Basiscursus ECG voor huisartsen
2e avond
Het afwijkende ECG

Jonas de Jong

Indeling

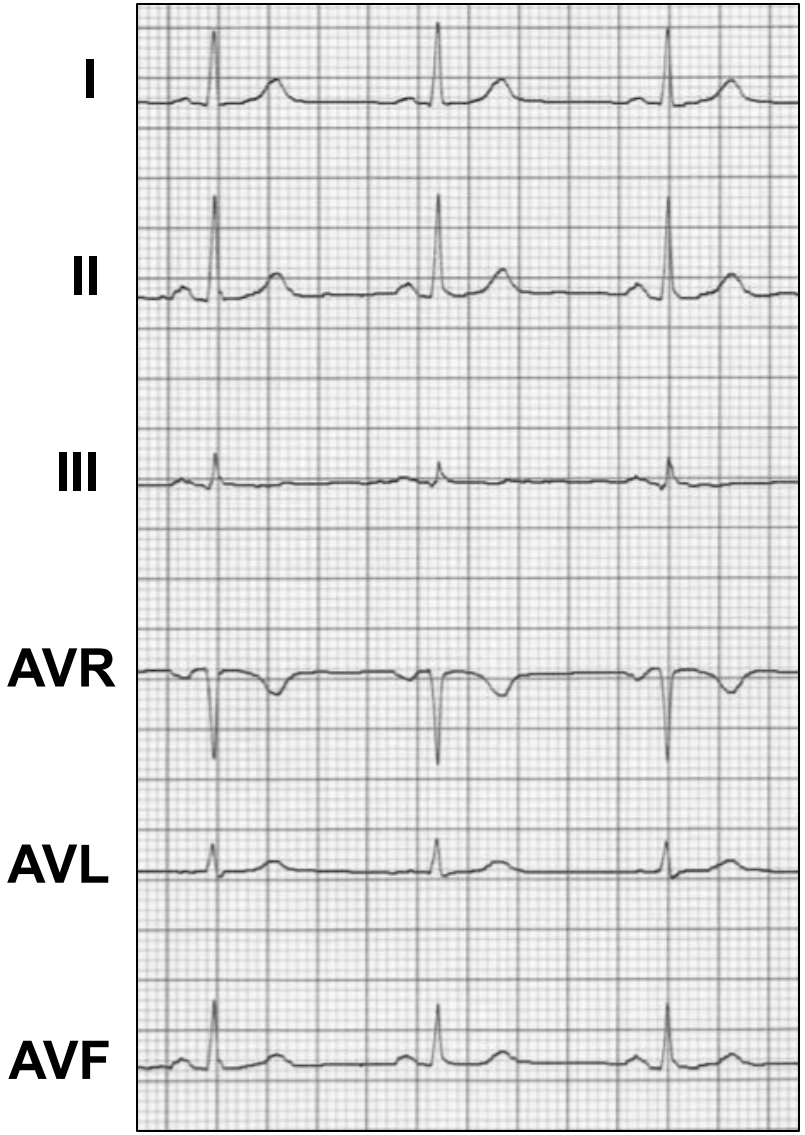
- Korte herhaling 7+2 stappenplan
- 2 korte casus
- Ritmestoornissen
- Geleidingsstoornissen
- Ischemie
- Oefen-ECG’s

