	115	0.15	2	2	2	tier3	shared	2
10	82764687	82774707	G	T	454	72	0.14	347	237	0.41	552	76	0.12	2	2	2	tier3	shared	1
10	83666211	83676231	T	A	386	46	0.11	311	195	0.39	538	80	0.13	2	2	2	tier3	shared	1
10	84453341	84463361	G	A	600	0	0.00	632	0	0.00	783	92	0.11	2	2	2	tier3	relapse-specific	1
10	84911614	84921634	G	A	569	72	0.11	490	360	0.42	766	144	0.16	2	2	2	tier3	shared	1
10	90685089	90695109	C	T	486	0	0.00	496	1	0.00	496	56	0.10	2	2	2	tier1	relapse-specific	0
10	93750121	93760141	G	A	430	69	0.14	337	262	0.44	582	72	0.11	2	2	2	tier3	shared	0

11	108348426	108843216	G	A	342	85	0.20	248	216	0.47	458	94	0.17	2	2	2	tier3	shared	0
11	114932108	115426898	G	A	402	70	0.15	304	194	0.39	503	74	0.13	2	2	2	tier3	shared	1
11	126873995	127368785	A	C	385	93	0.19	314	269	0.46	600	104	0.15	2	2	2	tier3	shared	1
11	133036355	133531145	C	T	558	103	0.16	455	335	0.42	828	123	0.13	2	2	2	tier3	shared	1
11	14216860	14260284	G	T	451	74	0.14	380	238	0.39	684	107	0.14	2	2	2	tier3	shared	1
11	81630181	81952533	G	A	108	19	0.15	73	62	0.46	135	22	0.14	2	2	2	tier3	shared	1
11	88630487	88990839	A	C	458	89	0.16	336	287	0.46	517	113	0.18	2	2	2	tier3	shared	0
11	88961314	89321666	G	A	415	69	0.14	287	231	0.45	451	76	0.14	2	2	2	tier3	shared	1
11	98926049	99420839	A	G	456	67	0.13	360	223	0.38	549	88	0.14	2	2	2	tier3	shared	2
12	104589528	106065398	C	T	638	88	0.12	424	353	0.45	834	118	0.12	2	2	2	tier2	shared	1
12	130082682	131516729	G	A	374	52	0.12	267	203	0.43	605	85	0.12	2	2	2	tier3	shared	0
12	13526038	13634771	C	T	396	65	0.14	322	224	0.41	562	87	0.13	2	2	2	tier2	shared	0
12	2855556	2985295	G	C	396	100	0.20	311	258	0.45	629	108	0.15	2	2	2	tier3	shared	1
12	44251466	45965199	A	G	530	64	0.11	394	291	0.42	601	131	0.18	2	2	2	tier3	shared	1
12	5932819	6062558	C	T	499	75	0.13	372	262	0.41	631	98	0.13	2	2	2	tier3	shared	2
12	61886315	63600048	A	G	552	76	0.12	431	324	0.43	832	150	0.15	2	2	2	tier2	shared	1
13	24101719	25203719	T	C	499	87	0.15	407	286	0.41	745	126	0.14	2	2	2	tier3	shared	0
13	27245431	28347431	A	G	479	85	0.15	307	260	0.46	681	117	0.15	2	2	2	tier3	shared	0
13	49600060	50702059	G	A	336	49	0.13	205	142	0.41	470	65	0.12	2	2	2	tier2	shared	0
13	57310496	58412495	G	T	687	94	0.12	570	378	0.40	969	123	0.11	2	2	2	tier3	shared	0
13	60387178	61489177	T	C	432	79	0.15	345	253	0.42	525	79	0.13	2	2	2	tier3	shared	1
13	86024201	87226200	A	T	422	60	0.12	319	225	0.41	484	80	0.14	2	2	2	tier2	shared	1
14	28970786	29901035	T	C	341	45	0.12	310	191	0.38	452	68	0.13	2	2	2	tier3	shared	0
14	31945736	32875985	A	G	416	68	0.14	318	261	0.45	546	95	0.15	2	2	2	tier3	shared	0
14	35243261	36173510	C	G	464	52	0.10	385	240	0.38	639	93	0.13	2	2	2	tier3	shared	0
14	60101057	61031304	T	A	489	87	0.15	415	294	0.41	786	131	0.14	2	2	2	tier3	shared	0
14	71404121	72334368	G	A	458	58	0.11	309	232	0.43	700	103	0.13	2	2	2	tier3	shared	1
14	81981587	82911834	G	A	522	89	0.15	399	269	0.40	693	116	0.14	2	2	2	tier3	shared	0
14	99144574	100074821	G	A	394	77	0.16	318	249	0.44	579	95	0.14	2	2	2	tier3	shared	0
15	27568855	29781563	C	T	530	64	0.11	403	294	0.42	710	111	0.14	2	2	2	tier3	shared	1
15	50800477	53013185	CGTCAGTAGACAA	-	67	13	0.16	80	21	0.21	89	52	0.37	2	2	2	tier3	shared	0
15	84235152	86434148	G	A	453	84	0.16	338	278	0.45	697	105	0.13	2	2	2	tier3	shared	1
15	94979771	97178767	G	A	368	64	0.15	325	239	0.42	543	95	0.15	2	2	2	tier3	shared	1
16	27557842	27650341	A	T	487	100	0.17	351	307	0.47	755	127	0.14	2	2	2	tier3	shared	0
16	48157810	49600309	G	A	199	30	0.13	151	86	0.36	350	55	0.14	2	2	2	tier2	shared	0
16	61747374	63189873	T	G	521	0	0.00	666	0	0.00	694	68	0.09	2	2	2	tier3	relapse-specific	1
16	62989048	64431547	G	T	399	2	0.00	513	2	0.00	474	41	0.08	2	2	2	tier2	relapse-specific	1
16	63862579	65305078	G	A	321	83	0.21	301	251	0.45	494	100	0.17	2	2	2	tier3	shared	0
16	75786717	77229216	G	A	368	48	0.12	290	181	0.38	623	86	0.12	2	2	2	tier3	shared	0
17	11469777	11529052	C	T	431	88	0.17	330	276	0.46	625	96	0.13	2	2	2	tier3	shared	5

17	22045352	22121225	T	A	197	0	0.00	192	0	0.00	180	17	0.09	2	2	2	tier3	relapse-specific	1
17	45384285	48029286	G	A	232	27	0.10	154	77	0.33	313	60	0.16	2	2	2	tier2	shared	0
17	74901938	77390343	C	T	407	75	0.16	361	195	0.35	795	90	0.10	2	2	2	tier3	shared	0
18	4240996	4250996	A	G	329	49	0.13	242	167	0.41	502	79	0.14	2	2	2	tier3	shared	0
18	42887822	44633824	G	C	639	0	0.00	831	0	0.00	894	58	0.06	2	2	2	tier3	relapse-specific	0
18	49631152	51377154	A	T	184	22	0.11	122	89	0.42	268	49	0.15	2	2	2	tier3	shared	1
18	74358793	76257805	C	T	230	27	0.11	198	121	0.38	397	53	0.12	2	2	2	tier2	shared	0
19	9190702	9329702	T	G	325	50	0.13	250	165	0.40	452	80	0.15	2	2	2	tier3	shared	0
2	1119223	1129223	T	G	565	0	0.00	727	0	0.00	776	83	0.10	2	2	2	tier3	relapse-specific	0
2	120945152	121228682	C	T	505	83	0.14	357	281	0.44	750	129	0.15	2	2	2	tier2	shared	1
2	132308722	132592252	A	G	237	53	0.18	160	115	0.42	334	69	0.17	2	1.2	1.35	tier3	shared	0
2	177039562	177331316	G	T	422	70	0.14	364	204	0.36	684	111	0.14	2	2	2	tier3	shared	1
2	1780321	1801314	G	A	467	76	0.14	361	215	0.37	613	105	0.15	2	2	2	tier2	shared	0
2	185954519	186246274	A	G	395	64	0.14	326	215	0.40	499	70	0.12	2	2	2	tier3	shared	1
2	226037120	226328876	T	C	444	69	0.13	363	247	0.40	695	122	0.15	2	2	2	tier3	shared	0
2	80360257	80506746	C	T	414	55	0.12	333	230	0.41	512	88	0.15	2	2	2	tier3	shared	1
2	84363515	84510004	G	A	337	39	0.10	230	151	0.40	464	93	0.17	2	2	2	tier2	shared	0
2	9847540	9930089	C	T	295	64	0.18	237	194	0.45	462	92	0.17	2	2	2	tier2	shared	0
20	21151872	21203872	A	G	428	65	0.13	292	231	0.44	545	72	0.12	2	2	2	tier3	shared	0
20	50693129	51259722	C	A	431	70	0.14	340	302	0.47	652	115	0.15	2	2	2	tier3	shared	0
20	50997947	51564540	C	A	120	21	0.15	100	80	0.44	137	22	0.14	2	2	2	tier3	shared	0
20	7083263	7135263	T	C	342	64	0.16	260	230	0.47	435	69	0.14	2	2	2	tier3	shared	1
20	9688020	9740020	A	G	521	71	0.12	399	330	0.45	726	120	0.14	2	2	2	tier3	shared	0
21	23407971	24486100	G	A	415	95	0.19	346	241	0.41	605	83	0.12	2	2	2	tier3	shared	0
22	34566545	36236599	C	T	133	20	0.13	116	90	0.44	176	28	0.14	2	2	2	tier2	shared	1
22	46051725	47673061	C	T	294	41	0.12	230	178	0.44	509	76	0.13	2	2	2	tier3	shared	1
22	48636061	50250057	A	G	388	51	0.12	308	208	0.40	614	102	0.14	2	2	2	tier2	shared	1
3	160308918	158826224	T	A	390	77	0.16	319	240	0.43	484	71	0.13	2	2	2	tier2	shared	0
3	162939745	161457051	G	A	449	66	0.13	341	184	0.35	580	83	0.13	2	2	2	tier3	shared	1
3	183065520	181582826	C	G	465	0	0.00	610	1	0.00	619	46	0.07	2	2	2	tier3	relapse-specific	0
3	1897326	1922326	G	A	446	70	0.14	333	223	0.40	620	89	0.13	2	2	2	tier3	shared	0
3	22074772	22099768	T	C	376	49	0.12	296	202	0.41	499	81	0.14	2	2	2	tier3	shared	1
3	38494675	38519671	C	T	321	38	0.11	214	160	0.43	460	78	0.14	2	2	2	tier1	shared	1
3	38926801	38951797	C	T	468	87	0.16	374	257	0.41	597	99	0.14	2	2	2	tier2	shared	0
3	52815055	52840015	C	T	209	45	0.18	165	130	0.44	337	64	0.16	2	2	2	tier3	shared	0
3	72131662	72048972	T	A	532	79	0.13	421	271	0.39	723	106	0.13	2	2	2	tier2	shared	1
3	8381350	8406350	A	G	331	51	0.13	256	161	0.39	417	70	0.14	2	2	2	tier3	shared	0
4	156523033	156303583	C	T	320	63	0.16	226	174	0.44	468	95	0.17	2	2	2	tier2	shared	0
4	162187617	161968167	G	A	518	70	0.12	389	325	0.46	630	105	0.14	2	2	2	tier2	shared	0
4	175013857	174777282	G	A	371	76	0.17	305	256	0.46	497	78	0.14	2	2	2	tier2	shared	1



4	185168709	184931715	C	G	405	1	0.00	482	0	0.00	570	65	0.10	2	2	2	tier1	relapse-specific	0
4	27805501	28196403	T	C	600	81	0.12	554	239	0.30	743	84	0.10	2	2	2	tier3	shared	1
4	31876103	32232205	T	C	368	60	0.14	248	212	0.46	516	97	0.16	2	2	2	tier3	shared	0
4	46928184	47233427	T	C	570	99	0.15	470	329	0.41	672	104	0.13	2	2	2	tier3	shared	1
4	5560977	5510076	A	G	445	68	0.13	327	249	0.43	703	105	0.13	2	2	2	tier3	shared	0
4	60624348	60941753	T	C	467	106	0.18	358	280	0.44	685	95	0.12	2	2	2	tier3	shared	1
4	7221259	7170358	G	A	337	60	0.15	269	193	0.42	560	84	0.13	2	2	2	tier3	shared	0
5	1297678	1244678	A	G	318	56	0.15	204	188	0.48	500	100	0.17	2	2	2	tier3	shared	0
5	15576863	15523863	G	A	520	67	0.11	348	250	0.42	704	112	0.14	2	2	2	tier3	shared	1
5	162177435	162244857	G	A	453	0	0.00	625	1	0.00	629	80	0.11	2	2	2	tier3	relapse-specific	0
5	170770148	170837543	-	TCTG	166	27	0.14	129	67	0.34	177	18	0.09	2	2	2	tier1	shared	55
5	17555650	17502650	C	T	580	72	0.11	480	185	0.28	884	109	0.11	2	2	2	tier3	shared	0
5	41469819	41434062	C	T	473	88	0.16	348	273	0.44	692	103	0.13	2	2	2	tier2	shared	0
5	5040012	4987012	G	A	264	52	0.16	265	167	0.39	365	70	0.16	2	2	2	tier2	shared	1
5	59661304	59625547	T	C	434	52	0.11	340	239	0.41	597	108	0.15	2	2	2	tier2	shared	0
5	81433358	81397602	A	G	463	72	0.13	361	240	0.40	562	108	0.16	2	2	2	tier2	shared	0
6	102924538	102817845	G	A	480	77	0.14	375	282	0.43	735	122	0.14	2	2	2	tier3	shared	1
6	70909420	70852699	C	T	542	68	0.11	376	253	0.40	699	131	0.16	2	2	2	tier1	shared	1
6	73006165	72949444	C	T	514	92	0.15	394	321	0.45	763	130	0.15	2	2	2	tier2	shared	2
6	93462438	93405717	G	A	384	0	0.00	481	1	0.00	368	43	0.10	2	2	2	tier3	relapse-specific	1
7	1129516	1162990	G	A	233	25	0.10	176	117	0.40	375	66	0.15	2	2	2	tier2	shared	0
7	126904338	127117102	C	T	399	54	0.12	300	208	0.41	495	89	0.15	2	2	2	tier3	shared	1
7	137742937	138092397	A	G	538	79	0.13	376	283	0.43	646	108	0.14	2	2	2	tier3	shared	0
7	27335064	27368539	C	A	248	42	0.14	184	155	0.46	404	80	0.17	2	2	2	tier2	shared	0
7	9411942	9445417	C	T	353	46	0.12	254	178	0.41	489	74	0.13	2	2	2	tier3	shared	1
8	3293986	3306578	G	A	538	0	0.00	718	0	0.00	740	83	0.10	2	2	2	tier3	relapse-specific	5
8	35385446	35265904	C	T	526	87	0.14	410	257	0.39	686	113	0.14	2	2	2	tier3	shared	1
8	4506706	4519298	G	A	573	98	0.15	468	331	0.41	734	112	0.13	2	2	2	tier3	shared	5
8	69990778	69828224	C	A	637	2	0.00	651	0	0.00	739	74	0.09	2	2	2	tier3	relapse-specific	1
8	72014233	71851679	G	C	613	123	0.17	453	369	0.45	749	100	0.12	2	2	2	tier2	shared	1
8	73668443	73505889	T	G	523	89	0.15	423	293	0.41	882	132	0.13	2	2	2	tier2	shared	0
8	90168004	90098888	C	T	392	65	0.14	345	220	0.39	596	85	0.12	2	2	2	tier3	shared	1
9	108822289	109782468	T	C	576	95	0.14	519	366	0.41	927	158	0.15	2	2	2	tier2	shared	0
9	128606555	129566734	C	T	399	62	0.13	314	223	0.42	594	99	0.14	2	2	2	tier3	shared	0
9	133385754	134395933	G	A	464	75	0.14	341	274	0.45	709	114	0.14	2	2	2	tier3	shared	0
9	133675566	134685745	T	C	552	67	0.11	343	236	0.41	760	126	0.14	2	2	2	tier3	shared	0
9	18413175	18423175	T	G	440	52	0.11	317	230	0.42	512	67	0.12	2	2	2	tier2	shared	1
9	80646169	81456349	C	T	402	58	0.13	324	211	0.39	475	71	0.13	2	2	2	tier3	shared	1
9	88474278	89284458	G	A	436	74	0.15	334	214	0.39	624	92	0.13	2	2	2	tier3	shared	1
X	121434334	121606653	G	A	510	2	0.00	603	2	0.00	723	55	0.07	2	2	2	tier3	relapse-specific	0

X	152730397	153077203	C	T	470	95	0.17	336	282	0.46	544	101	0.16	2	2	2	tier3	shared	0
X	37907322	38022378	T	A	539	110	0.17	399	320	0.45	713	121	0.15	2	2	2	tier3	shared	1
X	55700094	55683369	G	A	285	36	0.11	186	156	0.46	392	82	0.17	2	2	2	tier1	shared	1

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**Supplementary Table 6e.** Somatic point mutations and indels from UPN 758168 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	101795228	102022640	C	T	429	27	0.06	299	252	0.46	285	242	0.46	2	2	2	tier3	shared	1
1	108075256	108273733	C	T	655	42	0.06	351	273	0.44	340	255	0.43	2	2	2	tier3	shared	1
1	112186324	112384801	C	T	273	24	0.08	205	161	0.44	284	92	0.24	2	2	2	tier3	shared	0
1	113359631	113558108	A	G	201	19	0.09	131	72	0.35	143	117	0.45	2	2	2	tier3	shared	1
1	144426616	145715259	A	G	478	37	0.07	312	255	0.45	359	269	0.43	2	2	2	tier3	shared	0
1	145272658	146806034	T	C	478	34	0.07	256	264	0.51	289	266	0.48	2	2	2	tier3	shared	0
1	157535832	159269208	C	T	462	35	0.07	314	277	0.47	339	276	0.45	2	2	2	tier3	shared	0
1	161210083	162943459	C	T	598	47	0.07	349	281	0.45	378	256	0.40	2	2	2	tier3	shared	0
1	162652104	164385480	C	A	635	0	0.00	555	0	0.00	421	59	0.12	2	2	2	tier3	relapse-specific	1
1	162672026	164405402	C	T	248	17	0.06	142	139	0.49	134	116	0.46	2	2	2	tier3	shared	1
1	176722320	178455697	C	G	393	29	0.07	280	217	0.44	412	138	0.25	2	2	2	tier2	shared	0
1	182681055	184414432	T	G	352	23	0.06	165	145	0.47	171	135	0.44	2	2	2	tier3	shared	0
1	193708003	195441380	G	A	752	0	0.00	708	0	0.00	544	135	0.20	2	2	2	tier3	relapse-specific	1
1	193987679	195721056	G	T	433	0	0.00	371	0	0.00	322	64	0.17	2	2	2	tier3	relapse-specific	1
1	207565242	209498619	G	T	585	57	0.09	447	363	0.45	429	349	0.45	2	2	2	tier2	shared	1
1	209006734	210940111	C	T	755	1	0.00	659	0	0.00	512	112	0.18	2	2	2	tier3	relapse-specific	0
1	213699271	215632648	T	-	440	43	0.09	360	293	0.45	344	297	0.46	2	2	2	tier3	shared	1
1	213872512	215805889	C	T	609	69	0.10	391	342	0.47	434	328	0.43	2	2	2	tier3	shared	2
1	227069729	229003106	G	A	374	25	0.06	257	232	0.47	236	194	0.45	2	2	2	tier3	shared	1
1	227086932	229020309	T	C	656	52	0.07	328	257	0.44	355	334	0.48	2	2	2	tier3	shared	1
1	230816646	232750023	A	T	535	0	0.00	633	0	0.00	526	105	0.17	2	2	2	tier3	relapse-specific	0
1	30582076	30809489	C	T	530	49	0.08	383	358	0.48	391	327	0.46	2	2	2	tier3	shared	0
1	36221858	36449271	C	G	812	60	0.07	457	471	0.51	448	341	0.43	2	2	2	tier3	shared	0
1	44944905	45172318	G	A	694	0	0.00	735	0	0.00	616	129	0.17	2	2	2	tier3	relapse-specific	0
1	47682290	47909703	C	T	102	8	0.07	70	52	0.43	98	94	0.49	2	2	2	tier2	shared	0
1	49985351	50212764	T	C	586	43	0.07	344	305	0.47	333	304	0.48	2	2	2	tier2	shared	0
1	56758799	56986211	G	A	508	1	0.00	514	1	0.00	424	87	0.17	2	2	2	tier3	relapse-specific	0
1	62329867	62557279	T	C	665	0	0.00	582	0	0.00	629	44	0.07	2	2	2	tier3	relapse-specific	1
1	65105070	65332482	-	G	529	33	0.06	347	248	0.42	323	263	0.45	2	2	2	tier3	shared	0

1	73654309	73881721	T	A	416	28	0.06	235	187	0.44	263	204	0.44	2	2	2	tier3	shared	1
1	7784722	7862135	T	C	354	18	0.05	155	147	0.49	174	144	0.45	2	2	2	tier3	shared	0
1	79695278	79922690	A	G	558	44	0.07	369	291	0.44	353	270	0.43	2	2	2	tier3	shared	1
1	79793941	80021353	A	T	572	45	0.07	305	256	0.46	335	292	0.47	2	2	2	tier3	shared	0
1	80186452	80413864	A	T	326	0	0.00	322	1	0.00	261	56	0.18	2	2	2	tier3	relapse-specific	1
1	90765265	90992677	G	T	498	56	0.10	357	318	0.47	321	290	0.47	2	2	2	tier3	shared	1
1	9292525	9369938	G	C	430	33	0.07	291	202	0.41	286	226	0.44	2	2	2	tier3	shared	0
10	101883080	101893090	A	C	480	40	0.08	318	245	0.44	301	244	0.45	2	2	2	tier3	shared	0
10	107559315	107569325	G	-	618	48	0.07	332	277	0.45	341	239	0.41	2	2	2	tier3	shared	1
10	122985405	122995415	C	G	617	71	0.10	391	296	0.43	581	210	0.27	2	2	2	tier3	shared	0
10	125962311	125972321	C	T	490	30	0.06	304	263	0.46	330	252	0.43	2	2	2	tier3	shared	1
10	132611796	132721806	G	A	607	61	0.09	398	349	0.47	406	324	0.44	2	2	2	tier3	shared	1
10	133034167	133144177	G	A	335	14	0.04	212	164	0.44	235	222	0.49	2	2	2	tier3	shared	1
10	14102630	14062624	C	T	356	39	0.10	284	210	0.43	280	239	0.46	2	2	2	tier2	shared	0
10	16181275	16141269	A	C	400	38	0.09	286	272	0.49	268	268	0.50	2	2	2	tier3	shared	0
10	2824791	2834791	A	G	577	44	0.07	319	287	0.47	339	274	0.45	2	2	2	tier3	shared	1
10	29873202	29833196	G	A	537	41	0.07	308	244	0.44	318	245	0.44	2	2	2	tier3	shared	0
10	30326889	30286883	G	A	621	47	0.07	359	242	0.40	328	252	0.43	2	2	2	tier2	shared	0
10	34059045	34019039	G	A	586	48	0.08	314	251	0.44	335	259	0.44	2	2	2	tier3	shared	1
10	37500984	37460978	A	G	971	22	0.02	698	138	0.17	704	138	0.16	2	2	2	tier3	shared	1
10	3797379	3807379	C	A	478	35	0.07	311	267	0.46	311	258	0.45	2	2	2	tier2	shared	0
10	44603059	45283053	G	C	748	19	0.02	647	151	0.19	713	91	0.11	2	2	2	tier3	shared	0
10	52502567	52832561	A	C	339	0	0.00	321	0	0.00	302	55	0.15	2	2	2	tier3	relapse-specific	0
10	55997651	56327645	A	G	465	0	0.00	486	0	0.00	355	74	0.17	2	2	2	tier3	relapse-specific	1
10	56392820	56722814	A	T	424	0	0.00	444	0	0.00	408	79	0.16	2	2	2	tier2	relapse-specific	1
10	56477658	56807652	G	T	466	31	0.06	262	179	0.41	304	93	0.23	2	2	2	tier3	shared	1
10	58036972	58366966	C	A	431	32	0.07	278	187	0.40	276	186	0.40	2	2	2	tier3	shared	1
10	67368173	67698167	A	-	637	51	0.07	332	303	0.48	370	275	0.43	2	2	2	tier3	shared	1
10	68276865	68606859	C	G	548	40	0.07	384	273	0.42	361	259	0.42	2	2	2	tier3	shared	1
10	71282909	71612903	T	A	132	13	0.09	80	67	0.46	122	81	0.40	2	2	2	tier3	shared	0
10	74551292	74881286	C	T	495	38	0.07	381	250	0.40	390	274	0.41	2	2	2	tier3	shared	0
10	82964741	82974761	T	-	252	39	0.13	166	110	0.40	181	141	0.44	2	2	2	tier3	shared	1
10	84719564	84729584	G	A	611	0	0.00	633	2	0.00	467	134	0.22	2	2	2	tier2	relapse-specific	1
10	8605762	8565756	C	T	574	46	0.07	386	271	0.41	469	153	0.25	2	2	2	tier3	shared	0
10	86645712	86655732	T	G	253	13	0.05	114	142	0.55	129	127	0.50	2	2	2	tier3	shared	1
10	88479977	88489997	A	G	524	44	0.08	354	279	0.44	382	341	0.47	2	2	2	tier3	shared	0
10	91676896	91686916	G	A	325	18	0.05	230	170	0.43	210	206	0.50	2	2	2	tier2	shared	1
11	103263588	103758378	G	T	589	41	0.07	405	290	0.42	470	197	0.30	2	2	2	tier3	shared	0
11	10641809	10685233	T	G	538	87	0.14	46	495	0.91	61	579	0.90	2	2	2	tier3	shared	0
11	115895264	116390054	C	T	594	61	0.09	345	270	0.44	357	268	0.43	2	2	2	tier3	shared	1

11	117810868	118305658	G	A	366	36	0.09	288	231	0.45	295	229	0.44	2	2	2	tier2	shared	0
11	1229284	1272708	C	T	210	33	0.14	21	263	0.93	18	246	0.93	2	1.28	1.25	tier1	shared	3
11	130208081	130702871	G	T	532	29	0.05	304	235	0.44	319	266	0.45	2	2	2	tier3	shared	0
11	132418266	132913056	G	A	532	50	0.09	378	273	0.42	379	311	0.45	2	2	2	tier3	shared	0
11	132937657	133432447	G	A	492	11	0.02	518	86	0.14	604	43	0.07	2	2	2	tier3	shared	0
11	27062649	27106073	C	T	606	100	0.14	56	725	0.93	89	643	0.88	2	2	2	tier3	shared	0
11	29918482	29961906	A	T	404	74	0.15	65	405	0.86	36	448	0.93	2	2	2	tier3	shared	1
11	40213930	40257354	G	A	577	88	0.13	50	586	0.92	69	494	0.88	2	2	2	tier3	shared	0
11	61267618	61511042	C	T	325	0	0.00	365	0	0.00	313	76	0.20	2	2	1.38	tier1	relapse-specific	1
11	64146939	64390363	G	A	310	0	0.00	365	2	0.01	302	55	0.15	2	2	1.37	tier1	relapse-specific	2
11	69709680	70032032	C	T	357	22	0.06	233	211	0.48	246	199	0.45	2	2	2	tier3	shared	1
11	83471362	83793714	T	C	626	1	0.00	604	3	0.00	480	108	0.18	2	2	2	tier3	relapse-specific	0
11	99450197	99944987	C	T	566	46	0.08	352	290	0.45	305	260	0.46	2	2	2	tier1	shared	2
12	105079083	106554953	T	G	533	60	0.10	324	283	0.47	316	265	0.46	2	2	2	tier3	shared	0
12	115921314	117436931	A	G	463	5	0.01	520	74	0.12	500	51	0.09	2	2	2	tier3	shared	0
12	126424656	127858703	G	A	343	0	0.00	353	0	0.00	282	84	0.23	2	2	2	tier3	relapse-specific	1
12	2256098	2385837	T	C	631	49	0.07	336	291	0.46	303	276	0.48	2	2	2	tier3	shared	0
12	23485260	23593993	C	T	729	56	0.07	403	318	0.44	365	288	0.44	2	2	2	tier2	shared	1
12	40185832	41899565	C	T	538	40	0.07	347	237	0.41	467	156	0.25	2	2	2	tier3	shared	0
12	62791514	64505247	G	A	510	43	0.08	289	266	0.48	284	209	0.42	2	2	2	tier3	shared	0
12	67574421	69288154	C	T	519	38	0.07	274	239	0.47	318	247	0.44	2	2	2	tier3	shared	0
12	72713799	74427532	G	A	636	45	0.07	421	300	0.42	433	367	0.46	2	2	2	tier3	shared	1
12	77851066	79326935	C	T	447	29	0.06	229	170	0.43	286	207	0.42	2	2	2	tier3	shared	1
12	80948256	82424125	G	T	592	51	0.08	317	243	0.43	290	242	0.45	2	2	2	tier3	shared	1
12	83033586	84509455	T	C	558	0	0.00	517	0	0.00	438	76	0.15	2	2	2	tier3	relapse-specific	1
12	93956009	95431878	C	A	637	0	0.00	640	1	0.00	419	68	0.14	2	2	2	tier3	relapse-specific	0
13	102456951	103658950	G	A	500	25	0.05	291	201	0.41	307	241	0.44	2	2	2	tier3	shared	0
13	102748923	103950922	A	G	483	37	0.07	237	227	0.49	271	233	0.46	2	2	2	tier3	shared	0
13	112352058	113304057	C	G	661	51	0.07	439	301	0.41	416	334	0.45	2	2	2	tier3	shared	0
13	18194366	19296366	C	G	420	30	0.07	240	196	0.45	311	119	0.28	2	2	1.03	tier3	shared	0
13	18910252	20012252	C	T	381	32	0.08	213	165	0.44	198	191	0.49	2	2	2	tier1	shared	0
13	24234864	25336864	C	T	516	36	0.07	334	252	0.43	336	268	0.44	2	2	2	tier2	shared	0
13	32762787	33864787	C	G	438	33	0.07	293	259	0.47	343	274	0.44	2	2	2	tier3	shared	0
13	34044835	35146835	G	T	701	68	0.09	396	341	0.46	338	282	0.45	2	2	2	tier3	shared	0
13	35322433	36424433	G	A	433	21	0.05	186	138	0.43	172	126	0.42	2	2	2	tier3	shared	1
13	42492740	43594740	T	C	440	37	0.08	244	215	0.47	264	239	0.48	2	2	2	tier3	shared	1
13	55692368	56794367	C	T	423	24	0.05	206	152	0.42	231	168	0.42	2	2	2	tier3	shared	0
13	57139096	58241095	C	A	455	0	0.00	490	2	0.00	360	68	0.16	2	2	2	tier3	relapse-specific	0
13	57370234	58472233	G	A	404	22	0.05	202	155	0.43	219	160	0.42	2	2	2	tier3	shared	0
13	62444093	63546092	C	T	352	1	0.00	269	0	0.00	215	34	0.14	2	2	2	tier3	relapse-specific	1

13	62827741	63929740	A	T	373	0	0.00	291	0	0.00	299	46	0.13	2	2	2	tier3	relapse-specific	1
13	62831674	63933673	T	C	402	22	0.05	228	199	0.47	232	201	0.46	2	2	2	tier3	shared	1
13	65766919	66868918	G	T	552	70	0.11	385	301	0.44	383	295	0.44	2	2	2	tier3	shared	0
13	68643128	69745127	G	T	400	34	0.08	205	150	0.42	191	126	0.40	2	2	2	tier3	shared	1
13	71336488	72438487	G	A	601	59	0.09	388	291	0.43	380	359	0.49	2	2	2	tier3	shared	0
13	72244339	73346338	C	T	561	43	0.07	330	251	0.43	324	285	0.47	2	2	2	tier1	shared	3
13	77524745	78626744	T	C	376	18	0.05	188	174	0.48	244	200	0.45	2	2	2	tier3	shared	1
13	85872286	87074285	G	T	475	33	0.06	287	223	0.44	256	225	0.47	2	2	2	tier3	shared	1
13	89507219	90709218	G	A	563	32	0.05	332	220	0.40	271	219	0.45	2	2	2	tier3	shared	1
13	89938365	91140364	T	-	526	49	0.09	334	231	0.41	339	256	0.43	2	2	2	tier3	shared	1
13	90217967	91419966	T	C	472	29	0.06	240	241	0.50	216	272	0.56	2	2	2	tier3	shared	0
13	92080314	93282313	A	C	468	34	0.07	256	223	0.47	221	202	0.48	2	2	2	tier3	shared	0
13	94678458	95880457	C	T	452	37	0.08	322	240	0.43	410	147	0.26	2	2	2	tier2	shared	0
14	100608867	101539114	-	TGAGCGC	217	15	0.06	148	114	0.44	149	129	0.46	2	2	2	tier3	shared	0
14	103961698	104890653	-	G	178	12	0.06	163	65	0.29	183	47	0.20	2	2	1.28	tier3	shared	0
14	105609184	106538139	C	G	559	1	0.00	560	2	0.00	462	108	0.19	2	2	2	tier3	relapse-specific	1
14	26207658	27137818	C	T	406	29	0.07	242	205	0.46	221	184	0.45	2	2	2	tier3	shared	1
14	27174620	28104780	T	C	347	14	0.04	190	153	0.45	186	170	0.48	2	2	2	tier3	shared	0
14	33102337	34032586	C	T	430	24	0.05	275	247	0.47	364	169	0.32	2	2	2	tier3	shared	0
14	39653662	40583911	T	A	469	35	0.07	228	172	0.43	236	178	0.43	2	2	2	tier3	shared	1
14	46290472	47220722	C	T	621	0	0.00	591	0	0.00	528	36	0.06	2	2	2	tier3	relapse-specific	1
14	49588483	50518733	G	A	413	37	0.08	252	261	0.51	286	271	0.49	2	2	2	tier3	shared	0
14	49822908	50753158	C	T	392	39	0.09	270	256	0.49	297	217	0.42	2	2	2	tier3	shared	0
14	77942449	78872696	C	T	294	31	0.10	233	205	0.47	254	217	0.46	2	2	2	tier3	shared	2
14	82072551	83002798	C	T	467	31	0.06	250	221	0.47	192	190	0.50	2	2	2	tier2	shared	1
14	95069562	95999809	C	T	502	44	0.08	223	277	0.55	229	246	0.52	2	2	2	tier1	shared	0
15	33923658	36136366	C	G	648	58	0.08	412	378	0.48	357	281	0.44	2	2	2	tier3	shared	1
15	51192438	53405146	G	A	560	30	0.05	309	243	0.44	333	245	0.42	2	2	2	tier3	shared	1
15	61924663	64137610	A	T	325	26	0.07	151	140	0.48	169	136	0.45	2	2	2	tier3	shared	2
15	76418530	78631475	C	T	446	0	0.00	519	0	0.00	462	81	0.15	2	2	2	tier3	relapse-specific	0
15	84063349	86262345	AAGATCA	-	735	61	0.08	411	336	0.45	420	317	0.43	2	2	2	tier1	shared	2
15	85958112	88157108	A	T	500	40	0.07	323	243	0.43	316	233	0.42	2	2	2	tier3	shared	0
15	91530325	93729321	T	C	578	44	0.07	336	272	0.45	356	291	0.45	2	2	2	tier3	shared	0
15	96588459	98770936	G	A	546	56	0.09	393	294	0.43	528	184	0.26	2	2	2	tier3	shared	1
16	26981824	27074323	G	A	449	0	0.00	491	0	0.00	470	81	0.15	2	2	2	tier3	relapse-specific	1
16	32542349	32634848	T	C	311	33	0.10	231	179	0.44	207	186	0.47	2	2	2	tier3	shared	0
16	46232164	47674663	G	C	521	39	0.07	324	252	0.44	347	275	0.44	2	2	2	tier3	shared	0
16	46589196	48031695	C	T	538	28	0.05	302	220	0.42	221	205	0.48	2	2	2	tier3	shared	1
16	47618839	49061338	T	-	491	41	0.08	308	263	0.46	336	236	0.41	2	2	2	tier2	shared	1
16	58855461	60297960	G	T	373	34	0.08	197	191	0.49	253	197	0.44	2	2	2	tier3	shared	1

16	61371424	62813923	A	T	263	10	0.04	153	121	0.44	158	136	0.46	2	2	2	tier3	shared	0
16	61582014	63024513	T	C	325	24	0.07	195	130	0.40	247	70	0.22	2	2	2	tier3	shared	1
16	61594300	63036799	-	A	296	7	0.02	137	121	0.47	168	124	0.42	2	2	2	tier3	shared	1
16	61970462	63412961	T	G	515	35	0.06	260	204	0.44	298	244	0.45	2	2	2	tier3	shared	0
16	6728056	6788055	T	C	302	19	0.06	174	156	0.47	200	74	0.27	2	2	2	tier3	shared	0
16	71333400	72775899	G	T	362	0	0.00	339	0	0.00	336	61	0.15	2	2	2	tier3	relapse-specific	1
17	11513530	11572805	T	G	503	50	0.09	321	260	0.45	313	256	0.45	2	2	2	tier1	shared	5
17	13501009	13560284	G	A	342	0	0.00	335	0	0.00	301	62	0.17	2	2	2	tier3	relapse-specific	1
17	21630034	21705907	T	G	199	4	0.02	68	77	0.53	72	54	0.43	2	2	2	tier3	shared	0
17	21927249	22003122	C	T	408	51	0.11	243	221	0.48	287	234	0.45	2	2	2	tier3	shared	0
17	22978938	25954811	G	A	388	33	0.08	277	245	0.47	252	219	0.46	2	2	2	tier3	shared	0
17	3004064	3057314	G	A	467	0	0.00	525	0	0.00	436	106	0.20	2	2	2	tier1	relapse-specific	0
17	31379333	34355220	G	A	545	1	0.00	553	0	0.00	497	145	0.23	2	2	2	tier3	relapse-specific	0
17	36816355	39562829	C	T	311	37	0.11	244	161	0.40	226	146	0.39	2	2	2	tier3	shared	0
17	40721872	43366089	G	A	281	30	0.10	200	176	0.47	254	191	0.43	2	2	2	tier3	shared	0
17	46647529	49292530	G	A	531	37	0.07	320	265	0.45	339	230	0.40	2	2	2	tier2	shared	0
17	54205222	56850223	C	T	553	46	0.08	344	239	0.41	300	250	0.45	2	2	2	tier3	shared	0
17	69394173	71882578	G	A	709	1	0.00	775	0	0.00	678	160	0.19	2	2	2	tier3	relapse-specific	1
18	13532518	13542518	G	T	329	28	0.08	269	207	0.43	254	221	0.47	2	2	2	tier3	shared	1
18	25377609	27123611	G	T	412	24	0.06	247	175	0.41	262	133	0.34	2	2	2	tier3	shared	1
18	29678931	31424933	G	A	450	1	0.00	488	2	0.00	430	110	0.20	2	2	2	tier3	relapse-specific	0
18	3064471	3074471	T	C	458	37	0.07	282	286	0.50	329	277	0.46	2	2	2	tier3	shared	0
18	31880060	33626062	A	C	386	38	0.09	224	192	0.46	203	199	0.50	2	2	2	tier3	shared	0
18	37355263	39101265	C	T	745	0	0.00	826	0	0.00	715	124	0.15	2	2	2	tier3	relapse-specific	0
18	44872991	46618993	G	C	446	35	0.07	276	237	0.46	277	241	0.47	2	2	2	tier3	shared	0
18	47612101	49358103	A	-	261	40	0.13	111	124	0.53	96	105	0.52	2	2	2	tier3	shared	0
18	49094566	50840568	G	A	587	39	0.06	342	242	0.41	422	144	0.25	2	2	2	tier3	shared	0
18	53838328	55687330	G	C	814	1	0.00	875	0	0.00	710	150	0.17	2	2	2	tier3	relapse-specific	0
18	5846231	5856231	C	T	579	0	0.00	494	0	0.00	347	63	0.15	2	2	2	tier3	relapse-specific	0
18	61800412	63649432	A	G	596	39	0.06	349	267	0.43	396	313	0.44	2	2	2	tier3	shared	1
18	63477988	65327008	T	A	789	45	0.05	447	332	0.43	581	178	0.23	2	2	2	tier3	shared	1
18	63843371	65692391	C	T	516	32	0.06	357	318	0.47	320	287	0.47	2	2	2	tier3	shared	1
18	66656743	68505763	A	T	230	9	0.04	142	124	0.47	156	121	0.44	2	2	2	tier3	shared	1
18	73920029	75819041	C	A	488	47	0.09	337	301	0.47	287	276	0.49	2	2	2	tier3	shared	0
18	8840453	8850453	G	A	461	45	0.09	314	247	0.44	250	219	0.47	2	2	2	tier3	shared	1
19	35150116	30458276	G	A	521	31	0.06	381	262	0.41	476	167	0.26	2	2	2	tier3	shared	0
19	39057748	34365908	G	A	381	27	0.07	206	136	0.40	258	81	0.24	2	2	2	tier2	shared	1
19	39761080	35069240	C	T	191	22	0.10	137	92	0.40	158	131	0.45	2	2	2	tier3	shared	0
19	48131669	43439829	G	T	142	8	0.05	95	103	0.52	113	77	0.41	2	2	2	tier1	shared	0
19	5248118	5297118	G	A	179	24	0.12	140	153	0.52	169	173	0.51	2	2	1.23	tier3	shared	1

2	100377523	101011091	C	T	411	47	0.10	243	222	0.48	318	278	0.47	2	2	2	tier3	shared	0
2	103930757	104564325	T	C	435	34	0.07	222	201	0.48	251	169	0.40	2	2	2	tier3	shared	1
2	106517597	107151165	G	A	337	22	0.06	272	222	0.45	275	239	0.46	2	2	2	tier2	shared	1
2	109210679	109844247	T	A	416	46	0.10	313	304	0.49	350	277	0.44	2	2	2	tier3	shared	0
2	112581114	112864643	G	C	515	57	0.10	270	277	0.51	320	237	0.43	2	2	2	tier3	shared	1
2	116164256	116447786	ACTTTCCATTA CATAATATTGTC	-	255	24	0.09	138	113	0.45	165	133	0.45	2	2	2	tier3	shared	0
2	119959157	120242687	C	T	365	30	0.08	281	227	0.45	284	204	0.42	2	2	2	tier3	shared	2
2	121062191	121345721	C	T	678	0	0.00	659	0	0.00	575	113	0.16	2	2	2	tier2	relapse-specific	1
2	121512897	121796427	G	T	613	0	0.00	815	0	0.00	705	159	0.18	2	2	2	tier3	relapse-specific	0
2	123733119	124016649	C	T	661	64	0.09	402	357	0.47	358	315	0.47	2	2	2	tier3	shared	1
2	125156383	125439913	G	T	749	1	0.00	677	0	0.00	663	48	0.07	2	2	2	tier2	relapse-specific	2
2	125314902	125598432	C	A	496	2	0.00	594	0	0.00	479	82	0.15	2	2	2	tier2	relapse-specific	2
2	12812570	12895119	C	T	498	39	0.07	309	260	0.46	311	275	0.47	2	2	2	tier3	shared	0
2	132126629	132410159	A	G	279	0	0.00	277	0	0.00	203	53	0.21	2	2	2	tier3	relapse-specific	1
2	133290595	133574125	G	A	396	39	0.09	277	218	0.44	303	267	0.47	2	2	2	tier3	shared	1
2	136723675	137007205	G	A	733	1	0.00	830	0	0.00	647	151	0.19	2	2	2	tier3	relapse-specific	0
2	151445176	151736930	C	A	880	0	0.00	847	1	0.00	886	47	0.05	2	2	2	tier3	relapse-specific	1
2	152045229	152336983	C	T	517	42	0.08	312	248	0.44	279	214	0.43	2	2	2	tier3	shared	1
2	1604624	1625617	G	A	432	37	0.08	302	270	0.47	356	280	0.44	2	2	2	tier3	shared	0
2	16261487	16398006	C	T	590	0	0.00	588	1	0.00	488	98	0.17	2	2	2	tier2	relapse-specific	0
2	164635523	164927277	T	A	485	21	0.04	385	94	0.20	381	57	0.13	2	2	2	tier3	shared	1
2	164718050	165009804	G	T	788	0	0.00	773	0	0.00	556	114	0.17	2	2	2	tier3	relapse-specific	1
2	164933994	165225748	A	T	434	2	0.00	388	0	0.00	345	57	0.14	2	2	2	tier3	relapse-specific	1
2	165489935	165781689	G	A	717	60	0.08	379	323	0.46	373	343	0.48	2	2	2	tier3	shared	1
2	182857117	183148872	G	A	505	23	0.04	326	274	0.46	305	226	0.43	2	2	2	tier3	shared	0
2	1851512	1872505	C	T	150	13	0.08	136	94	0.41	138	120	0.47	2	2	2	tier2	shared	0
2	193658805	193950560	A	T	459	40	0.08	277	173	0.38	296	129	0.30	2	2	2	tier3	shared	1
2	200615435	200907190	G	T	503	1	0.00	534	1	0.00	425	84	0.17	2	2	2	tier2	relapse-specific	1
2	200990862	201282617	G	A	408	32	0.07	235	248	0.51	270	200	0.43	2	2	2	tier2	shared	1
2	204874744	205166499	T	C	458	37	0.07	248	229	0.48	287	227	0.44	2	2	2	tier3	shared	1
2	207420782	207712537	G	A	391	41	0.09	276	242	0.47	317	236	0.43	2	2	2	tier3	shared	1
2	214933246	215225001	T	C	482	0	0.00	456	0	0.00	391	74	0.16	2	2	2	tier3	relapse-specific	0
2	225157935	225449691	C	A	199	16	0.07	102	92	0.47	88	88	0.50	2	2	2	tier1	shared	1
2	23020073	23166568	C	A	466	23	0.05	270	227	0.46	307	246	0.44	2	2	2	tier3	shared	1
2	240682780	241034107	A	T	528	46	0.08	320	275	0.46	342	294	0.46	2	2	2	tier3	shared	0
2	32298967	32445463	A	G	545	46	0.08	352	344	0.49	383	285	0.43	2	2	2	tier1	shared	1
2	34324995	34471491	C	T	555	46	0.08	384	321	0.46	362	332	0.48	2	2	2	tier3	shared	1
2	3653144	3675269	A	G	789	59	0.07	563	514	0.48	521	446	0.46	2	2	2	tier2	shared	0
2	429750	439750	A	G	373	25	0.06	244	193	0.44	229	192	0.46	2	2	2	tier2	shared	1
2	52295638	52442134	A	G	545	54	0.09	291	263	0.47	273	218	0.44	2	2	2	tier3	shared	1