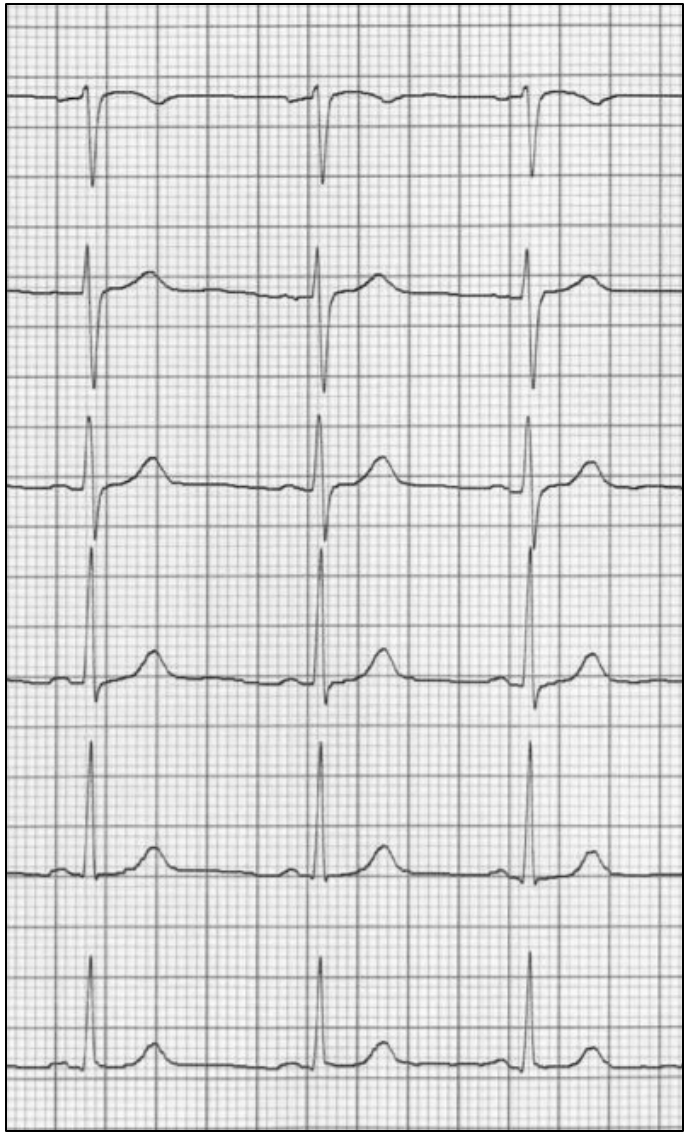
Systematische beoordeling

1. Ritme
2. Frequentie
3. Geleidingstijden
4. Hart-as
5. P top morfologie
6. QRS morfologie
7. ST morfologie

8. Vergelijking met oud ECG
9. Conclusie

Het normale ECG



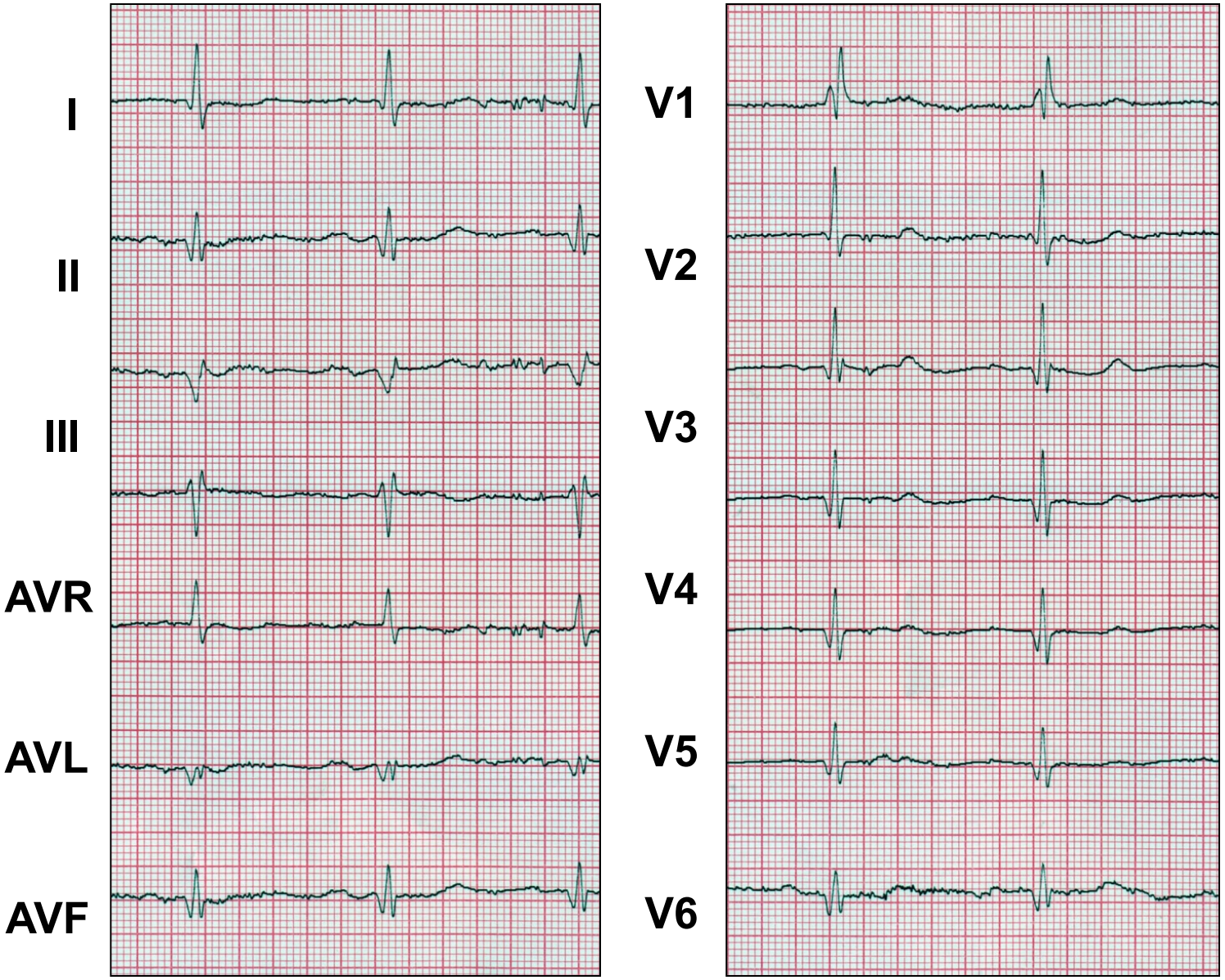


Het afwijkende ECG

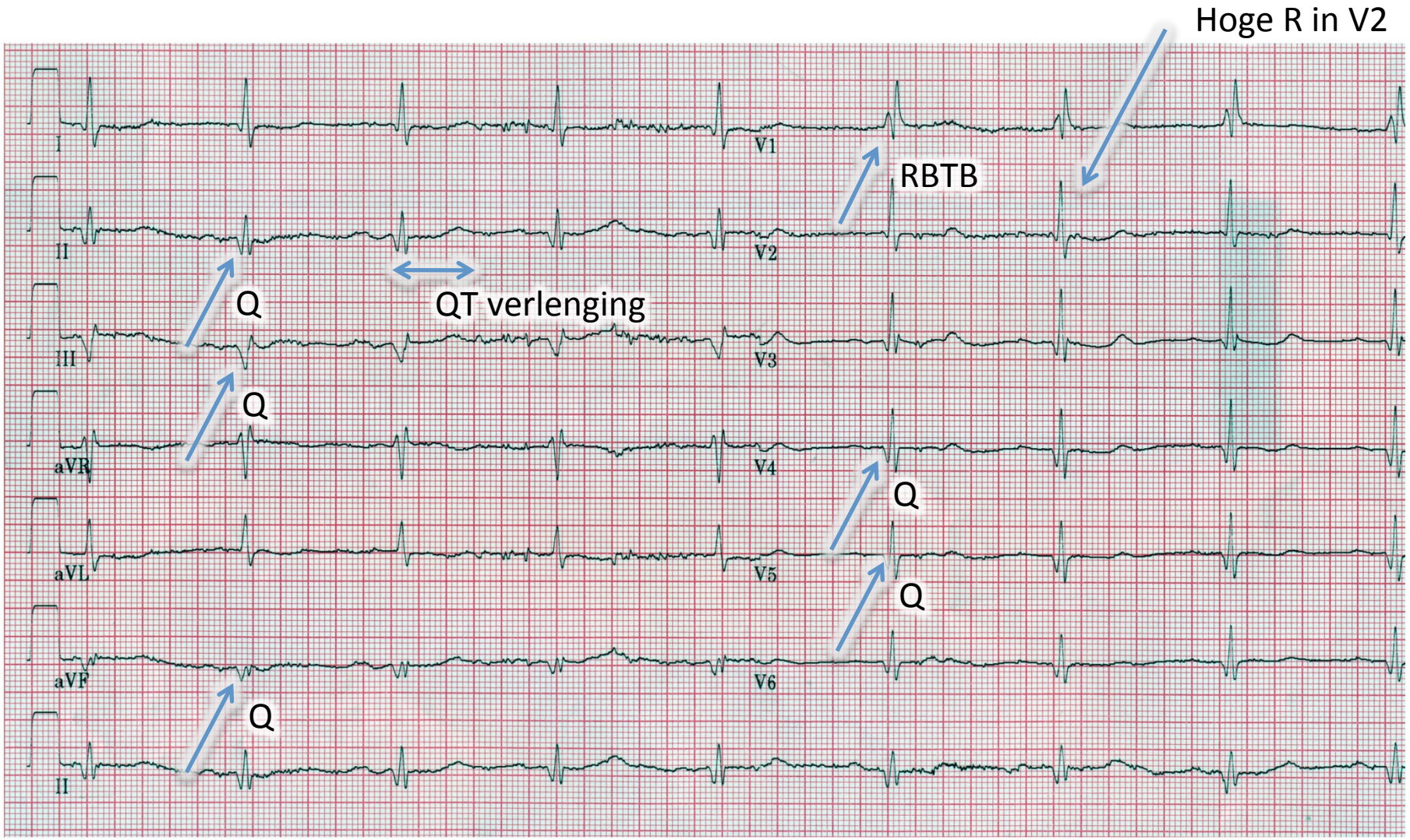
- Ritme- en geleiding
- Ischemie

Casus 1

- 67 jarige man
- Vorige week een paar dagen lang pijn op de borst gehad
- Nu lichte druk op de borst bij inspanning



Courtesy of CCU nursus, AMC, The Netherlands

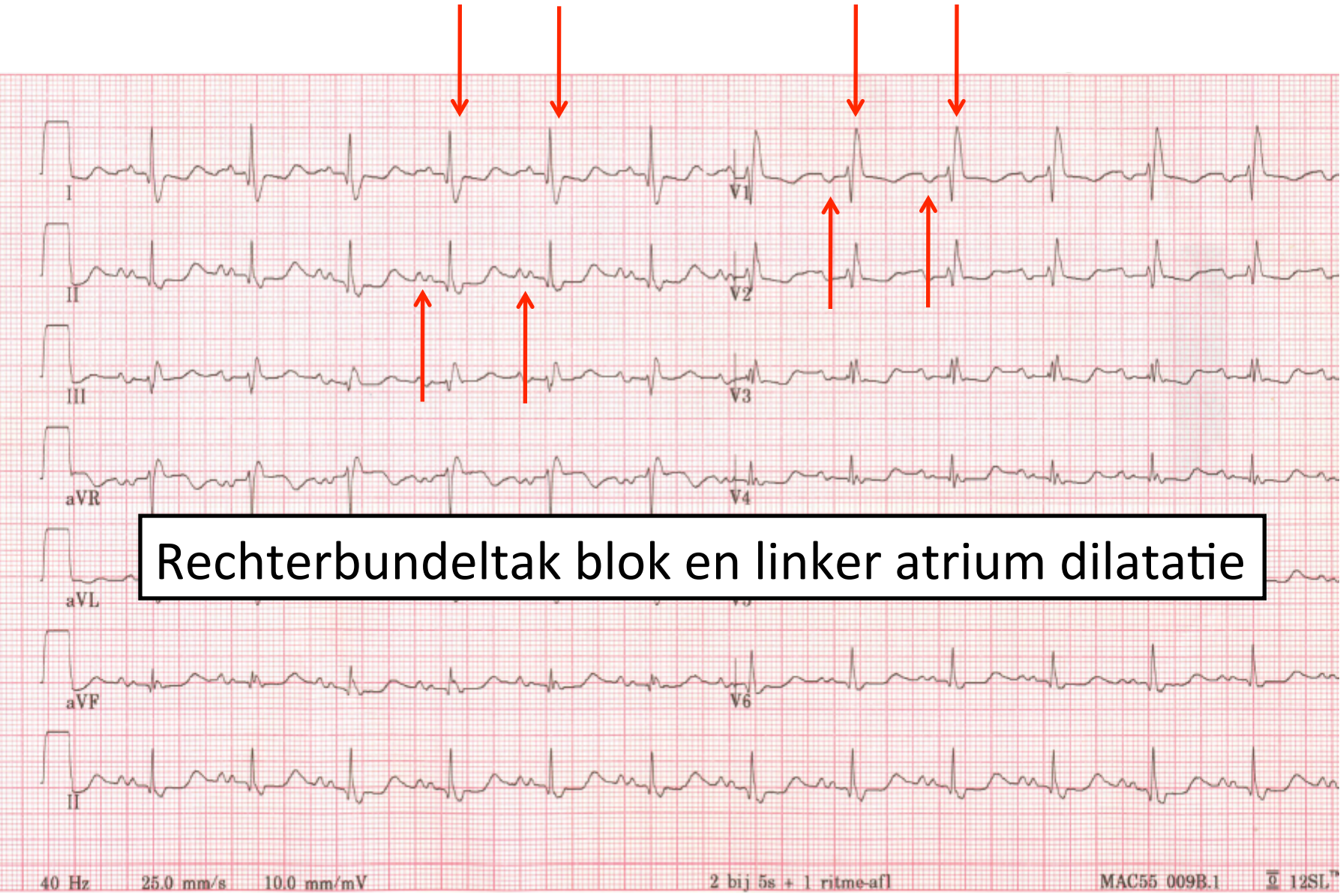


Doorgemaakt IPL-infarct, RBTB, QT verlenging

Casus 2

- Hr A. 68 jaar
- Rookt, hypertensie
- Medicatie: HCT, metoprolol, seretide
- Kortademig bij inspanning


I
II
III
AVR
AVL
AVF
V1
V2
V3
V4
V5
V6



Rechterbundeltak blok en linker atrium dilatatie

RITMESTOORNISSEN

Ritme- en geleidingstoornissen

- Wat is de hartfrequentie?
- Zijn er extra slagen?
- Zijn er P toppen die niet gevolgd worden?
- Breedcomplex-ritmestoornissen = niet pluis (zowel bradycardie als tachycardie)
- Volstrekt onregelmatig = boezemfibrilleren

Indeling ritmestoornissen

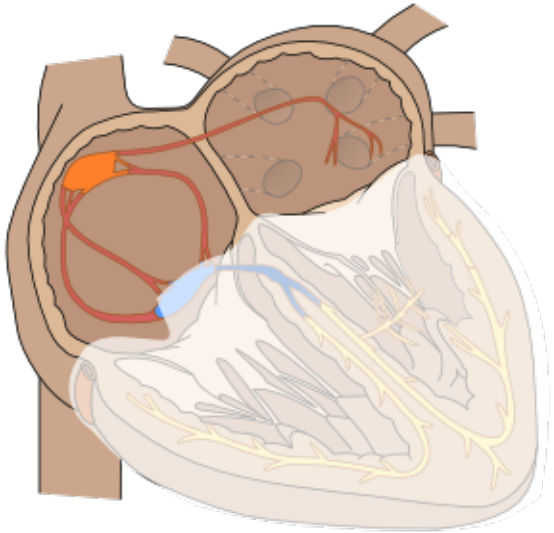
Naar oorsprong

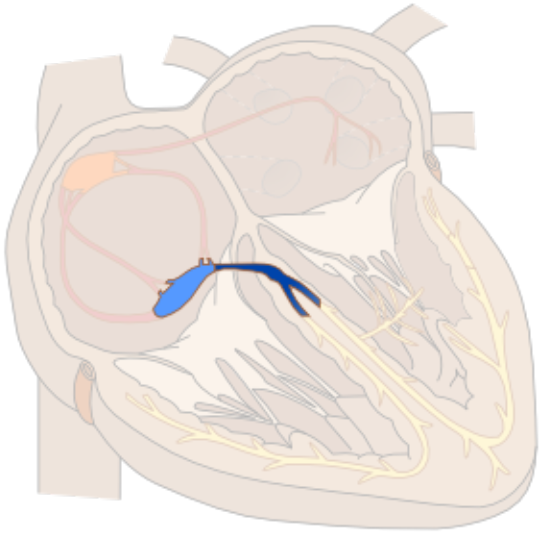
Supraventricular

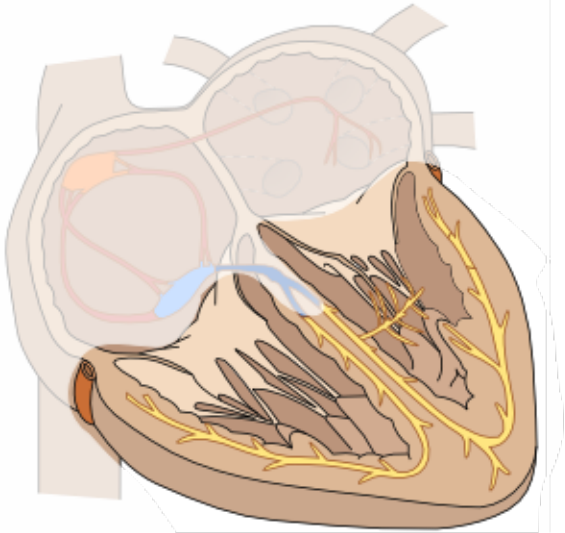