2	52365494	52511990	G	T	438	35	0.07	258	188	0.42	256	223	0.47	2	2	2	tier3	shared	0
2	5275186	5357735	A	T	497	41	0.08	383	240	0.39	426	151	0.26	2	2	2	tier3	shared	1
2	5381376	5463925	A	T	296	22	0.07	166	156	0.48	175	148	0.46	2	2	2	tier3	shared	0
2	59262624	59409120	C	A	620	51	0.08	370	316	0.46	424	322	0.43	2	2	2	tier3	shared	0
2	79424915	79571407	T	G	609	0	0.00	573	0	0.00	537	108	0.17	2	2	2	tier3	relapse-specific	1
2	79610921	79757413	A	-	615	45	0.07	400	262	0.40	371	292	0.44	2	2	2	tier3	shared	1
2	81008756	81155245	G	T	355	1	0.00	313	0	0.00	222	28	0.11	2	2	2	tier3	relapse-specific	1
2	83365574	83512063	T	A	533	0	0.00	451	4	0.01	453	93	0.17	2	2	2	tier3	relapse-specific	1
20	12364137	12416137	C	A	515	0	0.00	554	0	0.00	478	86	0.15	2	2	2	tier3	relapse-specific	1
20	41777325	42343911	G	A	362	40	0.10	232	187	0.45	256	200	0.44	2	2	2	tier1	shared	0
20	48335956	48902549	G	A	528	1	0.00	548	0	0.00	421	85	0.17	2	2	2	tier3	relapse-specific	0
20	56078527	56645121	C	A	412	31	0.07	285	201	0.41	351	148	0.30	2	2	2	tier3	shared	0
20	56640598	57207192	G	A	377	35	0.08	188	211	0.53	223	192	0.46	2	2	2	tier2	shared	0
21	18754617	19832746	C	T	408	16	0.04	219	186	0.46	199	169	0.46	2	2	2	tier3	shared	1
21	21114306	22192435	A	G	428	0	0.00	529	0	0.00	407	97	0.19	2	2	2	tier3	relapse-specific	0
21	21618540	22696669	G	A	601	34	0.05	324	238	0.42	440	154	0.26	2	2	2	tier3	shared	0
21	21760990	22839119	G	T	417	39	0.09	284	192	0.40	299	206	0.41	2	2	2	tier3	shared	0
21	21981958	23060087	T	C	399	22	0.05	198	134	0.40	222	137	0.38	2	2	2	tier3	shared	1
21	27426278	28504407	T	C	418	0	0.00	501	0	0.00	451	93	0.17	2	2	2	tier3	relapse-specific	0
21	31893517	32971646	T	A	283	22	0.07	195	170	0.47	219	187	0.46	2	2	2	tier3	shared	0
21	38710638	39788768	C	A	458	30	0.06	302	246	0.45	300	209	0.41	2	2	2	tier3	shared	0
22	24241650	25911650	T	C	436	32	0.07	285	221	0.44	327	108	0.25	2	2	2	tier3	shared	0
22	29431149	31101149	C	T	548	34	0.06	286	248	0.46	310	288	0.48	2	2	2	tier2	shared	1
22	45144326	46765662	G	T	352	24	0.06	234	181	0.44	290	199	0.41	2	2	1.34	tier1	shared	1
22	49192948	50846082	C	T	428	0	0.00	395	0	0.00	425	90	0.17	2	2	1.26	tier3	relapse-specific	0
3	103284349	101801659	T	A	593	45	0.07	370	353	0.49	403	316	0.44	2	2	2	tier3	shared	0
3	106257808	104775118	A	G	337	21	0.06	157	121	0.44	208	178	0.46	2	2	2	tier3	shared	1
3	11753564	11778564	G	A	296	33	0.10	199	142	0.42	245	163	0.40	2	2	2	tier3	shared	0
3	118059508	116576818	A	G	664	47	0.07	444	413	0.48	506	342	0.40	2	2	2	tier3	shared	1
3	118910038	117427348	G	A	552	37	0.06	317	219	0.41	293	248	0.46	2	2	2	tier2	shared	1
3	127686279	126203589	G	A	355	36	0.09	234	240	0.51	267	211	0.44	2	2	2	tier3	shared	0
3	141518769	140036079	C	T	448	29	0.06	270	230	0.46	286	197	0.41	2	2	2	tier3	shared	0
3	141679317	140196627	C	T	572	40	0.07	336	302	0.47	342	302	0.47	2	2	2	tier3	shared	0
3	145481009	143998319	A	G	404	27	0.06	222	161	0.42	198	182	0.48	2	2	2	tier2	shared	1
3	146095944	144613254	C	T	467	48	0.09	241	230	0.49	269	258	0.49	2	2	2	tier3	shared	1
3	149273554	147790864	A	G	450	30	0.06	200	176	0.47	191	146	0.43	2	2	2	tier3	shared	0
3	149296851	147814161	C	T	371	34	0.08	228	193	0.46	270	201	0.43	2	2	2	tier2	shared	0
3	154188051	152705361	C	A	113	5	0.04	56	36	0.39	51	20	0.28	2	2	2	tier3	shared	1
3	167344171	165861477	A	C	548	48	0.08	333	249	0.43	452	161	0.26	2	2	2	tier3	shared	0
3	175001625	173518931	T	C	608	0	0.00	549	0	0.00	571	31	0.05	2	2	2	tier3	relapse-specific	0

3	18036353	18061349	G	A	555	46	0.08	374	335	0.47	429	294	0.41	2	2	2	tier3	shared	1
3	18385519	18410515	C	T	631	62	0.09	316	336	0.52	361	296	0.45	2	2	2	tier3	shared	0
3	184733470	183250776	A	T	302	28	0.08	201	184	0.48	210	183	0.47	2	2	2	tier3	shared	0
3	1887762	1912762	G	A	664	0	0.00	644	0	0.00	497	101	0.17	2	2	2	tier2	relapse-specific	0
3	192716310	191233616	C	T	355	17	0.05	214	176	0.45	232	146	0.39	2	2	2	tier3	shared	1
3	194253917	192771223	T	C	115	13	0.10	58	51	0.47	106	87	0.45	2	2	2	tier3	shared	1
3	27672345	27697341	A	G	726	51	0.07	431	409	0.49	457	437	0.49	2	2	2	tier3	shared	0
3	28052846	28077842	G	T	292	16	0.05	188	105	0.36	152	106	0.41	2	2	2	tier3	shared	1
3	30888917	30913913	T	C	743	59	0.07	486	339	0.41	635	176	0.22	2	2	2	tier2	shared	0
3	47328661	47353657	T	G	432	42	0.09	291	204	0.41	343	107	0.24	2	2	2	tier3	shared	1
3	49658255	49683251	C	T	535	40	0.07	410	295	0.42	549	184	0.25	2	2	1.24	tier3	shared	4
3	521376	546376	C	G	607	37	0.06	344	287	0.45	261	248	0.49	2	2	2	tier3	shared	1
3	55017452	55042412	G	T	541	32	0.06	324	235	0.42	341	256	0.43	2	2	2	tier3	shared	3
3	6639859	6664859	C	-	626	31	0.05	402	289	0.42	358	279	0.44	2	2	2	tier3	shared	1
3	71150853	71068163	G	A	449	32	0.07	288	233	0.45	311	236	0.43	2	2	2	tier3	shared	1
3	77764726	77682036	G	A	580	33	0.05	372	239	0.39	326	271	0.45	2	2	2	tier3	shared	2
3	97257279	95774589	A	C	395	28	0.07	226	213	0.49	267	207	0.44	2	2	2	tier3	shared	0
3	98050427	96567737	A	T	481	33	0.06	278	266	0.49	285	216	0.43	2	2	2	tier3	shared	0
4	105371233	105151784	G	T	477	0	0.00	573	0	0.00	470	85	0.15	2	2	2	tier3	relapse-specific	1
4	111770497	111551048	A	T	448	0	0.00	586	0	0.00	549	113	0.17	2	2	2	tier3	relapse-specific	0
4	114171986	113952537	G	A	304	29	0.09	198	169	0.46	236	162	0.41	2	2	2	tier2	shared	2
4	116142222	115922773	C	T	127	9	0.07	87	43	0.33	113	78	0.41	2	2	2	tier3	shared	0
4	118665245	118445797	G	A	540	28	0.05	320	232	0.42	314	252	0.45	2	2	2	tier3	shared	1
4	120767588	120548140	T	C	296	26	0.08	144	147	0.51	171	135	0.44	2	2	2	tier2	shared	0
4	12162420	12553322	C	A	335	36	0.10	275	189	0.41	295	204	0.41	2	2	2	tier3	shared	1
4	127318827	127099377	T	A	505	37	0.07	300	234	0.44	271	208	0.43	2	2	2	tier3	shared	1
4	127858528	127639078	C	T	387	24	0.06	210	143	0.41	216	142	0.40	2	2	2	tier3	shared	1
4	136684198	136464748	T	A	381	28	0.07	204	158	0.44	206	164	0.44	2	2	2	tier3	shared	1
4	137387938	137168488	T	A	672	3	0.00	675	0	0.00	483	100	0.17	2	2	2	tier2	relapse-specific	1
4	137620857	137401407	A	T	613	0	0.00	544	0	0.00	437	106	0.20	2	2	2	tier3	relapse-specific	1
4	143682965	143463515	T	C	622	45	0.07	341	325	0.49	386	309	0.44	2	2	2	tier3	shared	0
4	150194373	149974923	T	C	496	36	0.07	313	271	0.46	354	282	0.44	2	2	2	tier3	shared	1
4	156270550	156051100	C	A	546	43	0.07	353	287	0.45	381	286	0.43	2	2	2	tier3	shared	1
4	156831276	156611826	T	C	584	36	0.06	349	321	0.48	381	311	0.45	2	2	2	tier3	shared	0
4	160132121	159912671	G	A	458	1	0.00	491	0	0.00	482	48	0.09	2	2	2	tier3	relapse-specific	0
4	163286595	163067145	G	C	340	30	0.08	292	178	0.38	283	119	0.30	2	2	2	tier3	shared	0
4	164404685	164185235	G	T	430	25	0.05	293	218	0.43	244	194	0.44	2	2	2	tier3	shared	1
4	168154262	167917687	A	T	498	48	0.09	331	282	0.46	336	263	0.44	2	2	2	tier3	shared	0
4	173558482	173321907	G	A	596	62	0.09	398	328	0.45	514	191	0.27	2	2	2	tier3	shared	1
4	179613086	179376092	C	T	418	31	0.07	291	233	0.44	283	232	0.45	2	2	2	tier3	shared	0

4	180900918	180663924	G	C	426	0	0.00	386	0	0.00	288	68	0.19	2	2	2	tier3	relapse-specific	1
4	183840022	183603028	C	T	386	0	0.00	435	0	0.00	401	39	0.09	2	2	2	tier1	relapse-specific	2
4	187430712	187193718	T	C	449	27	0.06	232	197	0.46	233	187	0.45	2	2	2	tier3	shared	0
4	188219693	187982699	C	A	500	39	0.07	414	310	0.43	383	325	0.46	2	2	2	tier3	shared	1
4	188388493	188151499	T	C	681	58	0.08	311	276	0.47	334	277	0.45	2	2	2	tier3	shared	1
4	188615824	188378830	C	A	496	37	0.07	242	209	0.46	225	190	0.46	2	2	2	tier2	shared	1
4	19892326	20283228	C	A	383	24	0.06	242	191	0.44	302	109	0.27	2	2	2	tier2	shared	1
4	20084861	20475763	G	A	313	0	0.00	307	0	0.00	302	70	0.19	2	2	2	tier2	relapse-specific	1
4	20218150	20609052	A	G	387	33	0.08	211	191	0.48	251	218	0.46	2	2	2	tier3	shared	1
4	23382337	23773239	G	C	491	37	0.07	305	304	0.50	295	262	0.47	2	2	2	tier3	shared	0
4	25244945	25635847	G	A	468	43	0.08	248	225	0.48	234	241	0.51	2	2	2	tier2	shared	1
4	30772025	31162927	C	T	623	2	0.00	721	0	0.00	631	104	0.14	2	2	2	tier3	relapse-specific	0
4	31398117	31789019	A	T	536	0	0.00	482	1	0.00	388	66	0.15	2	2	2	tier3	relapse-specific	1
4	33816693	34140298	A	T	424	43	0.09	250	246	0.50	258	245	0.49	2	2	2	tier3	shared	1
4	34558019	34881624	T	A	299	19	0.06	132	115	0.47	170	76	0.31	2	2	2	tier3	shared	1
4	44889709	45194952	A	T	705	53	0.07	388	305	0.44	320	261	0.45	2	2	2	tier3	shared	1
4	45315673	45620916	G	C	539	26	0.05	247	224	0.48	271	228	0.46	2	2	2	tier3	shared	1
4	60568584	60885989	T	A	626	7	0.01	521	79	0.13	553	49	0.08	2	2	2	tier3	shared	1
4	60649951	60967356	-	A	204	10	0.05	95	94	0.50	119	104	0.47	2	2	2	tier3	shared	1
4	63476465	63793870	T	A	465	39	0.08	315	234	0.43	318	235	0.42	2	2	2	tier3	shared	1
4	64442423	64759828	C	A	640	14	0.02	702	95	0.12	728	75	0.09	2	2	2	tier2	shared	1
4	75410336	75191472	G	A	538	26	0.05	344	245	0.42	396	158	0.29	2	2	2	tier3	shared	0
4	93687647	93468624	G	A	492	0	0.00	371	4	0.01	275	67	0.20	2	2	2	tier3	relapse-specific	0
4	94623821	94404798	T	G	495	46	0.09	329	295	0.47	308	238	0.44	2	2	2	tier3	shared	0
4	96814327	96595304	A	C	482	0	0.00	524	0	0.00	394	61	0.13	2	2	2	tier3	relapse-specific	1
5	104913612	104885713	G	A	502	46	0.08	313	268	0.46	315	241	0.43	2	2	2	tier3	shared	1
5	105981162	105953263	G	A	447	29	0.06	303	209	0.41	242	198	0.45	2	2	2	tier3	shared	1
5	111485540	111457641	G	A	582	48	0.08	306	275	0.47	385	270	0.41	2	2	2	tier3	shared	0
5	114558242	114530343	-	TATG	430	21	0.05	258	187	0.42	366	133	0.27	2	2	2	tier3	shared	0
5	116451537	116423638	T	-	531	42	0.07	343	284	0.45	319	226	0.41	2	2	2	tier3	shared	1
5	121598522	121570623	G	A	608	39	0.06	316	263	0.45	335	275	0.45	2	2	2	tier3	shared	1
5	122343970	122316071	G	C	431	4	0.01	327	46	0.12	389	44	0.10	2	2	2	tier2	shared	0
5	134701238	134673339	T	C	470	38	0.07	265	240	0.48	292	205	0.41	2	2	2	tier3	shared	0
5	139035635	139055451	C	G	450	0	0.00	551	0	0.00	391	81	0.17	2	2	1.37	tier3	relapse-specific	0
5	159299585	159367007	C	T	609	37	0.06	364	301	0.45	393	309	0.44	2	2	2	tier3	shared	0
5	163921776	163989198	G	A	413	0	0.00	477	1	0.00	335	62	0.16	2	2	2	tier3	relapse-specific	1
5	168146460	168213882	C	T	436	33	0.07	320	243	0.43	343	278	0.45	2	2	2	tier3	shared	0
5	169360334	169427756	A	C	458	39	0.08	321	278	0.46	371	292	0.44	2	2	2	tier3	shared	2
5	179375837	179443231	A	T	289	29	0.09	191	172	0.47	199	171	0.46	2	2	2	tier3	shared	0
5	21248739	21212982	G	C	653	0	0.00	664	1	0.00	455	124	0.21	2	2	2	tier3	relapse-specific	1

5	22482248	22446491	C	A	600	0	0.00	670	0	0.00	521	116	0.18	2	2	2	tier3	relapse-specific	0
5	22495984	22460227	G	A	547	0	0.00	367	0	0.00	297	68	0.19	2	2	2	tier3	relapse-specific	0
5	22744459	22708702	G	T	476	0	0.00	499	0	0.00	381	77	0.17	2	2	2	tier3	relapse-specific	0
5	22951039	22915282	C	T	752	48	0.06	395	285	0.42	575	204	0.26	2	2	2	tier2	shared	1
5	2610120	2557120	C	A	687	49	0.07	450	343	0.43	418	312	0.43	2	2	2	tier3	shared	1
5	35263858	35228101	T	C	610	52	0.08	325	284	0.47	338	302	0.47	2	2	2	tier3	shared	0
5	45004983	44969226	G	T	545	0	0.00	566	1	0.00	439	61	0.12	2	2	2	tier3	relapse-specific	1
5	5737274	5684274	G	A	455	39	0.08	303	217	0.42	361	161	0.31	2	2	2	tier3	shared	1
5	62068029	62032273	A	G	661	42	0.06	394	378	0.49	423	321	0.43	2	2	2	tier3	shared	0
5	85909652	85873896	T	A	480	25	0.05	258	158	0.38	339	118	0.26	2	2	2	tier3	shared	0
5	95646381	95620625	A	C	493	42	0.08	285	225	0.44	311	233	0.43	2	2	2	tier3	shared	1
6	103521248	103414555	C	A	244	0	0.00	224	0	0.00	147	23	0.14	2	2	2	tier3	relapse-specific	0
6	106364146	106257453	C	A	410	27	0.06	269	260	0.49	296	247	0.45	2	2	2	tier3	shared	1
6	113063678	112956985	A	T	257	12	0.04	145	135	0.48	107	121	0.53	2	2	2	tier3	shared	0
6	124532802	124491103	A	G	297	35	0.11	224	163	0.42	222	197	0.47	2	2	2	tier3	shared	0
6	128083405	128041712	A	C	496	41	0.08	303	220	0.42	349	130	0.27	2	2	2	tier3	shared	0
6	128515520	128473827	A	G	519	1	0.00	507	0	0.00	402	87	0.18	2	2	2	tier3	relapse-specific	0
6	134270886	134229193	G	A	370	32	0.08	212	178	0.46	309	217	0.41	2	2	2	tier3	shared	0
6	134865892	134824199	G	A	302	32	0.10	213	204	0.49	205	121	0.37	2	2	2	tier3	shared	1
6	135582876	135541183	ATTC	-	502	26	0.05	324	242	0.43	350	270	0.44	2	2	2	tier3	shared	0
6	139410524	139368831	G	A	581	34	0.06	380	269	0.41	349	259	0.43	2	2	2	tier3	shared	0
6	143431555	143389862	T	A	672	41	0.06	368	311	0.46	384	312	0.45	2	2	2	tier2	shared	0
6	162058578	162138588	G	A	353	45	0.11	219	184	0.46	223	200	0.47	2	2	2	tier3	shared	0
6	162536244	162616254	G	A	635	43	0.06	358	274	0.43	347	264	0.43	2	2	2	tier3	shared	0
6	19427793	19319814	A	T	560	51	0.08	364	311	0.46	380	281	0.43	2	2	2	tier3	shared	0
6	20902367	20794388	C	A	394	1	0.00	357	0	0.00	304	44	0.13	2	2	2	tier3	relapse-specific	0
6	322235	377235	T	G	631	34	0.05	548	198	0.27	533	174	0.25	2	2	2	tier3	shared	0
6	50040060	49932101	T	A	478	0	0.00	592	0	0.00	415	74	0.15	2	2	2	tier3	relapse-specific	0
6	51747125	51639166	G	A	487	39	0.07	300	216	0.42	281	242	0.46	2	2	2	tier3	shared	4
6	66897241	66840520	T	C	943	0	0.00	832	1	0.00	663	145	0.18	2	2	2	tier3	relapse-specific	0
6	71062197	71005476	A	G	590	42	0.07	361	285	0.44	370	299	0.45	2	2	2	tier3	shared	1
6	77165181	77108461	T	G	364	22	0.06	181	160	0.47	214	183	0.46	2	2	2	tier3	shared	1
6	83476188	83419469	C	T	380	41	0.10	205	164	0.44	213	178	0.46	2	2	2	tier3	shared	1
6	87126465	87069746	C	T	354	0	0.00	269	0	0.00	296	40	0.12	2	2	2	tier3	relapse-specific	1
6	91426599	91369878	C	A	526	34	0.06	321	240	0.43	292	265	0.48	2	2	2	tier3	shared	1
6	91783109	91726388	T	C	608	37	0.06	359	320	0.47	351	300	0.46	2	2	2	tier3	shared	1
6	93879979	93823258	T	C	636	63	0.09	434	370	0.46	478	392	0.45	2	2	2	tier3	shared	0
6	94961835	94905114	A	G	658	0	0.00	717	1	0.00	505	126	0.20	2	2	2	tier3	relapse-specific	1
7	101354947	101568227	T	C	571	71	0.11	338	350	0.51	352	342	0.49	2	2	2	tier3	shared	0
7	103870967	104083731	C	T	768	59	0.07	436	421	0.49	437	350	0.44	2	2	2	tier3	shared	0

7	114378637	114591401	A	-	303	43	0.12	211	146	0.41	168	136	0.45	2	2	2	tier3	shared	1
7	119556017	119768781	C	T	316	23	0.07	132	87	0.40	159	103	0.39	2	2	2	tier3	shared	1
7	13598141	13631616	C	T	608	1	0.00	616	1	0.00	553	114	0.17	2	2	2	tier3	relapse-specific	1
7	139293998	139647529	G	A	509	40	0.07	311	273	0.47	283	201	0.42	2	2	2	tier3	shared	0
7	147006720	147375787	C	T	548	0	0.00	628	0	0.00	489	91	0.16	2	2	2	tier2	relapse-specific	0
7	152932208	153301275	G	A	599	1	0.00	713	1	0.00	563	136	0.19	2	2	2	tier3	relapse-specific	1
7	153293175	153662242	C	G	655	41	0.06	404	360	0.47	433	322	0.43	2	1.13	1.17	tier2	shared	2
7	153349263	153718330	C	T	662	41	0.06	364	337	0.48	370	322	0.47	2	1.13	1.17	tier2	shared	2
7	156900510	157207749	C	T	453	47	0.09	283	253	0.47	312	272	0.47	2	2	2	tier2	shared	0
7	45879136	45912611	C	T	259	25	0.09	205	168	0.45	203	195	0.49	2	2	2	tier3	shared	0
7	46186467	46219942	A	G	807	60	0.07	464	386	0.45	437	363	0.45	2	2	2	tier3	shared	1
7	47290289	47323764	C	T	565	1	0.00	568	0	0.00	542	106	0.16	2	2	2	tier3	relapse-specific	0
7	53100607	53133113	G	A	665	39	0.06	390	285	0.42	354	257	0.42	2	2	2	tier3	shared	1
7	53334730	53367236	A	T	386	18	0.04	213	166	0.44	257	202	0.44	2	2	2	tier2	shared	1
7	53417884	53450390	C	T	423	31	0.07	286	246	0.46	310	229	0.42	2	2	2	tier3	shared	0
7	56078480	56110986	G	C	586	42	0.07	315	257	0.45	276	252	0.48	2	2	2	tier3	shared	0
7	6727252	6760727	A	G	188	15	0.07	96	115	0.55	127	85	0.40	2	2	2	tier1	shared	0
7	67591954	67954018	C	T	503	46	0.08	266	242	0.48	286	224	0.44	2	2	2	tier3	shared	1
7	68773299	69135363	T	C	503	0	0.00	540	0	0.00	431	87	0.17	2	2	2	tier3	relapse-specific	0
7	70611382	70973446	C	T	618	54	0.08	365	339	0.48	365	307	0.46	2	2	2	tier3	shared	1
7	81341802	81503866	C	A	560	28	0.05	321	233	0.42	337	254	0.43	2	2	2	tier3	shared	1
7	93194956	93357020	A	T	509	33	0.06	299	253	0.46	419	172	0.29	2	2	2	tier3	shared	1
7	95390896	95552960	T	C	602	50	0.08	337	286	0.46	356	282	0.44	2	2	2	tier3	shared	2
8	102987569	102918393	G	T	450	26	0.05	298	191	0.39	397	180	0.31	2	2	2	tier3	shared	0
8	106308953	106239777	A	G	508	50	0.09	346	283	0.45	315	234	0.43	2	2	2	tier3	shared	1
8	106683844	106614668	G	A	582	42	0.07	362	264	0.42	279	269	0.49	2	2	2	tier3	shared	0
8	10969176	10931766	C	T	364	25	0.06	232	170	0.42	265	207	0.44	2	2	2	tier3	shared	0
8	113468419	113399243	C	G	787	0	0.00	772	0	0.00	560	135	0.19	2	2	2	tier3	relapse-specific	2
8	113753710	113684534	C	T	303	25	0.08	231	140	0.38	201	180	0.47	2	2	2	tier3	shared	2
8	117193811	117124633	G	T	555	44	0.07	279	215	0.44	258	233	0.47	2	2	2	tier3	shared	0
8	136160399	136091217	C	T	541	39	0.07	349	285	0.45	395	320	0.45	2	2	2	tier3	shared	1
8	137086395	137017213	G	A	575	48	0.08	376	311	0.45	365	342	0.48	2	2	2	tier2	shared	1
8	140818385	140749203	G	T	413	36	0.08	377	222	0.37	400	112	0.22	2	2	2	tier3	shared	0
8	21825961	21770015	G	A	218	17	0.07	165	135	0.45	153	129	0.46	2	2	2	tier1	shared	1
8	23806889	23750944	C	T	597	0	0.00	623	1	0.00	526	109	0.17	2	2	2	tier2	relapse-specific	0
8	34439177	34319635	T	C	563	36	0.06	302	242	0.44	324	243	0.43	2	2	2	tier3	shared	1
8	34836384	34716842	G	A	513	41	0.07	332	303	0.48	418	334	0.44	2	2	2	tier3	shared	1
8	35087183	34967641	G	A	468	26	0.05	362	166	0.31	452	133	0.23	2	2	2	tier3	shared	1
8	35569037	35449495	G	A	455	34	0.07	350	235	0.40	482	179	0.27	2	2	2	tier3	shared	1
8	40348835	40229678	G	A	519	58	0.10	324	350	0.52	385	318	0.45	2	2	2	tier3	shared	1

8	40824826	40705669	A	C	510	55	0.10	342	351	0.51	334	363	0.52	2	2	2	tier3	shared	0
8	4788849	4801441	C	T	535	0	0.00	477	0	0.00	441	83	0.16	2	2	2	tier3	relapse-specific	5
8	52491260	52328707	T	C	570	47	0.08	320	232	0.42	318	213	0.40	2	2	2	tier3	shared	1
8	52967075	52804522	A	G	550	34	0.06	325	253	0.44	327	255	0.44	2	2	2	tier3	shared	0
8	54298129	54135576	C	T	630	39	0.06	378	294	0.44	393	287	0.42	2	2	2	tier3	shared	0
8	55535827	55373274	C	T	360	28	0.07	253	197	0.44	227	221	0.49	2	2	2	tier2	shared	0
8	62949307	62786753	C	T	466	31	0.06	237	203	0.46	308	108	0.26	2	2	2	tier3	shared	1
8	68841305	68678751	G	A	663	61	0.08	404	338	0.46	390	326	0.46	2	2	2	tier3	shared	0
8	72669371	72506817	C	T	571	47	0.08	377	270	0.42	343	278	0.45	2	2	2	tier3	shared	0
8	75296736	75134182	C	T	629	39	0.06	411	297	0.42	391	291	0.43	2	2	2	tier3	shared	0
8	78108824	77946269	G	T	443	28	0.06	289	240	0.45	273	279	0.51	2	2	2	tier3	shared	0
8	86583060	86395808	G	A	521	42	0.07	271	223	0.45	296	187	0.39	2	2	2	tier3	shared	0
8	87369705	87300589	C	A	642	56	0.08	324	262	0.45	353	291	0.45	2	2	2	tier3	shared	1
9	101227880	102188059	T	C	445	54	0.11	322	326	0.50	315	264	0.46	2	2	2	tier3	shared	1
9	104675905	105636084	C	A	409	26	0.06	251	211	0.46	270	210	0.44	2	2	2	tier3	shared	0
9	104746086	105706265	C	T	404	36	0.08	285	217	0.43	235	199	0.46	2	2	2	tier3	shared	0
9	11505134	11515134	C	T	670	41	0.06	389	356	0.48	455	369	0.45	2	2	2	tier3	shared	1
9	116137165	117097344	T	C	568	40	0.07	354	249	0.41	315	253	0.45	2	2	2	tier3	shared	0
9	12110080	12120080	A	T	650	0	0.00	602	0	0.00	475	102	0.18	2	2	2	tier3	relapse-specific	1
9	123698954	124659133	G	C	490	42	0.08	307	255	0.45	334	247	0.43	2	2	2	tier2	shared	0
9	12812544	12822544	T	G	379	36	0.09	254	188	0.43	302	127	0.30	2	2	2	tier3	shared	0
9	13336920	13346920	C	G	386	28	0.07	242	235	0.49	234	198	0.46	2	2	2	tier2	shared	0
9	135631789	136641968	C	T	352	14	0.04	314	65	0.17	343	55	0.14	2	2	1.24	tier3	shared	0
9	137624434	138484613	G	A	289	19	0.06	247	177	0.42	246	166	0.40	2	2	1.38	tier3	shared	0
9	16618272	16628272	G	A	603	34	0.05	368	272	0.43	337	273	0.45	2	2	2	tier2	shared	1
9	23743424	23753424	A	-	365	32	0.08	200	129	0.39	149	133	0.47	2	2	2	tier3	shared	0
9	27976160	27986160	A	-	197	16	0.08	128	84	0.40	103	88	0.46	2	2	2	tier3	shared	1
9	28701959	28711959	C	T	483	0	0.00	498	3	0.01	419	92	0.18	2	2	2	tier2	relapse-specific	1
9	30009260	30019260	C	A	496	0	0.00	508	0	0.00	397	81	0.17	2	2	2	tier3	relapse-specific	1
9	35205813	35215813	G	A	499	45	0.08	293	225	0.43	334	259	0.44	2	2	2	tier2	shared	0
9	7577987	7587987	T	C	802	44	0.05	476	361	0.43	403	269	0.40	2	2	2	tier3	shared	0
9	8463921	8473921	C	T	631	34	0.05	382	295	0.44	392	310	0.44	2	2	2	tier3	shared	1
9	87534973	88345153	A	G	587	34	0.05	371	316	0.46	421	315	0.43	2	2	2	tier3	shared	0
X	103800606	103913950	A	C	638	51	0.07	381	308	0.45	364	325	0.47	2	2	2	tier3	shared	0
X	116745872	116861844	G	A	652	0	0.00	627	0	0.00	594	113	0.16	2	2	2	tier3	relapse-specific	1
X	121043753	121216072	-	T	337	28	0.08	169	116	0.41	153	94	0.38	2	2	2	tier3	shared	1
X	123308435	123480754	C	T	227	1	0.00	262	0	0.00	293	18	0.06	2	2	2	tier3	relapse-specific	0
X	123754185	123926504	C	G	553	41	0.07	285	227	0.44	242	183	0.43	2	2	2	tier2	shared	0
X	125327309	125499628	T	A	565	39	0.06	335	230	0.41	487	130	0.21	2	2	2	tier2	shared	1
X	13117926	13208005	G	A	372	33	0.08	208	159	0.43	184	154	0.46	2	2	2	tier3	shared	1

X	134306458	134478792	G	A	232	15	0.06	159	139	0.47	82	78	0.49	2	2	2	tier2	shared	0
X	141821257	141993591	G	A	565	28	0.05	306	285	0.48	336	246	0.42	2	2	2	tier2	shared	0
X	141903775	142076109	G	T	635	51	0.07	335	314	0.48	417	196	0.32	2	2	2	tier3	shared	0
X	144265100	144457408	T	A	454	31	0.06	291	244	0.46	309	259	0.46	2	2	2	tier3	shared	1
X	146449310	146641618	A	T	445	27	0.06	239	179	0.43	252	200	0.44	2	2	2	tier3	shared	0
X	147945673	148137957	G	C	512	57	0.10	335	259	0.44	342	263	0.43	2	2	2	tier2	shared	0
X	21537732	21627811	T	C	366	33	0.08	250	240	0.49	237	195	0.45	2	2	2	tier3	shared	0
X	21592423	21682502	A	T	581	42	0.07	332	284	0.46	324	305	0.48	2	2	2	tier3	shared	0
X	23373203	23463282	C	T	643	2	0.00	545	0	0.00	470	76	0.14	2	2	2	tier3	relapse-specific	0
X	26022927	26113006	C	T	497	41	0.08	282	248	0.47	294	248	0.46	2	2	2	tier3	shared	0
X	27627740	27717819	C	G	734	52	0.07	419	285	0.40	510	169	0.25	2	2	2	tier3	shared	0
X	29598897	29688976	C	T	281	19	0.06	228	122	0.35	188	150	0.44	2	2	2	tier3	shared	0
X	32082647	32172726	T	C	470	39	0.08	318	275	0.46	275	232	0.46	2	2	2	tier3	shared	1
X	32610216	32700295	T	C	513	33	0.06	368	317	0.46	359	308	0.46	2	2	2	tier3	shared	1
X	34575163	34665242	G	A	497	31	0.06	341	261	0.43	307	268	0.47	2	2	2	tier3	shared	1
X	34772060	34862139	G	C	610	29	0.05	279	263	0.49	290	231	0.44	2	2	2	tier3	shared	1
X	39397156	39512212	A	-	706	51	0.07	414	335	0.45	429	285	0.40	2	2	2	tier2	shared	1
X	50437899	50421159	G	A	551	42	0.07	373	307	0.45	357	312	0.47	2	2	2	tier2	shared	0
X	6322152	6312152	T	C	718	49	0.06	492	345	0.41	440	352	0.44	2	2	2	tier3	shared	0
X	7701134	7741134	T	-	438	73	0.14	262	222	0.46	259	150	0.37	2	2	2	tier3	shared	0
X	87473949	87587293	C	T	372	22	0.06	192	130	0.40	183	155	0.46	2	2	2	tier3	shared	1
X	88250191	88363535	T	G	704	0	0.00	717	0	0.00	584	105	0.15	2	2	2	tier3	relapse-specific	1
X	89264635	89377979	T	A	542	47	0.08	323	224	0.41	401	154	0.28	2	1.04	1.32	tier3	shared	0
X	95115225	95228569	G	A	478	38	0.07	264	259	0.50	283	250	0.47	2	2	2	tier1	shared	1
X	97368810	97482154	T	A	200	0	0.00	184	0	0.00	235	32	0.12	2	2	2	tier3	relapse-specific	0
X	97742789	97856133	T	G	437	36	0.08	249	206	0.45	262	217	0.45	2	2	2	tier3	shared	1
X	99324803	99438147	C	A	569	40	0.07	355	229	0.39	342	250	0.42	2	2	2	tier3	shared	0

**Supplementary Table 6f.** Somatic point mutations and indels from UPN 804168 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	10885089	10962502	G	A	273	11	0.04	199	175	0.47	234	153	0.40	2	2	2	tier3	shared	1
1	109740325	109938802	C	T	435	15	0.03	171	163	0.49	360	230	0.39	2	2	2	tier3	shared	0
1	111864509	112062986	T	G	724	0	0.00	723	0	0.00	782	48	0.06	2	2	2	tier3	relapse-specific	0
1	112653995	112852472	C	G	475	11	0.02	278	204	0.42	381	252	0.40	2	2	2	tier3	shared	1
1	150584992	152318368	G	A	423	12	0.03	173	153	0.47	323	196	0.38	2	2	2	tier3	shared	5
1	152057953	153791329	G	A	499	16	0.03	328	268	0.45	421	259	0.38	2	2	2	tier1	shared	1
1	160968797	162702173	CTTGTCCTTT CAGAACTGG	-	354	10	0.03	197	202	0.51	254	197	0.44	2	2	2	tier3	shared	2
1	166672520	168405896	A	G	629	25	0.04	367	346	0.49	424	282	0.40	2	2	2	tier3	shared	0
1	169888177	171621554	C	T	565	26	0.04	329	282	0.46	391	308	0.44	2	2	2	tier1	shared	2
1	171107134	172840511	G	A	635	15	0.02	385	344	0.47	525	372	0.41	2	2	2	tier3	shared	0
1	172256631	173990008	A	G	96	0	0.00	48	0	0.00	55	10	0.15	2	2	2	tier1	relapse-specific	0
1	173615438	175348815	G	A	520	20	0.04	316	284	0.47	418	231	0.36	2	2	2	tier1	shared	2
1	184998422	186731799	G	T	459	7	0.02	241	198	0.45	353	230	0.39	2	2	2	tier3	shared	1
1	185612033	187345410	G	A	304	3	0.01	211	157	0.43	276	184	0.40	2	2	2	tier3	shared	1
1	188517385	190250762	T	A	484	16	0.03	194	164	0.46	309	194	0.39	2	2	2	tier1	shared	5
1	199603019	201336396	C	T	389	11	0.03	258	160	0.38	254	174	0.41	2	2	2	tier2	shared	0
1	209220288	211153665	T	A	846	26	0.03	442	382	0.46	556	378	0.40	2	2	2	tier3	shared	0
1	209581055	211514432	C	G	512	16	0.03	311	257	0.45	439	266	0.38	2	2	2	tier2	shared	0
1	211721326	213654703	T	C	468	19	0.04	220	174	0.44	345	266	0.44	2	2	2	tier3	shared	0
1	212507817	214441194	G	A	598	14	0.02	276	234	0.46	441	276	0.38	2	2	2	tier3	shared	0
1	214318465	216251842	C	T	431	12	0.03	200	145	0.42	355	182	0.34	2	2	2	tier3	shared	2
1	217976850	219910227	G	T	490	7	0.01	248	211	0.46	392	250	0.39	2	2	2	tier3	shared	0
1	218552672	220486049	C	T	450	12	0.03	286	236	0.45	396	234	0.37	2	2	2	tier3	shared	0
1	223794404	225727781	G	A	242	8	0.03	105	63	0.38	216	117	0.35	2	2	2	tier3	shared	0
1	231187565	233120942	G	T	364	10	0.03	208	176	0.46	214	190	0.47	2	2	2	tier3	shared	0
1	231529190	233462567	C	T	399	15	0.04	231	184	0.44	302	203	0.40	2	2	2	tier3	shared	0
1	239744232	241677609	C	T	657	28	0.04	370	241	0.39	488	316	0.39	2	2	2	tier3	shared	0
1	26254970	26382383	G	A	586	20	0.03	384	307	0.44	454	299	0.40	2	2	2	tier2	shared	0
1	27926031	28053444	C	T	469	0	0.00	521	29	0.05	465	145	0.24	2	2	2	tier3	shared	0



1	38451053	38678466	A	G	625	17	0.03	380	355	0.48	525	328	0.38	2	2	2	tier3	shared	1
1	40001674	40229087	C	T	60	7	0.10	9	68	0.88	15	78	0.84	2	2	2	tier3	shared	0
1	4391034	4491174	C	T	582	19	0.03	341	264	0.44	460	288	0.39	2	2	2	tier3	shared	0
1	51547674	51775086	C	A	381	14	0.04	212	177	0.46	310	173	0.36	2	2	2	tier1	shared	2
1	5822320	5899733	A	C	493	14	0.03	345	214	0.38	417	258	0.38	2	2	2	tier3	shared	1
1	61323152	61550564	G	A	458	6	0.01	250	129	0.34	317	203	0.39	2	2	2	tier2	shared	0
1	71800138	72027550	A	-	510	12	0.02	260	219	0.46	340	177	0.34	2	2	2	tier2	shared	0
1	72797149	73024561	G	T	582	17	0.03	325	256	0.44	467	303	0.39	2	2	2	tier2	shared	1
1	74274350	74501762	G	A	384	15	0.04	151	145	0.49	244	206	0.46	2	2	2	tier3	shared	0
1	7458084	7535497	C	T	440	17	0.04	269	237	0.47	353	233	0.40	2	2	2	tier3	shared	2
1	76675710	76903122	A	G	609	8	0.01	281	265	0.49	430	236	0.35	2	2	2	tier3	shared	1
1	85893519	86120931	C	T	598	18	0.03	257	246	0.49	394	249	0.39	2	2	2	tier3	shared	0
1	92405867	92633279	A	G	260	1	0.00	357	1	0.00	374	117	0.24	2	2	2	tier3	relapse-specific	0
1	92814472	93041884	A	G	187	0	0.00	185	0	0.00	191	54	0.22	2	2	2	tier3	relapse-specific	0
1	96583536	96810948	C	T	325	1	0.00	302	0	0.00	412	85	0.17	2	2	2	tier3	relapse-specific	0
10	106149282	106159292	G	T	607	25	0.04	366	288	0.44	451	328	0.42	2	2	2	tier3	shared	0
10	108206310	108216320	G	C	334	14	0.04	223	190	0.46	329	219	0.40	2	2	2	tier3	shared	1
10	109089653	109099663	G	T	493	10	0.02	256	198	0.44	404	272	0.40	2	2	2	tier3	shared	1
10	109474382	109484392	C	T	564	18	0.03	310	246	0.44	393	265	0.40	2	2	2	tier3	shared	1
10	111614680	111624690	C	T	516	21	0.04	294	238	0.45	404	255	0.39	2	2	2	tier3	shared	0
10	118521897	118531907	C	A	401	18	0.04	238	233	0.49	403	216	0.35	2	2	2	tier3	shared	0
10	123046446	123056456	C	T	495	15	0.03	293	255	0.47	421	251	0.37	2	2	2	tier3	shared	1
10	123240826	123250836	C	A	576	19	0.03	320	244	0.43	513	306	0.37	2	2	2	tier3	shared	0
10	130239575	130349585	C	T	346	11	0.03	228	219	0.49	275	192	0.41	2	2	2	tier3	shared	1
10	131811648	131921658	A	T	661	34	0.05	421	326	0.44	616	386	0.39	2	2	2	tier3	shared	0
10	132961953	133071963	C	T	312	6	0.02	261	151	0.37	274	179	0.40	2	2	2	tier3	shared	1
10	24796595	24756589	G	C	611	19	0.03	265	215	0.45	386	314	0.45	2	2	2	tier3	shared	2
10	2683387	2693387	G	A	558	0	0.00	513	1	0.00	540	179	0.25	2	2	2	tier3	relapse-specific	1
10	34395147	34355141	A	G	516	22	0.04	291	252	0.46	385	241	0.38	2	2	2	tier3	shared	1
10	35097999	35057993	G	A	564	18	0.03	330	294	0.47	386	292	0.43	2	2	2	tier3	shared	1
10	44234877	44914871	A	G	499	9	0.02	325	230	0.41	339	249	0.42	2	2	2	tier3	shared	0
10	49751447	50081441	G	A	494	20	0.04	309	291	0.49	475	265	0.36	2	2	2	tier3	shared	0
10	52900815	53230809	T	A	304	5	0.02	159	129	0.45	350	220	0.39	2	2	2	tier2	shared	0
10	57900843	58230837	G	A	481	20	0.04	250	189	0.43	383	258	0.40	2	2	2	tier3	shared	1
10	58707998	59037992	C	G	169	3	0.02	162	143	0.47	309	186	0.38	2	2	2	tier3	shared	1
10	59813586	60143580	A	C	319	15	0.04	138	112	0.45	225	147	0.40	2	2	2	tier3	shared	1
10	59929878	60259872	G	A	622	17	0.03	403	239	0.37	439	267	0.38	2	2	2	tier3	shared	0
10	60797293	61127287	G	A	454	16	0.03	282	249	0.47	367	250	0.41	2	2	2	tier2	shared	0
10	6584079	6544073	C	T	747	0	0.00	678	1	0.00	650	184	0.22	2	2	2	tier3	relapse-specific	0
10	66044462	66374456	G	A	353	9	0.02	120	86	0.42	249	119	0.32	2	2	2	tier3	shared	0

10	69405514	69735508	T	C	559	21	0.04	287	280	0.49	413	239	0.37	2	2	2	tier3	shared	0
10	78632491	78962485	G	C	647	17	0.03	338	278	0.45	483	299	0.38	2	2	2	tier3	shared	2
10	79386002	79715996	G	A	448	13	0.03	275	216	0.44	378	215	0.36	2	2	2	tier3	shared	0
10	83023330	83033350	C	T	525	26	0.05	235	205	0.47	459	266	0.37	2	2	2	tier3	shared	1
10	86788266	86798286	T	A	428	0	0.00	474	2	0.00	424	146	0.26	2	2	2	tier3	relapse-specific	1
10	89337464	89347484	T	A	350	8	0.02	158	182	0.54	248	211	0.46	2	2	2	tier3	shared	0
10	95035843	95045853	G	A	174	5	0.03	83	51	0.38	98	58	0.37	2	2	2	tier3	shared	0
11	100333298	100828088	C	T	559	21	0.04	263	245	0.48	421	290	0.41	2	2	2	tier3	shared	0
11	10203546	10246970	C	G	263	0	0.00	253	1	0.00	338	102	0.23	2	2	2	tier3	relapse-specific	1
11	11557702	11601126	G	A	434	11	0.02	250	195	0.44	349	214	0.38	2	2	2	tier3	shared	2
11	121559230	122054020	A	C	330	10	0.03	142	160	0.53	268	166	0.38	2	2	2	tier3	shared	0
11	121572463	122067253	G	A	560	9	0.02	321	260	0.45	428	258	0.38	2	2	2	tier3	shared	0
11	123267557	123762347	C	T	505	11	0.02	227	146	0.39	357	214	0.37	2	2	2	tier3	shared	0
11	123747677	124242467	G	A	611	22	0.03	369	323	0.47	515	326	0.39	2	2	2	tier2	shared	0
11	126858772	127353562	A	G	420	18	0.04	213	169	0.44	321	218	0.40	2	2	2	tier3	shared	1
11	128690570	129185360	G	A	437	14	0.03	222	185	0.45	324	243	0.43	2	2	2	tier2	shared	0
11	13312571	13355995	C	T	593	22	0.04	301	326	0.52	437	326	0.43	2	2	2	tier3	shared	0
11	134002987	134497777	C	T	440	15	0.03	238	159	0.40	318	189	0.37	2	2	2	tier3	shared	0
11	15314145	15357569	G	A	476	22	0.04	221	204	0.48	370	214	0.37	2	2	2	tier3	shared	1
11	25549437	25592861	T	C	303	12	0.04	150	116	0.44	259	182	0.41	2	2	2	tier3	shared	1
11	25964150	26007574	C	A	562	14	0.02	346	247	0.42	473	285	0.38	2	2	2	tier3	shared	1
11	32374485	32417909	-	GACCG	430	10	0.02	267	178	0.40	301	142	0.32	2	2	2	tier1	shared	12
11	40201299	40244723	C	T	424	9	0.02	230	214	0.48	361	236	0.40	2	2	2	tier3	shared	0
11	40438832	40482256	A	C	412	0	0.00	398	0	0.00	423	139	0.25	2	2	2	tier2	relapse-specific	1
11	41448094	41491518	G	A	401	10	0.02	214	159	0.43	350	215	0.38	2	2	2	tier3	shared	1
11	49589473	49632897	T	A	495	17	0.03	266	209	0.44	382	261	0.41	2	2	2	tier3	shared	0
11	50074658	50118082	C	-	289	14	0.05	119	113	0.49	207	130	0.39	2	2	2	tier3	shared	1
11	55428174	55671598	G	C	599	0	0.00	572	0	0.00	594	203	0.25	2	2	2	tier3	relapse-specific	0
11	64909362	65152786	T	C	482	25	0.05	289	319	0.52	344	243	0.41	2	2	2	tier3	shared	2
11	8041241	8084665	G	A	261	6	0.02	164	94	0.36	200	116	0.37	2	2	2	tier3	shared	1
11	86377427	86699779	C	T	577	18	0.03	265	231	0.47	450	287	0.39	2	2	2	tier3	shared	0
11	87891301	88251653	A	C	278	0	0.00	307	0	0.00	364	99	0.21	2	2	2	tier3	relapse-specific	1
11	88642511	89002863	G	A	367	12	0.03	174	134	0.44	286	206	0.42	2	2	2	tier3	shared	0
11	93776183	94136535	T	G	661	0	0.00	749	0	0.00	712	141	0.17	2	2	2	tier3	relapse-specific	0
11	95802521	96162873	A	G	353	10	0.03	141	116	0.45	283	181	0.39	2	2	2	tier3	shared	0
11	98849470	99344260	G	T	315	8	0.02	139	88	0.39	242	149	0.38	2	2	2	tier3	shared	2
11	99822559	100317349	C	-	680	20	0.03	406	334	0.45	486	312	0.39	2	2	2	tier3	shared	1
12	10136538	10245271	A	G	505	16	0.03	259	249	0.49	469	298	0.39	2	2	2	tier3	shared	0
12	106007689	107483559	A	G	489	10	0.02	261	219	0.46	455	300	0.40	2	2	2	tier3	shared	1
12	108956068	110471685	G	A	569	12	0.02	278	280	0.50	453	283	0.38	2	2	2	tier1	shared	1

12	110522431	112038048	A	G	574	1	0.00	544	0	0.00	556	127	0.19	2	2	2	tier2	relapse-specific	0
12	117762123	119277740	T	G	478	19	0.04	228	144	0.39	348	210	0.38	2	2	2	tier2	shared	0
12	11962884	12071617	C	T	709	19	0.03	424	371	0.47	529	338	0.39	2	2	2	tier3	shared	5
12	125520708	126954755	C	A	672	22	0.03	273	365	0.57	368	384	0.51	2	2	2	tier3	shared	0
12	126711072	128145119	C	T	388	7	0.02	199	158	0.44	254	181	0.42	2	2	2	tier3	shared	0
12	127357651	128791698	C	G	383	11	0.03	217	136	0.39	286	193	0.40	2	2	2	tier3	shared	1
12	130098775	131532822	G	T	355	15	0.04	260	211	0.45	316	186	0.37	2	2	2	tier3	shared	0
12	131479347	132969274	AGCCCAT AACCTG TCACTCTCATCTC	-	412	24	0.06	261	308	0.54	317	253	0.44	2	2	1.26	tier2	shared	1
12	22264699	22373432	C	T	628	16	0.02	321	276	0.46	528	339	0.39	2	2	2	tier3	shared	0
12	22700579	22809312	T	A	414	13	0.03	244	169	0.41	353	231	0.40	2	2	2	tier3	shared	0
12	31014363	31123096	T	C	542	16	0.03	320	260	0.45	393	256	0.39	2	2	2	tier3	shared	0
12	38297190	40010923	C	G	471	0	0.00	488	0	0.00	473	168	0.26	2	2	2	tier1	relapse-specific	0
12	44240246	45953979	T	G	488	0	0.00	411	0	0.00	488	94	0.16	2	2	2	tier3	relapse-specific	1
12	51724502	53438235	C	-	354	14	0.04	233	200	0.46	303	182	0.38	2	2	2	tier2	shared	1
12	52126095	53839828	C	T	174	13	0.07	95	95	0.50	136	107	0.44	2	2	2	tier1	shared	1
12	56811832	58525565	G	A	457	16	0.03	185	187	0.50	396	207	0.34	2	2	2	tier2	shared	1
12	60277805	61991538	G	A	667	20	0.03	375	304	0.45	486	302	0.38	2	2	2	tier3	shared	1
12	68965071	70678804	G	A	545	15	0.03	280	180	0.39	368	270	0.42	2	2	2	tier3	shared	0
12	70655871	72369604	G	A	633	12	0.02	391	305	0.44	463	330	0.42	2	2	2	tier3	shared	0
12	74609574	76323307	A	G	527	18	0.03	338	245	0.42	363	267	0.42	2	2	2	tier3	shared	0
12	79813281	81289150	C	T	553	0	0.00	466	0	0.00	555	108	0.16	2	2	2	tier3	relapse-specific	0
12	85138336	86614205	A	C	467	17	0.04	220	215	0.49	326	194	0.37	2	2	2	tier3	shared	1
12	86295165	87771034	G	T	451	17	0.04	206	165	0.44	355	224	0.39	2	2	2	tier3	shared	1
13	107421802	108623801	G	A	531	19	0.03	319	221	0.41	427	254	0.37	2	2	2	tier2	shared	1
13	108417114	109619113	C	A	502	17	0.03	321	251	0.44	456	253	0.36	2	2	2	tier3	shared	1
13	111072379	112274378	G	A	506	14	0.03	302	272	0.47	365	214	0.37	2	2	2	tier3	shared	0
13	18209209	19311209	G	A	273	12	0.04	148	163	0.52	234	143	0.38	2	2	2	tier3	shared	0
13	27506256	28608256	-	TCATATTCATATTCATATTCAT AT	449	4	0.01	288	106	0.27	310	103	0.25	2	2	2	tier1	shared	50
13	28152834	29254834	G	A	649	25	0.04	334	236	0.41	423	288	0.41	2	2	2	tier2	shared	0
13	29895438	30997438	TACTC	-	202	18	0.08	99	98	0.50	153	136	0.47	2	2	2	tier3	shared	0
13	34007876	35109876	C	T	409	16	0.04	202	158	0.44	304	165	0.35	2	2	2	tier3	shared	0
13	34100881	35202881	T	-	420	23	0.05	191	140	0.42	285	157	0.36	2	2	2	tier3	shared	1
13	54855092	55957091	G	A	171	4	0.02	56	46	0.45	127	91	0.42	2	2	2	tier3	shared	1
13	54857596	55959595	C	A	468	12	0.03	213	168	0.44	359	221	0.38	2	2	2	tier3	shared	1
13	54895439	55997438	A	C	466	16	0.03	214	199	0.48	358	217	0.38	2	2	2	tier3	shared	1
13	55417148	56519147	C	A	503	0	0.00	455	0	0.00	494	74	0.13	2	2	2	tier3	relapse-specific	1
13	58677514	59779513	A	T	721	29	0.04	341	345	0.50	490	375	0.43	2	2	2	tier3	shared	1
13	63599514	64701513	T	C	531	3	0.01	473	40	0.08	670	46	0.06	2	2	2	tier3	shared	1
13	65790842	66892841	C	T	489	20	0.04	233	232	0.50	361	238	0.40	2	2	2	tier3	shared	0
13	65819875	66921874	C	T	592	12	0.02	334	318	0.49	413	285	0.41	2	2	2	tier3	shared	0

13	68080775	69182774	T	C	329	3	0.01	226	197	0.47	338	234	0.41	2	2	2	tier3	shared	0
13	70427767	71529766	T	C	516	0	0.00	399	0	0.00	491	118	0.19	2	2	2	tier3	relapse-specific	0
13	81090538	82192537	C	A	430	0	0.00	359	0	0.00	483	85	0.15	2	2	2	tier3	relapse-specific	1
13	83995315	85097314	TAGG	-	442	12	0.03	285	221	0.44	408	193	0.32	2	2	2	tier2	shared	0
13	84039979	85141978	T	G	290	0	0.00	194	0	0.00	316	65	0.17	2	2	2	tier3	relapse-specific	0
13	88627192	89829191	C	G	158	4	0.02	117	62	0.35	168	101	0.38	2	2	2	tier3	shared	1
13	89964903	91166902	C	T	588	16	0.03	366	236	0.39	450	313	0.41	2	2	2	tier3	shared	1
13	92632214	93834213	C	T	379	12	0.03	230	136	0.37	320	168	0.34	2	2	2	tier2	shared	0
13	93513959	94715958	C	T	560	18	0.03	317	247	0.44	440	307	0.41	2	2	2	tier3	shared	0
13	93555335	94757334	G	A	235	8	0.03	142	101	0.42	194	126	0.39	2	2	2	tier3	shared	0
13	95096598	96298597	G	A	556	5	0.01	331	190	0.36	417	230	0.36	2	2	2	tier2	shared	0
14	100761804	101692051	G	A	151	15	0.09	97	174	0.64	132	194	0.60	2	2	2	tier3	shared	1
14	101028995	101959242	G	A	193	9	0.04	111	91	0.45	124	68	0.35	2	2	2	tier3	shared	1
14	105542139	106471094	A	T	297	0	0.00	319	0	0.00	326	95	0.23	2	2	2	tier3	relapse-specific	1
14	29397936	30328185	C	T	591	9	0.02	322	212	0.40	396	243	0.38	2	2	2	tier3	shared	1
14	31667574	32597823	G	A	247	0	0.00	265	0	0.00	194	57	0.23	2	2	2	tier3	relapse-specific	1
14	33154434	34084683	T	C	533	0	0.00	400	0	0.00	423	112	0.21	2	2	2	tier3	relapse-specific	0
14	48690637	49620887	T	C	359	11	0.03	158	205	0.56	286	155	0.35	2	2	2	tier3	shared	1
14	52599500	53529750	C	T	544	22	0.04	341	245	0.42	369	260	0.41	2	2	2	tier1	shared	1
14	56091064	57021311	C	T	653	0	0.00	554	0	0.00	560	137	0.20	2	2	2	tier3	relapse-specific	0
14	56274859	57205106	C	T	560	28	0.05	368	288	0.44	498	292	0.37	2	2	2	tier2	shared	1
14	61937789	62868036	A	C	526	13	0.02	235	229	0.49	405	289	0.42	2	2	2	tier3	shared	1
14	62593389	63523636	C	T	691	22	0.03	318	291	0.48	487	313	0.39	2	2	2	tier3	shared	2
14	64969508	65899755	C	T	104	3	0.03	52	48	0.48	106	62	0.37	2	2	2	tier2	shared	0
14	73015343	73945590	T	A	404	10	0.02	222	168	0.43	304	203	0.40	2	2	2	tier3	shared	1
14	76162153	77092400	C	A	505	18	0.03	294	232	0.44	358	252	0.41	2	2	2	tier3	shared	1
14	79736807	80667054	T	C	326	11	0.03	137	122	0.47	242	142	0.37	2	2	2	tier3	shared	1
14	79918273	80848520	C	T	571	18	0.03	372	292	0.44	430	265	0.38	2	2	2	tier3	shared	1
14	83367514	84297761	T	A	674	18	0.03	335	242	0.42	426	310	0.42	2	2	2	tier3	shared	1
14	83809609	84739856	G	T	432	24	0.05	250	207	0.45	352	207	0.37	2	2	2	tier3	shared	1
14	85694731	86624978	G	A	181	7	0.04	102	80	0.44	221	113	0.34	2	2	2	tier3	shared	1
14	99386453	100316700	G	T	563	17	0.03	321	259	0.45	417	275	0.40	2	2	2	tier3	shared	0
15	40851227	43063935	C	G	646	0	0.00	546	1	0.00	553	188	0.25	2	2	2	tier3	relapse-specific	1
15	48279128	50491836	A	G	242	4	0.02	86	79	0.48	141	100	0.41	2	2	2	tier3	shared	1
15	49763040	51975748	C	T	332	14	0.04	162	122	0.43	287	160	0.36	2	2	2	tier3	shared	0
15	56133363	58346071	G	A	628	20	0.03	327	284	0.46	485	330	0.40	2	2	2	tier2	shared	0
15	65905590	68118536	G	T	392	20	0.05	269	204	0.43	318	205	0.39	2	2	2	tier1	shared	1
15	68596723	70809669	C	T	515	14	0.03	296	236	0.44	370	237	0.39	2	2	2	tier3	shared	1
15	72494038	74706985	C	T	504	7	0.01	249	214	0.46	287	196	0.41	2	2	2	tier1	shared	1
15	76282691	78495636	C	T	578	21	0.04	340	293	0.46	451	300	0.40	2	2	2	tier3	shared	0

15	76344956	78557901	-	T	639	15	0.02	488	312	0.39	534	348	0.39	2	2	2	tier3	shared	0
15	78642023	80854968	A	G	518	14	0.03	296	190	0.39	418	268	0.39	2	2	2	tier3	shared	0
15	78892039	81104984	C	T	562	10	0.02	246	205	0.45	398	230	0.37	2	2	2	tier2	shared	1
15	79991574	82204519	A	C	534	0	0.00	570	0	0.00	553	101	0.15	2	2	2	tier3	relapse-specific	1
15	91557562	93756558	G	A	447	13	0.03	296	182	0.38	330	217	0.40	2	2	2	tier3	shared	0
15	93993689	96192685	C	T	448	16	0.03	223	221	0.50	388	207	0.35	2	2	2	tier3	shared	1
15	96136581	98335577	G	A	461	0	0.00	372	32	0.08	500	38	0.07	2	2	2	tier2	shared	1
15	99983562	102166039	C	T	569	19	0.03	369	250	0.40	443	290	0.40	2	2	2	tier3	shared	0
16	19233525	19326024	C	T	683	21	0.03	360	338	0.48	439	317	0.42	2	2	2	tier2	shared	0
16	2117184	2177183	G	A	568	25	0.04	375	309	0.45	405	296	0.42	2	2	1.22	tier2	shared	0
16	53595367	55037866	A	G	538	17	0.03	306	241	0.44	442	274	0.38	2	2	2	tier3	shared	1
16	5741425	5801424	C	T	570	23	0.04	341	290	0.46	427	274	0.39	2	2	2	tier3	shared	0
16	58910650	60353149	G	A	643	20	0.03	386	208	0.35	366	248	0.40	2	2	2	tier3	shared	0
16	58951352	60393851	C	T	153	8	0.05	80	92	0.53	89	69	0.44	2	2	2	tier3	shared	0
16	60628092	62070591	A	T	278	8	0.03	216	159	0.42	212	153	0.42	2	2	2	tier2	shared	1
16	6649061	6709060	G	A	406	12	0.03	176	144	0.45	244	177	0.42	2	2	2	tier3	shared	0
16	6807899	6867898	C	A	614	21	0.03	323	281	0.47	463	300	0.39	2	2	2	tier2	shared	0
16	7213109	7273108	T	A	541	23	0.04	286	259	0.48	412	257	0.38	2	2	2	tier3	shared	0
16	76077228	77519727	C	A	453	8	0.02	218	200	0.48	380	237	0.38	2	2	2	tier3	shared	0
16	76107813	77550312	G	T	596	23	0.04	322	259	0.45	469	277	0.37	2	2	2	tier3	shared	1
16	76385589	77828088	G	A	576	16	0.03	276	227	0.45	390	283	0.42	2	2	2	tier3	shared	0
16	86629993	88072492	T	C	393	13	0.03	230	209	0.48	377	213	0.36	2	2	1.31	tier3	shared	0
17	13675592	13734867	G	T	480	8	0.02	179	172	0.49	329	190	0.37	2	2	2	tier3	shared	1
17	16358142	16417417	A	G	450	10	0.02	264	187	0.41	294	200	0.40	2	2	2	tier3	shared	0
17	17469948	17529223	C	A	443	14	0.03	290	251	0.46	411	264	0.39	2	2	2	tier3	shared	0
17	21255680	21315087	A	T	1188	12	0.01	1066	199	0.16	1238	182	0.13	2	3.89	2	tier3	shared	1
17	21466743	21526150	T	C	665	7	0.01	526	130	0.20	862	164	0.16	2	2	3.51	tier3	shared	0
17	23027134	26003007	C	T	165	8	0.05	82	60	0.42	116	64	0.36	2	2	2	tier3	shared	0
17	27401222	30377109	-	T	301	7	0.02	176	133	0.43	266	168	0.39	2	1.11	1.06	tier1	shared	1
17	36333913	39080387	C	T	569	18	0.03	297	281	0.49	427	244	0.36	2	2	2	tier3	shared	0
17	38835868	41480342	C	T	304	13	0.04	144	122	0.46	218	144	0.40	2	2	2	tier3	shared	0
17	39843379	42487853	G	A	581	0	0.00	489	0	0.00	532	154	0.22	2	2	2	tier3	relapse-specific	1
17	40050083	42694557	G	A	586	22	0.04	359	306	0.46	408	271	0.40	2	2	2	tier3	shared	0
17	40442905	43087379	G	A	403	16	0.04	189	172	0.48	205	181	0.47	2	2	2	tier3	shared	0
17	45343100	47988101	G	C	327	0	0.00	329	0	0.00	289	66	0.19	2	2	2	tier2	relapse-specific	1
17	48566688	51211689	T	A	390	7	0.02	173	162	0.48	352	169	0.32	2	2	2	tier2	shared	1
17	58253055	60899323	C	T	467	1	0.00	556	0	0.00	537	97	0.15	2	2	2	tier3	relapse-specific	0
17	59595878	62242146	G	A	470	14	0.03	275	209	0.43	328	225	0.41	2	2	2	tier3	shared	0
17	66541218	69029623	G	T	759	25	0.03	350	321	0.48	516	351	0.40	2	2	2	tier2	shared	0
17	66623767	69112172	G	T	781	21	0.03	398	280	0.41	601	331	0.36	2	2	2	tier3	shared	1

17	68908757	71397162	G	T	454	22	0.05	283	245	0.46	341	208	0.38	2	2	2	tier1	shared	1
17	69104075	71592480	G	-	359	7	0.02	234	179	0.43	262	159	0.38	2	2	2	tier3	shared	1
17	77816725	80223436	T	G	422	11	0.03	275	245	0.47	325	222	0.41	2	2	1.19	tier3	shared	0
17	8989445	9048720	C	T	443	28	0.06	254	184	0.42	374	211	0.36	2	2	2	tier3	shared	0
18	11401121	11411121	T	C	355	0	0.00	296	0	0.00	346	84	0.20	2	2	2	tier3	relapse-specific	1
18	13357053	13367053	G	A	629	19	0.03	349	291	0.45	447	303	0.40	2	2	2	tier3	shared	1
18	24510358	26256360	C	A	624	25	0.04	357	285	0.44	465	272	0.37	2	2	2	tier3	shared	0
18	26790827	28536829	A	G	390	9	0.02	162	159	0.50	265	200	0.43	2	2	2	tier3	shared	0
18	26874395	28620397	A	G	601	19	0.03	311	246	0.44	466	258	0.36	2	2	2	tier3	shared	0
18	31407153	33153155	C	T	532	9	0.02	206	174	0.46	359	198	0.36	2	2	2	tier3	shared	0
18	35462584	37208586	C	T	533	16	0.03	295	219	0.43	399	221	0.36	2	2	2	tier3	shared	0
18	3663	13663	C	T	537	9	0.02	437	143	0.25	489	134	0.22	2	2	2	tier3	shared	0
18	38565791	40311793	T	G	371	13	0.03	181	141	0.44	324	202	0.38	2	2	2	tier3	shared	0
18	39337589	41083591	C	A	620	0	0.00	571	0	0.00	597	208	0.26	2	2	2	tier2	relapse-specific	1
18	5053185	5063185	G	A	339	0	0.00	284	0	0.00	362	74	0.17	2	2	2	tier3	relapse-specific	1
18	50651208	52500210	A	G	323	11	0.03	132	91	0.41	247	154	0.38	2	2	2	tier3	shared	0
18	56626116	58475136	C	T	389	7	0.02	215	146	0.40	317	196	0.38	2	2	2	tier3	shared	0
18	5938070	5948070	A	C	328	0	0.00	192	0	0.00	319	45	0.12	2	2	2	tier3	relapse-specific	0
18	63593005	65442025	C	T	605	0	0.00	620	0	0.00	558	147	0.21	2	2	2	tier3	relapse-specific	1
18	6741538	6751538	T	-	549	16	0.03	254	241	0.49	368	271	0.42	2	2	2	tier3	shared	0
18	69785377	71634397	C	T	518	18	0.03	287	228	0.44	412	266	0.39	2	2	2	tier3	shared	1
18	71180486	73051498	G	A	438	17	0.04	219	194	0.47	304	213	0.41	2	2	2	tier3	shared	0
18	7273835	7283835	A	G	295	15	0.05	192	176	0.48	269	172	0.39	2	2	2	tier3	shared	0
18	74251612	76150624	G	A	338	8	0.02	156	133	0.46	229	134	0.37	2	2	2	tier2	shared	1
19	1995081	2044081	A	G	344	17	0.05	291	293	0.50	340	264	0.44	2	2	1.27	tier2	shared	1
19	34247995	29556155	C	A	553	17	0.03	269	250	0.48	420	258	0.38	2	2	2	tier3	shared	1
19	35106340	30414500	T	A	626	22	0.03	355	319	0.47	501	336	0.40	2	2	2	tier3	shared	0
19	43341487	38649647	T	C	460	0	0.00	468	0	0.00	427	143	0.25	2	2	2	tier3	relapse-specific	1
19	43895312	39203472	T	G	418	17	0.04	242	189	0.44	326	199	0.38	2	2	2	tier3	shared	0
19	56767177	52075365	G	A	520	10	0.02	262	224	0.46	381	265	0.41	2	2	2	tier3	shared	0
19	5893322	5942322	G	A	584	0	0.00	538	0	0.00	446	159	0.26	2	2	2	tier2	relapse-specific	0
19	6928811	6977811	C	T	557	25	0.04	351	257	0.42	475	257	0.35	2	2	2	tier3	shared	0
19	7817120	7911120	C	T	449	10	0.02	251	253	0.50	351	236	0.40	2	2	1.3	tier3	shared	0
2	107911554	108545122	G	A	615	19	0.03	299	223	0.43	422	281	0.40	2	2	2	tier3	shared	0
2	113100668	113384197	G	A	434	12	0.03	290	218	0.43	371	242	0.39	2	2	2	tier2	shared	0
2	117989368	118272898	C	T	468	13	0.03	195	138	0.41	337	224	0.40	2	2	2	tier3	shared	1
2	126135788	126419318	G	A	345	0	0.00	390	0	0.00	332	120	0.27	2	2	2	tier3	relapse-specific	1
2	126632556	126916086	C	T	717	25	0.03	442	364	0.45	544	399	0.42	2	2	2	tier2	shared	1
2	12925647	13008196	C	T	453	18	0.04	214	175	0.45	334	187	0.36	2	2	2	tier3	shared	1
2	13004617	13087166	C	T	578	18	0.03	335	310	0.48	478	329	0.41	2	2	2	tier3	shared	1

2	134194471	134478001	G	A	739	23	0.03	510	367	0.42	569	329	0.37	2	2	2	tier3	shared	1
2	134728095	135011625	A	G	511	12	0.02	294	268	0.48	376	246	0.40	2	2	2	tier2	shared	0
2	138533941	138817471	C	A	328	9	0.03	134	106	0.44	262	165	0.39	2	2	2	tier3	shared	0
2	142698138	142981668	G	A	453	13	0.03	200	189	0.49	373	235	0.39	2	2	2	tier3	shared	1
2	145358586	145642116	T	C	344	10	0.03	228	185	0.45	316	180	0.36	2	2	2	tier3	shared	1
2	149244556	149528086	A	G	368	14	0.04	188	170	0.47	295	210	0.42	2	2	2	tier3	shared	0
2	151741023	152032777	A	G	645	18	0.03	407	333	0.45	489	320	0.40	2	2	2	tier3	shared	0
2	155526504	155818258	G	A	523	11	0.02	265	199	0.43	330	235	0.42	2	2	2	tier2	shared	0
2	162056438	162348192	C	A	443	13	0.03	173	156	0.47	262	197	0.43	2	2	2	tier2	shared	0
2	162376985	162668739	G	A	432	12	0.03	247	191	0.44	358	249	0.41	2	2	2	tier3	shared	1
2	163839660	164131414	G	A	557	24	0.04	347	316	0.48	471	303	0.39	2	2	2	tier3	shared	0
2	167238182	167529936	G	T	526	0	0.00	481	0	0.00	542	112	0.17	2	2	2	tier3	relapse-specific	1
2	170553191	170844945	G	C	584	17	0.03	266	232	0.47	423	269	0.39	2	2	2	tier3	shared	2
2	170590308	170882062	G	A	680	29	0.04	315	218	0.41	491	332	0.40	2	2	2	tier2	shared	2
2	170601120	170892874	G	A	493	12	0.02	312	228	0.42	404	327	0.45	2	2	2	tier3	shared	2
2	172352355	172644109	G	A	649	0	0.00	556	0	0.00	621	191	0.24	2	2	2	tier1	relapse-specific	0
2	173346781	173638535	T	C	413	0	0.00	323	0	0.00	334	83	0.20	2	2	2	tier3	relapse-specific	0
2	174223167	174514921	C	T	303	9	0.03	148	131	0.47	217	141	0.39	2	2	2	tier3	shared	1
2	174599527	174891281	G	A	430	13	0.03	304	249	0.45	321	200	0.38	2	2	2	tier2	shared	0
2	175187625	175479379	T	A	590	28	0.05	333	269	0.45	517	350	0.40	2	2	2	tier3	shared	1
2	175972420	176264174	G	T	583	18	0.03	255	238	0.48	403	295	0.42	2	2	2	tier3	shared	1
2	177107365	177399119	A	G	545	21	0.04	275	251	0.48	398	311	0.44	2	2	2	tier3	shared	1
2	184179988	184471743	C	T	583	1	0.00	521	1	0.00	510	174	0.25	2	2	2	tier3	relapse-specific	0
2	185694329	185986084	G	T	480	14	0.03	265	187	0.41	349	244	0.41	2	2	2	tier3	shared	1
2	18769914	18906433	T	G	359	0	0.00	281	0	0.00	317	78	0.20	2	2	2	tier3	relapse-specific	1
2	198812651	199104406	G	A	390	17	0.04	280	254	0.48	436	291	0.40	2	2	2	tier3	shared	1
2	199366589	199658344	T	C	539	13	0.02	264	228	0.46	422	271	0.39	2	2	2	tier3	shared	1
2	204063074	204354829	A	C	767	39	0.05	399	384	0.49	528	355	0.40	2	2	2	tier2	shared	2
2	209806414	210098169	A	-	611	23	0.04	350	262	0.43	483	285	0.37	2	2	2	tier3	shared	1
2	211346371	211638126	C	G	330	0	0.00	445	1	0.00	471	143	0.23	2	2	2	tier3	relapse-specific	1
2	211606619	211898374	A	T	553	18	0.03	266	270	0.50	392	245	0.38	2	2	2	tier3	shared	1
2	211950370	212242125	C	T	496	16	0.03	245	204	0.45	399	239	0.37	2	2	2	tier2	shared	0
2	215906054	216197809	A	C	601	0	0.00	553	0	0.00	597	159	0.21	2	2	2	tier3	relapse-specific	0
2	22189743	22336238	T	C	224	11	0.05	116	89	0.43	223	155	0.41	2	2	2	tier3	shared	1
2	222379753	222671509	T	C	478	10	0.02	309	234	0.43	399	220	0.36	2	2	2	tier3	shared	1
2	223355668	223647424	G	A	505	16	0.03	265	189	0.42	368	253	0.41	2	2	2	tier3	shared	1
2	22359545	22506040	C	T	492	1	0.00	499	1	0.00	421	152	0.27	2	2	2	tier3	relapse-specific	0
2	226124657	226416413	C	T	510	17	0.03	251	232	0.48	342	262	0.43	2	2	2	tier3	shared	0
2	228709267	229001023	G	A	597	20	0.03	265	200	0.43	404	296	0.42	2	2	2	tier2	shared	1
2	232588697	232880453	G	A	615	21	0.03	337	240	0.42	559	286	0.34	2	2	2	tier3	shared	0

2	236412740	236748001	G	A	372	13	0.03	227	177	0.44	284	174	0.38	2	2	2	tier3	shared	0
2	23779620	23926116	T	G	316	10	0.03	204	184	0.47	209	145	0.41	2	2	2	tier1	shared	0
2	240719398	241070725	A	C	473	0	0.00	444	0	0.00	349	130	0.27	2	2	2	tier3	relapse-specific	2
2	240798329	241149656	G	T	304	13	0.04	190	158	0.45	234	162	0.41	2	2	2	tier3	shared	1
2	26780566	26927062	C	A	332	8	0.02	218	167	0.43	247	193	0.44	2	2	2	tier3	shared	0
2	32055198	32201694	T	G	399	11	0.03	180	162	0.47	296	228	0.44	2	2	2	tier3	shared	0
2	33469395	33615891	G	A	413	18	0.04	282	222	0.44	369	218	0.37	2	2	2	tier3	shared	0
2	36083297	36229793	G	A	453	12	0.03	195	133	0.41	273	194	0.42	2	2	2	tier2	shared	1
2	36547137	36693633	C	T	617	13	0.02	387	273	0.41	485	310	0.39	2	2	2	tier3	shared	0
2	40229236	40375732	-	T	492	25	0.05	247	205	0.45	336	212	0.39	2	2	2	tier3	shared	0
2	40590204	40736700	C	T	437	11	0.02	304	211	0.41	345	246	0.42	2	2	2	tier3	shared	0
2	50857536	51004032	T	G	586	0	0.00	660	0	0.00	600	232	0.28	2	2	2	tier3	relapse-specific	1
2	56255977	56402473	T	C	645	22	0.03	402	297	0.42	545	305	0.36	2	2	2	tier2	shared	0
2	57822803	57969299	T	G	317	9	0.03	130	117	0.47	259	142	0.35	2	2	2	tier3	shared	1
2	66491986	66638482	A	C	186	0	0.00	122	0	0.00	186	45	0.19	2	2	2	tier3	relapse-specific	0
2	67016596	67163092	G	A	615	16	0.03	341	281	0.45	456	288	0.39	2	2	2	tier3	shared	1
2	77397977	77544469	T	G	329	6	0.02	125	121	0.49	229	171	0.43	2	2	2	tier3	shared	0
2	7955772	8038321	T	A	507	17	0.03	269	210	0.44	406	279	0.41	2	2	2	tier3	shared	0
2	83614631	83761120	G	C	585	0	0.00	544	0	0.00	442	169	0.28	2	2	2	tier3	relapse-specific	1
2	84115889	84262378	T	G	468	0	0.00	363	0	0.00	451	138	0.23	2	2	2	tier2	relapse-specific	1
2	96528883	97165156	A	G	265	6	0.02	207	165	0.44	199	135	0.40	2	2	2	tier3	shared	0
20	10715758	10767758	A	G	493	14	0.03	261	233	0.47	355	249	0.41	2	2	2	tier3	shared	1
20	11865626	11917626	G	C	357	7	0.02	160	148	0.48	282	177	0.39	2	2	2	tier3	shared	0
20	13210300	13262300	A	T	575	0	0.00	474	0	0.00	470	101	0.18	2	2	2	tier3	relapse-specific	0
20	14794162	14846162	C	T	380	18	0.05	224	180	0.45	290	184	0.39	2	2	2	tier3	shared	0
20	14840849	14892849	C	T	523	17	0.03	309	262	0.46	363	232	0.39	2	2	2	tier3	shared	0
20	20346418	20398418	T	G	554	17	0.03	294	242	0.45	396	281	0.42	2	2	2	tier3	shared	1
20	38705572	39272158	G	A	507	17	0.03	247	206	0.45	322	216	0.40	2	2	2	tier3	shared	0
20	40233548	40800134	C	T	444	7	0.02	227	206	0.48	336	229	0.41	2	2	2	tier3	shared	3
20	42302696	42869282	A	T	559	13	0.02	325	273	0.46	488	301	0.38	2	2	2	tier3	shared	0
20	4681021	4733021	A	G	342	10	0.03	219	171	0.44	288	185	0.39	2	2	2	tier3	shared	0
20	50407501	50974094	G	A	623	21	0.03	354	282	0.44	448	324	0.42	2	2	2	tier3	shared	1
20	51030183	51596776	C	T	603	20	0.03	278	218	0.44	374	250	0.40	2	2	2	tier3	shared	0
20	53745770	54312363	G	T	248	3	0.01	148	69	0.32	230	139	0.38	2	2	2	tier3	shared	1
20	54963861	55530454	G	A	395	19	0.05	226	213	0.49	290	235	0.45	2	2	2	tier2	shared	1
20	60230226	60796831	C	A	294	14	0.05	221	212	0.49	240	183	0.43	2	2	2	tier3	shared	0
20	61644839	62174395	T	C	319	0	0.00	320	0	0.00	264	61	0.19	2	2	1.35	tier3	relapse-specific	0
20	8347993	8399993	G	T	455	12	0.03	213	212	0.50	331	204	0.38	2	2	2	tier3	shared	0
21	18186691	19264820	C	G	515	15	0.03	230	173	0.43	416	220	0.35	2	2	2	tier3	shared	0
21	22404855	23482984	A	T	486	12	0.02	269	220	0.45	332	198	0.37	2	2	2	tier3	shared	0



21	24117145	25195274	T	C	504	11	0.02	263	189	0.42	358	244	0.41	2	2	2	tier3	shared	1
21	25100372	26178501	C	T	604	10	0.02	332	206	0.38	435	256	0.37	2	2	2	tier3	shared	1
21	34742474	35820604	C	T	408	18	0.04	214	207	0.49	259	185	0.42	2	2	2	tier2	shared	0
21	35242561	36320691	G	T	541	14	0.03	279	242	0.46	379	235	0.38	2	2	2	tier3	shared	16
21	42042422	43169353	C	T	662	0	0.00	699	0	0.00	627	214	0.25	2	2	2	tier1	relapse-specific	0
22	26191695	27861695	G	T	569	21	0.04	348	345	0.50	460	294	0.39	2	2	2	tier3	shared	1
22	30694329	32364329	C	T	360	9	0.02	212	148	0.41	263	163	0.38	2	2	2	tier2	shared	0
22	40878648	42548704	G	A	222	5	0.02	157	107	0.41	193	93	0.33	2	2	2	tier2	shared	0
22	43816898	45438234	T	C	412	5	0.01	227	177	0.44	309	194	0.39	2	2	2	tier3	shared	0
22	44307388	45928724	C	T	401	6	0.01	311	176	0.36	252	202	0.44	2	2	2	tier3	shared	0
22	46399434	48020770	C	T	453	15	0.03	253	230	0.48	331	211	0.39	2	2	2	tier3	shared	0
22	47687788	49301784	G	T	468	0	0.00	510	0	0.00	511	93	0.15	2	2	2	tier3	relapse-specific	0
22	47922920	49536916	G	A	343	5	0.01	228	145	0.39	258	152	0.37	2	2	2	tier3	shared	1
22	48085867	49699863	G	A	462	14	0.03	303	234	0.44	319	227	0.42	2	2	2	tier3	shared	1
3	100708493	99225803	G	A	451	22	0.05	197	172	0.47	326	220	0.40	2	2	2	tier3	shared	1
3	10613530	10638530	G	A	574	24	0.04	261	245	0.48	424	259	0.38	2	2	2	tier3	shared	2
3	114482133	112999443	C	T	737	18	0.02	454	347	0.43	593	355	0.37	2	2	2	tier1	shared	1
3	117330222	115847532	T	A	552	15	0.03	285	209	0.42	393	253	0.39	2	2	2	tier3	shared	0
3	119077681	117594991	T	C	546	21	0.04	278	263	0.49	455	333	0.42	2	2	2	tier3	shared	1
3	119409962	117927272	C	A	401	18	0.04	171	159	0.48	379	220	0.37	2	2	2	tier2	shared	1
3	119584064	118101374	C	T	576	16	0.03	296	214	0.42	440	247	0.36	2	2	2	tier3	shared	1
3	1214870	1239870	A	T	368	15	0.04	183	152	0.45	262	166	0.39	2	2	2	tier3	shared	1
3	12173873	12198873	G	A	412	20	0.05	221	221	0.50	285	213	0.43	2	2	2	tier3	shared	0
3	123211720	121729030	G	C	375	14	0.04	160	159	0.50	235	192	0.45	2	2	2	tier3	shared	3
3	127618916	126136226	G	T	695	20	0.03	329	289	0.47	448	286	0.39	2	2	2	tier3	shared	2
3	129545959	128063269	C	T	399	8	0.02	181	123	0.40	279	179	0.39	2	2	2	tier3	shared	0
3	135434803	133952113	T	-	438	14	0.03	243	195	0.45	301	212	0.41	2	2	2	tier3	shared	0
3	139135471	137652781	G	T	542	0	0.00	576	0	0.00	571	137	0.19	2	2	2	tier3	relapse-specific	1
3	148790700	147308010	G	C	594	10	0.02	266	208	0.44	430	233	0.35	2	2	2	tier3	shared	1
3	153473980	151991290	-	A	452	17	0.04	280	207	0.43	372	236	0.39	2	2	2	tier3	shared	0
3	166457428	164974734	A	T	509	24	0.05	251	179	0.42	354	253	0.42	2	2	2	tier3	shared	1
3	171675662	170192968	C	T	526	16	0.03	240	221	0.48	361	235	0.39	2	2	2	tier2	shared	0
3	180628899	179146205	C	A	458	0	0.00	466	0	0.00	453	174	0.28	2	2	2	tier3	relapse-specific	0
3	183327651	181844957	G	A	700	1	0.00	591	0	0.00	634	186	0.23	2	2	2	tier3	relapse-specific	1
3	186069932	184587238	T	A	449	16	0.03	204	165	0.45	309	225	0.42	2	2	2	tier3	shared	0
3	187605648	186122954	G	A	266	9	0.03	149	125	0.46	207	131	0.39	2	2	2	tier3	shared	1
3	189465626	187982932	C	T	576	23	0.04	257	222	0.46	407	256	0.39	2	2	2	tier3	shared	0
3	193663399	192180705	G	A	426	17	0.04	229	196	0.46	362	239	0.40	2	2	2	tier3	shared	0
3	194260045	192777351	G	C	332	11	0.03	161	120	0.43	258	183	0.41	2	2	2	tier3	shared	1
3	25100911	25125907	-	T	403	24	0.06	199	82	0.29	283	143	0.34	2	2	2	tier3	shared	1

3	25371167	25396163	CTATT	-	416	24	0.05	269	270	0.50	380	291	0.43	2	2	2	tier3	shared	0
3	26667767	26692763	A	G	554	14	0.02	325	272	0.46	377	276	0.42	2	2	2	tier3	shared	0
3	26879029	26904025	A	G	405	13	0.03	185	137	0.43	312	199	0.39	2	2	2	tier3	shared	1
3	29917464	29942460	T	-	248	9	0.04	152	114	0.43	227	109	0.32	2	2	2	tier3	shared	0
3	38713408	38738404	G	A	580	15	0.03	326	306	0.48	472	303	0.39	2	2	2	tier3	shared	2
3	41001684	41026680	T	A	526	18	0.03	278	279	0.50	437	305	0.41	2	2	2	tier3	shared	1
3	43881260	43906256	C	T	620	0	0.00	746	1	0.00	615	187	0.23	2	2	2	tier3	relapse-specific	1
3	43928562	43953558	G	A	320	5	0.02	129	125	0.49	226	152	0.40	2	2	2	tier3	shared	1
3	46659901	46684897	G	A	624	0	0.00	671	1	0.00	594	155	0.21	2	2	2	tier3	relapse-specific	0
3	54627493	54652453	G	C	161	4	0.02	84	59	0.41	116	60	0.34	2	2	2	tier3	shared	3
3	58516597	58541557	T	C	468	18	0.04	203	167	0.45	338	219	0.39	2	2	2	tier3	shared	0
3	61372165	61397125	G	A	656	21	0.03	344	301	0.47	467	313	0.40	2	2	2	tier3	shared	1
3	61429642	61454602	T	A	513	16	0.03	269	221	0.45	336	261	0.44	2	2	2	tier3	shared	1
3	65299751	65324711	T	A	390	15	0.04	208	193	0.48	302	209	0.41	2	2	2	tier3	shared	2
3	70355775	70273085	C	A	405	15	0.04	196	196	0.50	213	231	0.52	2	2	2	tier3	shared	0
3	70426028	70343338	C	-	233	3	0.01	122	49	0.29	189	108	0.36	2	2	2	tier3	shared	0
3	70705960	70623270	A	G	617	22	0.03	308	269	0.47	442	299	0.40	2	2	2	tier3	shared	0
3	71707904	71625214	T	C	571	16	0.03	302	259	0.46	449	296	0.40	2	2	2	tier3	shared	1
3	76089380	76006690	C	G	155	3	0.02	75	37	0.33	114	70	0.38	2	2	2	tier3	shared	2
3	7744284	7769284	G	A	507	19	0.04	353	305	0.46	444	345	0.44	2	2	2	tier3	shared	1
3	77822159	77739469	G	A	709	18	0.02	465	331	0.42	598	358	0.37	2	2	2	tier2	shared	2
3	83746577	83663887	C	A	767	19	0.02	420	365	0.46	575	403	0.41	2	2	2	tier3	shared	1
3	86549928	86467238	C	T	380	13	0.03	245	210	0.46	367	214	0.37	2	2	2	tier3	shared	1
3	96394238	94911548	A	G	652	0	0.00	476	0	0.00	551	183	0.25	2	2	2	tier3	relapse-specific	1
3	96664353	95181663	G	T	173	7	0.04	92	158	0.63	135	138	0.51	2	2	2	tier3	shared	1
3	97027688	95544998	-	T	367	10	0.03	140	114	0.45	294	180	0.38	2	2	2	tier3	shared	1
4	102222433	102003410	G	A	805	29	0.03	447	400	0.47	607	409	0.40	2	2	2	tier3	shared	1
4	105638488	105419039	A	T	497	15	0.03	291	270	0.48	375	272	0.42	2	2	2	tier3	shared	0
4	106213224	105993775	G	A	262	12	0.04	132	105	0.44	175	128	0.42	2	2	2	tier3	shared	0
4	123096911	122877461	C	T	586	0	0.00	633	0	0.00	509	105	0.17	2	2	2	tier3	relapse-specific	0
4	127372675	127153225	T	-	349	8	0.02	154	111	0.42	286	170	0.37	2	2	2	tier3	shared	1
4	131446209	131226759	A	-	358	9	0.02	212	160	0.43	325	192	0.37	2	2	2	tier3	shared	1
4	132093722	131874272	T	G	183	0	0.00	159	0	0.00	263	67	0.20	2	2	2	tier2	relapse-specific	1
4	133175523	132956073	T	G	406	0	0.00	363	0	0.00	328	109	0.25	2	2	2	tier3	relapse-specific	1
4	135294719	135075269	A	C	173	8	0.04	137	108	0.44	195	126	0.39	2	2	2	tier3	shared	1
4	136837154	136617704	A	T	450	0	0.00	360	24	0.06	403	139	0.26	2	2	2	tier3	shared	1
4	144623658	144404208	A	G	475	15	0.03	191	166	0.46	301	208	0.41	2	2	2	tier3	shared	0
4	146963640	146744190	T	C	440	11	0.02	245	190	0.44	298	193	0.39	2	2	2	tier3	shared	1
4	149100761	148881311	G	A	244	9	0.04	104	69	0.40	205	79	0.28	2	2	2	tier3	shared	0
4	151749822	151530372	T	C	677	27	0.04	402	352	0.47	555	339	0.38	2	2	2	tier3	shared	1

4	155602163	155382713	T	C	285	11	0.04	140	103	0.42	241	140	0.37	2	2	2	tier3	shared	2
4	158808993	158589543	-	TA	230	5	0.02	141	89	0.39	232	113	0.33	2	2	2	tier3	shared	1
4	166654234	166434784	A	G	573	25	0.04	291	251	0.46	405	255	0.39	2	2	2	tier3	shared	0
4	167528552	167309102	-	T	586	0	0.00	598	0	0.00	571	166	0.23	2	2	2	tier3	relapse-specific	1
4	168488170	168251595	C	T	54	4	0.07	34	16	0.32	32	29	0.48	2	2	2	tier3	shared	1
4	172620653	172384078	C	T	411	10	0.02	240	148	0.38	339	176	0.34	2	2	2	tier3	shared	1
4	173742874	173506299	A	T	409	9	0.02	144	121	0.46	251	176	0.41	2	2	2	tier3	shared	1
4	177658050	177421056	T	A	539	11	0.02	310	187	0.38	393	264	0.40	2	2	2	tier3	shared	1
4	179536441	179299447	T	C	533	22	0.04	249	239	0.49	362	249	0.41	2	2	2	tier2	shared	0
4	187856479	187619485	C	G	621	16	0.03	377	265	0.41	433	281	0.39	2	2	2	tier3	shared	3
4	190264978	190027984	A	-	557	18	0.03	257	135	0.34	340	160	0.32	2	2	2	tier3	shared	1
4	20622587	21013489	T	-	614	25	0.04	292	232	0.44	326	262	0.45	2	2	2	tier3	shared	0
4	26348426	26739328	G	A	417	8	0.02	303	190	0.39	378	278	0.42	2	2	2	tier3	shared	0
4	27322546	27713448	G	A	541	13	0.02	256	230	0.47	366	243	0.40	2	2	2	tier2	shared	1
4	27863801	28254703	T	C	329	0	0.00	238	0	0.00	321	77	0.19	2	2	2	tier3	relapse-specific	1
4	29671519	30062421	G	A	441	11	0.02	282	208	0.42	373	240	0.39	2	2	2	tier3	shared	1
4	30936847	31327749	G	C	472	17	0.03	246	180	0.42	335	256	0.43	2	2	2	tier3	shared	1
4	32406119	32762221	T	C	455	11	0.02	200	196	0.49	301	210	0.41	2	2	2	tier3	shared	1
4	32648103	32971708	G	T	846	19	0.02	494	310	0.39	575	360	0.39	2	2	2	tier2	shared	1
4	33033308	33356913	T	C	528	25	0.05	284	236	0.45	403	264	0.40	2	2	2	tier3	shared	1
4	33460727	33784332	G	A	352	9	0.02	236	200	0.46	378	246	0.39	2	2	2	tier3	shared	1
4	34614695	34938300	G	T	425	13	0.03	239	180	0.43	328	263	0.45	2	2	2	tier3	shared	0
4	43289838	43595081	C	T	63	2	0.03	42	16	0.28	75	24	0.24	2	2	2	tier3	shared	0
4	43766916	44072159	C	A	543	11	0.02	259	190	0.42	441	268	0.38	2	2	2	tier3	shared	1
4	43929949	44235192	A	G	215	6	0.03	138	92	0.40	225	175	0.44	2	2	2	tier3	shared	0
4	44399958	44705201	T	C	473	16	0.03	215	182	0.46	326	213	0.40	2	2	2	tier2	shared	0
4	45425271	45730514	A	G	509	16	0.03	295	251	0.46	423	241	0.36	2	2	2	tier3	shared	1
4	5256393	5205492	C	T	542	15	0.03	364	303	0.45	440	306	0.41	2	2	2	tier3	shared	0
4	57033214	57338457	A	T	466	12	0.03	246	186	0.43	366	213	0.37	2	2	2	tier3	shared	0
4	60674007	60991412	G	A	367	10	0.03	157	126	0.45	338	231	0.41	2	2	2	tier2	shared	1
4	64297194	64614599	G	T	403	16	0.04	220	204	0.48	349	255	0.42	2	2	2	tier3	shared	1
4	65007608	65325013	G	C	391	0	0.00	366	0	0.00	414	145	0.26	2	2	2	tier3	relapse-specific	0
4	70908682	70874093	C	A	556	19	0.03	182	183	0.50	332	208	0.39	2	2	2	tier3	shared	0
4	78407748	78188724	C	G	544	15	0.03	364	282	0.44	443	308	0.41	2	2	2	tier3	shared	1
4	79998292	79779268	T	G	183	6	0.03	73	58	0.44	159	88	0.36	2	2	2	tier3	shared	1
4	85982354	85763330	AGAAA	-	382	16	0.04	171	161	0.48	255	176	0.41	2	2	2	tier3	shared	1
4	87888195	87669171	T	A	421	11	0.03	220	173	0.44	334	189	0.36	2	2	2	tier2	shared	0
4	97422140	97203117	C	T	556	21	0.04	321	279	0.47	446	233	0.34	2	2	2	tier3	shared	1
5	106134513	106106614	G	A	296	11	0.04	135	68	0.33	232	104	0.31	2	2	2	tier3	shared	1
5	10790593	10737593	A	-	648	22	0.03	367	333	0.48	522	334	0.39	2	2	2	tier3	shared	0