Atrial

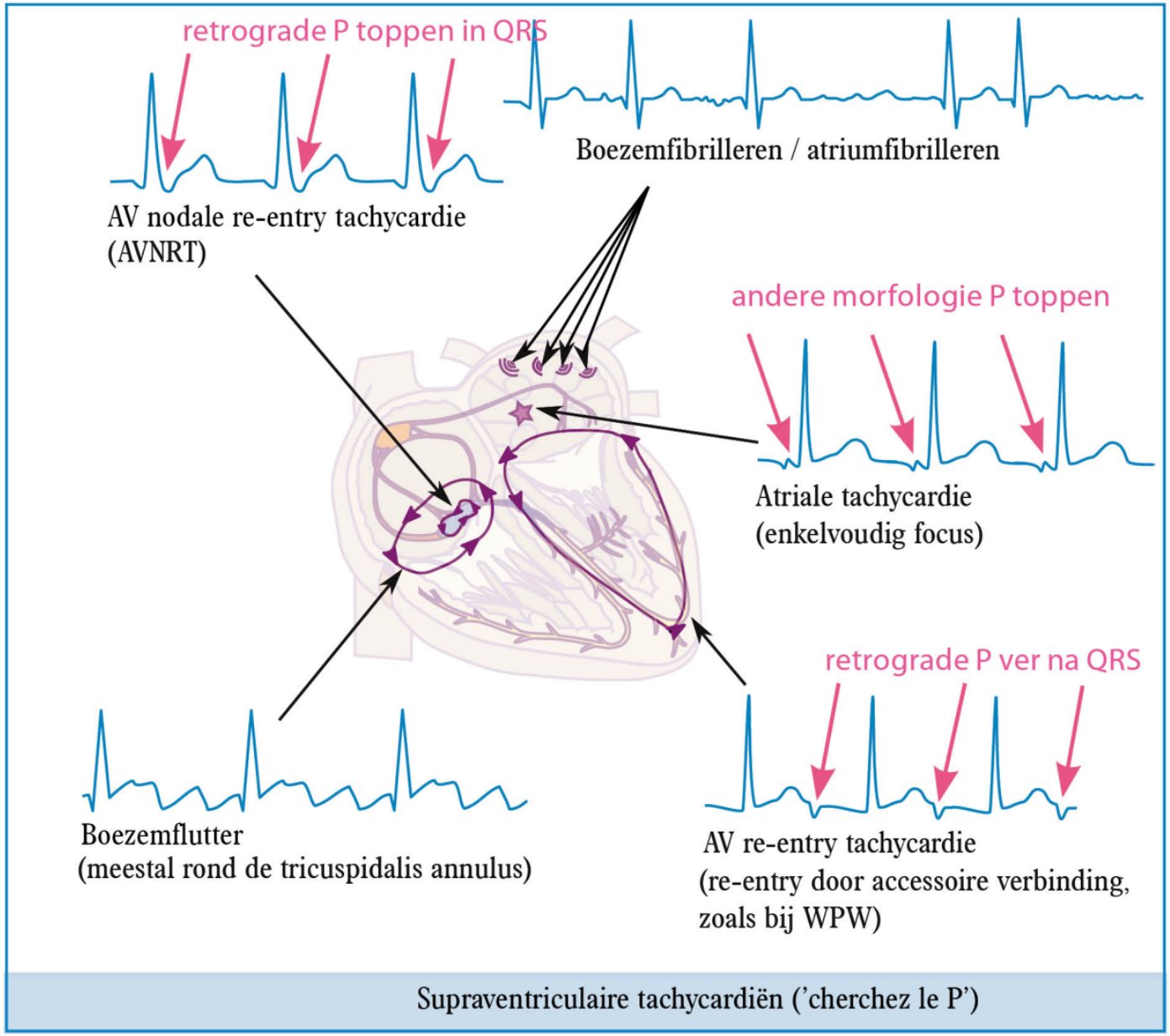
Nodal

Ventricular

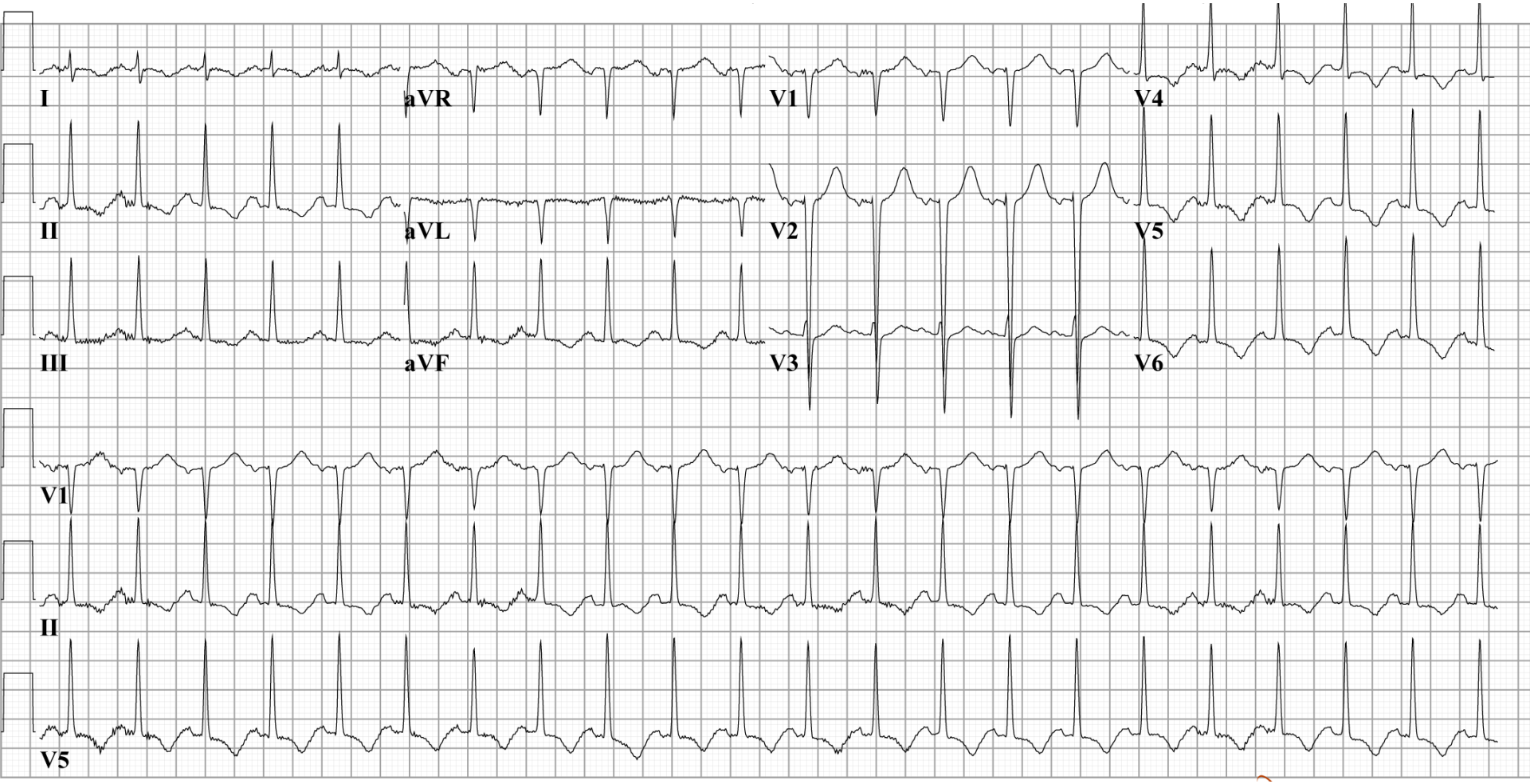






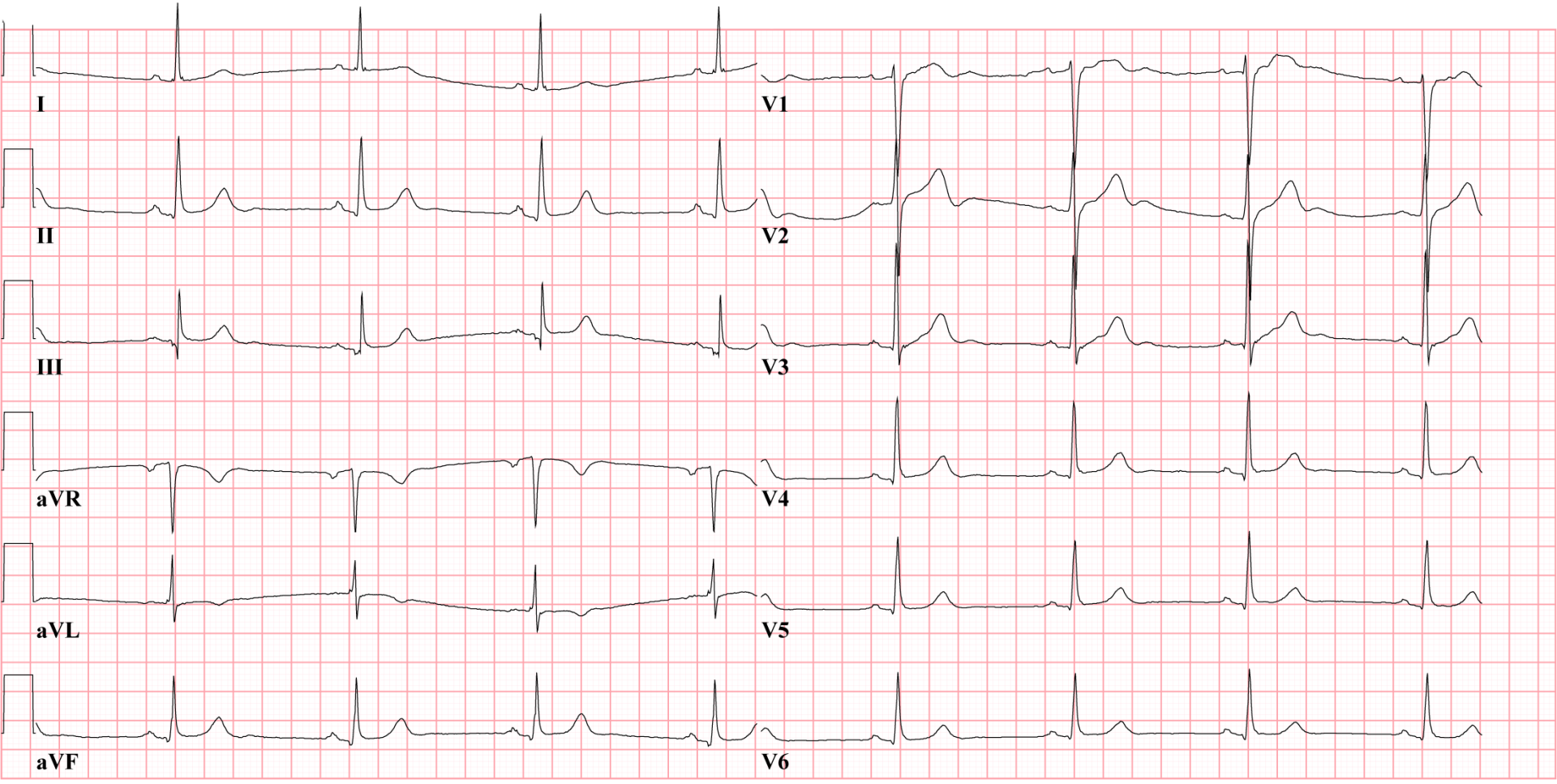

retrograde P toppen in QRS
Boezemfibrilleren / atriumfibrilleren
AV nodale re-entry tachycardie
(AVNRT)
andere morfologie P toppen
Atriale tachycardie
(enkelvoudig focus)
retrograde P ver na QRS
Boezemflutter
(meestal rond de tricuspidalis annulus)
AV re-entry tachycardie
(re-entry door accessoire verbinding,
zoals bij WPW)
Supraventriculaire tachycardiën (’cherchez le P’)