5	129560241	129532342	C	T	494	15	0.03	320	231	0.42	366	277	0.43	2	2	2	tier3	shared	0
5	136620525	136592626	C	T	564	14	0.02	289	229	0.44	347	240	0.41	2	2	2	tier3	shared	0
5	143073237	143093044	C	T	580	26	0.04	274	205	0.43	399	298	0.43	2	2	2	tier3	shared	1
5	144024078	144043885	C	T	512	10	0.02	333	217	0.39	406	255	0.39	2	2	2	tier2	shared	1
5	155277328	155344750	T	G	571	16	0.03	287	265	0.48	387	242	0.38	2	2	2	tier3	shared	1
5	158909817	158977239	G	T	565	26	0.04	326	303	0.48	426	272	0.39	2	2	2	tier3	shared	1
5	162253309	162320731	C	A	516	16	0.03	250	171	0.41	416	252	0.38	2	2	2	tier3	shared	1
5	164085587	164153009	C	G	576	20	0.03	317	301	0.49	402	273	0.40	2	2	2	tier3	shared	1
5	164711131	164778553	A	G	469	1	0.00	493	0	0.00	502	133	0.21	2	2	2	tier2	relapse-specific	1
5	166663641	166731063	G	A	601	23	0.04	303	263	0.46	502	307	0.38	2	2	2	tier3	shared	1
5	172379965	172447359	T	C	468	15	0.03	263	246	0.48	334	216	0.39	2	2	2	tier3	shared	0
5	23368167	23332410	C	A	654	0	0.00	594	2	0.00	519	185	0.26	2	2	2	tier3	relapse-specific	2
5	29890034	29854277	C	A	505	13	0.03	231	187	0.45	351	201	0.36	2	2	2	tier3	shared	1
5	30118829	30083072	T	C	519	21	0.04	239	227	0.49	383	314	0.45	2	2	2	tier3	shared	1
5	35272873	35237116	T	-	453	13	0.03	282	163	0.37	407	196	0.33	2	2	2	tier3	shared	0
5	4657658	4604658	A	G	371	18	0.05	188	154	0.45	323	186	0.37	2	2	2	tier3	shared	1
5	54085558	54049801	C	T	481	14	0.03	211	200	0.49	368	210	0.36	2	2	2	tier3	shared	1
5	56807873	56772116	T	A	491	0	0.00	442	0	0.00	410	113	0.22	2	2	2	tier3	relapse-specific	1
5	5939660	5886660	G	A	341	13	0.04	165	132	0.44	208	116	0.36	2	2	2	tier3	shared	1
5	59821760	59786003	G	C	712	25	0.03	434	380	0.47	533	375	0.41	2	2	2	tier3	shared	0
5	60905114	60869357	T	C	531	15	0.03	286	238	0.45	372	234	0.39	2	2	2	tier3	shared	0
5	62962549	62926793	T	C	589	34	0.05	285	239	0.46	403	244	0.38	2	2	2	tier3	shared	1
5	66984919	66949163	A	T	445	16	0.03	202	145	0.42	357	195	0.35	2	2	2	tier3	shared	1
5	72501813	72466057	C	T	691	18	0.03	364	291	0.44	495	325	0.40	2	2	2	tier3	shared	0
5	77980950	77945194	A	C	257	7	0.03	140	111	0.44	202	114	0.36	2	2	2	tier2	shared	0
5	80359649	80323893	G	T	461	13	0.03	237	193	0.45	353	237	0.40	2	2	2	tier3	shared	0
5	8368772	8315772	C	T	481	14	0.03	235	178	0.43	354	233	0.40	2	2	2	tier3	shared	1
5	85146323	85110567	T	A	575	14	0.02	317	263	0.45	442	274	0.38	2	2	2	tier3	shared	1
5	89232964	89197208	A	G	615	23	0.04	318	265	0.45	486	307	0.39	2	2	2	tier2	shared	0
5	95051120	95025364	T	C	407	16	0.04	188	200	0.52	298	172	0.37	2	2	2	tier3	shared	0
5	97908635	97880735	A	T	639	25	0.04	360	312	0.46	475	344	0.42	2	2	2	tier3	shared	0
5	98984803	98956904	T	C	415	22	0.05	289	186	0.39	359	204	0.36	2	2	2	tier3	shared	1
6	100964840	100858119	G	T	253	1	0.00	143	93	0.39	212	97	0.31	2	2	2	tier3	shared	0
6	103679228	103572535	G	T	470	10	0.02	249	187	0.43	364	208	0.36	2	2	2	tier3	shared	1
6	109550234	109443541	C	T	478	1	0.00	487	0	0.00	460	143	0.24	2	2	2	tier3	relapse-specific	0
6	112245364	112138671	C	T	492	0	0.00	494	1	0.00	545	138	0.20	2	2	2	tier3	relapse-specific	0
6	115799962	115693269	C	G	598	0	0.00	523	0	0.00	555	148	0.21	2	2	2	tier3	relapse-specific	0
6	120201343	120159644	T	G	445	12	0.03	187	188	0.50	332	188	0.36	2	2	2	tier3	shared	0
6	125941858	125900159	C	A	636	23	0.03	317	307	0.49	506	310	0.38	2	2	2	tier3	shared	1
6	126353	181353	T	G	415	0	0.00	391	0	0.00	358	133	0.27	2	2	2	tier3	relapse-specific	0

6	128556820	128515127	A	G	332	11	0.03	192	157	0.45	314	179	0.36	2	2	2	tier3	shared	0
6	12879500	12771514	G	A	508	11	0.02	243	195	0.45	392	248	0.39	2	2	2	tier2	shared	1
6	132513792	132472099	C	T	164	0	0.00	314	1	0.00	342	98	0.22	2	2	2	tier3	relapse-specific	1
6	145464261	145422568	C	A	595	14	0.02	346	295	0.46	481	281	0.37	2	2	2	tier3	shared	1
6	152466599	152424906	A	G	359	14	0.04	231	143	0.38	373	171	0.31	2	2	2	tier3	shared	1
6	160834989	160914999	G	A	433	11	0.02	255	222	0.47	357	234	0.40	2	2	2	tier3	shared	0
6	164206563	164286573	C	A	582	27	0.04	263	224	0.46	364	223	0.38	2	2	2	tier2	shared	0
6	25158617	25050638	A	G	437	13	0.03	201	183	0.48	316	228	0.42	2	2	2	tier3	shared	0
6	29047696	28939717	T	C	526	25	0.05	403	270	0.40	475	287	0.38	2	2	2	tier2	shared	0
6	41242986	41135008	C	T	712	19	0.03	442	376	0.46	542	358	0.40	2	2	2	tier3	shared	0
6	50085720	49977761	A	G	420	13	0.03	199	191	0.49	349	216	0.38	2	2	2	tier3	shared	0
6	51664683	51556724	C	T	706	15	0.02	460	371	0.45	523	382	0.42	2	2	2	tier3	shared	4
6	6270551	6325552	C	G	543	16	0.03	284	235	0.45	343	245	0.42	2	2	2	tier2	shared	0
6	6797368	6852369	G	T	584	20	0.03	246	211	0.46	385	235	0.38	2	2	2	tier3	shared	1
6	68090304	68033583	T	G	248	0	0.00	283	0	0.00	340	115	0.25	2	2	2	tier3	relapse-specific	1
6	71700473	71643752	C	T	558	18	0.03	326	240	0.42	403	291	0.42	2	2	2	tier3	shared	0
6	760755	815755	G	T	671	24	0.03	419	314	0.43	536	303	0.36	2	2	2	tier3	shared	0
6	77430774	77374055	G	T	736	0	0.00	603	1	0.00	642	174	0.21	2	2	2	tier3	relapse-specific	0
6	86029763	85973044	T	G	145	0	0.00	158	0	0.00	190	33	0.15	2	2	2	tier3	relapse-specific	0
6	94768681	94711960	G	T	563	0	0.00	456	0	0.00	500	119	0.19	2	2	2	tier3	relapse-specific	1
6	95656550	95599829	T	A	516	18	0.03	279	222	0.44	414	259	0.38	2	2	2	tier2	shared	1
6	9844264	9736278	G	T	446	0	0.00	394	0	0.00	390	134	0.26	2	2	2	tier3	relapse-specific	0
6	9879721	9771735	A	G	559	11	0.02	252	226	0.47	439	281	0.39	2	2	2	tier3	shared	0
7	104147320	104360084	G	A	347	1	0.00	302	0	0.00	343	66	0.16	2	2	2	tier2	relapse-specific	0
7	115210833	115423597	A	G	384	8	0.02	149	145	0.49	272	195	0.42	2	2	2	tier2	shared	0
7	119521788	119734552	G	A	434	7	0.02	247	171	0.41	366	245	0.40	2	2	2	tier3	shared	1
7	12126246	12159721	C	T	457	17	0.04	219	180	0.45	324	229	0.41	2	2	2	tier2	shared	1
7	126601885	126814649	C	A	557	15	0.03	310	211	0.40	396	243	0.38	2	2	2	tier3	shared	2
7	131565950	131915410	C	A	559	16	0.03	313	264	0.46	437	266	0.38	2	2	2	tier2	shared	1
7	134214919	134564379	G	A	427	11	0.03	200	147	0.42	350	197	0.36	2	2	2	tier3	shared	1
7	13880370	13913845	G	C	493	0	0.00	393	0	0.00	404	146	0.27	2	2	2	tier3	relapse-specific	0
7	142327817	142617695	C	T	389	13	0.03	205	167	0.45	274	180	0.40	2	2	2	tier3	shared	1
7	149471862	149840929	C	A	396	3	0.01	313	122	0.28	358	99	0.22	2	1.28	1.24	tier3	shared	1
7	155869626	156176865	A	G	404	0	0.00	387	0	0.00	361	101	0.22	2	2	2	tier3	relapse-specific	1
7	157069965	157377204	G	A	490	10	0.02	240	199	0.45	344	236	0.41	2	2	2	tier3	shared	2
7	18705925	18739400	T	A	334	13	0.04	179	167	0.48	285	192	0.40	2	2	2	tier3	shared	0
7	22672103	22705578	G	A	486	15	0.03	257	183	0.42	320	190	0.37	2	2	2	tier2	shared	0
7	29252234	29285709	G	C	611	26	0.04	308	315	0.51	473	346	0.42	2	2	2	tier3	shared	0
7	39559272	39592747	C	G	59	0	0.00	74	0	0.00	65	39	0.38	2	2	2	tier3	relapse-specific	0

7	4036784	4070258	G	A	573	23	0.04	315	287	0.48	341	295	0.46	2	2	2	tier3	shared	2
7	41326642	41360117	C	T	568	7	0.01	410	69	0.14	680	29	0.04	2	2	2	tier3	shared	1
7	43464046	43497521	C	G	585	15	0.03	306	283	0.48	506	316	0.38	2	2	2	tier2	shared	3
7	46307899	46341374	G	T	327	11	0.03	207	134	0.39	324	218	0.40	2	2	2	tier3	shared	1
7	50496712	50529218	C	T	557	19	0.03	242	235	0.49	422	281	0.40	2	2	2	tier3	shared	0
7	50688673	50721179	C	T	421	5	0.01	282	163	0.37	315	207	0.40	2	2	2	tier3	shared	1
7	51623845	51656351	C	T	450	5	0.01	262	224	0.46	357	213	0.37	2	2	2	tier3	shared	0
7	55323684	55356190	A	G	505	0	0.00	485	0	0.00	606	118	0.16	2	2	2	tier3	relapse-specific	1
7	57084750	57080808	G	A	293	11	0.04	207	149	0.42	236	162	0.41	2	0.37	0.3	tier3	shared	0
7	6427925	6461400	C	T	519	20	0.04	312	265	0.46	434	261	0.38	2	2	2	tier1	shared	2
7	65216367	65578932	A	G	409	21	0.05	265	184	0.41	291	212	0.42	2	2	2	tier2	shared	0
7	66462325	66824890	A	C	483	13	0.03	239	189	0.44	350	197	0.36	2	2	2	tier3	shared	0
7	70603061	70965125	G	A	326	14	0.04	184	170	0.48	260	163	0.39	2	2	2	tier3	shared	1
7	70978440	71340504	T	C	541	15	0.03	265	244	0.48	381	331	0.46	2	2	2	tier3	shared	0
7	71113423	71475487	G	A	518	19	0.04	281	195	0.41	377	249	0.40	2	2	2	tier3	shared	0
7	71598329	71960393	G	A	627	23	0.04	363	298	0.45	493	349	0.41	2	2	2	tier3	shared	0
7	75670321	75832385	C	T	559	7	0.01	344	229	0.40	446	297	0.40	2	2	2	tier2	shared	0
7	75860727	76022791	C	T	171	1	0.01	34	42	0.55	59	44	0.43	2	2	2	tier1	shared	1
7	92370959	92533023	C	T	249	7	0.03	112	125	0.53	268	178	0.40	2	2	2	tier3	shared	0
7	9315187	9348662	A	T	132	4	0.03	109	90	0.45	150	111	0.43	2	2	2	tier3	shared	1
7	97325261	97487325	C	A	343	8	0.02	200	169	0.46	254	167	0.40	2	2	2	tier3	shared	0
8	10005611	9968201	C	T	618	25	0.04	378	305	0.45	460	291	0.39	2	2	2	tier3	shared	0
8	101685643	101616467	C	T	263	12	0.04	139	138	0.50	264	197	0.43	2	2	2	tier3	shared	0
8	10238566	10201156	C	T	425	8	0.02	245	192	0.44	355	226	0.39	2	2	2	tier2	shared	0
8	110694461	110625285	G	T	581	18	0.03	256	229	0.47	417	264	0.39	2	2	2	tier3	shared	0
8	112015668	111946492	C	G	222	7	0.03	97	81	0.46	168	117	0.41	2	2	2	tier2	shared	0
8	113428346	113359170	C	T	331	13	0.04	157	123	0.44	225	116	0.34	2	2	2	tier3	shared	2
8	118381845	118312664	C	T	577	0	0.00	518	0	0.00	539	181	0.25	2	2	2	tier3	relapse-specific	1
8	124103559	124034378	G	C	683	23	0.03	283	256	0.47	499	323	0.39	2	2	2	tier3	shared	0
8	130991772	130922590	A	C	561	0	0.00	618	0	0.00	571	123	0.18	2	2	2	tier3	relapse-specific	0
8	131978742	131909560	G	A	575	13	0.02	318	233	0.42	406	300	0.42	2	2	2	tier3	shared	0
8	137478771	137409589	C	A	451	14	0.03	228	190	0.45	308	240	0.44	2	2	2	tier3	shared	1
8	137478943	137409761	T	C	284	7	0.02	132	102	0.44	189	138	0.42	2	2	2	tier3	shared	1
8	137885795	137816613	A	G	447	7	0.02	199	151	0.43	295	243	0.45	2	2	2	tier3	shared	1
8	138296068	138226886	A	G	751	24	0.03	404	338	0.46	535	359	0.40	2	2	2	tier3	shared	1
8	139453829	139384647	G	A	370	11	0.03	244	187	0.43	264	182	0.41	2	2	2	tier3	shared	0
8	140046412	139977230	T	A	389	13	0.03	236	172	0.42	292	190	0.39	2	2	2	tier3	shared	1
8	140883225	140814043	C	T	562	20	0.03	400	304	0.43	466	280	0.38	2	2	2	tier3	shared	0
8	14429813	14385442	A	-	573	21	0.04	286	187	0.40	396	266	0.40	2	2	2	tier2	shared	0
8	20049776	20005496	T	G	488	17	0.03	274	245	0.47	359	225	0.39	2	2	2	tier3	shared	0

8	20086729	20042449	C	T	461	12	0.03	267	228	0.46	363	200	0.36	2	2	2	tier3	shared	0
8	20387407	20343127	T	C	673	22	0.03	354	294	0.45	462	326	0.41	2	2	2	tier2	shared	1
8	25577832	25521915	C	T	563	21	0.04	371	293	0.44	402	324	0.45	2	2	2	tier2	shared	1
8	35119219	34999677	G	T	386	12	0.03	285	225	0.44	398	272	0.41	2	2	2	tier3	shared	1
8	36327505	36207956	G	A	457	13	0.03	278	169	0.38	311	231	0.43	2	2	2	tier3	shared	0
8	41276618	41157461	G	A	555	11	0.02	326	302	0.48	392	264	0.40	2	2	2	tier3	shared	0
8	4303191	4315783	-	G	651	14	0.02	363	222	0.38	544	312	0.36	2	2	2	tier2	shared	5
8	51018701	50856148	C	T	440	9	0.02	229	190	0.45	344	227	0.40	2	2	2	tier3	shared	1
8	51162090	50999537	A	G	567	16	0.03	297	228	0.43	444	251	0.36	2	2	2	tier3	shared	1
8	51935996	51773443	C	T	655	11	0.02	369	250	0.40	452	298	0.40	2	2	2	tier3	shared	1
8	56681917	56519363	A	G	502	9	0.02	332	300	0.47	443	285	0.39	2	2	2	tier3	shared	1
8	59052455	58889901	T	C	280	9	0.03	143	130	0.48	224	167	0.43	2	2	2	tier3	shared	0
8	62360428	62197874	G	A	588	23	0.04	234	252	0.52	357	253	0.41	2	2	2	tier2	shared	0
8	63596628	63434074	T	A	435	1	0.00	369	2	0.01	361	105	0.23	2	2	2	tier3	relapse-specific	0
8	65351175	65188621	C	A	286	13	0.04	158	142	0.47	315	211	0.40	2	2	2	tier3	shared	1
8	66999241	66836687	A	G	529	12	0.02	264	253	0.49	411	221	0.35	2	2	2	tier3	shared	1
8	70656631	70494077	G	A	566	24	0.04	319	275	0.46	446	336	0.43	2	2	2	tier3	shared	1
8	72857393	72694839	C	T	505	0	0.00	509	0	0.00	416	173	0.29	2	2	2	tier3	relapse-specific	0
8	76968843	76806288	A	T	456	14	0.03	251	203	0.45	321	204	0.39	2	2	2	tier3	shared	0
8	80648545	80485990	G	A	236	11	0.04	124	95	0.43	192	131	0.41	2	2	2	tier3	shared	0
8	80849786	80687231	G	T	229	3	0.01	111	103	0.48	229	161	0.41	2	2	2	tier3	shared	0
8	82622315	82459760	C	T	598	30	0.05	364	243	0.40	412	276	0.40	2	2	2	tier3	shared	0
8	99365402	99296226	T	C	662	14	0.02	415	382	0.48	519	336	0.39	2	2	2	tier3	shared	0
9	101888917	102849096	C	T	711	13	0.02	372	289	0.44	506	380	0.43	2	2	2	tier3	shared	0
9	110146992	1111107171	C	A	570	0	0.00	629	0	0.00	582	134	0.19	2	2	2	tier3	relapse-specific	0
9	118884413	119844592	A	G	729	0	0.00	847	1	0.00	697	224	0.24	2	2	2	tier3	relapse-specific	0
9	119179309	120139488	G	C	416	12	0.03	263	257	0.49	287	239	0.45	2	2	2	tier3	shared	0
9	121245312	122205491	C	T	551	20	0.04	275	289	0.51	406	279	0.41	2	2	2	tier3	shared	1
9	126126705	127086884	A	T	320	0	0.00	366	0	0.00	262	72	0.22	2	2	2	tier3	relapse-specific	0
9	127538437	128498616	G	C	482	16	0.03	234	211	0.47	420	277	0.40	2	2	2	tier3	shared	0
9	135482492	136492671	G	A	550	20	0.04	334	283	0.46	400	243	0.38	2	2	2	tier3	shared	0
9	136677404	137537583	G	A	368	0	0.00	478	0	0.00	347	125	0.26	2	2	2	tier2	relapse-specific	0
9	137642727	138502906	G	A	340	6	0.02	235	141	0.38	228	159	0.41	2	2	2	tier3	shared	0
9	22642860	22652860	G	A	739	22	0.03	357	303	0.46	524	307	0.37	2	2	2	tier2	shared	1
9	23949362	23959362	G	A	371	14	0.04	189	180	0.49	272	183	0.40	2	2	2	tier1	shared	0
9	27203572	27213572	G	A	437	12	0.03	259	186	0.42	361	215	0.37	2	2	2	tier1	shared	1
9	3109415	3119415	C	T	434	9	0.02	209	164	0.44	273	164	0.38	2	2	2	tier3	shared	1
9	34289662	34299662	G	A	287	8	0.03	278	208	0.43	383	244	0.39	2	2	2	tier2	shared	1
9	38249524	38259524	C	T	356	8	0.02	221	188	0.46	316	220	0.41	2	2	2	tier2	shared	1
9	4330530	4340530	T	C	428	12	0.03	284	237	0.45	320	222	0.41	2	2	2	tier3	shared	1

9	454456	464456	G	A	393	0	0.00	335	0	0.00	324	111	0.26	2	2	2	tier3	relapse-specific	1
9	73432413	74242593	G	A	658	19	0.03	334	276	0.45	533	329	0.38	2	2	2	tier3	shared	1
9	74779346	75589526	G	T	425	19	0.04	246	192	0.44	359	295	0.45	2	2	2	tier3	shared	0
9	79485413	80295593	C	T	564	17	0.03	303	253	0.46	440	338	0.43	2	2	2	tier3	shared	0
9	80165699	80975879	C	A	476	0	0.00	528	0	0.00	494	141	0.22	2	2	2	tier3	relapse-specific	0
9	86458473	87268653	A	G	396	13	0.03	235	221	0.48	358	216	0.38	2	2	2	tier3	shared	0
9	86788180	87598360	TGTCTGACTATAAACAAAC	-	478	16	0.03	242	232	0.49	354	222	0.39	2	2	2	tier3	shared	0
9	88744001	89554181	G	A	684	19	0.03	395	322	0.45	506	335	0.40	2	2	2	tier3	shared	0
9	8965173	8975173	T	C	368	7	0.02	181	149	0.45	315	209	0.40	2	2	2	tier3	shared	1
9	92915429	93875608	C	T	602	16	0.03	329	316	0.49	462	323	0.41	2	2	2	tier3	shared	0
X	104681903	104795247	C	T	193	5	0.03	30	120	0.80	53	184	0.78	2	0.97	1	tier3	shared	0
X	104960175	105073519	T	G	279	0	0.00	247	0	0.00	216	124	0.36	2	0.97	1	tier3	relapse-specific	1
X	111343447	111456791	G	T	258	0	0.00	199	4	0.02	119	118	0.50	2	0.97	1	tier3	relapse-specific	0
X	111801908	111915252	G	A	279	23	0.08	19	220	0.92	82	311	0.79	2	0.97	1	tier3	shared	0
X	122157809	122330128	C	A	342	18	0.05	30	313	0.91	89	299	0.77	2	0.93	1.03	tier3	shared	0
X	128145196	128317515	A	G	239	0	0.00	231	0	0.00	218	126	0.37	2	1.01	0.96	tier3	relapse-specific	1
X	133375658	133547992	G	A	201	14	0.07	13	189	0.94	61	223	0.79	2	1.01	0.96	tier1	shared	6
X	140908119	141080453	T	C	334	22	0.06	21	306	0.94	78	345	0.82	2	0.93	1.01	tier3	shared	1
X	141555307	141727641	G	A	297	15	0.05	16	218	0.93	61	237	0.80	2	0.93	1.01	tier3	shared	1
X	146216741	146409049	G	A	170	11	0.06	6	151	0.96	62	207	0.77	2	0.97	1.02	tier3	shared	0
X	2702186	2692186	C	T	612	12	0.02	392	302	0.44	495	325	0.40	2	2	2	tier3	shared	0
X	38008716	38123772	T	A	322	29	0.08	15	274	0.95	70	298	0.81	2	1	1	tier3	shared	1
X	40416092	40531148	T	C	370	28	0.07	19	286	0.94	102	323	0.76	2	1	1	tier1	shared	1
X	57963125	57946400	G	T	240	10	0.04	25	226	0.90	53	279	0.84	2	0.95	0.99	tier3	shared	0
X	78698656	78812000	C	T	261	24	0.08	25	315	0.93	63	310	0.83	2	0.92	1.03	tier3	shared	1
X	93658417	93771761	T	G	199	0	0.00	209	0	0.00	136	121	0.47	2	0.91	0.96	tier3	relapse-specific	1
Y	14043637	15534243	A	G	330	21	0.06	10	242	0.96	70	321	0.82	2	2	2	tier2	shared	0
Y	16113990	17604596	T	C	216	16	0.07	11	190	0.95	77	255	0.77	2	2	2	tier3	shared	0
Y	20078640	21619252	C	A	352	27	0.07	36	282	0.89	61	308	0.83	2	2	2	tier3	shared	0
Y	7721445	7661445	C	G	219	0	0.00	206	1	0.00	122	96	0.44	2	2	2	tier3	relapse-specific	0



**Supplementary Table 6g.** Somatic point mutations and indels from UPN 869586 tumor-relapse pair used for mutation spectrum and clonality analyses. Mutations identified in the relapse sample with <2% allele frequencies in the primary tumor were classified as relapse-specific.

Chr	Start (NCBI 36)	Start (GRCh37)	Ref	Var	NormalRefReads	NormalVarReads	NormalVarFreq	TumorRefReads	TumorVarReads	TumorVarFreq	RelapseRefReads	RelapseVarReads	RelapseVarFreq	NormalCN	TumorCN	RelapseCN	Tier	Classification	# of samples recurrent (out of 200)
1	100625419	100852831	T	A	441	3	0.01	219	142	0.39	308	71	0.19	2	2	2	tier3	shared	1
1	101021626	101249038	A	G	786	12	0.02	288	271	0.48	637	175	0.22	2	2	2	tier3	shared	1
1	104258517	104456994	G	A	602	11	0.02	168	152	0.48	269	103	0.28	2	2	2	tier3	shared	0
1	105515812	105714289	G	A	884	8	0.01	363	308	0.46	668	157	0.19	2	2	2	tier3	shared	1
1	106131808	106330285	C	T	598	9	0.01	212	131	0.38	340	75	0.18	2	2	2	tier2	shared	1
1	106715566	106914043	C	T	483	1	0.00	167	126	0.43	390	86	0.18	2	2	2	tier2	shared	1
1	108308251	108506728	A	G	344	3	0.01	183	135	0.42	239	48	0.17	2	2	2	tier2	shared	1
1	108373360	108571837	G	A	685	11	0.02	353	267	0.43	369	103	0.22	2	2	2	tier3	shared	1
1	109572363	109770840	G	C	497	3	0.01	198	76	0.28	493	0	0.00	2	2	2	tier3	tumor-specific	1
1	110820433	111018910	-	AC	504	2	0.00	320	117	0.27	374	0	0.00	2	2	2	tier3	tumor-specific	0
1	11747101	11824514	G	A	476	8	0.02	260	246	0.49	319	75	0.19	2	2	2	tier3	shared	1
1	117611163	117809640	C	T	807	11	0.01	467	386	0.45	541	123	0.19	2	2	2	tier2	shared	0
1	118567276	118765753	C	A	854	12	0.01	337	275	0.45	626	134	0.18	2	2	2	tier3	shared	0
1	12339316	12416729	T	C	460	5	0.01	211	178	0.46	333	87	0.21	2	2	2	tier3	shared	1
1	14105605	14233018	C	T	515	5	0.01	235	236	0.50	340	90	0.21	2	2	2	tier3	shared	0
1	14341255	14468668	G	A	531	8	0.01	258	211	0.45	418	92	0.18	2	2	2	tier3	shared	0
1	148144145	149877521	G	A	673	9	0.01	367	279	0.43	428	123	0.22	2	2	2	tier1	shared	1
1	148398368	150131744	-	G	344	5	0.01	229	152	0.40	230	59	0.20	2	2	2	tier3	shared	0
1	150571282	152304658	A	C	739	14	0.02	314	300	0.49	509	137	0.21	2	2	2	tier2	shared	0
1	15456527	15583940	G	A	764	8	0.01	378	297	0.44	422	97	0.19	2	2	2	tier3	shared	0
1	155813811	157547187	A	T	620	9	0.01	255	173	0.40	398	91	0.19	2	2	2	tier3	shared	0
1	157408286	159141662	G	A	139	3	0.02	69	51	0.43	92	34	0.27	2	2	2	tier2	shared	1
1	159331196	161064572	G	T	628	2	0.00	422	89	0.17	364	96	0.21	2	2	2	tier3	shared	0
1	160240958	161974334	-	A	376	8	0.02	244	183	0.43	308	73	0.19	2	2	2	tier3	shared	0
1	161173886	162907262	G	A	728	8	0.01	335	259	0.44	534	109	0.17	2	2	2	tier3	shared	0
1	168739155	170472531	C	T	847	8	0.01	413	322	0.44	606	149	0.20	2	2	2	tier2	shared	0
1	169564687	171298063	-	A	771	16	0.02	342	226	0.40	500	111	0.18	2	2	2	tier3	shared	0
1	17558566	17685979	G	T	372	6	0.02	207	180	0.47	250	69	0.22	2	2	2	tier3	shared	0
1	175674904	177408281	T	A	1090	9	0.01	492	405	0.45	707	200	0.22	2	2	2	tier2	shared	0

1	176375491	178108868	G	A	279	4	0.01	84	61	0.42	188	44	0.19	2	2	2	tier3	shared	0
1	177650817	179384194	C	T	561	7	0.01	160	153	0.49	282	86	0.23	2	2	2	tier3	shared	0
1	17822004	17949417	C	T	474	6	0.01	198	180	0.48	291	80	0.22	2	2	2	tier3	shared	2
1	181488479	183221856	C	T	354	2	0.01	221	180	0.45	235	51	0.18	2	2	2	tier1	shared	1
1	188037336	189770713	A	G	524	7	0.01	168	135	0.45	410	124	0.23	2	2	2	tier2	shared	1
1	188581276	190314653	C	A	261	1	0.00	52	16	0.24	176	42	0.19	2	2	2	tier2	shared	5
1	189330554	191063931	C	T	813	15	0.02	279	281	0.50	536	127	0.19	2	2	2	tier3	shared	1
1	191933988	193667365	C	T	823	6	0.01	374	278	0.43	572	141	0.20	2	2	2	tier3	shared	0
1	192800989	194534366	G	A	609	3	0.00	221	176	0.44	416	98	0.19	2	2	2	tier3	shared	1
1	194464035	196197412	C	T	610	8	0.01	255	220	0.46	518	128	0.20	2	2	2	tier1	shared	1
1	194688957	196422334	C	T	668	8	0.01	300	257	0.46	408	105	0.20	2	2	2	tier3	shared	1
1	195270064	197003441	G	A	437	9	0.02	124	109	0.47	285	73	0.20	2	2	2	tier3	shared	0
1	199884746	201618123	C	T	790	13	0.02	347	265	0.43	480	134	0.22	2	2	2	tier1	shared	2
1	20178272	20305685	C	T	567	10	0.02	377	357	0.49	456	131	0.22	2	2	2	tier3	shared	0
1	208906360	210839737	G	A	463	7	0.01	256	252	0.50	437	102	0.19	2	2	2	tier3	shared	0
1	209213244	211146621	C	T	789	9	0.01	327	281	0.46	557	129	0.19	2	2	2	tier3	shared	0
1	210726833	212660210	C	T	387	6	0.02	211	160	0.43	256	61	0.19	2	2	2	tier2	shared	0
1	213434125	215367502	C	T	470	9	0.02	166	96	0.37	303	62	0.17	2	2	2	tier3	shared	0
1	214374854	216308231	G	A	849	6	0.01	349	303	0.46	604	133	0.18	2	2	2	tier3	shared	2
1	214889105	216822482	C	T	624	5	0.01	222	190	0.46	395	97	0.20	2	2	2	tier3	shared	0
1	215154767	217088144	C	A	850	15	0.02	400	332	0.45	556	139	0.20	2	2	2	tier2	shared	0
1	215841463	217774840	C	T	769	11	0.01	301	261	0.46	534	128	0.19	2	2	2	tier3	shared	0
1	216163968	218097345	G	A	439	8	0.02	214	185	0.46	412	110	0.21	2	2	2	tier3	shared	1
1	216304035	218237412	G	A	736	11	0.01	373	365	0.49	575	146	0.20	2	2	2	tier2	shared	1
1	217256405	219189782	T	C	289	1	0.00	79	67	0.46	255	55	0.18	2	2	2	tier3	shared	1
1	221173612	223106989	G	T	335	2	0.01	189	34	0.15	306	68	0.18	2	2	2	tier3	shared	1
1	221677366	223610743	-	T	461	8	0.02	251	140	0.36	366	72	0.16	2	2	2	tier3	shared	0
1	221705623	223639000	C	T	696	5	0.01	320	264	0.45	491	132	0.21	2	2	2	tier3	shared	1
1	225627629	227561006	C	T	596	6	0.01	366	246	0.40	465	92	0.17	2	2	2	tier3	shared	0
1	229081409	231014786	C	A	914	7	0.01	372	285	0.43	649	171	0.21	2	2	2	tier3	shared	0
1	229494826	231428203	G	A	587	15	0.02	359	296	0.45	485	121	0.20	2	2	2	tier3	shared	0
1	22962664	23090077	G	A	490	8	0.02	238	203	0.46	315	84	0.21	2	2	2	tier3	shared	0
1	230362104	232295481	C	A	696	11	0.02	365	302	0.45	449	105	0.19	2	2	2	tier2	shared	1
1	23051601	23179014	C	T	299	2	0.01	111	83	0.43	204	34	0.14	2	2	2	tier2	shared	0
1	231744754	233678131	A	G	765	6	0.01	313	275	0.47	471	126	0.21	2	2	2	tier3	shared	1
1	233105368	235038745	C	A	1025	13	0.01	447	319	0.42	647	146	0.18	2	2	2	tier3	shared	0
1	236205132	238138509	A	G	1076	11	0.01	445	371	0.45	786	197	0.20	2	2	2	tier2	shared	0
1	236435727	238369104	C	T	282	1	0.00	70	38	0.35	183	32	0.15	2	2	2	tier3	shared	1
1	236647090	238580467	C	T	626	4	0.01	280	254	0.48	470	121	0.20	2	2	2	tier2	shared	1
1	236849286	238782663	C	T	770	8	0.01	305	269	0.47	513	148	0.22	2	2	2	tier3	shared	1

1	237548643	239482020	G	A	980	10	0.01	382	243	0.39	567	138	0.20	2	2	2	tier3	shared	1
1	239381660	241315037	C	A	925	11	0.01	369	254	0.41	475	101	0.18	2	2	2	tier2	shared	0
1	25222394	25349807	T	C	614	13	0.02	258	268	0.51	461	93	0.17	2	2	2	tier3	shared	1
1	30047873	30275286	G	A	356	8	0.02	169	127	0.43	247	69	0.22	2	2	2	tier2	shared	1
1	3022471	3032611	C	T	236	2	0.01	160	137	0.46	183	54	0.23	2	2	2	tier3	shared	1
1	30588269	30815682	G	A	106	0	0.00	106	26	0.20	109	0	0.00	2	2	2	tier3	tumor-specific	0
1	34170985	34398398	C	T	672	3	0.00	275	209	0.43	408	118	0.22	2	2	2	tier3	shared	0
1	34646377	34873790	G	A	758	10	0.01	327	276	0.46	485	113	0.19	2	2	2	tier3	shared	1
1	34803824	35031237	C	A	517	4	0.01	237	221	0.48	335	85	0.20	2	2	2	tier3	shared	1
1	35138238	35365651	G	A	453	10	0.02	263	231	0.47	344	99	0.22	2	2	2	tier3	shared	1
1	36853337	37080750	G	A	817	12	0.01	368	288	0.44	398	106	0.21	2	2	2	tier3	shared	0
1	45149811	45377224	T	C	941	11	0.01	418	414	0.50	552	174	0.24	2	2	2	tier3	shared	0
1	45858196	46085609	C	T	634	12	0.02	310	256	0.45	437	103	0.19	2	2	2	tier3	shared	0
1	58484050	58711462	C	T	516	1	0.00	198	114	0.37	354	82	0.19	2	2	2	tier3	shared	0
1	61049431	61276843	G	A	767	9	0.01	272	225	0.45	503	101	0.17	2	2	2	tier3	shared	1
1	64277040	64504452	C	T	668	6	0.01	233	226	0.49	456	122	0.21	2	2	2	tier3	shared	0
1	73704484	73931896	-	A	661	9	0.01	255	182	0.42	409	84	0.17	2	2	2	tier3	shared	1
1	75051626	75279038	C	T	686	4	0.01	312	273	0.47	533	114	0.18	2	2	2	tier3	shared	0
1	75400544	75627956	G	A	382	6	0.02	129	127	0.50	273	60	0.18	2	2	2	tier3	shared	0
1	79586157	79813569	A	T	639	0	0.00	419	0	0.00	409	89	0.18	2	2	2	tier3	relapse-specific	1
1	80505153	80732565	A	T	731	17	0.02	291	261	0.47	521	141	0.21	2	2	2	tier2	shared	0
1	80743777	80971189	C	T	452	2	0.00	233	41	0.15	298	82	0.22	2	2	2	tier3	shared	0
1	80882926	81110338	C	T	621	11	0.02	181	167	0.48	359	79	0.18	2	2	2	tier3	shared	1
1	81481229	81708641	C	G	665	2	0.00	202	165	0.45	407	111	0.21	2	2	2	tier2	shared	0
1	82154481	82381893	C	T	886	10	0.01	247	262	0.51	482	129	0.21	2	2	2	tier3	shared	1
1	82513492	82740904	G	A	762	8	0.01	492	86	0.15	500	122	0.20	2	2	2	tier3	shared	1
1	82979893	83207305	G	C	760	10	0.01	282	235	0.45	475	124	0.21	2	2	2	tier2	shared	1
1	85563599	85791011	A	G	950	7	0.01	298	247	0.45	452	107	0.19	2	2	2	tier2	shared	0
1	87704659	87932071	G	T	394	4	0.01	124	83	0.40	247	72	0.23	2	2	2	tier2	shared	0
1	88418025	88645437	G	A	336	2	0.01	115	82	0.42	279	82	0.23	2	2	2	tier2	shared	1
1	89889861	90117273	A	G	618	12	0.02	186	151	0.45	406	100	0.20	2	2	2	tier3	shared	0
1	89910422	90137834	C	T	1062	13	0.01	510	378	0.43	671	165	0.20	2	2	2	tier2	shared	0
1	90007390	90234802	G	A	486	4	0.01	290	247	0.46	396	83	0.17	2	2	2	tier3	shared	0
1	95852418	96079830	-	T	654	12	0.02	351	286	0.45	429	79	0.16	2	2	2	tier3	shared	1
1	96796746	97024158	C	T	762	9	0.01	341	285	0.46	503	129	0.20	2	2	2	tier3	shared	0
1	98866988	99094400	CTTAT	-	399	2	0.00	147	115	0.44	332	82	0.20	2	2	2	tier3	shared	0
1	99260217	99487629	T	A	575	8	0.01	181	149	0.45	429	85	0.17	2	2	2	tier2	shared	0
10	100068933	100078943	G	A	858	7	0.01	286	248	0.46	506	124	0.20	2	2	2	tier2	shared	1
10	101213454	101223464	C	G	888	18	0.02	466	395	0.46	649	162	0.20	2	2	2	tier2	shared	0
10	10282897	10242891	G	A	844	18	0.02	390	369	0.49	574	143	0.20	2	2	2	tier3	shared	0

10	10628016	10588010	C	T	737	12	0.02	250	240	0.49	390	108	0.22	2	2	2	tier2	shared	1
10	106595367	106605377	C	T	615	12	0.02	342	237	0.41	471	120	0.20	2	2	2	tier3	shared	1
10	106743384	106753394	C	A	585	11	0.02	288	188	0.39	484	120	0.20	2	2	2	tier2	shared	1
10	107281839	107291849	C	T	355	4	0.01	114	101	0.47	291	61	0.17	2	2	2	tier3	shared	0
10	108352378	108362388	A	G	462	5	0.01	269	231	0.46	346	111	0.24	2	2	2	tier3	shared	0
10	110925002	110935012	T	G	814	8	0.01	300	302	0.50	490	111	0.18	2	2	2	tier3	shared	1
10	11104505	11064499	-	T	482	25	0.05	225	116	0.34	365	68	0.16	2	2	2	tier3	shared	0
10	111110033	111120043	C	G	972	7	0.01	351	261	0.43	600	173	0.22	2	2	2	tier3	shared	1
10	111441529	111451539	G	C	806	9	0.01	311	219	0.41	545	137	0.20	2	2	2	tier3	shared	1
10	117428688	117438698	C	T	678	8	0.01	289	238	0.45	448	109	0.20	2	2	2	tier3	shared	2
10	117570150	117580160	G	A	755	2	0.00	352	228	0.39	405	81	0.17	2	2	2	tier3	shared	2
10	117845864	117855874	G	A	587	3	0.01	209	211	0.50	388	92	0.19	2	2	2	tier3	shared	0
10	118139345	118149355	C	T	620	9	0.01	261	209	0.44	446	122	0.21	2	2	2	tier3	shared	0
10	118726162	118736172	C	T	692	14	0.02	321	260	0.45	544	138	0.20	2	2	2	tier3	shared	0
10	123174487	123184497	C	T	716	6	0.01	294	276	0.48	394	94	0.19	2	2	2	tier3	shared	0
10	124082289	124092299	T	A	518	6	0.01	233	195	0.46	343	89	0.21	2	2	2	tier3	shared	1
10	124794442	124804452	T	C	648	5	0.01	151	153	0.50	431	110	0.20	2	2	2	tier3	shared	0
10	127227746	127237756	G	A	999	6	0.01	537	166	0.24	749	0	0.00	2	2	2	tier3	tumor-specific	1
10	128134394	128144404	T	C	869	11	0.01	466	405	0.46	645	143	0.18	2	2	2	tier3	shared	0
10	130088113	130198123	C	T	616	21	0.03	305	275	0.47	425	105	0.20	2	2	2	tier3	shared	1
10	130656603	130766613	C	T	753	5	0.01	302	251	0.45	484	140	0.22	2	2	2	tier3	shared	1
10	131103876	131213886	G	T	632	14	0.02	369	267	0.42	394	123	0.24	2	2	2	tier3	shared	1
10	132353514	132463524	C	T	765	8	0.01	353	303	0.46	475	103	0.18	2	2	2	tier3	shared	1
10	133849918	133999928	C	T	140	3	0.02	94	26	0.22	111	28	0.20	2	2	2	tier2	shared	0
10	134588664	134738674	C	T	313	3	0.01	206	175	0.46	230	58	0.20	2	2	2	tier2	shared	0
10	13681763	13641757	C	A	527	7	0.01	176	172	0.49	323	78	0.19	2	2	2	tier3	shared	0
10	16956314	16916308	C	T	678	13	0.02	297	244	0.45	469	121	0.21	2	2	2	tier3	shared	1
10	1709805	1719805	A	G	550	4	0.01	299	218	0.42	384	94	0.20	2	2	2	tier3	shared	0
10	19757104	19717098	G	A	461	8	0.02	235	236	0.50	396	100	0.20	2	2	2	tier3	shared	1
10	2534120	2544120	C	T	797	13	0.02	488	260	0.35	640	110	0.15	2	2	2	tier1	shared	1
10	28556997	28516991	G	A	954	15	0.02	302	250	0.45	590	156	0.21	2	2	2	tier3	shared	0
10	28864676	28824670	-	AGGGC	902	14	0.02	308	289	0.48	551	110	0.17	2	2	2	tier1	shared	2
10	29201770	29161764	G	A	891	9	0.01	317	273	0.46	478	129	0.21	2	2	2	tier3	shared	0
10	31062092	31022086	C	A	805	8	0.01	299	210	0.41	521	124	0.19	2	2	2	tier3	shared	1
10	36958360	36918354	C	T	301	5	0.02	79	68	0.46	201	55	0.21	2	2	2	tier3	shared	0
10	37691513	37651507	C	T	585	11	0.02	172	166	0.49	496	144	0.23	2	2	2	tier2	shared	0
10	37762773	37722767	G	T	1001	8	0.01	346	265	0.43	622	161	0.21	2	2	2	tier3	shared	1
10	42523772	43203766	G	A	815	5	0.01	296	253	0.46	436	128	0.23	2	2	2	tier3	shared	0
10	4423632	4433632	C	T	832	10	0.01	349	307	0.47	518	141	0.21	2	2	2	tier3	shared	0
10	45403334	46083328	G	T	348	1	0.00	136	58	0.30	256	50	0.16	2	2	2	tier3	shared	0

10	50307838	50637832	C	T	994	11	0.01	366	328	0.47	546	145	0.21	2	2	2	tier3	shared	0
10	53476687	53806681	C	A	794	11	0.01	320	272	0.46	538	132	0.20	2	2	2	tier3	shared	0
10	53491665	53821659	G	A	558	3	0.01	262	202	0.44	473	128	0.21	2	2	2	tier3	shared	0
10	57607320	57937314	C	T	631	12	0.02	129	125	0.49	406	126	0.24	2	2	2	tier3	shared	1
10	60867451	61197445	C	T	596	11	0.02	198	189	0.49	518	146	0.22	2	2	2	tier3	shared	1
10	61596587	61926581	C	A	1153	16	0.01	429	337	0.44	648	115	0.15	2	2	2	tier1	shared	1
10	617405	627405	T	A	334	4	0.01	130	92	0.41	290	73	0.20	2	2	2	tier3	shared	2
10	62932225	63262219	A	T	731	14	0.02	251	217	0.46	527	121	0.19	2	2	2	tier3	shared	0
10	65471530	65801524	C	T	212	5	0.02	108	85	0.44	128	25	0.16	2	2	2	tier3	shared	1
10	67606097	67936091	T	C	587	11	0.02	238	180	0.43	442	100	0.18	2	2	2	tier3	shared	1
10	67745103	68075097	G	C	848	9	0.01	318	284	0.47	554	133	0.19	2	2	2	tier3	shared	1
10	67807862	68137856	T	A	696	7	0.01	333	245	0.42	537	126	0.19	2	2	2	tier2	shared	1
10	67828365	68158359	G	A	825	12	0.01	377	341	0.47	555	139	0.20	2	2	2	tier2	shared	1
10	68901253	69231247	G	A	527	5	0.01	265	191	0.42	451	126	0.22	2	2	2	tier3	shared	1
10	70029424	70359418	C	T	516	13	0.02	278	226	0.45	344	84	0.20	2	2	2	tier2	shared	2
10	72583478	72913472	C	T	700	4	0.01	501	101	0.17	385	80	0.17	2	2	2	tier3	shared	1
10	73509568	73839562	G	C	485	8	0.02	283	261	0.48	317	105	0.25	2	2	2	tier3	shared	0
10	80716685	81046679	-	AACTTCTC	293	5	0.02	159	97	0.38	215	36	0.14	2	2	2	tier3	shared	0
10	83782638	83792658	G	A	558	3	0.01	192	146	0.43	356	104	0.23	2	2	2	tier3	shared	1
10	83995484	84005504	A	T	694	6	0.01	254	176	0.41	496	113	0.19	2	2	2	tier3	shared	1
10	84453471	84463491	G	T	680	14	0.02	266	198	0.43	459	94	0.17	2	2	2	tier3	shared	1
10	85411540	85421560	C	T	769	11	0.01	410	373	0.48	566	168	0.23	2	2	2	tier3	shared	0
10	8640977	8600971	C	T	648	10	0.02	325	296	0.48	464	142	0.23	2	2	2	tier3	shared	0
10	94405496	94415516	G	A	943	12	0.01	387	259	0.40	554	158	0.22	2	2	2	tier2	shared	0
10	94794402	94804422	C	T	581	9	0.02	216	205	0.49	354	85	0.19	2	2	2	tier3	shared	0
11	100391923	100886713	A	-	358	17	0.05	134	81	0.38	217	68	0.24	2	2	2	tier3	shared	0
11	101246636	101741426	C	T	1201	15	0.01	580	501	0.46	846	223	0.21	2	2	2	tier3	shared	0
11	102592234	103087024	-	T	507	5	0.01	109	101	0.48	277	62	0.18	2	2	2	tier2	shared	2
11	104447886	104942676	G	A	579	8	0.01	218	153	0.41	369	84	0.19	2	2	2	tier3	shared	0
11	106005732	106500522	A	-	812	21	0.03	362	264	0.42	512	136	0.21	2	2	2	tier3	shared	1
11	106972356	107467146	C	A	403	2	0.00	132	105	0.44	209	52	0.20	2	2	2	tier3	shared	1
11	112644644	113139434	-	A	888	7	0.01	464	359	0.44	580	129	0.18	2	2	2	tier3	shared	0
11	112982090	113476880	-	CCTCCCCC	579	2	0.00	291	127	0.30	554	69	0.11	2	2	2	tier2	shared	0
11	115844209	116338999	G	A	927	11	0.01	429	356	0.45	526	152	0.22	2	2	2	tier2	shared	1
11	119952559	120447349	G	A	566	8	0.01	382	339	0.47	468	101	0.18	2	2	2	tier3	shared	1
11	120711603	121206393	G	A	325	10	0.03	142	164	0.54	260	66	0.20	2	2	2	tier3	shared	0
11	121250028	121744818	C	A	532	5	0.01	314	207	0.40	434	107	0.20	2	2	2	tier3	shared	1
11	124577189	125071979	C	T	336	6	0.02	155	119	0.43	273	67	0.20	2	2	2	tier2	shared	0
11	126161018	126655808	T	C	491	7	0.01	194	160	0.45	345	98	0.22	2	2	2	tier3	shared	0
11	129099192	129593982	C	T	398	4	0.01	195	168	0.46	304	78	0.20	2	2	2	tier3	shared	0

11	131087426	131582216	G	A	713	13	0.02	282	220	0.44	465	125	0.21	2	2	2	tier3	shared	0
11	132525633	133020423	G	A	673	13	0.02	312	273	0.47	421	114	0.21	2	2	2	tier3	shared	0
11	13818946	13862370	C	A	1053	6	0.01	636	181	0.22	705	0	0.00	2	2	2	tier3	tumor-specific	0
11	13921326	13964750	G	T	479	2	0.00	363	88	0.20	334	71	0.18	2	2	2	tier3	shared	1
11	16766228	16809652	G	T	679	10	0.01	292	204	0.41	410	95	0.19	2	2	2	tier2	shared	0
11	2093070	2136494	C	T	304	4	0.01	135	125	0.48	186	48	0.21	2	2	2	tier3	shared	0
11	21157398	21200822	C	T	626	8	0.01	214	173	0.45	505	101	0.17	2	2	2	tier3	shared	1
11	21441779	21485203	C	T	1004	13	0.01	366	353	0.49	657	172	0.21	2	2	2	tier3	shared	1
11	23084461	23127885	C	T	891	5	0.01	423	126	0.23	736	0	0.00	2	2	2	tier3	tumor-specific	1
11	23252161	23295585	C	T	953	7	0.01	374	273	0.42	582	139	0.19	2	2	2	tier3	shared	1
11	23414375	23457799	A	T	311	8	0.03	74	77	0.51	189	43	0.19	2	2	2	tier3	shared	1
11	26176637	26220061	C	T	565	8	0.01	225	207	0.48	462	100	0.18	2	2	2	tier3	shared	1
11	26600393	26643817	A	T	900	11	0.01	371	301	0.45	595	176	0.23	2	2	2	tier3	shared	1
11	28141801	28185225	T	C	435	6	0.01	123	137	0.53	368	104	0.22	2	2	2	tier2	shared	0
11	29608177	29651601	G	A	504	11	0.02	219	182	0.45	364	84	0.19	2	2	2	tier3	shared	1
11	32374485	32417909	-	GACCG	474	2	0.00	284	198	0.41	300	66	0.18	2	2	2	tier1	shared	12
11	32813764	32857188	C	T	456	2	0.00	178	149	0.46	425	108	0.20	2	2	2	tier2	shared	0
11	35617793	35661217	G	A	368	11	0.03	230	159	0.41	255	81	0.24	2	2	2	tier3	shared	0
11	36130208	36173632	G	A	653	4	0.01	304	262	0.46	398	90	0.18	2	2	2	tier3	shared	1
11	37199515	37242939	G	A	412	11	0.03	148	122	0.45	325	91	0.22	2	2	2	tier3	shared	1
11	39886096	39929520	G	T	659	6	0.01	258	233	0.47	453	98	0.18	2	2	2	tier3	shared	0
11	40250680	40294104	G	A	291	6	0.02	116	110	0.49	246	52	0.17	2	2	2	tier3	shared	0
11	40618057	40661481	T	-	562	29	0.05	260	184	0.41	431	118	0.21	2	2	2	tier3	shared	1
11	40678606	40722030	A	C	643	13	0.02	199	199	0.50	402	110	0.21	2	2	2	tier3	shared	1
11	42231838	42275262	A	-	778	12	0.02	336	241	0.42	392	112	0.22	2	2	2	tier1	shared	0
11	4697163	4740587	C	T	615	6	0.01	371	254	0.41	430	119	0.22	2	2	2	tier2	shared	0
11	49764785	49808209	A	-	722	18	0.02	206	165	0.44	415	96	0.19	2	1.36	2	tier3	shared	0
11	67233955	67477379	G	A	540	5	0.01	324	249	0.43	372	81	0.18	2	2	2	tier3	shared	4
11	68820412	69063836	C	A	365	9	0.02	180	156	0.46	230	76	0.25	2	2	2	tier1	shared	1
11	69511014	69833366	C	A	515	8	0.02	246	239	0.49	301	79	0.21	2	2	2	tier3	shared	0
11	70110549	70432901	G	A	268	2	0.01	146	144	0.50	202	64	0.24	2	2	2	tier3	shared	0
11	70240166	70562518	G	A	423	4	0.01	186	187	0.50	338	88	0.21	2	2	2	tier3	shared	0
11	70313659	70636011	C	A	733	4	0.01	345	287	0.45	379	109	0.22	2	2	2	tier3	shared	0
11	70339479	70661831	G	A	269	4	0.01	163	166	0.50	184	44	0.19	2	2	2	tier3	shared	0
11	71333212	71655564	-	G	680	4	0.01	303	213	0.41	468	109	0.19	2	2	2	tier3	shared	0
11	71402098	71724450	-	CCCC	264	3	0.01	120	69	0.37	142	40	0.22	2	2	2	tier1	shared	1
11	7231970	7275394	G	A	681	12	0.02	551	101	0.15	467	113	0.19	2	2	2	tier3	shared	0
11	7401800	7445224	AGAG	-	419	4	0.01	176	181	0.51	237	60	0.20	2	2	2	tier3	shared	0
11	74692358	75014710	G	A	634	7	0.01	441	136	0.24	510	0	0.00	2	2	2	tier3	tumor-specific	1
11	78335902	78658254	C	T	657	1	0.00	377	75	0.17	372	78	0.17	2	2	2	tier2	shared	1

11	78591069	78913421	T	-	871	17	0.02	400	306	0.43	530	148	0.22	2	2	2	tier3	shared	1
11	79669683	79992035	G	A	916	7	0.01	369	252	0.41	494	104	0.17	2	2	2	tier3	shared	1
11	84033038	84355390	T	C	753	4	0.01	329	259	0.44	561	109	0.16	2	2	2	tier3	shared	0
11	85646239	85968591	T	A	520	11	0.02	193	168	0.47	322	82	0.20	2	2	2	tier1	shared	2
11	88599343	88959695	C	G	684	8	0.01	284	239	0.46	481	126	0.21	2	2	2	tier3	shared	0
11	90927540	91287892	-	T	358	11	0.03	142	98	0.41	258	62	0.19	2	2	2	tier3	shared	1
11	91626533	91986885	C	T	483	10	0.02	217	164	0.43	369	100	0.21	2	2	2	tier3	shared	1
11	91797028	92157380	C	T	525	8	0.02	165	128	0.44	358	66	0.16	2	2	2	tier3	shared	1
11	93002621	93362973	G	A	1002	17	0.02	465	385	0.45	665	209	0.24	2	2	2	tier3	shared	0
11	96998106	97492896	A	G	988	19	0.02	419	337	0.45	616	177	0.22	2	2	2	tier3	shared	0
11	97690656	98185446	T	A	641	10	0.02	256	219	0.46	405	89	0.18	2	2	2	tier2	shared	1
11	99590148	100084938	TTC	-	154	2	0.01	52	14	0.21	134	20	0.13	2	2	2	tier3	shared	2
12	105050145	106526015	C	T	718	7	0.01	320	290	0.48	480	117	0.20	2	2	2	tier3	shared	0
12	108709819	110225436	C	T	499	8	0.02	282	179	0.39	320	63	0.16	2	2	2	tier3	shared	0
12	111596853	113112470	G	T	684	10	0.01	313	264	0.46	497	119	0.19	2	2	2	tier3	shared	0
12	113491503	115007120	G	T	613	6	0.01	265	92	0.26	409	0	0.00	2	2	2	tier3	tumor-specific	0
12	11600664	11709397	C	T	915	3	0.00	524	144	0.22	681	1	0.00	2	2	2	tier3	tumor-specific	0
12	116484385	118000002	T	C	587	3	0.01	287	98	0.25	362	0	0.00	2	2	2	tier3	tumor-specific	1
12	124448371	125882418	C	G	1166	10	0.01	591	369	0.38	634	148	0.19	2	2	2	tier3	shared	0
12	125623798	127057845	G	A	624	4	0.01	343	312	0.48	467	113	0.19	2	2	2	tier2	shared	0
12	126850425	128284472	C	T	1060	17	0.02	384	287	0.43	528	117	0.18	2	2	2	tier3	shared	1
12	127808379	129242426	G	A	706	12	0.02	281	248	0.47	339	80	0.19	2	2	2	tier3	shared	0
12	128619257	130053304	C	G	684	5	0.01	241	222	0.48	376	109	0.22	2	2	2	tier3	shared	0
12	128705131	130139178	C	T	697	6	0.01	228	215	0.49	401	98	0.20	2	2	2	tier3	shared	0
12	130170627	131604674	C	T	439	9	0.02	197	183	0.48	262	61	0.19	2	2	2	tier3	shared	0
12	13575457	13684190	G	A	553	11	0.02	247	250	0.50	312	74	0.19	2	2	2	tier3	shared	0
12	1540410	1670149	C	T	777	12	0.02	378	347	0.48	441	135	0.23	2	2	2	tier3	shared	1
12	15513839	15622572	C	T	1029	14	0.01	393	289	0.42	576	155	0.21	2	2	2	tier3	shared	0
12	20925361	21034094	G	A	843	13	0.02	298	208	0.41	531	134	0.20	2	2	2	tier3	shared	0
12	29479858	29588591	C	T	539	8	0.01	236	185	0.44	381	82	0.18	2	2	2	tier3	shared	0
12	31412249	31520982	C	T	547	6	0.01	124	86	0.41	372	80	0.18	2	2	2	tier3	shared	0
12	31524470	31633203	A	-	619	40	0.06	233	182	0.44	395	107	0.21	2	2	2	tier3	shared	1
12	3515374	3645113	C	T	628	17	0.03	375	305	0.45	519	160	0.24	2	2	2	tier3	shared	0
12	37150181	38863914	C	T	821	13	0.02	246	203	0.45	562	131	0.19	2	2	2	tier2	shared	1
12	42005661	43719394	G	A	751	4	0.01	273	210	0.43	411	101	0.20	2	2	2	tier3	shared	0
12	44307912	46021645	G	A	607	6	0.01	260	204	0.44	379	104	0.22	2	2	2	tier2	shared	1
12	47152645	48866378	C	T	490	7	0.01	219	169	0.44	306	68	0.18	2	2	2	tier3	shared	0
12	48739047	50452780	C	G	463	2	0.00	208	161	0.44	285	70	0.20	2	2	2	tier1	shared	1
12	50955381	52669114	T	C	627	5	0.01	306	261	0.46	546	117	0.18	2	2	2	tier3	shared	0
12	62843551	64557284	G	T	725	9	0.01	321	255	0.44	450	137	0.23	2	2	2	tier3	shared	0

12	64216620	65930353	C	T	734	13	0.02	325	295	0.48	478	120	0.20	2	2	2	tier3	shared	1
12	6448244	6577983	G	A	689	24	0.03	431	310	0.42	510	133	0.21	2	2	2	tier2	shared	0
12	73564540	75278273	A	G	425	8	0.02	135	150	0.53	317	87	0.22	2	2	2	tier3	shared	1
12	76390199	77866068	C	A	709	6	0.01	204	167	0.45	418	129	0.24	2	2	2	tier3	shared	1
12	77981760	79457629	A	T	674	2	0.00	458	82	0.15	512	117	0.19	2	2	2	tier3	shared	1
12	80061033	81536902	C	T	533	1	0.00	256	230	0.47	452	99	0.18	2	2	2	tier1	shared	2
12	80305084	81780953	A	C	665	8	0.01	238	240	0.50	431	107	0.20	2	2	2	tier3	shared	0
12	82431272	83907141	T	A	671	7	0.01	277	224	0.45	430	111	0.21	2	2	2	tier3	shared	1
12	82550859	84026728	A	T	853	9	0.01	289	248	0.46	542	136	0.20	2	2	2	tier3	shared	1
12	82952593	84428462	A	G	819	8	0.01	268	171	0.39	499	147	0.23	2	2	2	tier2	shared	1
12	83466470	84942339	G	C	312	7	0.02	78	66	0.46	198	42	0.18	2	2	2	tier3	shared	1
12	84194039	85669908	A	T	219	5	0.02	72	52	0.42	185	47	0.20	2	2	2	tier3	shared	0
12	86504514	87980383	C	T	790	12	0.01	250	199	0.44	470	135	0.22	2	2	2	tier3	shared	1
12	87116911	88592780	T	A	327	1	0.00	102	72	0.41	242	51	0.17	2	2	2	tier3	shared	0
12	88004270	89480139	T	C	841	13	0.02	400	303	0.43	561	104	0.16	2	2	2	tier3	shared	1
12	93846488	95322357	T	C	593	0	0.00	739	1	0.00	564	137	0.20	2	2	2	tier2	relapse-specific	0
12	95073406	96549275	T	A	981	10	0.01	567	479	0.46	673	160	0.19	2	2	2	tier3	shared	0
12	96881316	98357185	C	T	283	0	0.00	106	90	0.46	196	56	0.22	2	2	2	tier3	shared	1
12	97214456	98690325	C	A	822	11	0.01	379	314	0.45	473	127	0.21	2	2	2	tier2	shared	1
13	100115086	101317085	T	C	903	13	0.01	404	322	0.44	480	130	0.21	2	2	2	tier2	shared	1
13	101420364	102622363	T	G	1162	15	0.01	392	272	0.41	686	165	0.19	2	2	2	tier3	shared	0
13	101449493	102651492	A	T	721	5	0.01	235	181	0.44	516	107	0.17	2	2	2	tier3	shared	0
13	102829803	104031802	C	T	632	5	0.01	197	168	0.46	409	128	0.24	2	2	2	tier2	shared	1
13	103499293	104701292	TCTT	-	531	10	0.02	116	82	0.41	351	94	0.21	2	2	2	tier3	shared	1
13	105717434	106919433	C	T	740	5	0.01	435	409	0.48	558	161	0.22	2	2	2	tier3	shared	1
13	108073578	109275577	G	A	767	13	0.02	327	269	0.45	597	137	0.19	2	2	2	tier3	shared	1
13	111779588	112731587	G	A	589	10	0.02	201	135	0.40	452	94	0.17	2	2	2	tier3	shared	0
13	112326383	113278382	C	T	484	3	0.01	281	228	0.45	318	65	0.17	2	2	2	tier2	shared	0
13	112390052	113342051	-	TC	485	3	0.01	197	207	0.51	348	82	0.19	2	2	2	tier3	shared	0
13	113159865	114111864	C	T	796	11	0.01	319	224	0.41	450	94	0.17	2	2	2	tier3	shared	0
13	19559062	20661062	G	A	549	4	0.01	174	111	0.39	329	85	0.21	2	2	2	tier2	shared	0
13	20228213	21330213	AGTT	-	631	15	0.02	223	185	0.45	418	105	0.20	2	2	2	tier3	shared	0
13	20365587	21467587	C	T	834	8	0.01	339	281	0.45	555	152	0.21	2	2	2	tier3	shared	0
13	24633630	25735630	C	A	643	13	0.02	209	229	0.52	336	87	0.21	2	2	2	tier3	shared	0
13	32444064	33546064	G	A	709	12	0.02	269	214	0.44	509	141	0.22	2	2	2	tier3	shared	0
13	33058730	34160730	G	A	581	10	0.02	265	196	0.43	359	92	0.20	2	2	2	tier3	shared	1
13	35194627	36296627	C	A	779	10	0.01	386	315	0.45	497	111	0.18	2	2	2	tier2	shared	0
13	35844364	36946364	C	T	700	13	0.02	348	285	0.45	424	97	0.19	2	2	2	tier3	shared	0
13	36262314	37364314	G	T	757	8	0.01	330	293	0.47	492	150	0.23	2	2	2	tier3	shared	0
13	36637852	37739852	C	T	741	5	0.01	316	243	0.43	552	159	0.22	2	2	2	tier3	shared	0



13	38218953	39320953	T	A	608	7	0.01	276	232	0.46	373	91	0.20	2	2	2	tier3	shared	3
13	40942534	42044534	C	T	922	12	0.01	383	381	0.50	565	161	0.22	2	2	2	tier3	shared	0
13	41628881	42730881	A	G	386	2	0.01	63	78	0.55	257	63	0.20	2	2	2	tier3	shared	0
13	41643589	42745589	C	T	852	15	0.02	356	300	0.46	573	132	0.19	2	2	2	tier3	shared	0
13	44270505	45372505	C	T	623	8	0.01	230	188	0.45	450	116	0.20	2	2	2	tier3	shared	0
13	48126290	49228289	C	T	477	10	0.02	161	114	0.41	338	68	0.17	2	2	2	tier3	shared	1
13	52837723	53939722	T	-	223	9	0.04	74	44	0.37	177	49	0.22	2	2	2	tier3	shared	0
13	55428867	56530866	A	-	329	5	0.01	113	77	0.41	175	40	0.19	2	2	2	tier3	shared	0
13	55752973	56854972	C	G	143	4	0.03	23	23	0.50	169	27	0.14	2	2	2	tier3	shared	1
13	56434844	57536843	A	T	688	7	0.01	257	229	0.47	367	109	0.23	2	2	2	tier3	shared	1
13	56547920	57649919	T	G	993	5	0.01	358	315	0.47	716	188	0.21	2	2	2	tier2	shared	1
13	57189099	58291098	C	T	694	9	0.01	366	53	0.13	430	114	0.21	2	2	2	tier2	shared	0
13	57300537	58402536	G	A	675	5	0.01	192	155	0.45	429	110	0.20	2	2	2	tier3	shared	1
13	58919452	60021451	A	T	731	3	0.00	437	119	0.21	688	0	0.00	2	2	2	tier2	tumor-specific	1
13	61836083	62938082	C	T	505	4	0.01	148	93	0.39	315	89	0.22	2	2	2	tier3	shared	0
13	61836206	62938205	A	T	334	4	0.01	76	78	0.51	204	49	0.19	2	2	2	tier3	shared	0
13	62067843	63169842	C	T	88	0	0.00	20	18	0.47	84	16	0.16	2	2	2	tier3	shared	1
13	62699194	63801193	C	T	300	5	0.02	95	62	0.39	194	46	0.19	2	2	2	tier3	shared	0
13	64190847	65292846	A	-	625	10	0.02	279	242	0.46	500	136	0.21	2	2	2	tier3	shared	1
13	65537506	66639505	A	G	479	4	0.01	107	111	0.51	430	118	0.22	2	2	2	tier3	shared	1
13	65882790	66984789	G	A	732	7	0.01	363	253	0.41	566	138	0.20	2	2	2	tier3	shared	0
13	66521030	67623029	G	T	520	10	0.02	245	185	0.43	308	103	0.25	2	2	2	tier2	shared	0
13	67217152	68319151	G	T	561	8	0.01	261	212	0.45	395	98	0.20	2	2	2	tier3	shared	1
13	67769515	68871514	C	A	814	4	0.00	265	258	0.49	447	126	0.22	2	2	2	tier2	shared	0
13	68145004	69247003	C	T	479	4	0.01	121	119	0.50	280	70	0.20	2	2	2	tier3	shared	0
13	69993817	71095816	A	T	557	6	0.01	121	168	0.58	323	94	0.23	2	2	2	tier3	shared	1
13	80692580	81794579	G	A	632	13	0.02	250	190	0.43	421	109	0.21	2	2	2	tier2	shared	0
13	81410702	82512701	T	C	723	11	0.01	308	230	0.43	364	115	0.24	2	2	2	tier3	shared	1
13	81853624	82955623	T	A	718	14	0.02	229	183	0.44	463	121	0.21	2	2	2	tier3	shared	1
13	89323401	90525400	C	G	563	11	0.02	223	185	0.45	363	83	0.19	2	2	2	tier2	shared	0
13	89699123	90901122	G	A	720	7	0.01	350	224	0.39	474	117	0.20	2	2	2	tier3	shared	0
13	90202612	91404611	C	A	759	12	0.02	411	288	0.41	595	129	0.18	2	2	2	tier3	shared	0
13	91834507	93036506	C	T	655	1	0.00	374	1	0.00	363	96	0.21	2	2	2	tier2	relapse-specific	0
13	92652556	93854555	G	A	814	10	0.01	377	298	0.44	590	139	0.19	2	2	2	tier3	shared	0
13	93181483	94383482	C	A	794	20	0.02	406	295	0.42	491	100	0.17	2	2	2	tier3	shared	0
13	94151983	95353982	C	T	450	7	0.02	259	192	0.43	320	80	0.20	2	2	2	tier3	shared	0
14	101930188	102860435	T	C	705	11	0.02	356	312	0.47	430	115	0.21	2	2	2	tier3	shared	0
14	23103149	24033309	C	T	928	19	0.02	397	347	0.47	479	133	0.22	2	2	2	tier1	shared	1
14	23754911	24685071	A	T	361	2	0.01	202	170	0.46	243	50	0.17	2	2	2	tier2	shared	0
14	24483450	25413610	C	T	493	2	0.00	183	156	0.46	352	68	0.16	2	2	2	tier3	shared	0

14	25426007	26356167	G	T	951	1	0.00	615	0	0.00	588	61	0.09	2	2	2	tier3	relapse-specific	1
14	26041535	26971695	A	T	561	4	0.01	176	117	0.40	408	84	0.17	2	2	2	tier3	shared	0
14	26444248	27374408	G	A	645	12	0.02	226	195	0.46	457	113	0.20	2	2	2	tier2	shared	0
14	27399693	28329853	T	C	515	5	0.01	189	149	0.44	297	83	0.22	2	2	2	tier3	shared	1
14	31466328	32396577	C	T	934	13	0.01	310	278	0.47	551	149	0.21	2	2	2	tier3	shared	1
14	35171105	36101354	G	T	623	4	0.01	168	75	0.31	441	76	0.15	2	2	2	tier3	shared	0
14	41798835	42729085	T	-	735	9	0.01	282	277	0.50	530	118	0.18	2	2	2	tier2	shared	0
14	41858480	42788730	T	A	451	15	0.03	118	91	0.44	378	57	0.13	2	2	2	tier3	shared	0
14	42164751	43095001	C	A	734	12	0.02	278	218	0.44	465	142	0.23	2	2	2	tier3	shared	1
14	43834668	44764918	G	C	715	16	0.02	406	331	0.45	701	163	0.19	2	2	2	tier3	shared	1
14	46259586	47189836	C	T	866	12	0.01	444	97	0.18	489	111	0.19	2	2	2	tier3	shared	1
14	46505564	47435814	T	G	603	7	0.01	173	167	0.49	463	96	0.17	2	2	2	tier3	shared	0
14	47724853	48655103	A	T	678	2	0.00	170	149	0.47	350	87	0.20	2	2	2	tier3	shared	1
14	50821980	51752230	C	A	635	5	0.01	309	285	0.48	433	111	0.20	2	2	2	tier3	shared	0
14	56040270	56970517	G	A	697	5	0.01	385	101	0.21	728	1	0.00	2	2	2	tier2	tumor-specific	1
14	56054992	56985239	G	T	570	12	0.02	277	225	0.45	336	105	0.24	2	2	2	tier3	shared	1
14	56849033	57779280	A	-	361	10	0.03	158	77	0.33	307	55	0.15	2	2	2	tier3	shared	0
14	56931759	57862006	T	C	625	6	0.01	210	135	0.39	426	106	0.20	2	2	2	tier3	shared	0
14	57621356	58551603	G	T	780	8	0.01	290	203	0.41	448	92	0.17	2	2	2	tier3	shared	0
14	58145492	59075739	G	A	719	11	0.02	312	289	0.48	567	119	0.17	2	2	2	tier2	shared	0
14	60763542	61693789	G	A	974	17	0.02	441	357	0.45	723	199	0.22	2	2	2	tier3	shared	1
14	61210471	62140718	-	AC	884	7	0.01	281	235	0.46	554	129	0.19	2	2	2	tier3	shared	0
14	61307948	62238195	-	T	559	5	0.01	296	173	0.37	436	91	0.17	2	2	2	tier3	shared	0
14	62826386	63756633	T	-	470	19	0.04	166	110	0.40	355	71	0.17	2	2	2	tier3	shared	0
14	64839231	65769478	G	A	775	12	0.02	341	289	0.46	397	96	0.19	2	2	2	tier2	shared	0
14	66539860	67470107	A	C	892	4	0.00	442	133	0.23	665	0	0.00	2	2	2	tier3	tumor-specific	0
14	66927867	67858114	C	T	242	6	0.02	179	200	0.53	229	69	0.23	2	2	2	tier2	shared	0
14	68436121	69366368	C	A	764	17	0.02	397	405	0.50	455	118	0.21	2	2	2	tier3	shared	0
14	69100487	70030734	C	T	711	6	0.01	353	288	0.45	527	143	0.21	2	2	2	tier3	shared	0
14	76800837	77731084	G	A	509	9	0.02	318	232	0.42	399	98	0.20	2	2	2	tier3	shared	0
14	80562772	81493019	A	T	714	11	0.02	256	245	0.49	542	126	0.19	2	2	2	tier3	shared	0
14	84518986	85449233	A	T	758	6	0.01	263	265	0.50	459	108	0.19	2	2	2	tier3	shared	1
14	90435550	91365797	T	C	825	5	0.01	532	155	0.23	790	0	0.00	2	2	2	tier3	tumor-specific	0
14	94117856	95048103	G	A	802	14	0.02	371	273	0.42	408	102	0.20	2	2	2	tier3	shared	0
14	94135231	95065478	G	A	612	7	0.01	313	271	0.46	384	96	0.20	2	2	2	tier2	shared	0
14	95469007	96399254	G	A	625	8	0.01	286	200	0.41	439	101	0.19	2	2	2	tier3	shared	0
14	99829178	100759425	C	T	417	12	0.03	215	156	0.42	248	71	0.22	2	2	2	tier2	shared	0
15	22289408	24738315	C	T	492	8	0.02	247	227	0.48	292	64	0.18	2	2	2	tier3	shared	1
15	24601542	27050449	-	T	666	10	0.01	255	168	0.40	417	86	0.17	2	2	2	tier3	shared	0
15	25745853	28072258	G	A	582	13	0.02	290	225	0.44	337	90	0.21	2	2	2	tier3	shared	0

15	30165141	32377849	G	A	625	5	0.01	205	161	0.44	421	80	0.16	2	2	2	tier3	shared	0
15	35204470	37417178	A	G	710	18	0.02	231	169	0.42	393	100	0.20	2	2	2	tier2	shared	0
15	36231034	38443742	G	A	861	7	0.01	328	289	0.47	504	150	0.23	2	2	2	tier3	shared	1
15	36318140	38530848	C	T	818	12	0.01	405	309	0.43	600	149	0.20	2	2	2	tier3	shared	0
15	38135540	40348248	-	TCGGA	400	7	0.02	265	163	0.38	314	67	0.18	2	2	2	tier3	shared	0
15	39384117	41596825	C	T	797	4	0.00	522	108	0.17	557	129	0.19	2	2	2	tier3	shared	0
15	42095339	44308047	G	A	725	14	0.02	311	265	0.46	496	124	0.20	2	2	2	tier3	shared	0
15	43790262	46002970	G	A	745	16	0.02	342	328	0.49	506	119	0.19	2	2	2	tier3	shared	0
15	52741139	54953847	G	A	881	6	0.01	311	269	0.46	597	145	0.20	2	2	2	tier3	shared	0
15	55623697	57836405	C	A	931	7	0.01	476	380	0.44	671	155	0.19	2	2	2	tier3	shared	0
15	61187432	63400379	C	A	610	9	0.01	301	312	0.51	432	111	0.20	2	2	2	tier3	shared	0
15	64063387	66276333	G	A	509	7	0.01	393	314	0.44	440	102	0.19	2	2	2	tier3	shared	1
15	65829689	68042635	G	T	956	20	0.02	420	347	0.45	734	147	0.17	2	2	2	tier3	shared	0
15	69291325	71504271	G	A	531	5	0.01	253	208	0.45	395	77	0.16	2	2	2	tier3	shared	0
15	77461201	79674146	G	A	844	17	0.02	380	323	0.46	557	151	0.21	2	2	2	tier3	shared	1
15	81157623	83360569	C	T	796	13	0.02	323	309	0.49	462	104	0.18	2	2	2	tier2	shared	0
15	84614905	86813901	G	A	917	19	0.02	404	313	0.44	621	144	0.19	2	2	2	tier3	shared	1
15	84729981	86928977	G	T	806	12	0.01	322	285	0.47	448	110	0.20	2	2	2	tier3	shared	1
15	85034844	87233840	C	G	656	2	0.00	259	196	0.43	352	92	0.21	2	2	2	tier3	shared	1
15	85796054	87995050	C	T	835	2	0.00	313	254	0.45	510	112	0.18	2	2	2	tier3	shared	0
15	91229444	93428440	A	C	394	3	0.01	115	118	0.51	283	81	0.22	2	2	2	tier3	shared	0
15	93352910	95551906	-	T	1026	9	0.01	348	277	0.44	515	124	0.19	2	2	2	tier3	shared	1
15	93668521	95867517	G	A	624	4	0.01	281	199	0.41	484	113	0.19	2	2	2	tier2	shared	0
15	94242177	96441173	C	T	997	10	0.01	403	367	0.48	581	144	0.20	2	2	2	tier3	shared	1
15	95463316	97662312	A	G	677	9	0.01	357	260	0.42	500	119	0.19	2	2	2	tier3	shared	0
15	95607153	97806149	C	T	876	11	0.01	296	275	0.48	487	149	0.23	2	2	2	tier3	shared	1
15	97094563	99277040	C	T	530	11	0.02	281	239	0.46	458	106	0.19	2	2	2	tier2	shared	0
15	98695666	100878143	C	A	1059	4	0.00	406	338	0.45	647	163	0.20	2	2	2	tier3	shared	1
16	10162241	10254740	C	T	644	19	0.03	41	466	0.92	318	211	0.40	2	2	2	tier3	shared	0
16	1056286	1116285	T	A	141	5	0.03	22	182	0.89	89	75	0.46	2	1.28	1.34	tier2	shared	0
16	13958122	14050621	TAG	-	150	149	0.50	286	12	0.04	187	83	0.31	2	2	2	tier3	shared	0
16	25864554	25957053	C	T	883	27	0.03	72	642	0.90	430	289	0.40	2	2	2	tier3	shared	0
16	27978208	28070707	C	T	181	2	0.01	34	167	0.83	97	55	0.36	2	2	2	tier3	shared	0
16	34278798	34421297	C	G	746	6	0.01	258	196	0.43	336	96	0.22	2	2	2	tier3	shared	0
16	34581303	34723802	C	A	1486	9	0.01	723	230	0.24	816	92	0.10	2	3.92	3.86	tier1	shared	0
16	34841397	34983896	T	G	454	4	0.01	182	153	0.46	251	54	0.18	2	2	2	tier3	shared	0
16	4275072	4335071	T	C	756	26	0.03	73	675	0.90	284	184	0.39	2	2	2	tier3	shared	0
16	51059044	52501543	G	T	768	5	0.01	248	220	0.47	430	114	0.21	2	2	2	tier3	shared	1
16	51123481	52565980	C	T	674	8	0.01	288	225	0.44	394	124	0.24	2	2	2	tier3	shared	1
16	52994187	54436686	G	A	761	5	0.01	562	136	0.19	508	138	0.21	2	2	2	tier3	shared	1

16	53962618	55405117	G	A	337	7	0.02	150	123	0.45	207	68	0.25	2	2	2	tier3	shared	0
16	57529049	58971548	G	A	729	11	0.01	325	263	0.45	534	118	0.18	2	2	2	tier3	shared	1
16	60412783	61855282	C	G	862	7	0.01	277	219	0.44	585	143	0.20	2	2	2	tier3	shared	1
16	60907206	62349705	G	A	743	19	0.02	294	253	0.46	451	95	0.17	2	2	2	tier2	shared	0
16	61642452	63084951	G	T	879	8	0.01	333	268	0.45	456	118	0.21	2	2	2	tier2	shared	1
16	62479403	63921902	G	C	579	8	0.01	215	205	0.49	366	91	0.20	2	2	2	tier3	shared	1
16	62712754	64155253	T	A	679	10	0.01	261	239	0.48	457	106	0.19	2	2	2	tier3	shared	1
16	62829263	64271762	A	T	1109	9	0.01	742	229	0.24	977	0	0.00	2	2	2	tier3	tumor-specific	1
16	63209502	64652001	G	T	775	13	0.02	325	251	0.44	463	113	0.20	2	2	2	tier2	shared	1
16	65770615	67213114	C	T	481	10	0.02	244	176	0.42	268	84	0.24	2	2	2	tier3	shared	0
16	66217970	67660469	C	T	754	11	0.01	431	349	0.45	485	141	0.23	2	2	2	tier1	shared	2
16	6727010	6787009	G	A	614	10	0.02	59	522	0.90	252	188	0.43	2	2	2	tier3	shared	0
16	7071479	7131478	G	T	626	19	0.03	75	422	0.85	343	206	0.38	2	2	2	tier2	shared	0
16	72877051	74319550	C	T	736	6	0.01	346	277	0.44	541	141	0.21	2	2	2	tier3	shared	0
16	74089247	75531746	G	T	548	7	0.01	225	211	0.48	342	101	0.23	2	2	2	tier3	shared	2
16	76733310	78175809	G	A	381	8	0.02	104	108	0.51	348	92	0.21	2	2	2	tier2	shared	0
16	78153399	79595898	C	A	950	9	0.01	430	345	0.45	527	129	0.20	2	2	2	tier3	shared	0
16	7907101	7967100	G	A	779	12	0.02	45	523	0.92	279	193	0.41	2	2	2	tier3	shared	0
16	79588713	81031212	A	G	727	0	0.00	520	0	0.00	455	110	0.19	2	2	2	tier3	relapse-specific	0
16	82546470	83988969	G	A	316	3	0.01	213	159	0.43	217	39	0.15	2	2	2	tier3	shared	0
16	84885805	86328304	C	T	779	8	0.01	460	370	0.45	581	157	0.21	2	2	2	tier2	shared	0
16	85959576	87402075	G	A	651	12	0.02	397	276	0.41	465	115	0.20	2	2	2	tier2	shared	0
17	13252186	13311461	-	C	656	2	0.00	357	238	0.40	509	129	0.20	2	2	2	tier2	shared	1
17	14981214	15040489	T	G	510	6	0.01	486	93	0.16	438	104	0.19	2	2	2	tier2	shared	1
17	16285101	16344376	C	T	762	11	0.01	389	287	0.42	507	150	0.23	2	2	2	tier3	shared	0
17	17227878	17287153	G	A	163	2	0.01	63	76	0.55	85	41	0.33	2	2	2	tier1	shared	0
17	18173889	18233164	G	A	543	4	0.01	238	242	0.50	435	118	0.21	2	2	2	tier3	shared	0
17	18225292	18284567	C	T	442	7	0.02	236	194	0.45	273	64	0.19	2	2	2	tier3	shared	0
17	19562643	19622051	C	T	401	9	0.02	231	196	0.46	258	79	0.23	2	2	2	tier3	shared	0
17	20787873	20847281	C	T	757	8	0.01	289	254	0.47	395	90	0.19	2	2	2	tier3	shared	0
17	21861423	21937296	G	T	690	9	0.01	252	200	0.44	351	75	0.18	2	2	2	tier3	shared	0
17	25062077	28037951	C	T	453	5	0.01	284	226	0.44	351	91	0.21	2	2	2	tier3	shared	0
17	26587107	29562981	C	T	638	10	0.02	41	266	0.87	372	123	0.25	2	1.04	2	tier1	shared	3
17	27317311	30293198	G	A	389	7	0.02	10	86	0.90	228	46	0.17	2	1.04	1.23	tier1	shared	2
17	29638693	32614580	A	T	677	10	0.01	281	254	0.47	405	120	0.23	2	2	2	tier3	shared	1
17	35203222	37949696	G	A	978	18	0.02	455	421	0.48	640	172	0.21	2	2	2	tier3	shared	1
17	35336721	38083195	C	G	514	4	0.01	323	218	0.40	340	86	0.20	2	2	2	tier2	shared	0
17	36960500	39706974	T	A	786	9	0.01	368	275	0.43	506	120	0.19	2	2	2	tier3	shared	2
17	38492196	41238670	G	C	944	12	0.01	375	297	0.44	622	125	0.17	2	2	2	tier3	shared	0
17	41464770	44108923	C	T	207	7	0.03	100	67	0.40	132	33	0.20	2	2	2	tier1	shared	2

17	44156725	46801726	G	T	379	5	0.01	162	137	0.46	207	48	0.19	2	2	2	tier1	shared	1
17	45903937	48548938	C	T	555	10	0.02	309	259	0.46	335	96	0.22	2	2	2	tier3	shared	1
17	52504691	55149692	C	T	659	10	0.01	421	84	0.17	380	117	0.24	2	2	2	tier3	shared	0
17	53937533	56582534	-	GGTCAG	783	7	0.01	664	116	0.15	483	89	0.16	2	2	2	tier3	shared	0
17	55365250	58010468	A	T	544	7	0.01	249	201	0.45	374	97	0.21	2	2	2	tier3	shared	0
17	56755423	59400641	T	C	560	11	0.02	232	179	0.44	435	105	0.19	2	2	2	tier3	shared	0
17	5746607	5805883	C	T	521	11	0.02	314	272	0.46	318	89	0.22	2	2	2	tier3	shared	1
17	65996414	68484819	T	A	558	4	0.01	254	234	0.48	483	118	0.20	2	2	2	tier3	shared	1
17	66124108	68612513	G	T	865	9	0.01	308	283	0.48	522	145	0.22	2	2	2	tier3	shared	1
17	67097763	69586168	A	C	639	5	0.01	272	252	0.48	441	111	0.20	2	2	2	tier3	shared	0
17	67400601	69889006	C	T	872	5	0.01	402	337	0.46	526	147	0.22	2	2	2	tier2	shared	1
17	67884705	70373110	A	-	405	33	0.08	161	142	0.47	212	72	0.25	2	2	2	tier2	shared	0
17	72195638	74684043	C	T	201	1	0.00	152	100	0.40	208	34	0.14	2	2	2	tier3	shared	0
17	72401240	74889645	G	A	485	4	0.01	387	93	0.19	326	83	0.20	2	2	2	tier3	shared	1
17	74668164	77156569	C	T	344	9	0.03	251	182	0.42	292	58	0.17	2	2	2	tier2	shared	0
17	76214324	78599729	G	A	377	4	0.01	173	130	0.43	396	86	0.18	2	2	2	tier3	shared	0
17	78575203	80981914	A	T	708	14	0.02	349	350	0.50	429	134	0.24	2	2	2	tier3	shared	0
18	10252033	10262033	T	C	754	8	0.01	345	294	0.46	435	115	0.21	2	2	2	tier3	shared	1
18	11156222	11166222	G	A	598	7	0.01	314	275	0.47	429	127	0.23	2	2	2	tier3	shared	1
18	14588945	14598945	C	A	670	8	0.01	240	157	0.40	341	71	0.17	2	1.09	1.26	tier3	shared	0
18	18267507	20013509	G	A	729	12	0.02	228	199	0.47	398	100	0.20	2	2	2	tier3	shared	0
18	18370824	20116826	C	T	648	9	0.01	326	259	0.44	434	136	0.24	2	2	2	tier2	shared	1
18	23487973	25233975	C	T	730	15	0.02	263	221	0.46	491	137	0.22	2	2	2	tier3	shared	1
18	23513588	25259590	C	G	877	10	0.01	386	357	0.48	636	157	0.20	2	2	2	tier3	shared	1
18	26146117	27892119	-	A	467	4	0.01	131	99	0.43	325	69	0.18	2	2	2	tier3	shared	1
18	26875514	28621516	G	A	507	8	0.02	247	219	0.47	305	93	0.23	2	2	2	tier2	shared	0
18	28716219	30462221	G	A	954	9	0.01	321	242	0.43	616	163	0.21	2	2	2	tier3	shared	1
18	32301437	34047439	C	T	400	3	0.01	266	197	0.43	333	91	0.21	2	2	2	tier3	shared	0
18	33019829	34765831	G	A	400	4	0.01	120	83	0.41	271	54	0.17	2	2	2	tier3	shared	0
18	33422881	35168883	T	-	190	6	0.03	99	49	0.33	195	42	0.18	2	2	2	tier2	shared	0
18	36688146	38434148	C	T	662	15	0.02	323	266	0.45	513	141	0.22	2	2	2	tier3	shared	1
18	368469	378469	C	T	577	7	0.01	278	258	0.48	299	89	0.23	2	2	2	tier3	shared	0
18	40600060	42346062	-	GT	490	12	0.02	305	185	0.38	352	59	0.14	2	2	2	tier3	shared	1
18	44059580	45805582	G	A	756	14	0.02	311	274	0.47	416	102	0.20	2	2	2	tier3	shared	0
18	46473871	48219873	C	T	844	2	0.00	359	293	0.45	533	135	0.20	2	2	2	tier3	shared	0
18	51548336	53397338	G	A	516	6	0.01	278	275	0.50	412	87	0.17	2	2	2	tier3	shared	1
18	53088803	54937805	G	A	878	14	0.02	368	349	0.49	680	154	0.18	2	2	2	tier3	shared	0
18	56979477	58828497	C	T	699	16	0.02	404	359	0.47	522	119	0.19	2	2	2	tier3	shared	1
18	59684865	61533885	G	A	651	8	0.01	290	233	0.45	459	131	0.22	2	2	2	tier3	shared	0
18	59945136	61794156	C	T	639	8	0.01	316	71	0.18	493	92	0.16	2	2	2	tier2	shared	0

18	63759016	65608036	G	A	596	2	0.00	253	187	0.43	381	95	0.20	2	2	2	tier3	shared	1
18	64227606	66076626	T	-	481	22	0.04	165	121	0.42	308	76	0.20	2	2	2	tier3	shared	1
18	64854142	66703162	G	A	717	9	0.01	271	214	0.44	441	104	0.19	2	2	2	tier3	shared	1
18	6593666	6603666	C	T	553	1	0.00	491	0	0.00	365	95	0.21	2	2	2	tier3	relapse-specific	0
18	66639122	68488142	T	C	435	1	0.00	181	79	0.30	390	0	0.00	2	2	2	tier3	tumor-specific	1
18	71942227	73813239	G	A	799	8	0.01	288	231	0.45	484	141	0.23	2	2	2	tier3	shared	1
18	73098218	74969230	T	-	542	43	0.07	194	177	0.48	346	89	0.20	2	2	2	tier3	shared	0
18	73166661	75037673	G	A	683	5	0.01	271	254	0.48	438	78	0.15	2	2	2	tier3	shared	1
18	73498391	75369403	G	A	692	9	0.01	288	264	0.48	457	109	0.19	2	2	2	tier3	shared	1
18	8803690	8813690	G	A	718	5	0.01	297	230	0.44	370	93	0.20	2	2	2	tier3	shared	1
19	10770237	10909237	-	GCCATCGT	457	5	0.01	246	147	0.37	269	55	0.17	2	2	2	tier1	shared	0
19	1339089	1388089	G	A	409	0	0.00	337	0	0.00	242	55	0.19	2	2	2	tier3	relapse-specific	0
19	16858458	16997458	G	C	468	14	0.03	339	237	0.41	497	109	0.18	2	2	2	tier3	shared	0
19	18858533	18997533	G	A	352	4	0.01	202	107	0.35	206	37	0.15	2	2	2	tier2	shared	0
19	19511501	19650501	C	T	434	13	0.03	211	153	0.42	276	79	0.22	2	2	2	tier1	shared	1
19	33034534	28342694	C	T	605	9	0.01	286	217	0.43	371	97	0.21	2	2	2	tier3	shared	0
19	34625104	29933264	C	T	352	3	0.01	224	162	0.42	223	80	0.26	2	2	2	tier3	shared	0
19	35677114	30985274	G	A	637	7	0.01	352	304	0.46	408	107	0.21	2	2	2	tier3	shared	0
19	35924138	31232298	G	A	848	12	0.01	339	297	0.47	576	132	0.19	2	2	2	tier3	shared	1
19	37239780	32547940	G	A	560	3	0.01	331	274	0.45	403	100	0.20	2	2	2	tier3	shared	1
19	37745682	33053842	-	T	584	12	0.02	143	145	0.50	429	112	0.21	2	2	2	tier3	shared	0
19	37855446	33163606	G	A	446	5	0.01	232	205	0.47	322	80	0.20	2	2	2	tier2	shared	1
19	38636663	33944823	C	T	652	9	0.01	370	340	0.48	566	169	0.23	2	2	2	tier3	shared	0
19	39063795	34371955	C	T	340	4	0.01	133	130	0.49	221	70	0.24	2	2	2	tier3	shared	0
19	40534990	35843150	G	A	328	3	0.01	167	148	0.47	200	43	0.18	2	2	2	tier1	shared	1
19	40611308	35919468	C	T	408	4	0.01	175	92	0.34	313	69	0.18	2	2	2	tier3	shared	0
19	42941321	38249481	A	T	508	1	0.00	204	62	0.23	506	0	0.00	2	2	2	tier3	tumor-specific	0
19	44661403	39969563	G	C	339	2	0.01	221	75	0.25	521	1	0.00	2	2	2	tier2	tumor-specific	0
19	47108048	42416208	C	T	769	10	0.01	409	329	0.45	386	92	0.19	2	2	2	tier2	shared	0
19	53413830	48722018	C	A	541	8	0.01	362	65	0.15	315	69	0.18	2	2	2	tier3	shared	0
19	55857216	51165404	C	T	660	7	0.01	336	259	0.44	381	81	0.18	2	2	2	tier1	shared	2
19	5773127	5822127	G	A	381	5	0.01	136	156	0.53	177	53	0.23	2	2	2	tier3	shared	1
19	57830425	53138613	G	A	308	8	0.03	142	142	0.50	193	46	0.19	2	2	2	tier3	shared	0
19	58432183	53740371	G	T	555	5	0.01	223	150	0.40	335	61	0.15	2	2	2	tier1	shared	1
19	58999238	54307426	C	T	466	12	0.03	247	192	0.44	366	92	0.20	2	2	2	tier3	shared	0
19	60555201	55863389	G	A	436	4	0.01	529	91	0.15	309	64	0.17	2	2	2	tier2	shared	0
19	62068178	57376366	C	T	411	6	0.01	230	158	0.41	313	64	0.17	2	2	2	tier2	shared	0
19	63216065	58524253	G	A	510	12	0.02	264	257	0.49	276	70	0.20	2	2	2	tier3	shared	0
2	100951891	101585459	G	A	389	5	0.01	149	151	0.50	331	75	0.18	2	2	2	tier3	shared	1
2	100974121	101607689	C	T	337	7	0.02	202	161	0.44	248	60	0.19	2	2	2	tier2	shared	1