Sinustachycardie

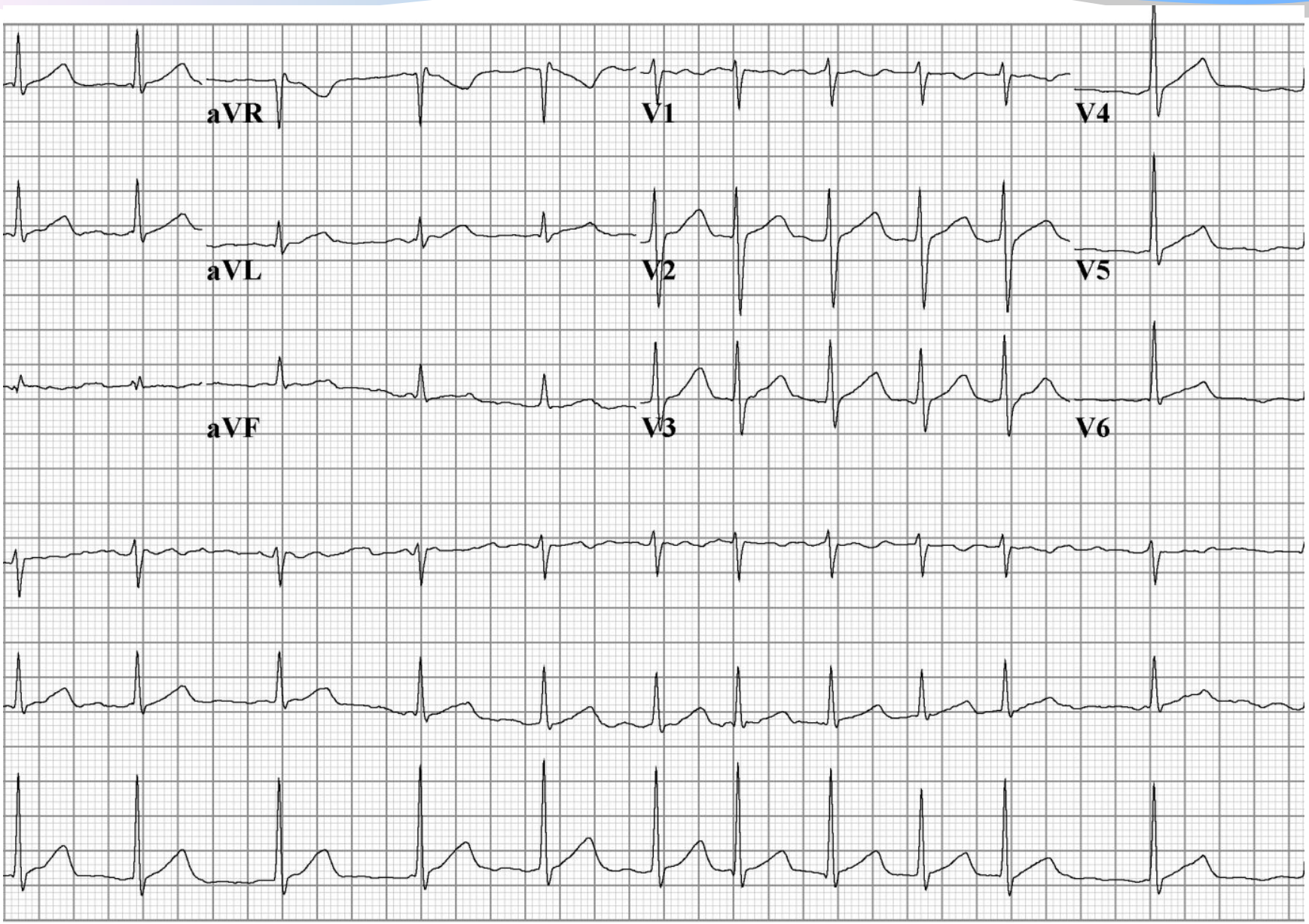


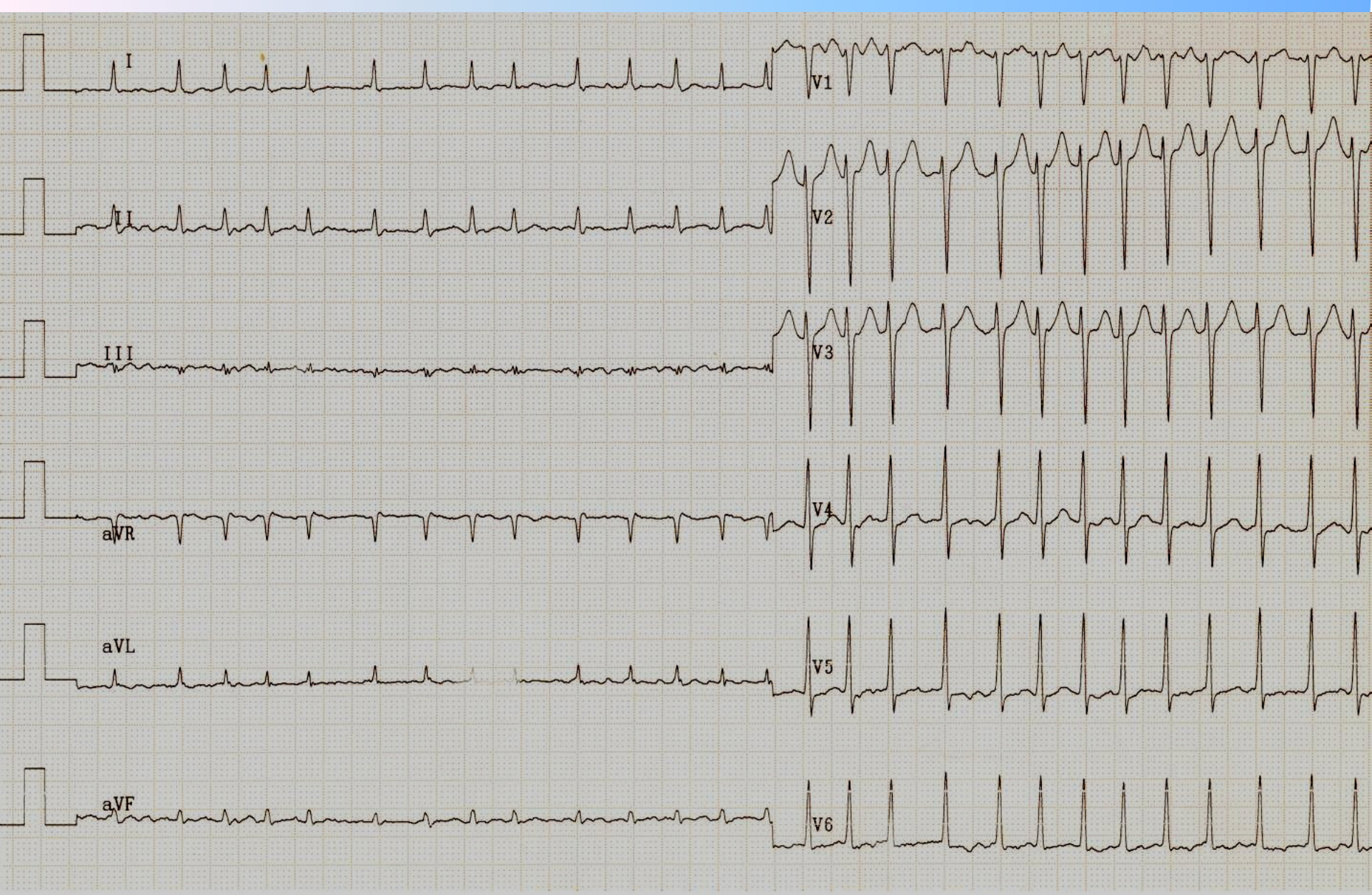
Courtesy of Ivo van der Bilt

Sinusbradycardie



Courtesy of Ivo van der Bilt


aVR
V1
V4
aVL
V2
V5
aVF
V3
V6



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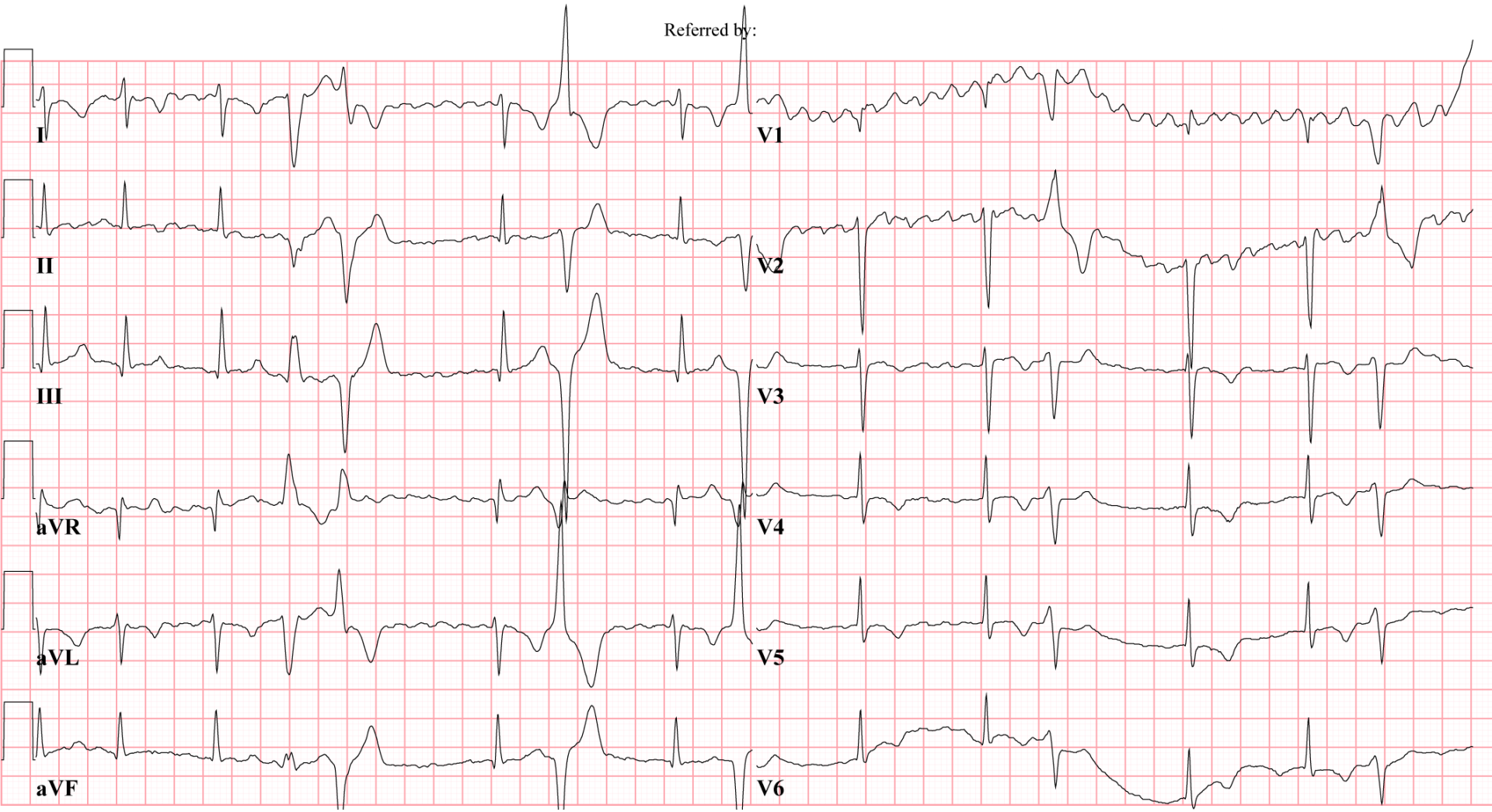
Boezemfibrilleren

Rate vs Rhythm control
Antistolling obv Chadsvasc2

Problemen:
- CVA risico
- Proaritmie van anti-aritmica



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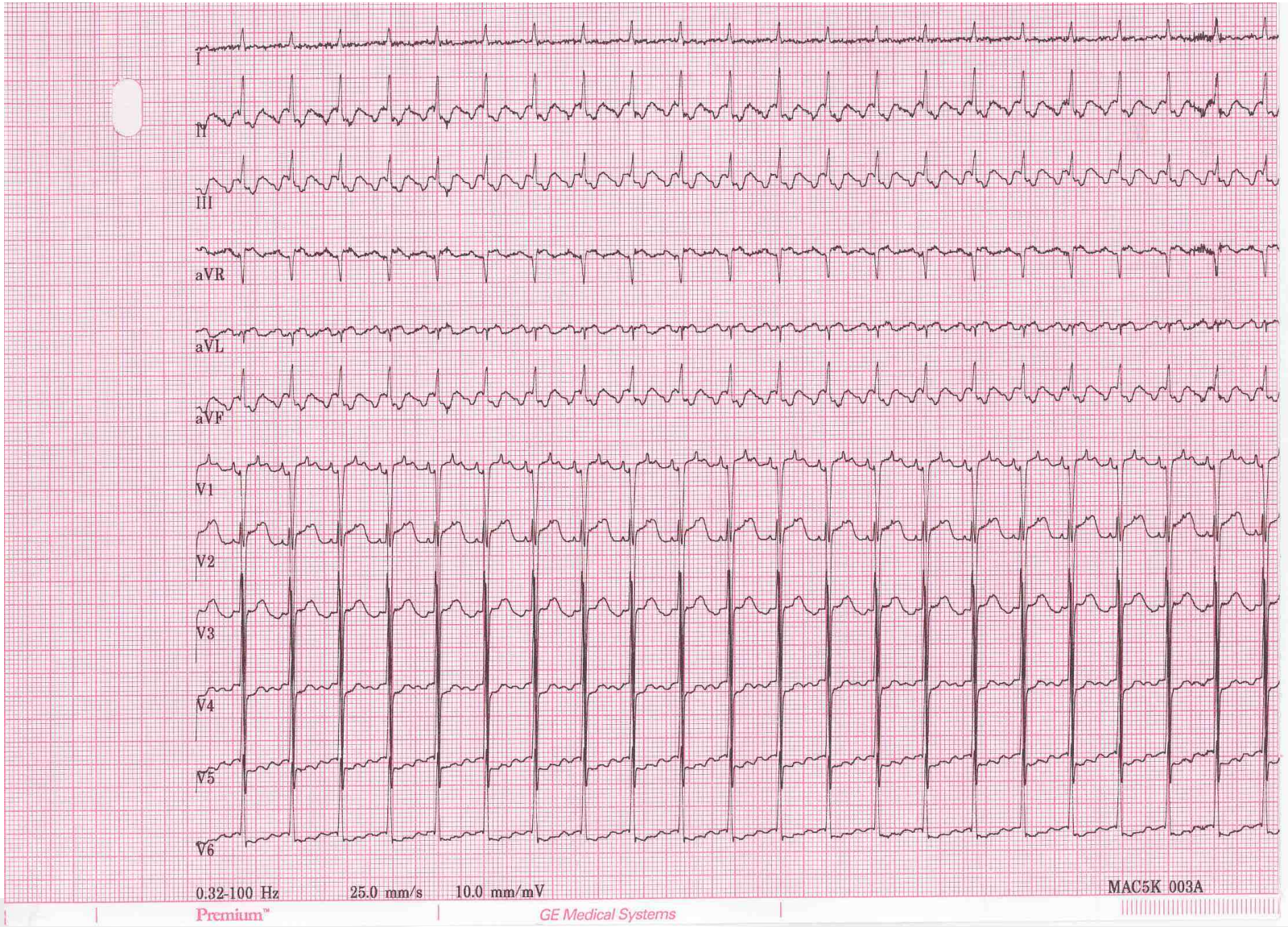
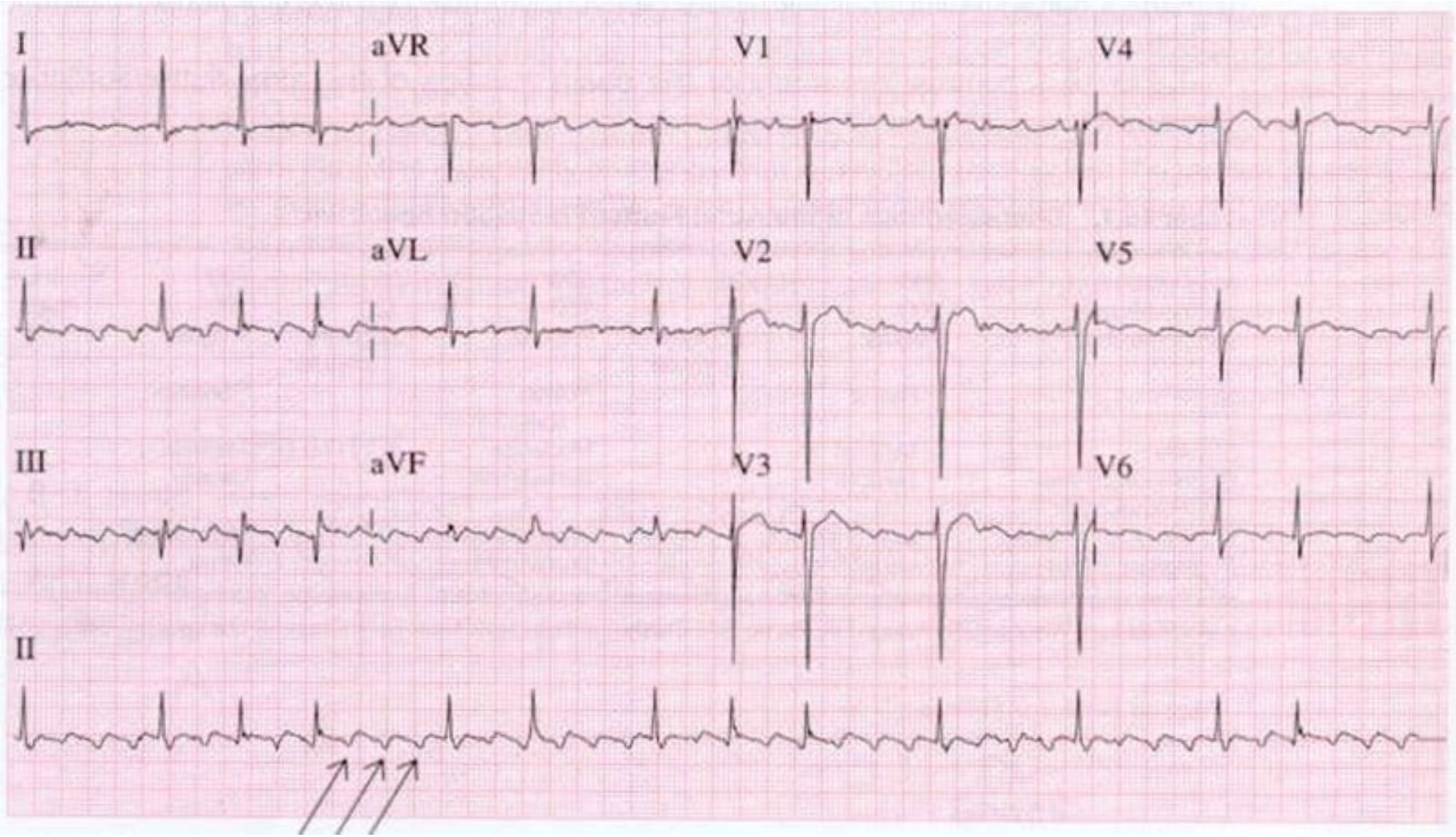
Boezemflutter