2	101352567	101986135	G	A	1012	8	0.01	527	298	0.36	681	128	0.16	2	2	2	tier3	shared	0
2	101644202	102277770	A	G	250	3	0.01	89	79	0.47	180	34	0.16	2	2	2	tier2	shared	0
2	102946459	103580027	C	A	582	7	0.01	277	190	0.41	413	89	0.18	2	2	2	tier3	shared	1
2	103732160	104365728	G	T	742	8	0.01	224	219	0.49	427	94	0.18	2	2	2	tier3	shared	1
2	105927416	106560984	C	T	479	6	0.01	141	121	0.46	332	87	0.21	2	2	2	tier3	shared	0
2	108976530	109610098	G	A	725	5	0.01	416	357	0.46	547	156	0.22	2	2	2	tier3	shared	0
2	115898068	116181598	C	T	850	9	0.01	332	251	0.43	573	132	0.19	2	2	2	tier3	shared	0
2	116417004	116700534	C	T	626	9	0.01	308	280	0.48	497	124	0.20	2	2	2	tier3	shared	1
2	116686644	116970174	G	A	766	11	0.01	282	266	0.49	582	135	0.19	2	2	2	tier3	shared	1
2	116976596	117260126	G	T	462	10	0.02	179	111	0.38	389	107	0.22	2	2	2	tier3	shared	1
2	118458	128458	G	A	476	9	0.02	235	227	0.49	307	81	0.21	2	2	2	tier3	shared	0
2	118763902	119047432	G	A	760	7	0.01	412	81	0.16	493	116	0.19	2	2	2	tier3	shared	1
2	125273710	125557240	T	C	663	10	0.01	286	236	0.45	410	120	0.23	2	2	2	tier3	shared	2
2	131501602	131785132	C	T	949	12	0.01	363	307	0.46	530	133	0.20	2	2	2	tier3	shared	0
2	133304226	133587756	C	A	766	11	0.01	277	254	0.48	446	108	0.19	2	2	2	tier3	shared	1
2	138462489	138746019	-	G	656	9	0.01	312	243	0.44	417	99	0.19	2	2	2	tier3	shared	0
2	141704189	141987719	C	T	885	9	0.01	309	262	0.46	521	143	0.22	2	2	2	tier3	shared	4
2	14371539	14454088	C	T	834	7	0.01	329	274	0.45	552	113	0.17	2	2	2	tier3	shared	0
2	144039224	144322754	-	GGCGGCGA CCCGCCG	411	3	0.01	186	59	0.24	430	37	0.08	2	2	2	tier3	shared	0
2	147777631	148061161	T	A	541	0	0.00	298	0	0.00	350	120	0.26	2	2	2	tier3	relapse-specific	0
2	148426126	148709656	G	A	568	6	0.01	175	113	0.39	359	82	0.19	2	2	2	tier3	shared	0
2	151102056	151393810	A	G	482	8	0.02	114	92	0.45	316	59	0.16	2	2	2	tier3	shared	0
2	156266038	156557792	T	C	423	3	0.01	254	104	0.29	398	73	0.15	2	2	2	tier3	shared	1
2	157000487	157292241	C	T	161	4	0.02	96	86	0.47	145	30	0.17	2	2	2	tier2	shared	2
2	157144907	157436661	A	T	237	0	0.00	105	96	0.48	186	45	0.19	2	2	2	tier3	shared	2
2	158726162	159017916	C	T	676	7	0.01	357	273	0.43	511	109	0.18	2	2	2	tier3	shared	0
2	1684403	1705396	C	T	208	4	0.02	92	114	0.55	149	34	0.19	2	2	2	tier3	shared	0
2	169488496	169780250	G	A	813	10	0.01	324	287	0.47	408	114	0.22	2	2	2	tier1	shared	1
2	170014135	170305889	C	T	740	7	0.01	258	180	0.41	466	104	0.18	2	2	2	tier3	shared	0
2	172895156	173186910	-	CCCCAGAGA	943	11	0.01	322	227	0.41	495	103	0.17	2	2	2	tier2	shared	1
2	174437766	174729520	G	A	917	9	0.01	470	406	0.46	536	175	0.25	2	2	2	tier2	shared	0
2	177304022	177595776	C	T	885	5	0.01	312	276	0.47	568	113	0.17	2	2	2	tier3	shared	0
2	177922539	178214293	-	GA	479	9	0.02	482	260	0.35	256	33	0.11	2	2	2	tier2	shared	0
2	178772824	179064578	A	-	660	11	0.02	236	172	0.42	409	86	0.17	2	2	2	tier3	shared	0
2	178850982	179142736	C	T	783	9	0.01	453	360	0.44	537	135	0.20	2	2	2	tier3	shared	0
2	179181002	179472757	-	GAC	844	6	0.01	512	127	0.20	667	62	0.09	2	2	2	tier1	shared	12
2	183591905	183883660	G	A	506	5	0.01	217	180	0.45	484	119	0.20	2	2	2	tier3	shared	0
2	184617885	184909640	C	T	689	11	0.02	288	223	0.44	474	104	0.18	2	2	2	tier3	shared	1
2	18529058	18665577	-	A	217	3	0.01	81	46	0.36	229	50	0.18	2	2	2	tier3	shared	1
2	185768090	186059845	A	G	704	18	0.02	246	205	0.45	561	148	0.21	2	2	2	tier3	shared	1

2	186405735	186697490	G	A	448	2	0.00	145	78	0.35	311	73	0.19	2	2	2	tier3	shared	0
2	188554119	188845874	G	A	267	3	0.01	84	66	0.44	251	48	0.16	2	2	2	tier3	shared	1
2	189640171	189931926	G	A	488	15	0.03	150	98	0.40	412	97	0.19	2	2	2	tier3	shared	0
2	190632484	190924239	T	C	341	2	0.01	151	141	0.48	414	98	0.19	2	2	2	tier3	shared	0
2	193034189	193325944	A	-	417	29	0.07	139	110	0.44	275	83	0.23	2	2	2	tier3	shared	1
2	19391113	19527632	G	A	993	12	0.01	456	327	0.42	609	168	0.22	2	2	2	tier3	shared	0
2	204365567	204657322	T	C	727	9	0.01	292	242	0.45	415	100	0.19	2	2	2	tier3	shared	0
2	206131128	206422883	C	A	773	9	0.01	365	253	0.41	429	106	0.20	2	2	2	tier3	shared	0
2	206152603	206444358	G	A	599	8	0.01	246	219	0.47	398	105	0.21	2	2	2	tier2	shared	0
2	206976570	207268325	-	T	338	9	0.03	135	94	0.41	228	42	0.16	2	2	2	tier3	shared	0
2	208047027	208338782	-	TT	625	8	0.01	227	173	0.43	351	93	0.21	2	2	2	tier3	shared	1
2	209526236	209817991	C	T	546	12	0.02	265	196	0.43	559	132	0.19	2	2	2	tier3	shared	0
2	211114327	211406082	G	A	687	13	0.02	275	231	0.46	416	97	0.19	2	2	2	tier2	shared	0
2	211283939	211575694	C	T	640	5	0.01	249	191	0.43	373	95	0.20	2	2	2	tier3	shared	0
2	21462746	21609241	T	G	868	10	0.01	359	321	0.47	606	145	0.19	2	2	2	tier3	shared	1
2	222406435	222698191	G	A	521	3	0.01	323	65	0.17	315	85	0.21	2	2	2	tier2	shared	1
2	227762967	228054723	C	T	918	17	0.02	415	350	0.46	601	138	0.19	2	2	2	tier3	shared	1
2	23233620	23380115	C	A	866	12	0.01	266	237	0.47	561	150	0.21	2	2	2	tier2	shared	1
2	234326238	234661499	A	T	791	3	0.00	606	124	0.17	589	122	0.17	2	2	2	tier3	shared	0
2	236198765	236534026	G	A	570	15	0.03	329	258	0.44	433	103	0.19	2	2	2	tier2	shared	0
2	237129575	237464836	A	G	337	3	0.01	199	166	0.45	256	63	0.20	2	2	2	tier3	shared	0
2	239464461	239799524	G	A	798	11	0.01	356	330	0.48	554	135	0.20	2	2	2	tier3	shared	0
2	240260571	240595634	G	A	569	5	0.01	282	231	0.45	369	85	0.19	2	2	2	tier3	shared	0
2	28074844	28221340	-	T	510	12	0.02	119	75	0.39	311	80	0.20	2	2	2	tier3	shared	0
2	28786413	28932909	TAATTAA	-	526	3	0.01	232	216	0.48	321	71	0.18	2	2	2	tier3	shared	0
2	2895021	2916014	C	T	548	6	0.01	243	199	0.45	308	59	0.16	2	2	2	tier2	shared	1
2	34022984	34169480	T	-	597	23	0.04	392	273	0.41	535	158	0.23	2	2	2	tier3	shared	1
2	34651077	34797573	T	-	612	6	0.01	210	136	0.39	516	121	0.19	2	2	2	tier3	shared	1
2	35718525	35865021	G	A	836	13	0.02	377	221	0.37	587	118	0.17	2	2	2	tier3	shared	1
2	3703521	3725646	G	A	644	14	0.02	324	257	0.44	427	101	0.19	2	2	2	tier2	shared	2
2	39034368	39180864	A	T	1025	4	0.00	626	178	0.22	703	0	0.00	2	2	2	tier3	tumor-specific	0
2	43770990	43917486	T	-	313	25	0.07	240	48	0.17	249	62	0.20	2	2	2	tier3	shared	0
2	44812014	44958510	C	G	531	8	0.01	265	188	0.42	339	78	0.19	2	2	2	tier3	shared	1
2	4534542	4556667	G	T	714	10	0.01	355	333	0.48	542	108	0.17	2	2	2	tier3	shared	0
2	47676114	47822610	C	A	413	9	0.02	208	163	0.44	327	67	0.17	2	2	2	tier3	shared	0
2	4835095	4857220	G	T	445	4	0.01	144	82	0.36	270	70	0.21	2	2	2	tier3	shared	0
2	49557457	49703953	G	A	491	2	0.00	120	68	0.36	282	70	0.20	2	2	2	tier3	shared	1
2	50905412	51051908	G	C	614	6	0.01	302	266	0.47	537	149	0.22	2	2	2	tier3	shared	1
2	52327615	52474111	C	A	476	9	0.02	131	122	0.48	400	117	0.23	2	2	2	tier2	shared	1
2	5486989	5569538	C	T	944	12	0.01	375	309	0.45	660	151	0.19	2	2	2	tier3	shared	1



2	5650617	5733166	A	-	460	18	0.04	139	101	0.42	260	61	0.19	2	2	2	tier3	shared	1
2	57449163	57595659	T	C	508	8	0.02	256	208	0.45	462	114	0.20	2	2	2	tier3	shared	1
2	59650870	59797366	T	A	367	5	0.01	185	148	0.44	277	81	0.23	2	2	2	tier2	shared	0
2	66396484	66542980	C	A	587	13	0.02	280	215	0.43	422	94	0.18	2	2	2	tier3	shared	0
2	67805940	67952436	G	A	815	14	0.02	347	225	0.39	532	134	0.20	2	2	2	tier3	shared	1
2	68345908	68492404	C	T	783	6	0.01	364	255	0.41	521	117	0.18	2	2	2	tier3	shared	0
2	7081077	7163626	A	G	720	11	0.02	322	290	0.47	550	135	0.20	2	2	2	tier3	shared	0
2	72405888	72552380	A	G	844	15	0.02	372	334	0.47	676	146	0.18	2	2	2	tier3	shared	0
2	74498548	74645040	G	A	210	5	0.02	122	96	0.44	173	0	0.00	2	2	2	tier3	tumor-specific	2
2	77783494	77929986	A	G	350	3	0.01	95	80	0.46	250	42	0.14	2	2	2	tier3	shared	0
2	77922371	78068863	A	T	622	8	0.01	219	177	0.45	411	107	0.21	2	2	2	tier2	shared	1
2	79831845	79978337	C	G	615	12	0.02	266	220	0.45	537	134	0.20	2	2	2	tier3	shared	1
2	80018562	80165051	C	A	633	10	0.02	243	176	0.42	401	102	0.20	2	2	2	tier3	shared	1
2	81196674	81343163	G	T	479	5	0.01	216	159	0.42	313	67	0.18	2	2	2	tier3	shared	1
2	82418827	82565316	A	G	670	10	0.01	263	234	0.47	487	103	0.17	2	2	2	tier3	shared	0
2	82787207	82933696	C	T	656	7	0.01	329	272	0.45	511	105	0.17	2	2	2	tier3	shared	1
2	84327755	84474244	G	A	771	10	0.01	368	392	0.52	654	160	0.20	2	2	2	tier3	shared	0
2	88836257	89055142	GAGTT	-	631	12	0.02	325	231	0.42	509	125	0.20	2	2	2	tier3	shared	0
2	94793322	95429595	C	A	88	1	0.01	61	54	0.47	62	23	0.27	2	2	2	tier3	shared	0
2	96121006	96757279	C	T	528	4	0.01	314	242	0.44	380	65	0.15	2	2	2	tier2	shared	0
2	963422	973422	C	T	798	7	0.01	428	337	0.44	445	115	0.21	2	2	2	tier3	shared	0
2	99819633	100453201	A	G	400	7	0.02	121	117	0.49	266	66	0.20	2	2	2	tier2	shared	0
20	11740319	11792319	T	C	439	3	0.01	140	129	0.48	291	93	0.24	2	2	2	tier3	shared	0
20	11897877	11949877	-	A	345	3	0.01	173	126	0.42	200	45	0.18	2	2	2	tier3	shared	0
20	13605323	13657323	A	C	612	13	0.02	208	214	0.51	418	103	0.20	2	2	2	tier3	shared	0
20	15227176	15279176	A	G	586	9	0.02	269	247	0.48	386	111	0.22	2	2	2	tier3	shared	0
20	15733935	15785935	C	T	631	10	0.02	278	185	0.40	378	96	0.20	2	2	2	tier3	shared	0
20	21076958	21128958	T	C	661	12	0.02	261	202	0.44	492	129	0.21	2	2	2	tier3	shared	0
20	21453856	21505856	A	T	973	7	0.01	449	415	0.48	665	155	0.19	2	2	2	tier3	shared	0
20	22441415	22493415	G	A	493	7	0.01	231	181	0.44	288	81	0.22	2	2	2	tier3	shared	1
20	24902759	24954759	G	A	768	11	0.01	295	242	0.45	507	133	0.21	2	2	2	tier3	shared	0
20	33485469	34022055	A	T	256	4	0.02	114	86	0.43	130	37	0.22	2	2	2	tier1	shared	0
20	3603624	3655624	-	G	221	4	0.02	202	149	0.42	264	57	0.18	2	2	2	tier3	shared	0
20	37978602	38545188	C	T	698	8	0.01	356	304	0.46	471	93	0.16	2	2	2	tier3	shared	0
20	4260112	4312112	C	A	510	17	0.03	298	286	0.49	423	126	0.23	2	2	2	tier3	shared	1
20	48432454	48999047	-	GGGCCAGAG	546	7	0.01	330	164	0.33	367	75	0.17	2	2	2	tier3	shared	0
20	50410533	50977126	G	A	642	5	0.01	292	233	0.44	408	115	0.22	2	2	2	tier3	shared	1
20	53981980	54548573	G	T	345	17	0.05	250	187	0.43	335	84	0.20	2	2	2	tier3	shared	0
20	5556509	5608509	C	T	851	14	0.02	413	321	0.44	498	134	0.21	2	2	2	tier3	shared	0
20	56588797	57155391	C	T	424	6	0.01	208	159	0.43	323	68	0.17	2	2	2	tier3	shared	0

20	57500227	58066832	C	T	662	10	0.01	362	284	0.44	480	113	0.19	2	2	2	tier3	shared	0
20	59147387	59713992	C	T	482	7	0.01	181	180	0.50	280	69	0.20	2	2	2	tier3	shared	1
20	59694017	60260622	G	A	648	12	0.02	341	246	0.42	350	99	0.22	2	2	2	tier3	shared	1
20	60494666	61061271	A	T	520	7	0.01	226	166	0.42	312	56	0.15	2	2	2	tier3	shared	0
20	61097191	61626746	C	T	582	8	0.01	341	271	0.44	434	83	0.16	2	2	2	tier3	shared	0
20	61196445	61726000	G	A	585	15	0.03	306	264	0.46	359	79	0.18	2	2	2	tier3	shared	0
20	842287	894287	G	A	968	11	0.01	486	487	0.50	548	154	0.22	2	2	2	tier3	shared	0
21	15397360	16475489	-	T	506	7	0.01	272	143	0.34	438	89	0.17	2	2	2	tier3	shared	0
21	16144190	17222319	C	T	299	4	0.01	83	60	0.42	281	67	0.19	2	2	2	tier3	shared	0
21	16338704	17416833	C	T	622	12	0.02	195	145	0.43	343	86	0.20	2	2	2	tier3	shared	0
21	19075723	20153852	A	G	563	10	0.02	268	244	0.48	332	78	0.19	2	2	2	tier3	shared	1
21	19352744	20430873	A	C	487	7	0.01	97	108	0.53	453	136	0.23	2	2	2	tier3	shared	1
21	21921868	22999997	A	C	768	15	0.02	322	251	0.44	464	117	0.20	2	2	2	tier3	shared	0
21	23932660	25010789	C	T	654	7	0.01	229	187	0.45	381	111	0.23	2	2	2	tier2	shared	1
21	24117139	25195268	C	A	698	9	0.01	279	206	0.42	468	118	0.20	2	2	2	tier3	shared	1
21	24167684	25245813	G	A	626	8	0.01	202	179	0.47	401	107	0.21	2	2	2	tier3	shared	1
21	24984752	26062881	C	A	461	3	0.01	102	69	0.40	288	57	0.17	2	2	2	tier3	shared	1
21	27892746	28970875	A	G	852	19	0.02	426	332	0.44	589	138	0.19	2	2	2	tier2	shared	1
21	30692169	31770298	C	T	692	0	0.00	611	0	0.00	548	116	0.17	2	2	2	tier3	relapse-specific	0
21	35174739	36252869	-	GGCTA	532	6	0.01	306	188	0.38	437	76	0.15	2	2	2	tier1	shared	16
21	35543051	36621181	A	G	616	11	0.02	320	237	0.43	328	109	0.25	2	2	2	tier2	shared	1
21	37017631	38095761	C	T	519	9	0.02	258	245	0.49	303	77	0.20	2	2	2	tier3	shared	0
21	37380897	38459027	T	A	790	9	0.01	402	322	0.44	497	129	0.21	2	2	2	tier3	shared	2
21	38837308	39915438	A	C	623	9	0.01	197	156	0.44	462	94	0.17	2	2	2	tier3	shared	0
21	44204493	45380065	G	A	783	9	0.01	481	428	0.47	563	159	0.22	2	2	2	tier3	shared	0
21	46795914	47971486	T	C	892	12	0.01	309	281	0.48	449	120	0.21	2	2	2	tier3	shared	1
22	18037304	19657304	G	A	604	8	0.01	277	227	0.45	495	100	0.17	2	2	2	tier3	shared	0
22	26058330	27728330	G	A	318	12	0.04	146	136	0.48	241	59	0.20	2	2	2	tier2	shared	1
22	27622622	29292622	C	A	798	13	0.02	309	287	0.48	533	129	0.19	2	2	2	tier3	shared	0
22	30654997	32324997	C	A	562	11	0.02	293	270	0.48	409	81	0.17	2	2	2	tier3	shared	0
22	31549562	33219562	G	A	734	14	0.02	354	270	0.43	446	120	0.21	2	2	2	tier3	shared	1
22	33807628	35477628	A	G	444	5	0.01	294	246	0.46	325	88	0.21	2	2	2	tier3	shared	0
22	37565854	39235908	T	G	707	7	0.01	283	207	0.42	394	79	0.17	2	2	2	tier3	shared	1
22	37566187	39236241	G	T	307	5	0.02	188	151	0.45	199	59	0.23	2	2	2	tier3	shared	1
22	38685367	40355421	C	T	246	5	0.02	149	185	0.55	171	66	0.28	2	2	2	tier3	shared	0
22	38693185	40363239	G	A	944	7	0.01	456	377	0.45	693	128	0.16	2	2	2	tier3	shared	0
22	40994686	42664742	-	A	1011	15	0.01	456	341	0.43	586	139	0.19	2	2	2	tier3	shared	0
22	43811533	45432869	C	T	809	13	0.02	396	337	0.46	616	105	0.15	2	2	2	tier3	shared	0
22	45357133	46978469	G	A	476	4	0.01	368	129	0.26	459	0	0.00	2	2	2	tier3	tumor-specific	1
22	47301588	48922924	G	A	398	10	0.02	228	181	0.44	315	77	0.20	2	2	2	tier3	shared	0

22	47525066	49139060	C	T	519	8	0.02	264	215	0.45	279	56	0.17	2	2	2	tier3	shared	0
3	10155644	10180644	G	A	716	6	0.01	286	213	0.43	563	131	0.19	2	2	2	tier3	shared	0
3	10231291	10256291	A	T	644	6	0.01	183	181	0.50	439	149	0.25	2	2	2	tier3	shared	0
3	10636309	10661309	C	T	474	10	0.02	285	189	0.40	300	68	0.18	2	2	2	tier2	shared	2
3	110985679	109502989	T	A	628	9	0.01	154	150	0.49	412	102	0.20	2	2	2	tier3	shared	1
3	111440867	109958177	A	G	701	10	0.01	259	201	0.44	466	110	0.19	2	2	2	tier3	shared	1
3	11182425	11207425	A	G	728	7	0.01	384	287	0.43	448	116	0.21	2	2	2	tier2	shared	0
3	112622545	111139855	C	T	691	9	0.01	236	184	0.44	395	100	0.20	2	2	2	tier3	shared	1
3	114733815	113251125	-	T	303	12	0.04	151	97	0.39	227	29	0.11	2	2	2	tier2	shared	0
3	1151817	1176817	G	T	574	7	0.01	256	255	0.50	483	120	0.20	2	2	2	tier2	shared	1
3	115862709	114380019	G	C	718	9	0.01	532	111	0.17	490	130	0.21	2	2	2	tier3	shared	0
3	116000742	114518052	G	C	1208	21	0.02	477	390	0.45	644	195	0.23	2	2	2	tier3	shared	0
3	117215291	115732601	A	G	499	4	0.01	198	157	0.44	425	93	0.18	2	2	2	tier3	shared	0
3	117925746	116443056	C	T	1096	18	0.02	362	361	0.50	662	178	0.21	2	2	2	tier3	shared	1
3	118376358	116893668	A	G	495	6	0.01	110	123	0.53	296	68	0.19	2	2	2	tier3	shared	1
3	119101366	117618676	G	A	538	10	0.02	204	176	0.46	397	93	0.19	2	2	2	tier3	shared	1
3	12178231	12203231	T	C	773	12	0.02	476	340	0.42	552	117	0.17	2	2	2	tier3	shared	0
3	125738237	124255547	G	A	573	10	0.02	228	199	0.47	465	134	0.22	2	2	2	tier3	shared	1
3	127261201	125778511	G	A	729	18	0.02	385	312	0.45	512	115	0.18	2	2	2	tier3	shared	0
3	130212164	128729474	C	T	290	1	0.00	231	72	0.24	291	0	0.00	2	2	2	tier3	tumor-specific	0
3	134126457	132643767	C	T	175	0	0.00	47	43	0.48	89	15	0.14	2	2	2	tier3	shared	1
3	141311794	139829104	C	T	812	7	0.01	358	312	0.47	733	166	0.18	2	2	2	tier3	shared	0
3	142302687	140819997	-	C	576	4	0.01	305	260	0.46	365	96	0.21	2	2	2	tier3	shared	0
3	149286574	147803884	G	T	547	2	0.00	95	49	0.34	358	82	0.19	2	2	2	tier3	shared	0
3	149292848	147810158	C	A	445	11	0.02	166	133	0.44	386	78	0.17	2	2	2	tier3	shared	0
3	1501179	1526179	A	T	720	11	0.02	273	215	0.44	456	116	0.20	2	2	2	tier3	shared	1
3	158822306	157339612	G	A	438	11	0.02	212	193	0.48	350	105	0.23	2	2	2	tier3	shared	0
3	159747211	158264517	C	T	964	10	0.01	364	327	0.47	619	147	0.19	2	2	2	tier3	shared	0
3	164377776	162895082	G	A	710	9	0.01	208	188	0.47	428	85	0.17	2	2	2	tier3	shared	0
3	164688095	163205401	T	G	516	7	0.01	142	131	0.48	350	92	0.21	2	2	2	tier3	shared	0
3	164995486	163512792	C	T	720	12	0.02	297	183	0.38	506	148	0.23	2	2	2	tier3	shared	1
3	167307898	165825204	G	A	646	11	0.02	210	168	0.44	388	91	0.19	2	2	2	tier3	shared	1
3	167420251	165937557	C	T	894	9	0.01	311	261	0.46	587	118	0.17	2	2	2	tier3	shared	0
3	167997880	166515186	T	G	205	6	0.03	49	47	0.49	105	33	0.24	2	2	2	tier3	shared	0
3	170003465	168520771	C	T	899	6	0.01	642	125	0.16	492	116	0.19	2	2	2	tier1	shared	0
3	170876894	169394200	C	A	872	8	0.01	342	291	0.46	526	113	0.18	2	2	2	tier3	shared	0
3	175311421	173828727	C	A	800	10	0.01	288	211	0.42	507	121	0.19	2	2	2	tier2	shared	0
3	177183210	175700516	C	T	614	5	0.01	192	131	0.41	339	83	0.20	2	2	2	tier3	shared	1
3	184874164	183391470	T	C	956	17	0.02	395	358	0.48	522	128	0.20	2	2	2	tier3	shared	0
3	186144885	184662191	C	T	585	14	0.02	272	233	0.46	389	92	0.19	2	2	2	tier3	shared	0

3	186776963	185294269	C	T	127	3	0.02	34	19	0.36	196	47	0.19	2	2	2	tier3	shared	0
3	187943981	186461287	A	T	939	9	0.01	424	294	0.41	612	177	0.22	2	2	2	tier3	shared	0
3	192086469	190603775	A	T	466	4	0.01	148	143	0.49	280	71	0.20	2	2	2	tier3	shared	0
3	192511916	191029222	C	T	673	11	0.02	308	268	0.47	403	87	0.18	2	2	2	tier3	shared	0
3	192676992	191194298	C	A	926	8	0.01	341	215	0.39	464	124	0.21	2	2	2	tier3	shared	0
3	193463531	191980837	A	G	470	6	0.01	158	144	0.48	345	75	0.18	2	2	2	tier3	shared	0
3	195575023	194093734	C	T	366	11	0.03	209	169	0.45	315	81	0.20	2	2	2	tier3	shared	1
3	2034970	2059970	G	A	727	1	0.00	472	72	0.13	419	107	0.20	2	2	2	tier3	shared	1
3	2078249	2103249	C	T	838	12	0.01	287	263	0.48	506	115	0.19	2	2	2	tier3	shared	0
3	21174762	21199758	-	A	555	10	0.02	252	221	0.47	421	105	0.20	2	2	2	tier3	shared	0
3	2244802	2269802	T	A	302	11	0.04	76	58	0.43	228	59	0.21	2	2	2	tier2	shared	0
3	25507680	25532676	G	A	408	9	0.02	152	135	0.47	331	68	0.17	2	2	2	tier3	shared	0
3	27052799	27077795	C	A	874	11	0.01	501	357	0.42	542	142	0.21	2	2	2	tier3	shared	1
3	2984885	3009885	T	G	808	16	0.02	357	277	0.44	477	118	0.20	2	2	2	tier3	shared	0
3	30365401	30390397	C	T	617	9	0.01	235	187	0.44	446	125	0.22	2	2	2	tier3	shared	0
3	36370530	36395526	G	A	671	8	0.01	327	237	0.42	528	143	0.21	2	2	2	tier3	shared	0
3	3679305	3704305	A	G	488	10	0.02	215	211	0.50	500	123	0.20	2	2	2	tier3	shared	0
3	38544147	38569143	C	T	574	8	0.01	313	253	0.45	484	117	0.19	2	2	2	tier3	shared	1
3	41780881	41805877	T	A	508	10	0.02	161	134	0.45	410	103	0.20	2	2	2	tier3	shared	1
3	45071520	45096516	T	A	934	13	0.01	289	274	0.49	530	131	0.20	2	2	2	tier3	shared	0
3	50268699	50293695	G	A	621	2	0.00	310	94	0.23	391	0	0.00	2	2	2	tier1	tumor-specific	1
3	51728562	51753522	T	A	496	5	0.01	223	157	0.41	357	104	0.23	2	2	2	tier2	shared	0
3	53895898	53920858	A	G	545	5	0.01	199	138	0.41	347	75	0.18	2	2	2	tier3	shared	0
3	55215807	55240767	A	G	596	6	0.01	244	184	0.43	423	93	0.18	2	2	2	tier3	shared	1
3	5767652	5792652	A	G	687	11	0.02	296	224	0.43	559	137	0.20	2	2	2	tier3	shared	1
3	64994383	65019343	G	C	563	8	0.01	291	214	0.42	473	113	0.19	2	2	2	tier2	shared	1
3	65900914	65925874	C	T	578	9	0.02	300	270	0.47	443	91	0.17	2	2	2	tier3	shared	2
3	76036604	75953914	G	T	621	6	0.01	192	112	0.37	389	97	0.20	2	2	2	tier3	shared	2
3	77331179	77248489	A	C	593	13	0.02	336	247	0.42	420	123	0.23	2	2	2	tier2	shared	2
3	77729580	77646890	G	T	772	4	0.01	240	175	0.42	454	89	0.16	2	2	2	tier3	shared	2
3	77854450	77771760	G	T	991	11	0.01	358	303	0.46	568	152	0.21	2	2	2	tier3	shared	1
3	78065897	77983207	A	G	494	8	0.02	221	167	0.43	375	70	0.16	2	2	2	tier3	shared	1
3	78833219	78750529	G	A	960	24	0.02	280	251	0.47	570	140	0.20	2	2	2	tier3	shared	0
3	79042227	78959537	C	T	577	6	0.01	194	163	0.46	384	81	0.17	2	2	2	tier3	shared	0
3	79977138	79894448	G	T	433	4	0.01	109	96	0.47	314	55	0.15	2	2	2	tier3	shared	1
3	80089414	80006724	C	A	160	5	0.03	84	74	0.47	136	38	0.22	2	2	2	tier2	shared	1
3	80218392	80135702	C	-	353	8	0.02	75	73	0.49	234	63	0.21	2	2	2	tier3	shared	1
3	80560540	80477850	T	G	562	11	0.02	161	172	0.52	457	119	0.21	2	2	2	tier3	shared	1
3	8069738	8094738	G	A	585	8	0.01	249	177	0.42	283	72	0.20	2	2	2	tier3	shared	1
3	80989228	80906538	T	A	458	7	0.02	92	88	0.49	322	89	0.22	2	2	2	tier3	shared	1

3	8111011	8136011	G	A	768	15	0.02	332	257	0.44	529	136	0.20	2	2	2	tier3	shared	1
3	82551753	82469063	G	A	577	10	0.02	196	119	0.38	479	118	0.20	2	2	2	tier3	shared	1
3	83059588	82976898	G	A	773	10	0.01	345	282	0.45	652	139	0.18	2	2	2	tier2	shared	1
3	85162026	85079336	C	T	601	2	0.00	433	100	0.19	389	104	0.21	2	2	2	tier3	shared	2
3	88866317	88783627	T	-	727	7	0.01	234	217	0.48	417	106	0.20	2	2	2	tier3	shared	1
3	89935385	89852695	G	A	685	9	0.01	204	134	0.40	509	135	0.21	2	2	2	tier3	shared	1
3	96666103	95183413	G	A	791	12	0.01	278	253	0.48	468	95	0.17	2	2	2	tier3	shared	1
3	96784077	95301387	T	C	751	9	0.01	254	218	0.46	512	131	0.20	2	2	2	tier2	shared	1
3	97215967	95733277	A	G	656	8	0.01	246	177	0.42	460	97	0.17	2	2	2	tier3	shared	1
3	9761731	9786731	T	C	492	8	0.02	282	223	0.44	355	82	0.19	2	2	2	tier1	shared	1
3	97893567	96410877	G	A	669	12	0.02	212	151	0.42	457	105	0.19	2	2	2	tier3	shared	0
3	98446452	96963762	T	A	450	6	0.01	203	41	0.17	342	90	0.21	2	2	2	tier3	shared	0
3	98606525	97123835	G	A	949	7	0.01	344	300	0.47	735	154	0.17	2	2	2	tier3	shared	0
4	106092739	105873290	T	-	383	16	0.04	90	86	0.49	368	104	0.22	2	2	2	tier3	shared	0
4	12084534	12475436	A	G	775	11	0.01	299	216	0.42	627	175	0.22	2	2	2	tier3	shared	1
4	120921013	120701565	T	G	812	4	0.00	365	235	0.39	566	146	0.21	2	2	2	tier3	shared	1
4	12107182	12498084	C	A	542	3	0.01	236	210	0.47	405	92	0.19	2	2	2	tier3	shared	1
4	121285570	121066122	G	A	821	15	0.02	367	301	0.45	567	174	0.23	2	2	2	tier3	shared	0
4	125600762	125381312	G	A	725	3	0.00	564	59	0.09	408	120	0.23	2	2	2	tier3	shared	0
4	126588250	126368800	C	T	470	9	0.02	137	93	0.40	300	69	0.19	2	2	2	tier3	shared	1
4	126893935	126674485	C	T	401	5	0.01	94	84	0.47	278	59	0.18	2	2	2	tier3	shared	1
4	127516900	127297450	C	A	694	10	0.01	295	263	0.47	438	144	0.25	2	2	2	tier2	shared	1
4	130454747	130235297	G	A	930	13	0.01	371	349	0.48	682	140	0.17	2	2	2	tier3	shared	1
4	130541766	130322316	C	T	709	3	0.00	449	79	0.15	519	138	0.21	2	2	2	tier3	shared	1
4	133038147	132818697	G	A	536	5	0.01	190	165	0.46	356	80	0.18	2	1.06	2	tier3	shared	0
4	137108969	136889519	C	A	445	8	0.02	133	86	0.39	363	89	0.20	2	2	2	tier3	shared	0
4	137637510	137418060	A	-	372	9	0.02	133	88	0.40	281	67	0.19	2	2	2	tier3	shared	1
4	142258827	142039377	G	T	648	5	0.01	339	263	0.44	349	82	0.19	2	2	2	tier3	shared	0
4	142853353	142633903	T	A	347	0	0.00	147	0	0.00	256	72	0.22	2	2	2	tier3	relapse-specific	0
4	14954202	15345104	G	T	665	7	0.01	292	210	0.42	463	133	0.22	2	2	2	tier3	shared	0
4	152840379	152620929	-	AC	608	7	0.01	302	165	0.35	378	59	0.14	2	2	2	tier3	shared	0
4	152868972	152649522	A	G	911	9	0.01	289	246	0.46	524	175	0.25	2	2	2	tier3	shared	0
4	154334476	154115026	C	T	591	5	0.01	254	184	0.42	303	85	0.22	2	2	2	tier3	shared	0
4	162690344	162470894	T	C	823	14	0.02	304	246	0.45	509	130	0.20	2	2	2	tier3	shared	0
4	163264471	163045021	A	-	364	17	0.04	122	85	0.41	225	55	0.20	2	2	2	tier3	shared	0
4	166070056	165850606	C	A	586	8	0.01	289	231	0.44	364	79	0.18	2	2	2	tier3	shared	0
4	167015901	166796451	G	T	526	7	0.01	235	205	0.47	370	98	0.21	2	2	2	tier2	shared	0
4	168415185	168178610	C	T	876	11	0.01	249	173	0.41	441	99	0.18	2	2	2	tier3	shared	0
4	168629207	168392632	C	T	712	3	0.00	360	114	0.24	684	0	0.00	2	2	2	tier3	tumor-specific	1
4	173920794	173684219	C	T	948	10	0.01	382	294	0.43	489	145	0.23	2	2	2	tier3	shared	1

4	174728239	174491664	C	A	480	9	0.02	263	224	0.46	407	96	0.19	2	2	2	tier3	shared	0
4	176729323	176492329	G	T	574	3	0.01	291	87	0.23	466	0	0.00	2	2	2	tier3	tumor-specific	1
4	179697612	179460618	T	C	1048	18	0.02	373	321	0.46	651	155	0.19	2	2	2	tier3	shared	1
4	182026988	181789994	C	T	956	8	0.01	319	191	0.37	608	147	0.19	2	2	2	tier3	shared	1
4	182229752	181992758	C	T	528	1	0.00	175	103	0.37	382	85	0.18	2	2	2	tier3	shared	0
4	182348378	182111384	C	G	687	4	0.01	244	184	0.43	496	115	0.19	2	2	2	tier2	shared	0
4	182597952	182360958	T	-	734	2	0.00	331	97	0.23	614	2	0.00	2	2	2	tier3	tumor-specific	1
4	18285640	18676542	C	T	781	5	0.01	404	278	0.41	570	139	0.20	2	2	2	tier3	shared	1
4	183462889	183225895	G	A	806	20	0.02	378	314	0.45	502	117	0.19	2	2	2	tier3	shared	2
4	183488821	183251827	C	T	619	9	0.01	331	275	0.45	474	100	0.17	2	2	2	tier2	shared	2
4	183981898	183744904	-	T	959	14	0.01	368	308	0.46	599	162	0.21	2	2	2	tier3	shared	0
4	186118876	185881882	C	T	561	3	0.01	355	123	0.26	528	1	0.00	2	2	2	tier3	tumor-specific	0
4	186649789	186412795	C	T	610	5	0.01	274	285	0.51	376	126	0.25	2	2	2	tier3	shared	0
4	18683902	19074804	C	T	743	12	0.02	324	273	0.46	587	155	0.21	2	2	2	tier3	shared	1
4	187679838	187442844	T	C	992	11	0.01	311	239	0.43	608	192	0.24	2	2	2	tier3	shared	0
4	187885961	187648967	G	A	901	19	0.02	479	378	0.44	659	153	0.19	2	2	2	tier3	shared	3
4	187925810	187688816	C	T	450	7	0.02	256	199	0.44	397	95	0.19	2	2	2	tier3	shared	3
4	188198245	187961251	T	C	499	2	0.00	267	256	0.49	375	127	0.25	2	2	2	tier3	shared	1
4	188687167	188450173	-	A	629	6	0.01	176	112	0.39	457	105	0.19	2	2	2	tier3	shared	1
4	189159937	188922943	G	A	633	2	0.00	296	237	0.44	502	130	0.21	2	2	2	tier3	shared	1
4	18920367	19311269	G	A	838	10	0.01	379	322	0.46	584	126	0.18	2	2	2	tier2	shared	1
4	189400871	189163877	G	A	543	5	0.01	302	214	0.41	395	87	0.18	2	2	2	tier3	shared	1
4	189441137	189204143	C	T	490	12	0.02	247	234	0.49	336	76	0.18	2	2	2	tier2	shared	1
4	19193052	19583954	C	T	496	3	0.01	152	130	0.46	284	75	0.21	2	2	2	tier3	shared	1
4	196944	206944	C	T	413	5	0.01	158	140	0.47	185	51	0.22	2	2	2	tier2	shared	0
4	19864204	20255106	C	T	541	5	0.01	255	224	0.47	373	115	0.24	2	2	2	tier2	shared	1
4	19876182	20267084	G	A	771	16	0.02	270	222	0.45	531	132	0.20	2	2	2	tier3	shared	1
4	2044468	2074670	C	T	429	7	0.02	281	234	0.45	329	82	0.20	2	2	2	tier3	shared	0
4	20516603	20907505	C	T	593	6	0.01	154	109	0.41	286	75	0.21	2	2	2	tier3	shared	0
4	21110916	21501818	G	A	624	6	0.01	189	163	0.46	308	79	0.20	2	2	2	tier3	shared	0
4	21119183	21510085	T	G	758	11	0.01	360	299	0.45	593	172	0.22	2	2	2	tier3	shared	0
4	21319658	21710560	C	T	451	4	0.01	209	35	0.14	377	94	0.20	2	2	2	tier3	shared	0
4	23632204	24023106	C	A	1026	11	0.01	414	358	0.46	667	136	0.17	2	2	2	tier3	shared	1
4	23750349	24141251	C	T	849	14	0.02	388	272	0.41	470	119	0.20	2	2	2	tier3	shared	1
4	27195937	27586839	G	A	368	4	0.01	131	113	0.46	222	50	0.18	2	2	2	tier2	shared	0
4	27578426	27969328	T	A	753	11	0.01	383	87	0.19	421	100	0.19	2	2	2	tier3	shared	1
4	28561760	28952662	C	G	714	11	0.02	263	201	0.43	545	118	0.18	2	2	2	tier3	shared	1
4	28906848	29297750	C	T	758	8	0.01	295	217	0.42	516	135	0.21	2	2	2	tier3	shared	1
4	28960008	29350910	C	T	437	7	0.02	134	94	0.41	240	59	0.20	2	2	2	tier3	shared	1
4	29105232	29496134	C	G	425	5	0.01	117	65	0.36	352	67	0.16	2	2	2	tier3	shared	0

4	29107730	29498632	-	T	395	7	0.02	181	119	0.40	304	51	0.14	2	2	2	tier3	shared	0
4	30563192	30954094	A	-	452	17	0.04	157	112	0.42	238	74	0.24	2	2	2	tier3	shared	0
4	30653089	31043991	C	T	706	11	0.02	274	195	0.42	503	136	0.21	2	2	2	tier3	shared	0
4	30712415	31103317	G	T	862	7	0.01	325	281	0.46	569	123	0.18	2	2	2	tier3	shared	0
4	30729745	31120647	T	-	678	23	0.03	212	188	0.47	500	133	0.21	2	2	2	tier3	shared	0
4	30764036	31154938	A	C	838	8	0.01	358	281	0.44	580	133	0.19	2	2	2	tier3	shared	0
4	31298402	31689304	A	C	791	7	0.01	343	286	0.45	493	99	0.17	2	2	2	tier3	shared	1
4	31827243	32183345	G	A	542	5	0.01	185	169	0.48	429	112	0.21	2	2	2	tier3	shared	0
4	32781093	33104698	A	C	773	16	0.02	256	215	0.46	550	134	0.20	2	2	2	tier3	shared	1
4	35250271	35573876	G	A	669	9	0.01	235	166	0.41	464	111	0.19	2	2	2	tier2	shared	1
4	35471130	35794735	A	G	721	10	0.01	289	229	0.44	511	137	0.21	2	2	2	tier3	shared	1
4	36530355	36853960	C	T	1003	6	0.01	760	64	0.08	583	163	0.22	2	2	2	tier3	shared	1
4	36730979	37054584	T	C	635	13	0.02	298	297	0.50	416	97	0.19	2	2	2	tier3	shared	1
4	37062353	37385958	C	T	865	8	0.01	368	347	0.49	687	170	0.20	2	2	2	tier3	shared	0
4	37856847	38180452	G	T	973	9	0.01	415	331	0.44	556	147	0.21	2	2	2	tier3	shared	0
4	41866526	42171769	G	A	781	18	0.02	406	327	0.45	516	124	0.19	2	2	2	tier3	shared	0
4	45360745	45665988	C	A	553	4	0.01	258	230	0.47	419	101	0.19	2	2	2	tier3	shared	1
4	53509282	53814525	G	A	774	14	0.02	337	261	0.44	400	91	0.19	2	2	2	tier2	shared	0
4	56396856	56702099	G	A	683	6	0.01	295	232	0.44	516	115	0.18	2	2	2	tier3	shared	0
4	58046630	58351873	C	T	552	6	0.01	381	146	0.28	407	0	0.00	2	2	2	tier3	tumor-specific	0
4	59003521	59308764	C	A	352	2	0.01	135	28	0.17	336	0	0.00	2	2	2	tier3	tumor-specific	1
4	59753060	60070465	C	T	789	11	0.01	304	278	0.48	575	122	0.18	2	2	2	tier2	shared	1
4	63048485	63365890	C	A	628	6	0.01	213	148	0.41	399	107	0.21	2	2	2	tier3	shared	1
4	63365101	63682506	C	T	123	0	0.00	42	47	0.53	85	23	0.21	2	2	2	tier2	shared	0
4	63845241	64162646	C	G	454	2	0.00	140	135	0.49	343	91	0.21	2	2	2	tier3	shared	1
4	65524263	65841668	G	A	841	13	0.02	305	253	0.45	500	121	0.19	2	2	2	tier3	shared	1
4	66607172	66924577	A	-	503	7	0.01	179	135	0.43	357	112	0.24	2	2	2	tier3	shared	0
4	66875415	67192820	G	C	770	9	0.01	263	216	0.45	540	114	0.17	2	2	2	tier3	shared	1
4	69928008	69893419	T	C	843	7	0.01	308	271	0.47	495	110	0.18	2	2	2	tier3	shared	0
4	70511151	70476562	A	G	689	9	0.01	242	213	0.47	430	109	0.20	2	2	2	tier3	shared	0
4	71747205	71528341	C	T	719	2	0.00	292	46	0.14	537	114	0.18	2	2	2	tier3	shared	0
4	76450527	76231503	T	-	601	49	0.08	258	224	0.46	420	123	0.23	2	2	2	tier3	shared	0
4	80251211	80032187	T	-	327	5	0.02	76	56	0.42	270	56	0.17	2	2	2	tier3	shared	1
4	80339543	80120519	C	T	764	12	0.02	291	295	0.50	504	97	0.16	2	2	2	tier2	shared	1
4	80829340	80610316	T	C	390	4	0.01	124	101	0.45	311	85	0.21	2	2	2	tier3	shared	1
4	87781430	87562406	G	A	250	4	0.02	95	129	0.58	175	65	0.27	2	2	2	tier3	shared	0
4	94206628	93987605	C	T	775	9	0.01	299	259	0.46	583	165	0.22	2	2	2	tier3	shared	0
4	95615408	95396385	T	C	328	5	0.02	100	102	0.50	286	75	0.21	2	2	2	tier3	shared	0
5	100265461	100237562	T	A	586	19	0.03	488	99	0.17	446	121	0.21	2	2	2	tier3	shared	1
5	104006486	103978587	G	A	472	3	0.01	142	83	0.37	320	49	0.13	2	2	2	tier3	shared	1