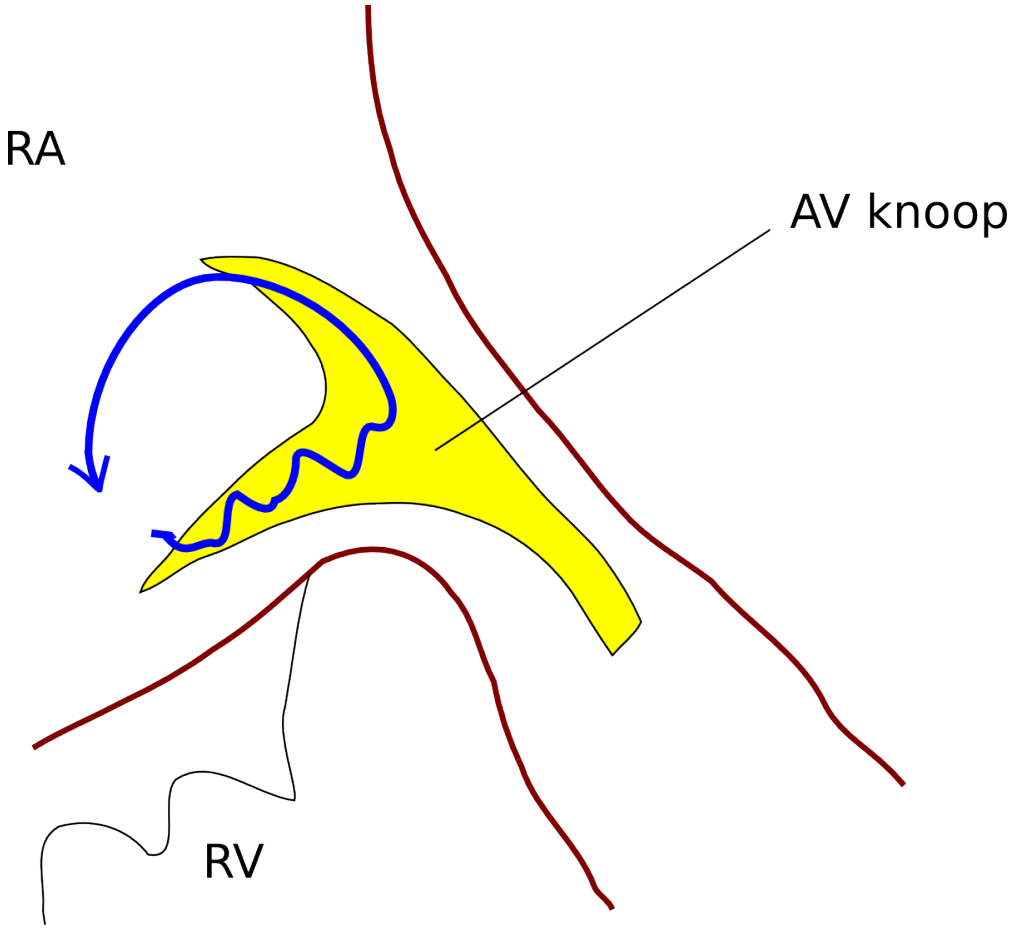


Boezemflutter:

- Rate en rhythm control vaak moeizaam
- Ablatie geïndiceerd bij 1^{e} recidief


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

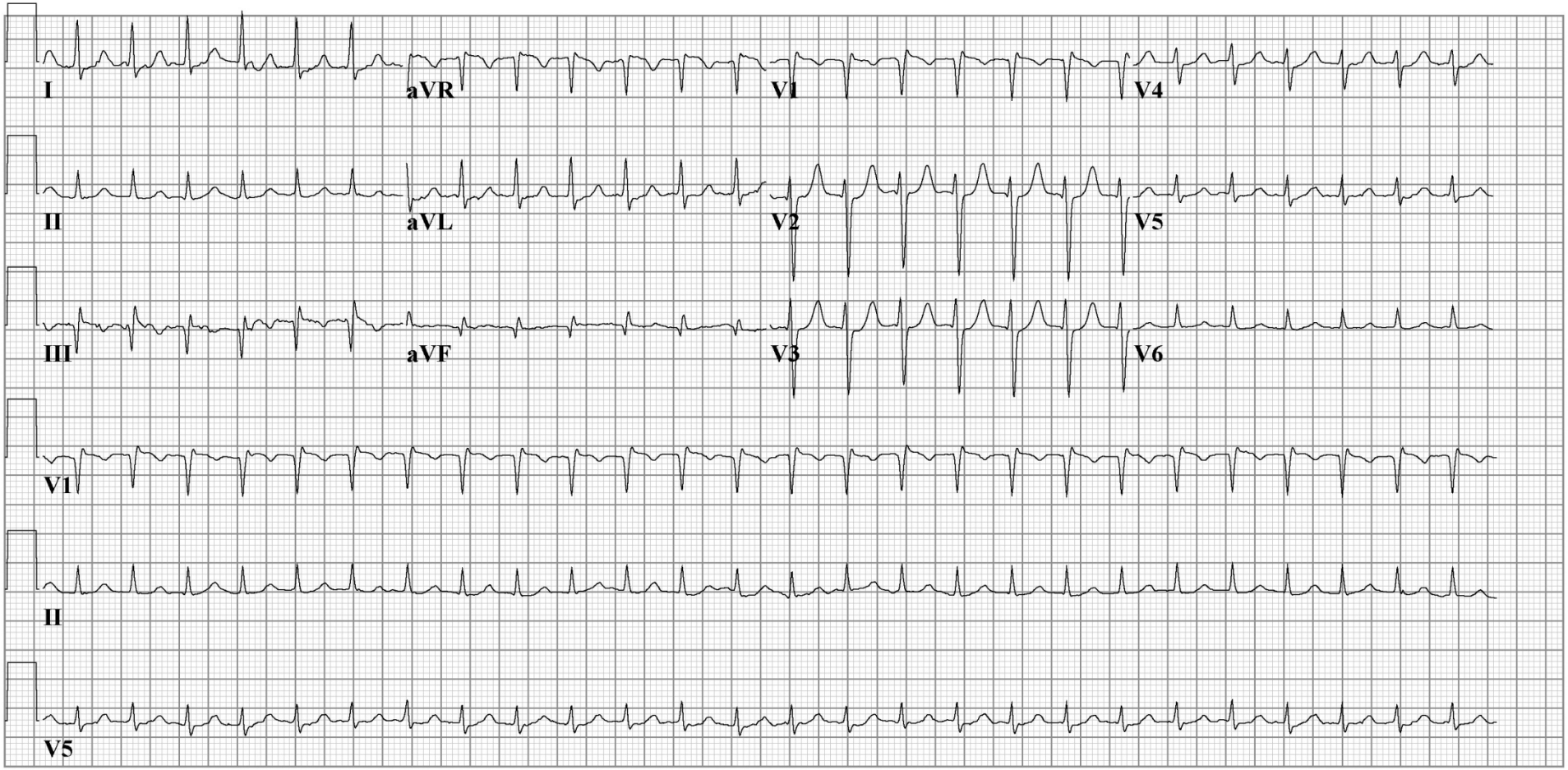
AV Nodale re-entry tachycardie.