5	107201359	107173460	T	C	553	16	0.03	358	225	0.39	417	95	0.19	2	2	2	tier3	shared	0
5	11221977	11168977	C	T	817	10	0.01	308	248	0.45	480	135	0.22	2	2	2	tier3	shared	0
5	116352856	116324957	C	G	939	15	0.02	368	301	0.45	617	142	0.19	2	2	2	tier3	shared	1
5	117154709	117126810	T	C	935	10	0.01	344	303	0.47	595	149	0.20	2	2	2	tier3	shared	0
5	117806828	117778929	C	T	901	9	0.01	300	222	0.43	472	111	0.19	2	2	2	tier3	shared	1
5	122462602	122434703	C	T	223	3	0.01	81	79	0.49	139	38	0.21	2	2	2	tier2	shared	0
5	123606437	123578538	T	C	583	7	0.01	256	224	0.47	442	110	0.20	2	2	2	tier3	shared	0
5	124421179	124393280	C	T	723	12	0.02	251	205	0.45	505	142	0.22	2	2	2	tier3	shared	1
5	127001815	126973916	C	T	1048	19	0.02	473	392	0.45	591	148	0.20	2	2	2	tier3	shared	0
5	127934833	127906934	C	T	1001	18	0.02	340	313	0.48	574	166	0.22	2	2	2	tier2	shared	1
5	128331328	128303429	C	A	244	0	0.00	111	19	0.15	332	95	0.22	2	2	2	tier3	shared	1
5	1283613	1230613	C	T	505	9	0.02	285	255	0.47	338	86	0.20	2	2	2	tier3	shared	0
5	129733200	129705301	-	A	662	5	0.01	236	179	0.43	482	137	0.22	2	2	2	tier3	shared	1
5	133794553	133766654	A	T	706	7	0.01	252	225	0.47	575	130	0.18	2	2	2	tier2	shared	0
5	138778650	138750751	C	G	681	11	0.02	293	218	0.43	503	101	0.17	2	2	2	tier3	shared	0
5	1410892	1357892	G	A	518	9	0.02	272	260	0.49	345	92	0.21	2	2	2	tier3	shared	0
5	141578573	141598389	T	A	522	1	0.00	379	103	0.21	399	0	0.00	2	2	2	tier3	tumor-specific	1
5	143554034	143573841	G	T	1024	5	0.00	600	179	0.23	734	0	0.00	2	2	2	tier3	tumor-specific	0
5	145689874	145709681	C	T	903	14	0.02	395	285	0.42	652	162	0.20	2	2	2	tier3	shared	0
5	1482894	1429894	C	A	535	15	0.03	258	214	0.45	293	91	0.24	2	2	2	tier3	shared	0
5	149344538	149364345	-	CCC	800	9	0.01	470	102	0.18	675	60	0.08	2	2	2	tier3	shared	1
5	149761862	149781669	G	A	675	18	0.03	317	276	0.47	365	77	0.17	2	2	2	tier3	shared	1
5	151415323	151435130	G	A	452	8	0.02	277	215	0.44	300	79	0.21	2	2	2	tier3	shared	1
5	15521544	15468544	T	-	723	16	0.02	217	154	0.42	395	104	0.21	2	2	2	tier2	shared	1
5	156250002	156317424	G	A	1118	14	0.01	444	425	0.49	643	212	0.25	2	2	2	tier3	shared	0
5	157119862	157187284	G	A	682	2	0.00	401	105	0.21	657	0	0.00	2	2	2	tier3	tumor-specific	0
5	159213503	159280925	C	T	486	8	0.02	192	126	0.40	377	85	0.18	2	2	2	tier3	shared	1
5	16072497	16019497	C	A	373	10	0.03	164	163	0.50	315	69	0.18	2	2	2	tier3	shared	0
5	163315359	163382781	C	T	298	4	0.01	96	87	0.48	212	54	0.20	2	2	2	tier2	shared	1
5	165252124	165319546	A	G	721	10	0.01	309	283	0.48	397	103	0.21	2	2	2	tier3	shared	1
5	166441782	166509204	C	T	863	11	0.01	284	241	0.46	683	162	0.19	2	2	2	tier3	shared	1
5	166898714	166966136	A	T	1000	12	0.01	337	313	0.48	604	130	0.18	2	2	2	tier2	shared	1
5	167178479	167245901	C	T	647	7	0.01	363	276	0.43	427	109	0.20	2	2	2	tier3	shared	1
5	171987112	172054507	G	A	867	11	0.01	362	309	0.46	433	114	0.21	2	2	2	tier3	shared	0
5	172597106	172664500	C	T	496	9	0.02	214	158	0.42	337	87	0.21	2	2	2	tier2	shared	0
5	176460736	176528130	G	A	344	7	0.02	144	114	0.44	231	65	0.22	2	2	2	tier3	shared	0
5	19662222	19626465	C	T	1021	17	0.02	322	327	0.50	568	127	0.18	2	2	2	tier3	shared	0
5	20266446	20230689	G	A	608	10	0.02	223	171	0.43	512	115	0.18	2	2	2	tier3	shared	1
5	20612321	20576564	T	A	534	12	0.02	182	154	0.46	356	88	0.20	2	2	2	tier3	shared	1
5	23016236	22980479	T	G	938	9	0.01	400	315	0.44	677	177	0.21	2	2	2	tier3	shared	1



5	24634237	24598480	G	C	776	8	0.01	242	164	0.40	402	114	0.22	2	2	2	tier3	shared	0
5	26191116	26155359	T	C	438	6	0.01	118	95	0.45	317	66	0.17	2	2	2	tier3	shared	1
5	27519527	27483770	C	T	937	17	0.02	365	259	0.42	608	173	0.22	2	2	2	tier3	shared	1
5	28213116	28177359	G	A	448	5	0.01	176	127	0.42	322	72	0.18	2	2	2	tier3	shared	1
5	40075061	40039304	C	T	877	4	0.00	313	222	0.41	467	136	0.23	2	2	2	tier2	shared	1
5	41026023	40990266	C	A	837	11	0.01	318	276	0.46	621	132	0.18	2	2	2	tier3	shared	1
5	41340785	41305028	C	T	446	6	0.01	309	222	0.42	453	82	0.15	2	2	2	tier3	shared	0
5	45050802	45015045	-	A	689	12	0.02	274	175	0.39	426	86	0.17	2	2	2	tier3	shared	0
5	50287607	50251850	G	A	881	10	0.01	470	392	0.45	623	142	0.19	2	2	2	tier3	shared	1
5	50319955	50284198	A	T	511	9	0.02	184	136	0.43	318	72	0.18	2	2	2	tier3	shared	1
5	5195032	5142032	A	C	514	14	0.03	203	176	0.46	396	97	0.20	2	2	2	tier3	shared	1
5	52674933	52639176	G	A	995	16	0.02	405	363	0.47	554	162	0.23	2	2	2	tier3	shared	1
5	58047178	58011421	A	C	827	9	0.01	246	211	0.46	551	148	0.21	2	2	2	tier3	shared	0
5	6011937	5958937	C	T	828	7	0.01	341	262	0.43	596	150	0.20	2	2	2	tier3	shared	0
5	61925228	61889472	A	T	658	18	0.03	339	272	0.45	587	121	0.17	2	2	2	tier3	shared	0
5	62828121	62792365	-	A	815	10	0.01	267	171	0.39	490	97	0.17	2	2	2	tier3	shared	1
5	66228134	66192378	T	A	492	2	0.00	226	161	0.42	332	71	0.18	2	2	2	tier3	shared	0
5	68754819	68719063	C	T	607	6	0.01	233	194	0.45	268	71	0.21	2	2	2	tier3	shared	0
5	73010150	72974394	G	A	667	13	0.02	261	217	0.45	389	109	0.22	2	2	2	tier3	shared	0
5	8136010	8083010	A	G	295	4	0.01	138	100	0.42	220	34	0.13	2	2	2	tier3	shared	1
5	81957081	81921325	T	C	815	13	0.02	440	369	0.46	611	156	0.20	2	2	2	tier3	shared	1
5	83095005	83059249	G	A	591	4	0.01	202	184	0.48	383	86	0.18	2	2	2	tier3	shared	0
5	83291845	83256089	C	T	502	3	0.01	150	96	0.39	268	72	0.21	2	2	2	tier3	shared	1
5	84796281	84760525	C	T	423	4	0.01	152	151	0.50	163	54	0.25	2	2	2	tier2	shared	1
5	8688495	8635495	C	T	253	6	0.02	92	67	0.42	203	53	0.21	2	2	2	tier3	shared	0
5	91259125	91223369	C	T	162	0	0.00	35	26	0.43	156	36	0.19	2	2	2	tier3	shared	1
5	9560797	9507797	G	A	556	9	0.02	262	218	0.45	355	91	0.20	2	2	2	tier3	shared	0
5	99860373	99832474	G	A	963	12	0.01	368	298	0.45	560	125	0.18	2	2	2	tier3	shared	0
6	103552654	103445961	-	T	747	7	0.01	313	203	0.39	434	98	0.18	2	2	2	tier3	shared	0
6	104194545	104087852	C	T	838	18	0.02	322	248	0.44	507	115	0.18	2	2	2	tier3	shared	1
6	107361572	107254879	C	T	867	9	0.01	416	294	0.41	602	152	0.20	2	2	2	tier3	shared	0
6	107911572	107804879	A	G	750	8	0.01	225	225	0.50	457	114	0.20	2	2	2	tier3	shared	0
6	108973472	108866779	C	T	388	6	0.02	210	174	0.45	313	69	0.18	2	2	2	tier2	shared	0
6	109236604	109129911	G	A	498	5	0.01	268	249	0.48	351	85	0.19	2	2	2	tier3	shared	0
6	114486344	114379651	C	T	780	4	0.01	184	166	0.47	418	100	0.19	2	2	2	tier3	shared	0
6	116543169	116436476	G	A	673	12	0.02	263	231	0.47	533	136	0.20	2	2	2	tier3	shared	0
6	116546904	116440211	G	A	679	8	0.01	207	167	0.45	419	85	0.17	2	2	2	tier2	shared	0
6	117234348	117127655	C	A	463	9	0.02	238	204	0.46	344	68	0.17	2	2	2	tier1	shared	2
6	119393476	119351777	T	A	504	11	0.02	175	144	0.45	512	102	0.17	2	2	2	tier3	shared	0
6	121696163	121654464	A	T	651	7	0.01	264	174	0.40	482	85	0.15	2	2	2	tier3	shared	1

6	122089204	122047505	G	T	312	3	0.01	96	66	0.41	264	64	0.20	2	2	2	tier3	shared	0
6	124876095	124834396	C	A	560	1	0.00	238	57	0.19	442	0	0.00	2	2	2	tier3	tumor-specific	0
6	126252643	126210950	A	G	656	12	0.02	222	190	0.46	413	113	0.21	2	2	2	tier1	shared	2
6	132760245	132718552	C	T	787	6	0.01	327	284	0.46	564	112	0.17	2	2	2	tier2	shared	0
6	143970701	143929008	T	C	624	2	0.00	244	239	0.49	396	110	0.22	2	2	2	tier3	shared	0
6	144327153	144285460	G	T	671	10	0.01	286	256	0.47	433	108	0.20	2	2	2	tier3	shared	0
6	148349163	148307470	C	A	814	15	0.02	433	372	0.46	591	141	0.19	2	2	2	tier2	shared	1
6	148695029	148653336	A	-	442	25	0.05	217	159	0.42	280	108	0.28	2	2	2	tier3	shared	0
6	149503164	149461471	-	GGTTCGCTT CTTTAAGGG	981	5	0.01	356	195	0.35	515	107	0.17	2	2	2	tier3	shared	0
6	150400423	150358730	C	T	540	8	0.01	239	205	0.46	292	80	0.22	2	2	2	tier2	shared	0
6	153178125	153136432	C	T	803	10	0.01	331	250	0.43	552	133	0.19	2	2	2	tier3	shared	1
6	15481562	15373583	C	T	562	7	0.01	191	167	0.47	317	84	0.21	2	2	2	tier3	shared	0
6	159876141	159956151	G	T	602	10	0.02	367	289	0.44	396	103	0.21	2	2	2	tier3	shared	2
6	160718533	160798543	C	T	304	8	0.03	137	133	0.49	266	63	0.19	2	2	2	tier3	shared	0
6	161879231	161959241	G	T	714	18	0.02	367	301	0.45	559	145	0.21	2	2	2	tier3	shared	0
6	162006577	162086587	G	A	610	15	0.02	345	206	0.37	508	129	0.20	2	2	2	tier3	shared	0
6	163316275	163396285	G	T	949	9	0.01	463	358	0.44	704	172	0.20	2	2	2	tier3	shared	0
6	168215885	168473036	G	A	279	5	0.02	138	124	0.47	178	41	0.19	2	2	2	tier3	shared	0
6	168920610	169178685	G	A	714	8	0.01	231	168	0.42	478	91	0.16	2	2	2	tier3	shared	1
6	18123087	18015108	T	C	549	3	0.01	160	152	0.49	358	89	0.20	2	2	2	tier3	shared	1
6	19868483	19760504	C	T	794	13	0.02	365	293	0.45	592	125	0.17	2	2	2	tier3	shared	1
6	20536224	20428245	-	CTCC	464	5	0.01	277	173	0.38	360	116	0.24	2	2	2	tier3	shared	0
6	24626589	24518610	A	G	553	8	0.01	271	226	0.45	391	103	0.21	2	2	2	tier2	shared	0
6	30800185	30692206	T	C	192	5	0.03	195	31	0.14	166	27	0.14	2	2	2	tier3	shared	0
6	33396275	33288297	G	A	746	9	0.01	353	344	0.49	466	107	0.19	2	2	2	tier1	shared	2
6	33906603	33798625	C	T	761	15	0.02	305	271	0.47	443	109	0.20	2	2	2	tier3	shared	0
6	3979247	4034248	G	A	390	4	0.01	144	85	0.37	336	69	0.17	2	2	2	tier3	shared	2
6	39977212	39869234	C	T	211	8	0.04	131	107	0.45	157	36	0.19	2	2	2	tier1	shared	1
6	40675531	40567553	C	T	279	5	0.02	112	125	0.53	211	37	0.15	2	2	2	tier2	shared	0
6	40865465	40757487	A	C	646	13	0.02	388	307	0.44	507	139	0.22	2	2	2	tier2	shared	1
6	4318625	4373626	A	T	606	11	0.02	254	217	0.46	358	105	0.23	2	2	2	tier3	shared	1
6	44351654	44243676	G	A	249	1	0.00	98	71	0.42	120	32	0.21	2	2	2	tier1	shared	1
6	45028492	44920514	C	T	591	6	0.01	213	150	0.41	346	76	0.18	2	2	2	tier3	shared	0
6	46963602	46855643	C	T	884	10	0.01	427	337	0.44	596	153	0.20	2	2	2	tier3	shared	0
6	51685200	51577241	T	A	520	3	0.01	294	54	0.16	445	86	0.16	2	2	2	tier3	shared	4
6	53286741	53178782	-	CCTGGT AGGCAA	773	8	0.01	435	271	0.38	574	96	0.14	2	2	2	tier3	shared	0
6	62689159	62631200	T	G	627	11	0.02	230	188	0.45	470	99	0.17	2	2	2	tier3	shared	0
6	65410114	65353393	G	T	431	4	0.01	225	218	0.49	320	86	0.21	2	2	2	tier2	shared	0
6	65976834	65920113	C	T	815	14	0.02	336	284	0.46	515	141	0.21	2	2	2	tier3	shared	0

6	67396065	67339344	G	A	733	8	0.01	215	184	0.46	553	122	0.18	2	2	2	tier3	shared	1
6	68084645	68027924	G	A	641	10	0.02	231	180	0.44	471	115	0.20	2	2	2	tier3	shared	1
6	69877328	69820607	G	A	726	4	0.01	217	190	0.47	438	128	0.23	2	2	2	tier3	shared	0
6	72910224	72853503	C	T	510	4	0.01	341	69	0.17	372	83	0.18	2	2	2	tier3	shared	2
6	75454007	75397287	G	A	685	11	0.02	329	226	0.41	566	121	0.18	2	2	2	tier3	shared	1
6	75872009	75815289	T	A	764	15	0.02	281	228	0.45	501	121	0.19	2	2	2	tier3	shared	4
6	75917701	75860981	G	A	628	3	0.00	210	133	0.39	416	108	0.21	2	2	2	tier1	shared	4
6	76192831	76136111	C	T	664	5	0.01	274	227	0.45	392	118	0.23	2	2	2	tier3	shared	1
6	76716833	76660113	A	T	802	16	0.02	302	189	0.38	533	129	0.19	2	2	2	tier3	shared	0
6	77534162	77477443	G	T	436	8	0.02	108	85	0.44	326	71	0.18	2	2	2	tier3	shared	1
6	78132876	78076157	C	T	648	10	0.02	183	179	0.49	471	88	0.16	2	2	2	tier3	shared	1
6	78733352	78676633	T	A	519	5	0.01	241	27	0.10	323	82	0.20	2	2	2	tier2	shared	1
6	80356095	80299376	G	A	584	5	0.01	370	69	0.16	577	133	0.19	2	2	2	tier3	shared	0
6	80528802	80472083	A	G	835	10	0.01	329	262	0.44	650	166	0.20	2	2	2	tier3	shared	0
6	82333029	82276310	-	T	659	9	0.01	322	210	0.39	401	122	0.23	2	2	2	tier3	shared	0
6	82854081	82797362	G	T	642	8	0.01	368	270	0.42	466	120	0.20	2	2	2	tier2	shared	1
6	84357966	84301247	-	T	283	6	0.02	94	50	0.35	222	46	0.17	2	2	2	tier3	shared	0
6	87597030	87540311	G	A	251	3	0.01	52	44	0.46	187	48	0.20	2	2	2	tier1	shared	1
6	89948418	89891699	C	T	440	5	0.01	220	191	0.46	314	73	0.19	2	2	2	tier1	shared	1
6	91450832	91394111	C	T	872	16	0.02	427	335	0.44	531	151	0.22	2	2	2	tier3	shared	1
6	92034634	91977913	T	A	183	2	0.01	116	30	0.21	236	1	0.00	2	2	2	tier3	tumor-specific	1
6	92083597	92026876	T	C	549	8	0.01	191	151	0.44	360	90	0.20	2	2	2	tier3	shared	1
6	94849356	94792635	C	G	583	6	0.01	196	139	0.41	405	109	0.21	2	2	2	tier3	shared	1
6	96935294	96828573	G	A	600	6	0.01	227	196	0.46	421	79	0.16	2	2	2	tier2	shared	1
6	97344287	97237566	C	T	820	9	0.01	355	323	0.48	452	94	0.17	2	2	2	tier3	shared	0
6	98868269	98761548	C	T	403	3	0.01	153	34	0.18	260	55	0.17	2	2	2	tier3	shared	1
7	103196046	103408810	A	-	437	31	0.07	206	163	0.44	380	105	0.22	2	2	2	tier3	shared	1
7	108836479	109049243	G	A	907	16	0.02	366	314	0.46	577	143	0.20	2	2	2	tier3	shared	1
7	113957820	114170584	-	A	451	9	0.02	139	101	0.42	364	80	0.18	2	2	2	tier2	shared	0
7	11758269	11791744	G	A	918	14	0.02	347	250	0.42	494	125	0.20	2	2	2	tier3	shared	1
7	117982213	118194977	A	T	590	2	0.00	345	65	0.16	463	90	0.16	2	2	2	tier3	shared	1
7	118021666	118234430	C	T	771	7	0.01	303	237	0.44	488	92	0.16	2	2	2	tier3	shared	1
7	118788131	119000895	T	G	572	4	0.01	169	146	0.46	464	105	0.18	2	2	2	tier3	shared	1
7	119110412	119323176	G	A	498	4	0.01	95	54	0.36	353	95	0.21	2	2	2	tier3	shared	1
7	121048122	121260886	G	C	729	4	0.01	259	234	0.47	508	106	0.17	2	2	2	tier3	shared	0
7	121180499	121393263	G	T	660	8	0.01	307	238	0.44	405	105	0.21	2	2	2	tier3	shared	0
7	12126741	12160216	C	T	801	9	0.01	308	210	0.41	548	131	0.19	2	2	2	tier3	shared	1
7	121979809	122192573	G	A	627	7	0.01	332	237	0.42	501	128	0.20	2	2	2	tier3	shared	0
7	12343039	12376514	G	T	540	14	0.03	206	202	0.50	375	86	0.19	2	2	2	tier3	shared	0
7	124683407	124896171	C	T	876	8	0.01	303	240	0.44	486	126	0.21	2	2	2	tier3	shared	0

7	124892606	125105370	A	C	864	18	0.02	306	286	0.48	507	160	0.24	2	2	2	tier3	shared	1
7	125413416	125626180	C	A	829	6	0.01	317	276	0.47	529	122	0.19	2	2	2	tier3	shared	1
7	126133132	126345896	G	T	252	5	0.02	70	61	0.47	194	45	0.19	2	2	2	tier3	shared	2
7	126677763	126890527	C	A	768	10	0.01	331	306	0.48	538	165	0.23	2	2	2	tier3	shared	2
7	12893363	12926838	G	C	202	1	0.00	46	60	0.57	134	44	0.25	2	2	2	tier3	shared	0
7	130050909	130400369	C	T	577	12	0.02	240	187	0.44	431	100	0.19	2	2	2	tier3	shared	0
7	13310673	13344148	C	A	1146	13	0.01	397	330	0.45	641	165	0.20	2	2	2	tier2	shared	1
7	133834313	134183773	C	T	626	5	0.01	208	164	0.44	447	95	0.18	2	2	2	tier3	shared	0
7	135616675	135966135	G	A	894	11	0.01	291	230	0.44	597	126	0.17	2	2	2	tier3	shared	0
7	136953685	137303145	C	A	882	14	0.02	385	326	0.46	495	136	0.22	2	2	2	tier3	shared	0
7	13982316	14015791	G	A	858	17	0.02	317	238	0.43	441	103	0.19	2	2	2	tier3	shared	1
7	14027804	14061279	G	T	824	7	0.01	321	289	0.47	535	145	0.21	2	2	2	tier3	shared	1
7	140813368	141166899	G	A	714	8	0.01	417	298	0.42	498	145	0.23	2	2	2	tier3	shared	0
7	143334961	143704028	A	G	825	9	0.01	334	256	0.43	467	122	0.21	2	2	2	tier3	shared	0
7	145279476	145648543	G	A	933	16	0.02	390	263	0.40	671	197	0.23	2	2	2	tier3	shared	0
7	145812969	146182036	G	A	524	7	0.01	161	109	0.40	390	83	0.18	2	2	2	tier3	shared	0
7	147045265	147414332	G	A	794	7	0.01	472	81	0.15	530	126	0.19	2	2	2	tier3	shared	0
7	147184461	147553528	C	T	975	10	0.01	358	290	0.45	485	129	0.21	2	2	2	tier2	shared	0
7	147458830	147827897	T	-	482	3	0.01	174	120	0.41	286	78	0.21	2	2	2	tier3	shared	0
7	150308416	150677483	G	A	342	1	0.00	252	220	0.47	280	59	0.17	2	2	2	tier3	shared	2
7	150449000	150818067	C	T	389	7	0.02	238	191	0.45	258	84	0.25	2	2	2	tier3	shared	0
7	154050162	154419229	T	A	564	6	0.01	218	160	0.42	316	73	0.19	2	2	2	tier3	shared	2
7	155933309	156240548	G	A	840	13	0.02	400	325	0.45	624	126	0.17	2	2	2	tier3	shared	1
7	156029939	156337178	C	T	691	12	0.02	298	219	0.42	453	115	0.20	2	2	2	tier3	shared	1
7	157401607	157708846	C	T	614	7	0.01	273	204	0.43	365	91	0.20	2	2	2	tier3	shared	2
7	157546337	157853576	G	A	547	8	0.01	273	206	0.43	437	99	0.18	2	2	2	tier3	shared	2
7	16471580	16505055	A	-	465	20	0.04	245	183	0.43	311	86	0.22	2	2	2	tier3	shared	0
7	16612624	16646099	G	A	575	4	0.01	166	121	0.42	512	101	0.16	2	2	2	tier3	shared	0
7	18985171	19018646	C	A	595	4	0.01	242	173	0.42	403	101	0.20	2	2	2	tier3	shared	0
7	19896920	19930395	G	A	582	1	0.00	380	1	0.00	450	140	0.24	2	2	2	tier3	relapse-specific	1
7	20705083	20738558	C	T	649	9	0.01	303	253	0.46	475	133	0.22	2	2	2	tier3	shared	1
7	21530093	21563568	G	T	572	10	0.02	185	76	0.29	410	94	0.19	2	2	2	tier3	shared	1
7	22567575	22601050	C	T	476	10	0.02	222	184	0.45	311	80	0.20	2	2	2	tier2	shared	0
7	27582747	27616222	-	A	838	14	0.02	366	280	0.43	688	160	0.19	2	2	2	tier3	shared	0
7	28538689	28572164	G	A	832	8	0.01	356	247	0.41	504	118	0.19	2	2	2	tier2	shared	0
7	34480256	34513731	G	A	354	5	0.01	150	140	0.48	244	56	0.19	2	2	2	tier3	shared	0
7	36496966	36530441	AATC	-	781	13	0.02	401	265	0.40	596	130	0.18	2	2	2	tier3	shared	0
7	3872973	3906447	G	A	576	11	0.02	336	307	0.48	375	94	0.20	2	2	2	tier3	shared	2
7	41365685	41399160	T	A	586	6	0.01	245	201	0.45	505	124	0.20	2	2	2	tier2	shared	1
7	45917575	45951050	G	A	794	13	0.02	407	322	0.44	483	144	0.23	2	2	2	tier3	shared	0

7	46613062	46646537	T	A	789	19	0.02	382	292	0.43	476	122	0.20	2	2	2	tier2	shared	1
7	46999091	47032566	G	A	659	16	0.02	456	299	0.40	553	106	0.16	2	2	2	tier3	shared	0
7	48243583	48273037	C	T	499	8	0.02	159	159	0.50	273	81	0.23	2	2	2	tier3	shared	1
7	48517246	48546700	G	A	594	14	0.02	256	194	0.43	344	92	0.21	2	2	2	tier3	shared	1
7	53945984	53978490	A	T	403	3	0.01	102	78	0.43	331	82	0.20	2	2	2	tier3	shared	0
7	5607312	5640786	T	C	544	4	0.01	196	186	0.49	349	118	0.25	2	2	2	tier3	shared	0
7	62139096	62501661	G	A	207	1	0.00	151	122	0.45	145	32	0.18	2	2	2	tier3	shared	0
7	64554301	64916866	G	A	616	5	0.01	261	225	0.46	403	110	0.21	2	2	2	tier2	shared	1
7	67727257	68089321	T	C	637	5	0.01	300	239	0.44	472	129	0.21	2	2	2	tier2	shared	1
7	69598443	69960507	-	T	646	10	0.02	390	316	0.45	468	123	0.21	2	2	2	tier3	shared	0
7	70083513	70445577	G	A	413	9	0.02	239	224	0.48	264	77	0.23	2	2	2	tier2	shared	1
7	75641728	75803792	G	A	536	11	0.02	265	204	0.43	315	58	0.16	2	2	2	tier3	shared	0
7	77964306	78126370	C	T	756	5	0.01	316	217	0.41	518	127	0.20	2	2	2	tier3	shared	3
7	79553451	79715515	C	A	547	7	0.01	163	117	0.42	343	81	0.19	2	2	2	tier3	shared	0
7	79811760	79973824	C	A	768	6	0.01	277	149	0.35	521	125	0.19	2	2	2	tier3	shared	0
7	82688262	82850326	C	T	779	13	0.02	306	238	0.44	561	136	0.20	2	2	2	tier3	shared	1
7	82707778	82869842	C	T	620	18	0.03	194	147	0.43	558	123	0.18	2	2	2	tier2	shared	1
7	83500850	83662914	C	A	862	12	0.01	291	241	0.45	570	122	0.18	2	2	2	tier3	shared	2
7	85736915	85898979	T	C	619	3	0.00	211	195	0.48	374	120	0.24	2	2	2	tier3	shared	1
7	85740139	85902203	T	A	955	11	0.01	315	266	0.46	558	129	0.19	2	2	2	tier3	shared	1
7	89409537	89571601	C	A	582	9	0.02	186	177	0.49	394	85	0.18	2	2	2	tier3	shared	1
7	90733681	90895745	G	A	576	8	0.01	242	201	0.45	316	71	0.18	2	2	2	tier1	shared	1
7	91075171	91237235	G	A	565	7	0.01	301	256	0.46	459	127	0.22	2	2	2	tier3	shared	1
7	9128829	9162304	T	C	570	8	0.01	237	156	0.40	406	127	0.24	2	2	2	tier2	shared	1
7	94408472	94570536	G	A	666	15	0.02	274	227	0.45	407	87	0.18	2	2	2	tier3	shared	1
7	95994573	96156637	G	A	955	16	0.02	333	294	0.47	501	141	0.22	2	2	2	tier3	shared	0
8	100274306	100205130	C	A	959	13	0.01	401	267	0.40	541	130	0.19	2	2	2	tier1	shared	1
8	102195749	102126573	G	A	744	12	0.02	273	212	0.44	446	116	0.21	2	2	2	tier3	shared	0
8	103718738	103649562	G	A	219	4	0.02	117	135	0.54	163	54	0.25	2	2	2	tier3	shared	0
8	104741189	104672013	G	A	696	12	0.02	375	282	0.43	385	97	0.20	2	2	2	tier2	shared	0
8	105436497	105367321	C	T	706	12	0.02	315	241	0.43	413	102	0.20	2	2	2	tier1	shared	1
8	105440530	105371354	T	C	613	16	0.03	272	213	0.44	385	98	0.20	2	2	2	tier3	shared	0
8	108709296	108640120	T	C	527	7	0.01	181	161	0.47	302	76	0.20	2	2	2	tier3	shared	1
8	11035050	10997640	A	-	228	16	0.07	50	52	0.51	230	83	0.27	2	2	2	tier3	shared	0
8	112102672	112033496	C	T	572	11	0.02	302	257	0.46	592	128	0.18	2	2	2	tier2	shared	1
8	112908937	112839761	T	A	293	4	0.01	124	70	0.36	257	59	0.19	2	2	2	tier3	shared	1
8	112908940	112839764	A	T	289	5	0.02	124	71	0.36	262	61	0.19	2	2	2	tier3	shared	1
8	113563112	113493936	G	T	624	9	0.01	245	245	0.50	563	143	0.20	2	2	2	tier3	shared	2
8	113884103	113814927	C	T	310	1	0.00	72	43	0.37	280	78	0.22	2	2	2	tier3	shared	2
8	113952281	113883105	G	T	646	9	0.01	206	190	0.48	432	96	0.18	2	2	2	tier3	shared	2

8	114524003	114454827	C	A	215	1	0.00	41	30	0.42	130	28	0.18	2	2	2	tier3	shared	2
8	116221163	116151987	G	A	616	5	0.01	234	189	0.45	509	127	0.20	2	2	2	tier3	shared	1
8	123401103	123331922	A	T	667	9	0.01	310	299	0.49	601	168	0.22	2	2	2	tier3	shared	1
8	126722699	126653517	C	T	263	2	0.01	180	127	0.41	199	52	0.21	2	2	2	tier3	shared	1
8	129603854	129534672	C	T	721	6	0.01	331	290	0.47	450	123	0.21	2	2	2	tier3	shared	1
8	132866073	132796891	G	A	525	3	0.01	208	191	0.48	396	98	0.20	2	2	2	tier3	shared	1
8	133786740	133717558	C	T	930	8	0.01	367	290	0.44	632	145	0.19	2	2	2	tier3	shared	0
8	136741543	136672361	G	T	868	11	0.01	403	380	0.49	579	123	0.18	2	2	2	tier3	shared	0
8	137945484	137876302	G	A	699	10	0.01	293	249	0.46	438	103	0.19	2	2	2	tier3	shared	1
8	138136457	138067275	T	-	702	11	0.02	299	248	0.45	490	120	0.20	2	2	2	tier3	shared	1
8	138808147	138738965	G	A	525	9	0.02	115	94	0.45	326	67	0.17	2	2	2	tier3	shared	1
8	139010667	138941485	T	A	959	12	0.01	378	295	0.44	520	114	0.18	2	2	2	tier3	shared	0
8	14003678	13959307	G	A	468	8	0.02	123	115	0.48	319	43	0.12	2	2	2	tier3	shared	0
8	141826006	141756824	T	C	838	16	0.02	326	253	0.44	607	131	0.18	2	2	2	tier3	shared	2
8	142691667	142622485	C	T	511	5	0.01	286	235	0.45	394	97	0.20	2	2	2	tier3	shared	1
8	143442253	143444346	C	T	578	2	0.00	313	337	0.52	388	118	0.23	2	2	2	tier2	shared	0
8	143622650	143625648	C	T	448	4	0.01	160	178	0.53	242	70	0.22	2	2	2	tier1	shared	2
8	143691876	143694874	C	G	577	14	0.02	304	229	0.43	371	87	0.19	2	2	2	tier1	shared	1
8	145639466	145668658	G	A	588	9	0.02	301	238	0.44	356	92	0.21	2	2	2	tier1	shared	1
8	15129878	15085507	C	T	786	7	0.01	249	216	0.46	465	105	0.18	2	2	2	tier3	shared	0
8	15637985	15593614	G	A	776	5	0.01	413	98	0.19	490	121	0.20	2	2	2	tier3	shared	1
8	17926247	17881967	A	C	383	8	0.02	123	100	0.45	322	76	0.19	2	2	2	tier3	shared	0
8	1797828	1810421	G	A	174	0	0.00	134	95	0.41	158	37	0.19	2	2	2	tier2	shared	0
8	19365821	19321541	C	T	663	4	0.01	342	373	0.52	411	114	0.22	2	2	2	tier3	shared	1
8	20096196	20051916	C	T	390	6	0.02	148	147	0.50	268	83	0.24	2	2	2	tier3	shared	0
8	21547942	21503662	C	T	390	5	0.01	153	134	0.47	220	60	0.21	2	2	2	tier2	shared	0
8	22120146	22064201	C	T	732	12	0.02	377	277	0.42	445	111	0.20	2	2	2	tier3	shared	0
8	22640746	22584801	G	A	608	8	0.01	350	245	0.41	358	77	0.18	2	2	2	tier3	shared	0
8	25061684	25005767	T	C	835	6	0.01	398	292	0.42	433	130	0.23	2	2	2	tier3	shared	1
8	2615106	2627699	C	T	674	6	0.01	291	201	0.41	500	108	0.18	2	2	2	tier3	shared	1
8	30202324	30082782	C	T	924	12	0.01	355	275	0.44	612	128	0.17	2	2	2	tier3	shared	0
8	3374021	3386613	C	T	781	10	0.01	292	196	0.40	498	126	0.20	2	2	2	tier3	shared	5
8	34617311	34497769	C	T	743	11	0.01	408	291	0.42	497	137	0.22	2	2	2	tier3	shared	1
8	34710517	34590975	C	T	663	8	0.01	356	217	0.38	516	118	0.19	2	2	2	tier3	shared	1
8	37792367	37673209	G	A	394	6	0.02	241	161	0.40	260	72	0.22	2	2	2	tier3	shared	1
8	3844133	3856725	A	G	444	4	0.01	132	112	0.46	231	58	0.20	2	2	2	tier3	shared	5
8	40901384	40782227	G	A	490	8	0.02	205	234	0.53	309	79	0.20	2	2	2	tier3	shared	0
8	4514793	4527385	C	G	550	9	0.02	196	153	0.44	351	124	0.26	2	2	2	tier3	shared	5
8	4666132	4678724	G	A	1138	14	0.01	392	323	0.45	616	175	0.22	2	2	2	tier3	shared	5
8	49695481	49532928	G	A	764	12	0.02	335	307	0.48	453	123	0.21	2	2	2	tier2	shared	0

8	49768959	49606406	G	A	479	3	0.01	235	155	0.40	313	59	0.16	2	2	2	tier3	shared	0
8	52769210	52606657	C	T	592	10	0.02	326	254	0.44	508	115	0.18	2	2	2	tier2	shared	1
8	52919557	52757004	T	C	965	13	0.01	430	362	0.46	641	172	0.21	2	2	2	tier2	shared	0
8	5533819	5546411	C	T	601	5	0.01	217	167	0.43	457	113	0.20	2	2	2	tier3	shared	1
8	56380197	56217643	C	T	575	12	0.02	217	150	0.41	365	104	0.22	2	2	2	tier3	shared	1
8	56433852	56271298	G	A	667	6	0.01	323	248	0.43	482	107	0.18	2	2	2	tier3	shared	1
8	63723910	63561356	C	A	514	15	0.03	298	249	0.46	384	102	0.21	2	2	2	tier3	shared	0
8	6563244	6575836	-	CTGTCCT GTACCAT	589	3	0.01	366	252	0.41	476	104	0.18	2	2	2	tier2	shared	0
8	68686633	68524079	C	T	638	10	0.02	290	257	0.47	423	121	0.22	2	2	2	tier2	shared	0
8	69257911	69095357	C	T	429	10	0.02	231	197	0.46	373	91	0.20	2	2	2	tier3	shared	0
8	72611511	72448957	C	T	897	11	0.01	334	289	0.46	472	125	0.21	2	2	2	tier3	shared	0
8	76784885	76622330	A	G	572	16	0.03	244	196	0.45	328	84	0.20	2	2	2	tier3	shared	1
8	77920715	77758160	C	A	628	5	0.01	181	141	0.44	364	84	0.19	2	2	2	tier3	shared	1
8	79939985	79777430	G	A	453	2	0.00	117	99	0.46	294	78	0.21	2	2	2	tier3	shared	1
8	80274759	80112204	T	G	819	13	0.02	304	265	0.47	648	123	0.16	2	2	2	tier3	shared	1
8	82111729	81949174	G	A	794	14	0.02	247	209	0.46	432	93	0.18	2	2	2	tier2	shared	0
8	82285709	82123154	C	T	566	6	0.01	255	209	0.45	335	93	0.22	2	2	2	tier3	shared	0
8	83837357	83674802	G	A	556	2	0.00	292	89	0.23	475	0	0.00	2	2	2	tier3	tumor-specific	1
8	8483635	8446225	G	A	438	6	0.01	216	178	0.45	281	55	0.16	2	2	2	tier2	shared	0
8	89618273	89549157	G	T	727	18	0.02	304	296	0.49	460	156	0.25	2	2	2	tier3	shared	1
8	91377089	91307913	G	A	678	9	0.01	183	152	0.45	400	98	0.20	2	2	2	tier3	shared	1
8	91615221	91546045	G	A	944	10	0.01	411	351	0.46	650	132	0.17	2	2	2	tier3	shared	0
8	92065382	91996206	C	T	583	6	0.01	224	165	0.42	414	70	0.14	2	2	2	tier3	shared	0
8	92594485	92525309	C	T	741	6	0.01	325	229	0.41	553	118	0.18	2	2	2	tier3	shared	0
8	96026248	95957072	A	G	463	2	0.00	215	198	0.48	275	70	0.20	2	2	2	tier3	shared	1
8	98358079	98288903	C	A	549	6	0.01	313	237	0.43	365	87	0.19	2	2	2	tier1	shared	1
9	100051345	101011524	C	T	444	5	0.01	309	293	0.49	350	87	0.20	2	2	2	tier3	shared	1
9	103136695	104096874	G	A	543	13	0.02	224	232	0.51	279	80	0.22	2	2	2	tier3	shared	0
9	112429998	113390177	A	G	756	12	0.02	269	215	0.44	515	110	0.18	2	2	2	tier3	shared	0
9	112540631	113500810	A	G	775	14	0.02	416	308	0.43	597	160	0.21	2	2	2	tier3	shared	0
9	115637768	116597947	C	T	553	2	0.00	134	137	0.51	457	99	0.18	2	2	2	tier3	shared	0
9	11778521	11788521	C	T	613	10	0.02	252	224	0.47	363	94	0.21	2	2	2	tier3	shared	1
9	118895816	119855995	G	A	729	9	0.01	326	313	0.49	447	116	0.21	2	2	2	tier3	shared	0
9	120457959	121418138	T	A	1051	16	0.01	484	446	0.48	730	203	0.22	2	2	2	tier3	shared	1
9	122962406	123922585	-	T	616	11	0.02	219	149	0.40	446	85	0.16	2	2	2	tier2	shared	0
9	12372897	12382897	G	C	713	7	0.01	209	163	0.44	353	74	0.17	2	2	2	tier3	shared	1
9	124303704	125263883	-	T	629	14	0.02	276	189	0.41	486	105	0.18	2	2	2	tier3	shared	0
9	12462110	12472110	A	-	344	3	0.01	70	66	0.49	318	95	0.23	2	2	2	tier3	shared	1
9	125239975	126200154	C	T	886	13	0.01	391	291	0.43	664	141	0.18	2	2	2	tier3	shared	0
9	130824292	131784471	G	A	407	2	0.00	259	78	0.23	305	0	0.00	2	2	2	tier2	tumor-specific	1

9	133152891	134163070	C	T	337	3	0.01	196	180	0.48	226	69	0.23	2	2	2	tier3	shared	0
9	134657601	135667780	T	C	567	11	0.02	248	230	0.48	431	118	0.21	2	2	2	tier3	shared	2
9	135068561	136078740	G	A	792	9	0.01	369	287	0.44	569	143	0.20	2	2	2	tier2	shared	0
9	135249598	136259777	C	T	716	12	0.02	409	365	0.47	465	121	0.21	2	2	2	tier3	shared	0
9	20967939	20977939	T	A	724	15	0.02	327	254	0.44	476	125	0.21	2	2	2	tier3	shared	1
9	23653985	23663985	-	A	608	6	0.01	258	162	0.39	456	98	0.18	2	2	2	tier2	shared	0
9	23993511	24003511	G	A	910	16	0.02	296	313	0.51	534	95	0.15	2	2	2	tier2	shared	0
9	24788760	24798760	T	C	728	11	0.01	269	231	0.46	531	129	0.20	2	2	2	tier3	shared	1
9	25271855	25281855	A	T	669	0	0.00	381	1	0.00	452	107	0.19	2	2	2	tier3	relapse-specific	1
9	25520654	25530654	G	T	726	5	0.01	395	74	0.16	563	135	0.19	2	2	2	tier3	shared	1
9	25733587	25743587	T	-	269	3	0.01	56	30	0.35	217	29	0.12	2	2	2	tier3	shared	1
9	2715979	2725979	G	A	614	6	0.01	260	186	0.42	400	95	0.19	2	2	2	tier3	shared	0
9	27496041	27506041	-	A	800	8	0.01	304	259	0.46	476	97	0.17	2	2	2	tier3	shared	0
9	30116649	30126649	C	T	905	12	0.01	342	290	0.46	571	117	0.17	2	2	2	tier3	shared	1
9	31824992	31834992	C	T	895	14	0.02	431	415	0.49	692	167	0.19	2	2	2	tier3	shared	1
9	34558623	34568623	G	A	345	3	0.01	203	172	0.46	249	63	0.20	2	2	2	tier2	shared	0
9	37138478	37148478	T	C	280	4	0.01	116	66	0.36	207	52	0.20	2	2	2	tier3	shared	0
9	39132812	39142812	C	G	541	9	0.02	212	180	0.46	286	75	0.21	2	0.77	1	tier3	shared	0
9	39160257	39170257	C	T	585	9	0.02	168	182	0.52	402	92	0.19	2	0.77	1	tier3	shared	0
9	6228687	6238687	G	A	583	15	0.03	221	195	0.47	308	104	0.25	2	2	2	tier3	shared	0
9	74858303	75668483	C	T	1108	12	0.01	348	375	0.52	631	162	0.20	2	2	2	tier3	shared	0
9	75453786	76263966	C	T	458	3	0.01	206	213	0.51	271	62	0.19	2	2	2	tier2	shared	0
9	75857041	76667221	C	T	879	13	0.01	365	325	0.47	501	126	0.20	2	2	2	tier3	shared	1
9	77672764	78482944	A	T	752	10	0.01	320	314	0.50	449	118	0.21	2	2	2	tier3	shared	1
9	81202267	82012447	C	A	730	7	0.01	349	251	0.42	536	101	0.16	2	2	2	tier3	shared	0
9	82369236	83179416	G	A	260	2	0.01	103	74	0.42	174	35	0.17	2	2	2	tier2	shared	0
9	84069279	84879459	G	A	751	9	0.01	250	250	0.50	474	102	0.18	2	2	2	tier3	shared	1
9	87310011	88120191	G	A	829	10	0.01	374	263	0.41	476	110	0.19	2	2	2	tier3	shared	0
9	8780779	8790779	G	T	351	6	0.02	133	104	0.44	309	77	0.20	2	2	2	tier3	shared	1
9	90923638	91733818	C	T	676	15	0.02	302	247	0.45	538	127	0.19	2	2	2	tier3	shared	0
9	92997205	93957384	A	G	593	9	0.01	245	250	0.51	373	92	0.20	2	2	2	tier2	shared	0
9	9326002	9336002	G	A	588	4	0.01	220	150	0.41	332	87	0.21	2	2	2	tier3	shared	1
9	9452332	9462332	G	A	1002	0	0.00	373	98	0.21	697	0	0.00	2	2	2	tier2	tumor-specific	1
9	95020233	95980412	C	A	255	0	0.00	146	132	0.47	187	42	0.18	2	2	2	tier3	shared	1
9	95096259	96056438	G	A	684	4	0.01	370	333	0.47	442	126	0.22	2	2	2	tier3	shared	1
9	95486459	96446638	G	A	238	2	0.01	118	76	0.39	117	26	0.18	2	2	2	tier3	shared	1
9	97513272	98473451	G	A	974	8	0.01	419	314	0.43	637	167	0.21	2	2	2	tier2	shared	0
9	98437138	99397317	T	C	932	12	0.01	359	322	0.47	570	131	0.19	2	2	2	tier3	shared	0
MT	3919	-	G	A	246	1	0.00	477	111	0.19	23	65	0.74	2	2	2	tier1	shared	4
X	110124130	110237474	G	A	485	16	0.03	24	360	0.94	227	122	0.35	2	0.97	0.98	tier3	shared	1



X	112979355	113093090	A	-	273	7	0.03	19	172	0.90	160	90	0.36	2	0.97	0.98	tier3	shared	1
X	113807806	113901550	C	T	233	5	0.02	8	147	0.95	145	89	0.38	2	0.97	0.98	tier2	shared	0
X	131787031	131959350	C	T	272	2	0.01	22	207	0.90	123	85	0.41	2	0.97	0.99	tier3	shared	0
X	132161919	132334253	C	T	350	15	0.04	29	190	0.87	230	131	0.36	2	0.97	0.99	tier3	shared	1
X	133378890	133551224	G	T	449	15	0.03	22	316	0.93	235	145	0.38	2	0.97	0.99	tier1	shared	6
X	144715326	144907634	G	A	344	12	0.03	28	215	0.88	222	147	0.40	2	0.98	1	tier2	shared	0
X	145019083	145211391	C	T	324	4	0.01	14	170	0.92	149	84	0.36	2	0.98	1	tier3	shared	1
X	145600667	145792975	G	A	155	6	0.04	14	76	0.84	74	50	0.40	2	0.98	1	tier3	shared	1
X	151560017	151809361	C	T	364	9	0.02	26	281	0.92	165	123	0.43	2	1.02	0.96	tier3	shared	0
X	15274686	15364765	C	G	278	8	0.03	5	115	0.96	100	64	0.39	2	1	1	tier3	shared	0
X	2427079	2417079	T	C	678	7	0.01	209	206	0.50	352	112	0.24	2	2	2	tier2	shared	0
X	27570931	27661010	C	T	508	15	0.03	70	288	0.80	273	170	0.38	2	1	1	tier2	shared	0
X	29548786	29638865	A	G	189	12	0.06	6	92	0.94	115	93	0.45	2	1	1	tier2	shared	0
X	29962225	30052304	A	G	219	10	0.04	16	160	0.91	159	104	0.40	2	1	1	tier3	shared	0
X	40119720	40234776	G	T	255	8	0.03	29	207	0.88	142	87	0.38	2	1	1	tier3	shared	0
X	508177	588177	G	A	636	10	0.02	276	257	0.48	371	89	0.19	2	2	2	tier3	shared	0
X	79431528	79544872	G	A	581	6	0.01	223	233	0.51	440	1	0.00	2	0.91	0.99	tier3	tumor-specific	0
X	82891773	83005117	C	A	189	5	0.03	8	78	0.91	110	51	0.32	2	0.91	0.99	tier3	shared	0
X	91194846	91308190	C	G	239	2	0.01	13	92	0.88	106	85	0.45	2	0.41	0.9	tier3	shared	1
X	91457678	91571022	A	G	351	3	0.01	22	194	0.90	189	127	0.40	2	0.4	0.9	tier3	shared	1
X	92968362	93081706	A	G	184	4	0.02	5	107	0.96	74	53	0.42	2	0.94	0.9	tier3	shared	1
X	97645952	97759296	C	T	137	4	0.03	6	84	0.93	94	55	0.37	2	0.94	0.9	tier3	shared	1
X	9952490	9992490	GGA	-	112	4	0.03	16	85	0.84	46	24	0.34	2	1	1	tier3	shared	0
Y	27050713	28641325	T	C	261	7	0.03	18	197	0.92	129	89	0.41	2	2	2	tier3	shared	0

**Supplementary Table 7.** Deep readcounts for normal, primary tumor, relapse and FFPE progression samples from UPN 933124.

Gene	Chr	Start (NCBI 36)	Start (GRCCh37)	Reference Allele Variant Allele	Normal			Tumor			ffpe-0915678			ffpe-0915679			ffpe-0915680			Relapse			ffpe-0915681			ffpe-0915682		
					Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency	Reference Supporting Reads	Variant Supporting Reads	Variant Frequency
<i>PTPRT</i>	20	40164254	40730840	G A	4060	943	18.85%	2506	1952	43.79%	22399	2	0.01%	21339	200	0.93%	11148	113	1.00%	2431	1706	41.24%	18374	235	1.26%	26584	160	0.60%
<i>NPM1</i>	5	170770150	170837545	0 TGCA GAAATCAAC GTAGAAGTAC	3343	270	7.47%	1899	1727	47.63%	0	0		5470	0	0.00%	3082	1	0.03%	1755	1222	41.05%	5810	0	0.00%	5323	0	0.00%
<i>FLT3</i>	13	27506273	28608273	0 TCATTATCTGA	4622	343	6.91%	3242	1274	28.21%	9242	3	0.03%	9296	0	0.00%	4890	0	0.00%	3469	1415	28.97%	9142	0	0.00%	8709	0	0.00%
<i>DNMT3A</i>	2	25317018	25463514	A -	3296	762	18.78%	1925	1789	48.17%	2	3		983	0	0.00%	3858	33	0.85%	2767	2044	42.49%	4348	0	0.00%	0	0	
<i>STK4</i>	20	43115217	43681803	- GAGCGCGGGGC	4848	0	0.00%	4078	0	0.00%	4943	0	0.00%	8011	0	0.00%	4817	1	0.02%	2668	1427	34.85%	4731	0	0.00%	11045	0	0.00%
<i>MYO18B</i>	22	24752889	26422889	G A	2702	2	0.07%	2728	1	0.04%	0	0		0	0		172	1	0.58%	808	506	38.51%	0	0		627	1	0.16%
<i>ETV6</i>	12	11883491	11992224	G C	4333	0	0.00%	4391	2	0.05%	2442	1	0.04%	8648	0	0.00%	6004	1	0.02%	3217	1264	28.21%	0	0		0	0	

Sample Id	Description	Day
tumor	Presentation, initial diagnosis	0
ffpe-0915678	1st remission	43
ffpe-0915679	Continued remission	121
ffpe-0915680	30 days post autograft	170
relapse	1st relapse (sequenced)	338
ffpe-0915681	2nd remission, 30 days post allograft	422
ffpe-0915682	Suspected relapse but no disease	501
-	Death	750

**Supplementary Table 8.** Validated somatic structural variants in all 8 patients. CTX stands for chromosomal translocation.

ID	UPN	Chromosome	Position (NCBI 36)	Position (GRCh 37)	Chromosome	Position (NCBI 36)	Position (GRCh 37)	Event	Normal Read Count	Normal SV Read Count	Relapse Read Count	Relapse SV Read Count	Tumor Read Count	Tumor SV Read Count	Affected Genes
AML40	804168	6	133155294	133196987	X	100458317	100344973	CTX	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	TMEM35
AML15	758168	15	72113517	69900571	17	35756958	32831071	CTX	3696	13	5825	84	5705	98	PML RARA
AML15	758168	15	72113430	69900484	17	35756718	32830831	CTX	3697	19	5829	90	5710	91	PML RARA
AML1	933124	10	28864148	28904154	12	870062	740323	CTX	6155	0	2079	189	2719	0	WNK1 WAC

**Supplementary Table 9. *WNK1* and *WAC* expression in UPN 933124 and other AMLs.**

PROBESETID			1555068_at	202940_at	211992_at	211993_at	211994_at	39313_at	217742_s_at	219679_s_at	222389_s_at	222390_at	242427_at		
Chrom			12	12	12	12	12	12	10	10	10	10	10		
Start			732154	859634	732485	732485	732485	859634	28937188	28862474	28862439	28862439	28867788		
Stop			806924	881560	890879	890879	890879	881409	28949464	28937366	28950027	28950027	28868526		
ANNOTDATE			40130	40130	40130	40130	40130	40130	40130	40130	40130	40130	40130		
GOLD123_DET_ALL			102	162	185	169	187	185	187	183	186	187	175		
GENETITLE			WNK lysine deficient protein kinase 1	WNK lysine deficient protein kinase 1	WNK lysine deficient protein kinase 1	WNK lysine deficient protein kinase 1	WNK lysine deficient protein kinase 1	WNK lysine deficient protein kinase 1	WW domain containing adaptor with coiled-coil	WW domain containing adaptor with coiled-coil	WW domain containing adaptor with coiled-coil	WW domain containing adaptor with coiled-coil	WW domain containing adaptor with coiled-coil		
GENESYMBOL	FAB	UPN	WGS	Array	WNK1	WNK1	WNK1	WNK1	WNK1	WNK1	WAC	WAC	WAC	WAC	WAC
10474_Signal	M1	933124 (relapse)	1	10474	48	1010.3	3788.9	257.6	4541.9	539.6	7180.6	2873	10657.2	16503.6	919
10475_Signal	M1	933124 (relapse)	1	10475	135.5	933	4686.2	1218.8	4405.7	665.5	6417.6	1936.5	10298.3	14850.9	561.4
M1_933124_S	M1	933124 (primary)	1	7502	234.1	890.9	4481.7	570	6301.6	578.4	7820.8	4540.3	13548.5	23692.6	694.6
M0_203_S	M0	203	0	6317	181.6	789.2	9105.9	963.7	9289	286.5	10626.2	5635.9	16758.5	30143.9	889.8
M0_DN_128392_S	M0	128392	0	18295	337.3579	2098.178	13634.25	3064.272	9312.437	1906.188	11388.21	3558.736	12921.3	28670.33	697.1782
M0_150951_S	M0	150951	0	6324	264.2	880.6	9120.4	1266.9	9934.4	765.3	8044.6	6507.6	10808.2	24673.5	724
M0_DN_255108_S	M0	255108	0	18249	209.4357	1692.238	7945.027	1335.014	6226.86	1440.165	9882.821	2697.802	13489.24	30816.43	364.9267
M0_269542_S	M0	269542	0	9843	24.8	1064.3	9236.5	975	7389.6	1279.6	15828.1	9281.3	24701	32453.6	1358.1
M0_301733_S	M0	301733	0	7495	272.7	776.8	4872.6	684.4	9167.8	630.2	9153.4	5374	19378.3	28355.1	821
M0_DN_303818_S	M0	303818	0	18139	155.8863	2016.047	15636.62	660.8937	7278.293	2403.329	10942.15	2753.99	12854	30244.21	871.2317
M0_369065_S	M0	369065	0	7508	373.9	1035.2	8002.8	662.1	10147.9	1007.1	10243	6208.3	18949.7	31871.4	1873.1
M0_DN_434640_S	M0	434640	0	18155	285.5829	2167.329	12700.93	4677.531	9726.557	1895.58	12784.49	7681.029	20474.61	34778.3	643.2431
M0_DN_553863_S	M0	553863	0	18161	188.0065	1712.504	10989.46	3496.409	8929.919	1773.129	11066.56	5378.261	16427.71	32175.45	856.0559
M0_692900_S	M0	692900	0	7506	344.5	1569.7	9507.9	1356.4	12424.9	1601.9	9658	6255.8	18015.7	28298.3	552.3
M0_DN_700717_S	M0	700717	36	17999	439.9295	1296.896	7187.558	1266.527	5787.513	993.7762	9859.125	3108.982	14453.09	27981.95	683.279
M0_DN_740266_S	M0	740266	0	18200	175.4029	1185.805	5642.946	961.4573	7166.367	1325.032	9952.841	3201.147	19761.49	45293.2	646.6891
M1_237_S	M1	237	0	6318	211.7	610.4	5586.8	745.3	6826.1	292.4	7799.9	5960.3	13936.2	22840.7	1009.8
M1_245_S	M1	245	0	6319	252	881.3	11895.7	709.8	9027.5	962.9	9972.1	6836.5	16486.3	24260.1	1765.5
M1_123172_S	M1	123172	3	6323	300.2	913.5	11811.9	1355.4	7825	629.8	8341.9	3786.3	11323.6	26484	1584.9
M1_DN_146218_S	M1	146218	0	17908	120.8386	812.6149	2694.276	192.5788	7536.91	369.4689	10353.21	2382.611	13872.2	28466.88	280.3309
M1_DN_150288_S	M1	150288	0	17909	313.0969	672.6077	4215.277	104.7728	9332.337	626.7845	13716.7	1823.647	9165.47	27154.64	428.02
M1_DN_224143_S	M1	224143	21	17884	159.8247	1247.712	8277.254	388.8837	5416.232	1736.016	8058.069	2342.995	21194.94	37306.98	352.9152
M1_274429_S	M1	274429	0	9615	336.5	1800.4	15063.6	915.8	9226	1749.5	8240.2	5485.5	18944.2	22838.9	1150.9

M1_DN_322110_S	M1	322110	0	18141	364.9119	1964.852	9332.337	854.2581	5458.711	2225.206	10177.39	3082.667	13916.56	28333.77	907.0831
M1_327733_S	M1	327733	8	7494	439.9	829.6	5758.6	422.5	10524.3	573.4	11477.5	4070.2	16979	29272	1636.3
M1_DN_329614_S	M1	329614	0	18144	252.0226	1475.253	9324.862	468.3089	7254.854	1557.042	11568.99	4809.68	13783.85	27147.65	529.9066
M1_DN_332131_S	M1	332131	0	18145	173.8162	1396.815	7226.608	1928.542	7032.914	1781.035	9951.247	3503.114	17426.95	35489.25	522.0771
M1_DN_345701_S	M1	345701	0	18153	192.1423	1698.466	7973.384	2603.648	6725.827	1459.619	11871.55	4566.05	16810.6	26797.35	854.4272
M1_DN_431799_S	M1	431799	0	18302	295.3505	2281.047	12540.08	3304.758	8696.631	2334.165	10163.48	5677.109	16527.67	32493.83	775.3183
M1_DN_498463_S	M1	498463	0	18157	368.4572	1534.016	9837.924	3198.663	8819.531	1403.654	11422.15	6877.058	17677.79	39386.98	373.2515
M1_509733_S	M1	509733	0	6339	228.4	1428.9	7763.6	770.9	9527.9	746.8	9005.7	6709	13564.2	40511.7	3725.4
M1_509754_S	M1	509754	7	9681	214.6	3076.8	9973	1255.6	7468.3	2308.4	8504	5484.3	18494.9	21244.8	913.4
M1_DN_514066_S	M1	514066	0	18159	224.9354	866.6609	4371.716	1352.562	3433.054	760.9903	5024.978	954.5438	4517.188	15936.58	758.7257
M1_DN_545259_S	M1	545259	33	17887	371.1495	1250.217	5931.742	233.8909	11457.55	1450.679	10393.62	3207.204	20876.06	37680.33	214.8386
M1_DN_548327_S	M1	548327	34	17888	355.2929	1172.333	5415.614	210.7637	5589.42	1842.144	8664.344	1021.76	15202.87	34165.65	358.3484
M1_585686_S	M1	585686	0	10569	286.2	581.4	7525.2	441.2	7932.3	714	11308	4947.3	16032.9	29333.2	1815.1
M1_DN_594368_S	M1	594368	0	18162	164.6125	951.3661	7328.222	1661.051	6055.692	962.0799	11435.39	4508.005	13859.28	24486.05	528.5656
M1_633734_S	M1	633734	0	9680	157.3	1478.3	10049	1362.5	6548.6	1304.4	8320.6	1613	15629.1	25125.3	1487.3
M1_DN_721214_S	M1	721214	0	18197	223.2367	1281.503	6606.438	894.2997	8515.674	1158.695	7603.25	3415.395	16701.77	31504.38	418.8472
M1_DN_804168_S	M1	804168	40	18256	238.2037	747.8181	1993.612	108.1187	3869.892	480.9968	8698.378	1216.218	16143.75	37733.77	148.4671
M1_807615_S	M1	807615	0	6336	303.6	443.4	10805.5	738.3	7422.6	398.3	9561.6	3727.3	14621.2	28159.1	1528.6
M1_807970_S	M1	807970	2	11416	365.7	1910.7	6697.7	2227.4	6456.1	1579.5	10314.8	7595.8	15397.5	27308.8	837
M1_808642_S	M1	808642	6	11423	228.7	1557	7639.4	2229.4	7179.4	1005.5	8953.2	7777.3	17172.4	25192.1	513.6
M1_DN_809653_S	M1	809653	0	18204	538.5926	1663.616	14671.64	1524.789	12560.35	1808.433	8711.613	3949.24	14930.13	37404.36	215.959
M1_831711_S	M1	831711	4	13067	445.7	1715.4	11648.8	3970.7	7152.5	1442.1	8545.3	6960.4	13136.1	18093.3	1842.4
M1_849660_S	M1	849660	5	10567	428	1576.2	13333.1	1287.6	9929.2	960.9	10174.7	5008	18607	31296.5	368.1
M1_DN_851929_S	M1	851929	0	18205	298.8251	1872.241	8525.545	1329.118	9606.269	2008.704	7726.361	2956.381	15253.98	36009.25	373.3518
M1_852559_S	M1	852559	0	9847	244.5	499.3	4277.7	605.7	3069.4	634.3	9964.5	5661.6	16487.5	26977.1	353.1
M1_974749_S	M1	974749	0	6338	180.2	659.5	7882.6	598.2	9641.7	439.4	10308.4	4767.6	18426.5	34548	1187.3
M1_975684_S	M1	975684	0	9692	473.3	1033.1	10218.5	712.2	8707.9	392.9	11620	8618	22975.8	31083.3	2212.6
M1_DN_982009_S	M1	982009	0	18209	296.8021	1991.445	8105.772	1279.763	6883.345	1714.108	10025.76	3355.945	14249.85	25050.8	397.7517
M1_984036_S	M1	984036	0	9695	16	1954.2	11892.4	707.7	8093.6	1049.1	13792.7	7540.6	15554	15957.7	1056.6
M1_DN_987523_S	M1	987523	0	18210	346.1815	1750.396	8253.029	930.3145	10231.85	1380.556	15176.66	6236.029	20737.16	45510.34	459.6495
M1_989176_S	M1	989176	0	13066	162.5	1346.3	7842.6	2552.8	4709.8	1239.8	10155.8	6314.6	11287.8	15007.3	2330.1
M1_992966_S	M1	992966	0	9686	106.5	1539	8455.1	719.7	6607.2	812.9	9222	5808.7	19008.9	20500.2	2810.4
M2_269_S	M2	269	0	6320	285.8	1485	11721.5	1261	9075.3	1179.6	8988	3330	15012.5	29690.5	2538.9
M2_295_S	M2	295	0	9833	62.7	1041.2	12254	854.1	5526.7	895.2	10760.8	4652.3	25872.3	17346.7	2571.5
M2_DN_103342_S	M2	103342	17	17903	222.679	1921.984	13254.17	419.9704	6933.246	2095.438	10593.84	2200.195	8799.323	26331.66	620.1928
M2_104851_S	M2	104851	0	7500	199.4	939.6	6705.2	472.6	6353.1	630.7	9285.4	4803.4	13911.8	25816.9	1970.3
M2_108135_S	M2	108135	0	6322	437.5	314.7	7777.1	980.4	7735.2	630.5	8127.8	5817.1	13762.4	29452.4	1888.8

M2_DN_113971_S	M2	113971	18	17904	294.4258	1380.519	13211.43	668.8361	9333.999	1836.447	12320.71	3344.677	17388.44	39022.54	769.0372
M2_DN_141273_S	M2	141273	0	17907	307.866	624.179	2378.408	115.2654	7143.087	498.2436	10475.83	1299.001	8432.677	25527.86	217.7442
M2_DN_179223_S	M2	179223	20	18297	733.7283	3921.41	24776.29	4638.933	16065.52	4134.074	9817.859	2934.904	11657.97	32138.01	598.0331
M2_195182_S	M2	195182	0	9694	301.5	2186.4	11297.2	1085.9	7554.5	1732.2	11207.6	7335.6	19236.7	17724	1120.5
M2_208027_S	M2	208027	0	7491	233.2	825.3	6394.7	779.9	7752.5	814.5	9172.3	4742.4	16939.6	25717	778.4
M2_DN_225373_S	M2	225373	22	18299	353.0934	2355.579	11154.66	4090.698	4678.386	3483.011	8595.87	3985.495	7551.571	34426.18	861.6507
M2_DN_237983_S	M2	237983	0	18065	215.4335	1471.566	8102.6	433.8173	7174.515	1307.663	10442.72	5428.332	25069.8	48461.47	486.5141
M2_DN_254137_S	M2	254137	24	18300	589.4583	1663.529	11370.11	2987.072	6589.971	2230.312	9924.67	3338.357	13187.69	35332.72	299.0573
M2_DN_258135_S	M2	258135	0	18135	279.9937	1876.756	10245.74	706.2094	6229.453	1736.92	10257.28	1933.507	15189.94	35437.57	577.9929
M2_263578_S	M2	263578	0	6327	175.2	932.4	9403.1	1031.7	5922.4	753.4	9022.7	4112.7	14356.8	24231.4	1689.2
M2_273919_S	M2	273919	25	11420	161.9	964.1	6925.5	1309.3	7652.5	604.7	12694.1	5579.9	17170.2	23798.4	276.9
M2_DN_275786_S	M2	275786	0	18136	112.5518	814.0866	5938.358	556.1102	6268.059	684.1697	11020.74	4232.395	13989.4	25664.36	905.877
M2_312340_S	M2	312340	0	6330	475.9	2228.5	25269.9	5325.8	13938.3	2895.2	7685.1	5251.4	10238.6	36838.6	1649.6
M2_DN_319955_S	M2	319955	0	18140	160.4172	1703.69	12465.34	648.331	6378.901	1975.426	10198.81	3414.519	14815.94	37117.08	1155.471
M2_DN_325028_S	M2	325028	0	18142	35.26897	107.0832	3622.571	1872.624	7903.494	83.90916	5263.366	2344.235	3809.394	7804.083	1462.932
M2_DN_326772_S	M2	326772	0	18143	433.4755	2032.103	17108.93	1585.088	8442.276	2454.814	13060.77	2995.114	16984.61	30155.81	659.4302
M2_DN_400830_S	M2	400830	0	18146	221.6867	1715.022	7108.592	2676.946	8518.752	2075.743	9803.715	3185.288	20102.41	39694.98	483.2742
M2_426980_S	M2	426980	28	9693	471.4	1269.5	12142.7	1325.3	6399.7	1050.2	10934.7	7248.2	18471.4	22685.1	868
M2_432398_S	M2	432398	0	9834	502.5	1489.5	14902.1	1174.7	8270.6	1599.7	10968.8	7325.9	20562.4	24621.3	736.8
M2_433325_S	M2	433325	0	7501	441.6	847.6	5895.7	549.4	9189	899.5	8687.9	5873.3	15542.6	29380.4	821
M2_445045_S	M2	445045	30	11413	381.7	1558.5	8996.7	1857.7	10011.5	1275.6	8595.1	4565.4	14994	25297.7	484.1
M2_DN_463352_S	M2	463352	0	18148	74.30852	1063.859	5172.884	2240.176	5964.897	1044.192	10111.39	4348.464	15450.05	33733.81	442.9827
M2_570755_S	M2	570755	0	9689	397.2	1800.1	12150	1190	7450	1690.6	7357.2	4487	15975.3	17679.6	930.7
M2_593890_S	M2	593890	0	11418	157.6	2133.7	13766.8	2369.5	10660.2	1784.8	11245.9	5027.3	17528.5	28703.6	1039.3
M2_606061_S	M2	606061	0	6334	278	1045.6	14031.4	2231	8416.5	785.8	10591.6	3087.8	17765.9	47834.6	3093.6
M2_631879_S	M2	631879	0	7660	271.5	1848.1	8617.7	880	9810.8	1111.6	9248.7	1541.2	3664.9	13171	527.7
M2_645137_S	M2	645137	0	6335	188.1	542	6962.2	919.5	6389.2	377.8	8168.6	5649.4	12811.1	29167.9	3039.3
M2_724606_S	M2	724606	0	7496	110.1	783.8	6456.5	756	11873.7	1046.4	10396	6240.6	20563.2	24177.4	1599.6
M2_DN_750152_S	M2	750152	0	17906	239.746	764.121	1823.447	172.6131	6218.667	425.0748	13352.94	1908.394	10681.66	30876.63	368.7142
M2_DN_753374_S	M2	753374	38	18001	1026.111	3950.896	34523.55	7055.504	8598.931	5803.497	7967.284	2576.297	16115.41	34741.75	524.3723
M2_767545_S	M2	767545	0	7507	349.6	573	10520.2	651	15201.9	1016.2	14820.3	4328.2	14666.8	26093.3	915
M2_DN_817156_S	M2	817156	42	18004	422.7896	2394.738	10016.21	1493.606	6026.755	2105.374	7436.253	2519.357	9366.108	29397.59	847.1683
M2_DN_869922_S	M2	869922	0	18352	169.955	1798.372	8773.453	1286.165	7328.188	1924.781	9388.569	2250.6	13170.16	31565.54	553.166
M2_905179_S	M2	905179	0	9679	215.8	1753	6427.6	832.1	5720.7	1143.2	8623.8	4618.8	14176.9	18843	647.6
M2_936028_S	M2	936028	0	10568	231	315.4	8120.8	645.8	5996.5	880.6	9722.9	5028.4	17744.9	22024.1	787.4
M2_991612_S	M2	991612	46	11421	173.7	2186.1	14565.6	2086.4	12037.9	2113.6	10596.7	7016.8	15785.8	21245	410.3
M2_DN_997292_S	M2	997292	0	18212	155.909	1007.987	11979.28	2138.391	8768.985	1105.695	9445.41	5046.131	18665.88	34916.32	1545.518

M3_110_S	M3	110	0	7490	192.3	998	3062.6	222.3	4392.9	1362.7	7632.3	1302.3	19051.3	27264.2	381.8
M3_201_S	M3	201	0	7493	688.2	1947.8	14700.4	1888.1	19255	1786.4	11717.4	3735.1	13787.6	25461.1	1604.4
M3_287_S	M3	287	0	7499	283.8	1339.5	5026.5	1916.5	4856.4	1573.9	8471.3	3019.7	14775.3	32169.8	860.9
M3_DN_179016_S	M3	179016	0	18062	364.8046	2769.113	12212.13	929.988	7185.734	3772.508	8484.663	2252.138	7122.859	21132.51	425.1876
M3_DN_202127_S	M3	202127	48	17883	185.6835	951.1861	4710.347	225.4786	5853.682	700.1725	8810.556	2955.147	18923.58	35861.98	218.8984
M3_291696_S	M3	291696	0	11415	90.1	511.3	4689.9	1397.2	5598.4	526.3	11084.9	8291.7	16214.8	26840.4	479.6
M3_321258_S	M3	321258	14	10572	302.4	904.7	9067.5	1340.4	8875.2	1229.4	10814.3	4794.8	13311	32057.5	556.6
M3_344551_S	M3	344551	12	9684	68.5	3489.7	38025.2	5247.4	7349.1	3146.8	5448.1	7001.3	11027.2	12322.7	4911.6
M3_447649_S	M3	447649	0	6333	231.6	1196.9	9809.7	829.5	5617.2	879.4	7537.5	3726.2	12553.5	31749.6	2430.1
M3_DN_455499_S	M3	455499	16	17885	27.19196	716.2982	4391.995	293.468	5782.356	1032.779	8794.956	979.5588	19616.3	42292.28	113.7817
M3_DN_478908_S	M3	478908	11	17886	307.5625	693.0395	4465.168	211.8602	6911.58	1119.865	9556.377	1466.697	13744.03	38161.46	196.6484
M3_501944_S	M3	501944	50	7509	404.8	996.6	3993.3	577	6218.6	488	12121.4	5250.5	16046.9	26474.8	746.1
M3_537782_S	M3	537782	0	6340	190.5	1643	6416.9	824	3680.8	1003.8	8626.3	1113.3	17768.2	44008.7	2048.8
M3_575512_S	M3	575512	0	9850	197.9	1438.1	7673.1	1072.3	6771.3	989.3	11306	6197.6	19420.8	23006.2	461
M3_673778_S	M3	673778	13	9614	456.4	1126.6	8504.8	960	6054.8	1189.6	10543	5987.9	20629.6	23437.8	1470.4
M3_709968_S	M3	709968	9	9685	246.4	1641.3	10100.6	1583.9	6917.1	2279	8255.9	5136.6	14585.4	16044	1663.1
M3_731274_S	M3	731274	0	7498	241.8	676	6542.9	575.1	5319.3	709.5	9921.2	4666.4	11153.6	23968	956.3
M3_DN_757199_S	M3	757199	0	18201	180.4966	1703.116	5026.221	792.197	5304.673	2141.594	8784.884	2995.03	15241.12	29581.97	648.4532
M3_DN_758168_S	M3	758168	15	17996	481.3824	2563.299	13692.1	3514.812	9908.357	2894.811	8824.983	3789.13	7107.854	26634.54	1057.962
M3_863018_S	M3	863018	10	9678	607.7	1764.9	12297.2	1745.1	5987.2	1401.7	7826.9	4189.2	10009.6	16363	2046.4
M3_943309_S	M3	943309	51	11414	253.1	1379.4	7760.6	1531	7160.8	1255.6	10671.3	6107.7	16313.1	26078.8	519.5
M3_964886_S	M3	964886	0	9691	406.9	1630.2	7830.9	599.1	4984.4	1439.2	8511.3	5517.6	14313	17749.2	1041.8
M4_104_S	M4	104	0	7492	67.9	1871.5	7031.1	1922.2	7344.2	1468	9222.1	3314.2	17763.8	31433.5	742.2
M4_296_S	M4	296	0	7497	1055.8	1078.5	6093.3	1159.3	3572.3	1465.2	18332.8	6328.3	29601.7	37857.3	1034.9
M4_DN_142074_S	M4	142074	19	18248	177.8048	238.4344	2419.492	165.9711	6400.701	477.9228	10028.75	1006.573	10781.75	26992.68	228.4113
M4_147796_S	M4	147796	0	10570	286.7	741.8	9800.2	1161.4	9064.8	775.5	8740.6	5501.3	17678.9	31419.3	565.3
M4_156704_S	M4	156704	0	7503	274.6	985.7	5762.7	671.8	7640.8	806.8	9137.5	5827.5	14980.9	23590.3	460.3
M4_186481_S	M4	186481	0	6325	339.6	914.3	12790	1594.5	9357.4	1205.7	9128.9	5419.7	13799	40197.9	2453.3
M4_DN_242129_S	M4	242129	0	18066	259.9712	1615.383	11404.71	951.2936	6741.534	1995.837	8654.776	2762.217	18527.45	29698.29	677.2202
M4_DN_245450_S	M4	245450	0	18133	156.0679	1853.058	11599.71	839.1526	6460.999	1764.488	8541.882	3552.499	9424.779	27580.9	771.9271
M4_DN_246634_S	M4	246634	23	18292	248.5161	2429.97	8389.955	4312.611	5875.258	3603.542	6684.762	2529.815	6121.092	13730.06	3394.922
M4_DN_290344_S	M4	290344	0	18137	572.208	1887.783	15487.05	567.5286	8429.751	2176.061	10275.29	2440.128	11217.38	34296.18	829.1417
M4_311636_S	M4	311636	0	6329	389	1139.2	13145.3	1409.6	6877.4	1350	8626.8	2174.3	15366.3	32379.4	2629.3
M4_318433_S	M4	318433	0	6331	157.3	888.2	9898.7	1079.9	10039.6	832.4	7216.3	4900	13605.2	26475.8	1181.6
M4_346190_S	M4	346190	0	9690	40.2	1899.2	12010.2	1388	9894.4	1452.6	8041.2	4884.8	17424.6	22063.2	522.4
M4_399253_S	M4	399253	0	6332	303.7	631.6	11992.1	1044.6	9732.1	578.5	6923	5056.5	14633	31246.2	2773
M4_DN_400220_S	M4	400220	27	18252	117.6743	969.6259	3198.232	336.8893	7646.584	739.0547	13315.22	971.3914	10493.86	26441.99	305.9138

M4_407992_S	M4	407992	0	7504	175.5	1135.8	4307.2	778.6	8656.8	1110.2	11539.7	3762.9	21025.6	33897	420.7
M4_418499_S	M4	418499	0	9688	347	1758.9	12652.8	1544.4	7542.6	1837.2	8334.2	5135.3	19718.4	23544.6	1131
M4_DN_456892_S	M4	456892	32	17998	311.7274	2429.461	18094.69	1776.541	8723.532	2622.059	9684.902	2737.108	12592.16	27196.32	701.7245
M4_DN_470690_S	M4	470690	0	18156	153.6104	1729.907	9811.791	2209.689	6641.052	1760.971	9799.106	2474.224	13151.12	29907.73	372.4909
M4_DN_499294_S	M4	499294	0	18158	235.9749	2479.028	14802.56	5884.622	7894.809	3421.951	9591.951	3582.292	16488.38	34495.57	454.3971
M4_DN_507696_S	M4	507696	0	18150	163.4631	1109.636	6290.904	1690.298	7268.49	1077.837	10413.6	3849.227	16551.59	35578.49	389.7811
M4_558395_S	M4	558395	0	7505	193.5	971.7	4543.1	332.6	6305.1	600.3	10718.9	5855.5	16775.8	25048.1	724.5
M4_DN_573988_S	M4	573988	35	18349	286.1372	2122.334	15210.6	2440.782	8094.373	2498.551	12573.04	2373.186	13974.6	27695.25	566.6025
M4_DN_595704_S	M4	595704	0	18152	352.753	1557.398	8061.158	2128.626	7385.268	1875.458	9297.394	2813.257	13060.14	35955.54	632.6037
M4_619751_S	M4	619751	0	9687	15.7	2040.2	10000.8	892.1	6268	1557.4	7908.7	5205.8	17540.5	18864.3	1270.9
M4_670224_S	M4	670224	0	9683	473.6	1737.2	10672.1	873.4	5977.6	1279.9	6991	5586.4	15680.3	17912.4	2472.1
M4_DN_671473_S	M4	671473	0	18350	252.6257	1979.9	11537.32	2040.129	6886.659	2196.807	12433.04	1979.384	14170.07	29432.66	760.5497
M4_DN_708512_S	M4	708512	0	18293	158.0512	2356.27	11498.36	3510.269	5033.363	3420.434	9640.479	1905.093	17291.78	29778.26	784.9251
M4_818119_S	M4	818119	0	10892	253.3	1068.1	8071.8	644	8776.4	946.6	9416.4	7907	17827.5	23983.3	732.4
M4_826984_S	M4	826984	0	6337	498.3	2251.2	25291.3	1642.6	15568	1873.9	9417.2	2900.1	14484	28924.2	1861.8
M4_DN_862507_S	M4	862507	0	11422	382.7016	1755.717	7357.426	1469.206	7488.974	1306.779	10090.44	3036.406	13358.11	31073.83	368.8578
M4_868231_S	M4	868231	0	11412	260.8	1825.8	8530.7	3871.6	6980.7	1388.1	8381.9	6401	15194.7	22767.5	419.5
M4_869586_S	M4	869586	43	10571	541	1550.3	7216.4	1006.9	7847.6	1054	8331.7	3857.5	11730.8	25055.4	1104.9
M4_DN_906708_S	M4	906708	44	18005	486.0807	2217.347	11241.95	1690.291	6572.17	2619.495	7732.25	2539.878	12818.22	32262.08	897.5732
M4_DN_944281_S	M4	944281	0	18208	378.0195	2284.824	6245.841	1914.271	5906.933	3054.38	6536.208	1221.701	6378.615	30076.44	630.7974
M4_DN_962561_S	M4	962561	0	11424	209.6312	1228.837	7231.026	1576.569	6596.596	1390.842	8763.858	4177.362	17618.23	28114.25	897.491
M5_DN_180168_S	M5	180168	0	18063	342.1317	2355.331	18337.94	1020.388	10961.35	2897.544	8255.597	3704.893	16495.57	27778.45	606.3204
M5_294154_S	M5	294154	0	9851	677.3	2589.6	22483.8	2630.3	11915	3196.6	10555.6	4948.6	11088.4	16158.7	844.4
M5_296361_S	M5	296361	0	11425	249.7	1046	7867.8	2135.1	7698.8	983	7126.5	7472.7	15737.7	25872	574.6
M5_DN_335640_S	M5	335640	26	18298	423.5873	3768.398	12373.06	3227.075	5063.762	4941.47	7450.782	1134.402	9347.085	22377.14	815.2957
M5_DN_375182_S	M5	375182	0	18296	253.8706	1780.626	13035.47	3605.006	7238.687	2388.569	10316.28	4468.284	12421.56	23681.8	666.2891
M5_380949_S	M5	380949	0	9853	89.3	1082.8	8457	697.1	5083.2	1100.8	10904.4	5246.5	16195.8	18153.8	716
M5_DN_410324_S	M5	410324	0	18154	312.1799	2456.731	7453.208	1861.197	4513.212	3102.446	6133.078	2127.972	8755.477	21586.43	247.9588
M5_412761_S	M5	412761	0	9839	289.9	1623.4	14399	1496	8758	1561.5	6598.4	4882.1	16474.4	19407.9	876.2
M5_427366_S	M5	427366	0	9835	718	1045.1	13797.8	1444.5	8065.3	1397.9	6831.3	5034	14374.2	19445.7	651
M5_DN_452198_S	M5	452198	31	18301	247.5185	1648.682	11473.59	1697.835	6294.992	1721.108	8927.402	2001.283	11235.57	25171.95	607.4284
M5_494454_S	M5	494454	0	9852	287.4	1483.1	13097	2277.9	8175.7	1399.3	7379.8	5473.1	17556.7	17772.1	3515.8
M5_DN_690397_S	M5	690397	0	18195	191.1506	1378.985	7965.666	1159.103	5336.522	1486.544	7477.875	1373.791	13461.38	32560.15	571.5416
M5_DN_702808_S	M5	702808	37	18000	441.539	3283.912	16482.4	2517.911	10001.2	3496.929	8954.391	4320.867	18521.18	30560.23	999.1746
M5_DN_717456_S	M5	717456	0	18196	178.7554	1363.237	5979.425	996.0701	6192.15	1550.214	7332.877	1834.602	13737.37	32889.96	371.7767
M5_730817_S	M5	730817	0	9840	600.6	1295.3	10948.5	1369.7	8447.5	1427.6	9195.4	5910.5	13204.5	21017.6	957.2
M5_DN_737451_S	M5	737451	0	18199	138.0162	1269.403	5385.149	791.1404	7129.272	1286.417	7613.451	2766.162	15163.91	33942.66	459.2255



M5_775109_S	M5	775109	39	9844	16.4	1301	13809.9	1719.9	6632.1	1339.9	8032.8	4001.4	11319.6	17557.4	527.3
M5_DN_816067_S	M5	816067	41	18002	646.0905	3653.389	13056.93	2252.984	7605.384	5535.424	7423.851	2077.119	13390.77	33717.34	1300.471
M5_DN_907786_S	M5	907786	45	18006	216.9161	2182.514	12456.41	1956.525	7032.574	2542.905	7716.207	3350.995	17191.1	29370.46	518.0335
M5_DN_923966_S	M5	923966	0	18258	118.8627	1372.913	8228.831	1765.178	6864.093	1821.494	9736.23	3436.875	14403.4	22595.67	873.6022
M5_957664_S	M5	957664	0	9848	365.4	2102.3	9335.9	768.6	5404.4	1207.1	7157.2	1882.6	10905.5	15239.4	531.8
M6_327929_S	M6	327929	0	9862	834.1	3335	58509	4236.1	71085.1	3224.5	17297.1	8973.7	30204.3	27633.4	3028.1
M6_569053_S	M6	569053	0	9845	378.7	1407	12326	1395.9	10018.1	1333.2	11725.4	3654.1	16800.9	23463.5	654.5
M6_884262_S	M6	884262	0	9838	378.2	1044.2	9572.7	710.9	7087.5	814.2	9916.1	5568	19384.2	24223.6	468.5
M7_530962_S	M7	530962	0	11419	88.2	1283.3	10779.6	1527.9	9899.6	1155.7	9424.2	7932.9	17202.9	24127.8	307.7
M7_938150_S	M7	938150	0	9836	254	1277.1	15252.2	1690.3	8241.7	1053.7	10160.3	4879.8	15846.5	17264.8	547.7
M7_986000_S	M7	986000	0	9841	400.6	2394.3	14163.4	1114.5	9208.2	1108.7	9438.6	4250.2	16975.3	21798.3	115.8
CD34_1 (1)	CD34				499.4	754.5	4760.6	751	9014.9	453.9	12472.7	4120.2	15893.3	38322.3	393.8
CD34_2 (1)	CD34				323.8	942.7	6031.3	828.3	5561	942	14051.2	3484.6	19432.6	36194.6	1075.4
cd34-3_13068_S	CD34				238	658.5	8647.4	1067.5	6816.8	345.4	7339.6	6498.5	16711	23954	896
cd34-4_13234_S	CD34				813.8	1516.9	7859.6	2593.1	7340.6	254	9047	2867.2	14761.8	18789.1	1124
cd34-5_13230_S	CD34				252.5	585.1	6528.5	555.4	6798.4	427.5	9650.3	4705.8	13110.2	17389.2	1188
pros-5_13069_S	Pros				356.1	830.7	15659.5	4389.4	4462	967.8	11281	4442.8	20537.5	25979.5	2338.2
pros-6_13073_S	Pros				295.3	893	12073.5	2524.5	6469.9	804.9	11339	10639	26650.9	33617.9	2240.8
pros-7_13074_S	Pros				440.2	1527.7	13122.7	3708.5	9798.6	747	13189.2	7944.8	25569.4	34576.9	1747.3
pros-9_13233_S	Pros				324.3	1093.3	13040.2	4859.9	7986.1	1328.9	10909.1	11146.7	26581.4	28439.1	3403
pros-8_13232_S	Pros				452.7	955.1	12869.5	6135.2	7634.6	759.1	11325.5	9322.1	19886.7	26337.6	3334.7
Late_1 (1)	PMNs				254	3030.5	24989.7	2563	13261.5	2601.2	15347.2	13565	49676.7	46213.4	1437
Late_2 (1)	PMNs				656.7	2678.2	27980.2	2092.9	15485.3	3262.7	19350.2	15733.3	43199.4	34932.3	1192.8
pmns-5_13070_S	PMNs				540.4	200.5	12150.5	3953.4	9170.7	1375	21316	4084.4	26432	44946.9	965.9
pmns6_13075_S	PMNs				33.5	1398.8	10974.8	3014.9	8993.6	1337.3	21970	18702.7	20908.7	16904.3	2322.8
pmns-7_13076_S	PMNs				370.6	1820.1	16653.9	3562.9	9790.3	1342.3	22063.7	11100.1	31966.8	39744.6	1

**Supplementary Table 10.** Major clusters identified by Kernel Density Estimation (KDE) analysis in 7 primary tumor-relapse pairs.

ID	UPN	Cluster	Primary Tumor Variant Allele Frequency(%)	Relapse Variant Allele Frequency(%)	Normal Variant Allele Frequency(%)
AML15	758168	Cluster1	45.5*	44.8	7.05
AML15	758168	Cluster2	41.8*	26*	-
AML15	758168	Cluster3	0	17	-
AML27	400220	Cluster1	44.6	36.6	7.05
AML27	400220	Cluster2	0	13.3	-
AML28	426980	Cluster1	45.4	41.3	1.37
AML28	426980	Cluster2	45.4	11.5	-
AML28	426980	Cluster3	45.4	0	-
AML28	426980	Cluster4	18.2	0	-
AML28	426980	Cluster5	0	30.1	-
AML31	452198	Cluster1	45.4	18	20.4
AML31	452198	Cluster2	36	0	-
AML31	452198	Cluster3	11	0	-
AML31	452198	Cluster4	0	18	-
AML35	573988	Cluster1	41.7	14.3	14.1
AML35	573988	Cluster2	0	10.4	-
AML40	804168	Cluster1	45.2	39.3	2.94
AML40	804168	Cluster2	0	21.7	-
AML43	869586	Cluster1	45.4	20	1.17
AML43	869586	Cluster2	23.3	0	-
AML43	869586	Cluster3	16.4	20	-
AML43	869586	Cluster4	0	20	-

\* Clusters were identified with mcluster, dbSCAN was used to resolve allele frequencies between cluster 1 and 2 in AML15 UPN758168

**Supplementary Table 11.** 6 classes of transition and transversion events in primary tumor mutations and relapse-specific mutations from 8 AML cases.

ID Relapse UPN	AML1 933124	AML15 758168	AML27 400220	AML28 426980	AML31 452198	AML35 573988	AML40 804168	AML43 869586	Total
A-->C	6	4	1	6	3	3	22	0	45
A-->G	5	13	3	11	9	0	17	2	60
A-->T	5	13	0	10	3	1	6	4	42
C-->A	17	20	5	15	9	2	14	1	83
C-->G	7	6	3	6	4	3	12	0	41
C-->T	25	43	10	55	14	6	28	5	186

ID Tumor UPN	AML1 933124	AML15 758168	AML27 400220	AML28 426980	AML31 452198	AML35 573988	AML40 804168	AML43 869586	Total
A-->C	16	24	11	38	4	5	23	37	158
A-->G	66	69	34	128	12	35	94	129	567
A-->T	19	40	14	58	6	9	42	92	280
C-->A	40	47	47	77	8	11	76	161	467
C-->G	24	26	12	48	5	5	28	48	196
C-->T	157	166	150	391	40	68	260	690	1922

	Relapse	Tumor	p-value (prop.test)
A-->C	45/457	158/3590	9.13E-07
A-->G	60/457	567/3590	0.1573
A-->T	42/457	280/3590	0.3456
C-->A	83/457	467/3590	0.003122
C-->G	41/457	196/3590	0.003664
C-->T	186/457	1922/3590	2.99E-07
<b>Transversion/(Transversion+Transition)</b>	<b>211/457</b>	<b>1101/3590</b>	<b>3.71E-11</b>

**Supplementary Table 12.** Genes in transmembrane transport process (based on gene ontology analysis) harbor mutation(s) in at least one of the 8 cases.

<b>GO Term</b>	<b>Mutated Gene</b>	<b>Sample</b>	<b>TumorVarFreq</b>	<b>RelapseVarFreq</b>	<b>Classification</b>	<b>Amino Acid Change</b>
<b>GO:0055085: transmembrane transport</b>	<i>ABCB11</i>	869586	46.97%	21.84%	shared	p.A1283V
	<i>GABRR1</i>	869586	46.47%	18.86%	shared	p.A286T
	<i>KCNQ2</i>	426980	46.99%	12.68%	shared	e15+1
	<i>SLC15A1</i>	933124	51.50%	45.90%	shared	p.W77*
	<i>SLC25A12</i>	804168	0.00%	23.52%	relapse-specific	p.R603W
	<i>SLC30A6</i>	758168	49.43%	42.66%	shared	p.H356R
	<i>TPTE2</i>	758168	43.65%	49.10%	shared	p.E339K

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