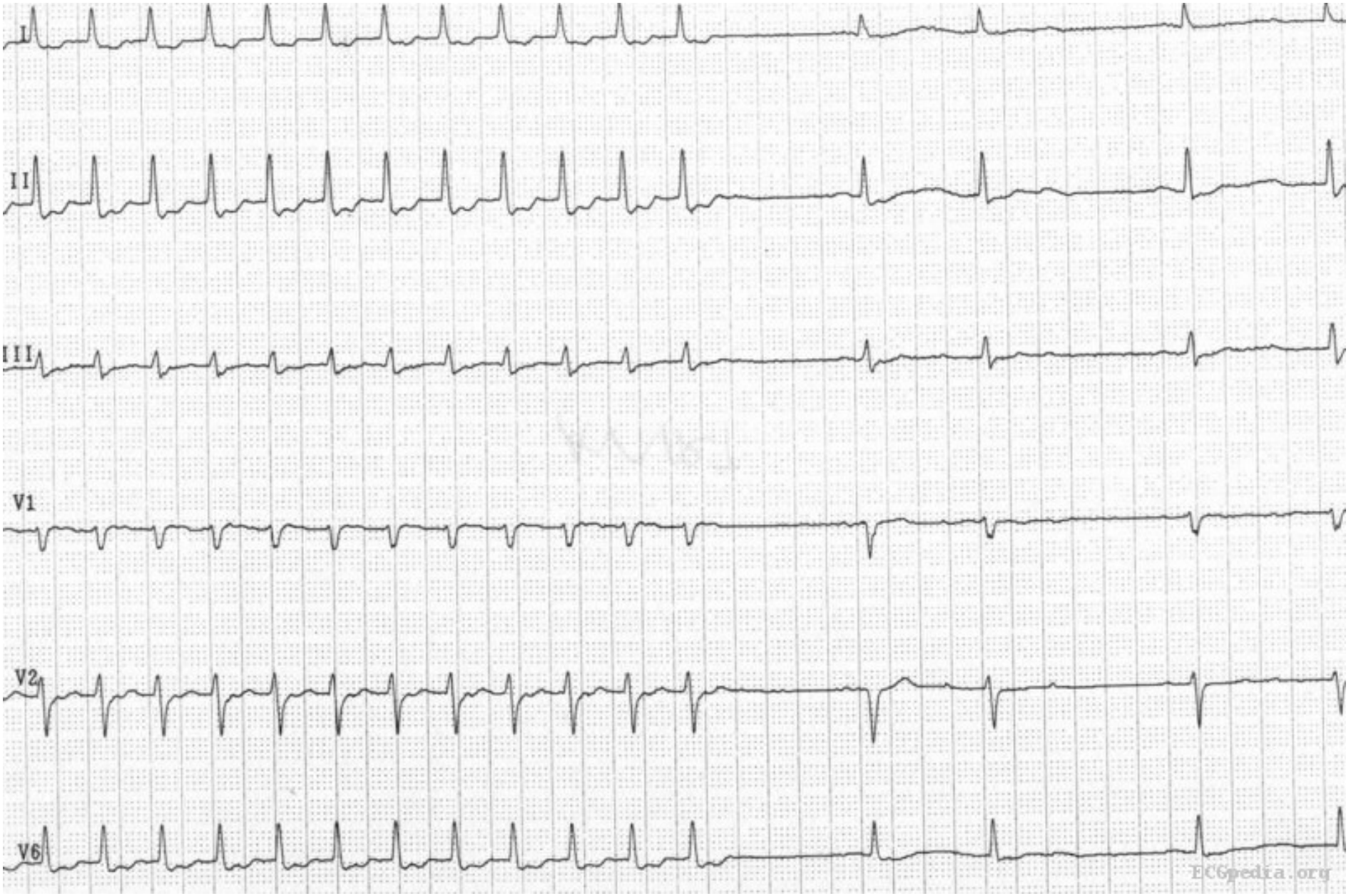
- Frequentie: 180-250 / min
- R-R’ in V1
- Typisch jonge patiënt
- Recidiverend

Manoeuvres:

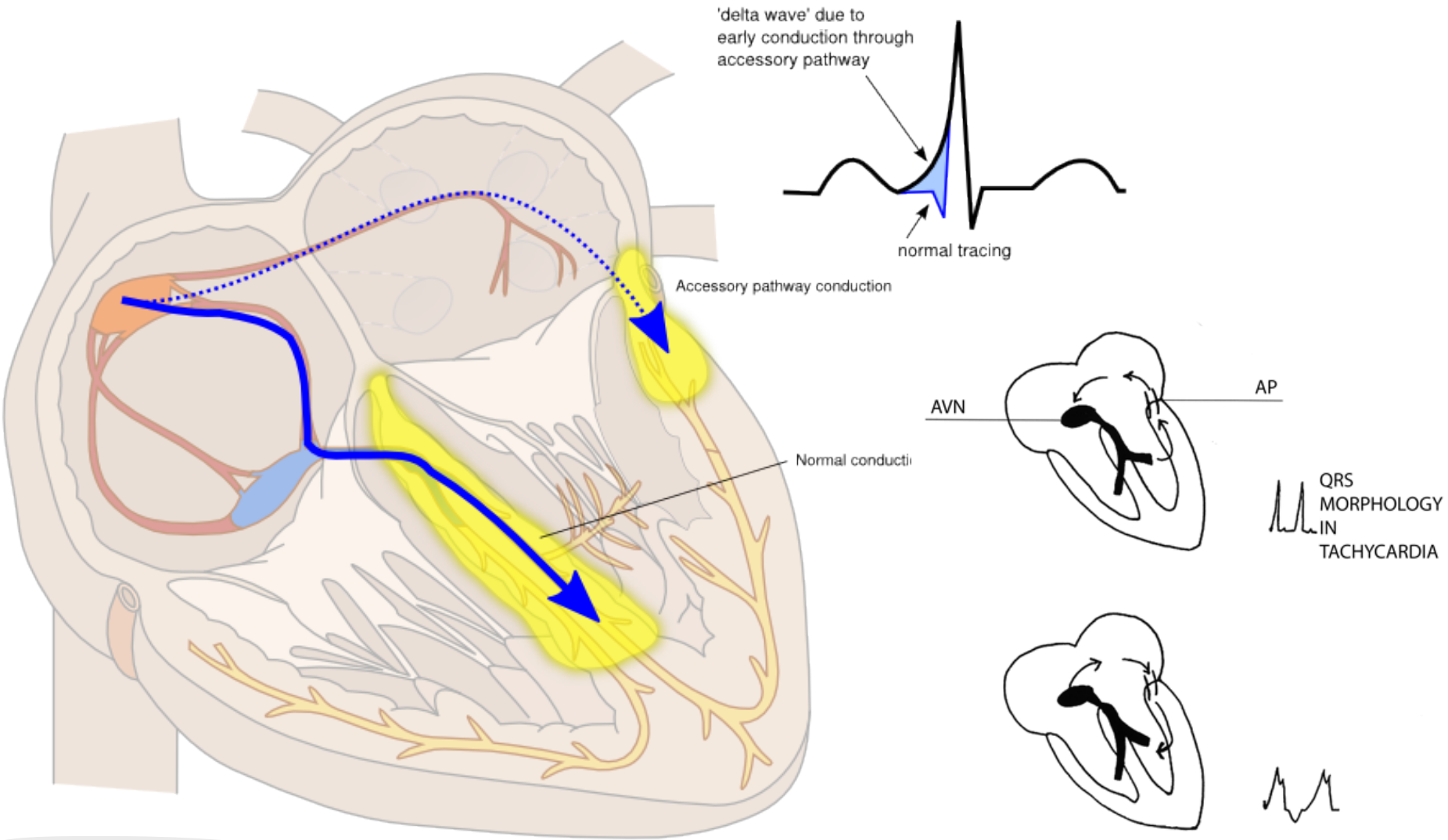
- Hurken
- Sinus carotis massage
- Adenosine

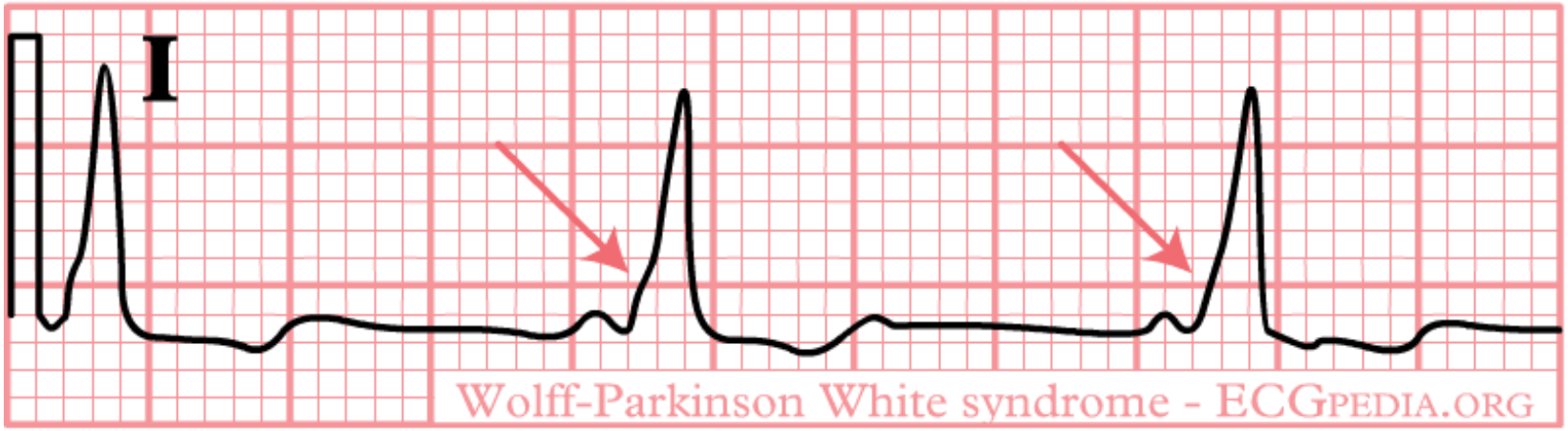

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5

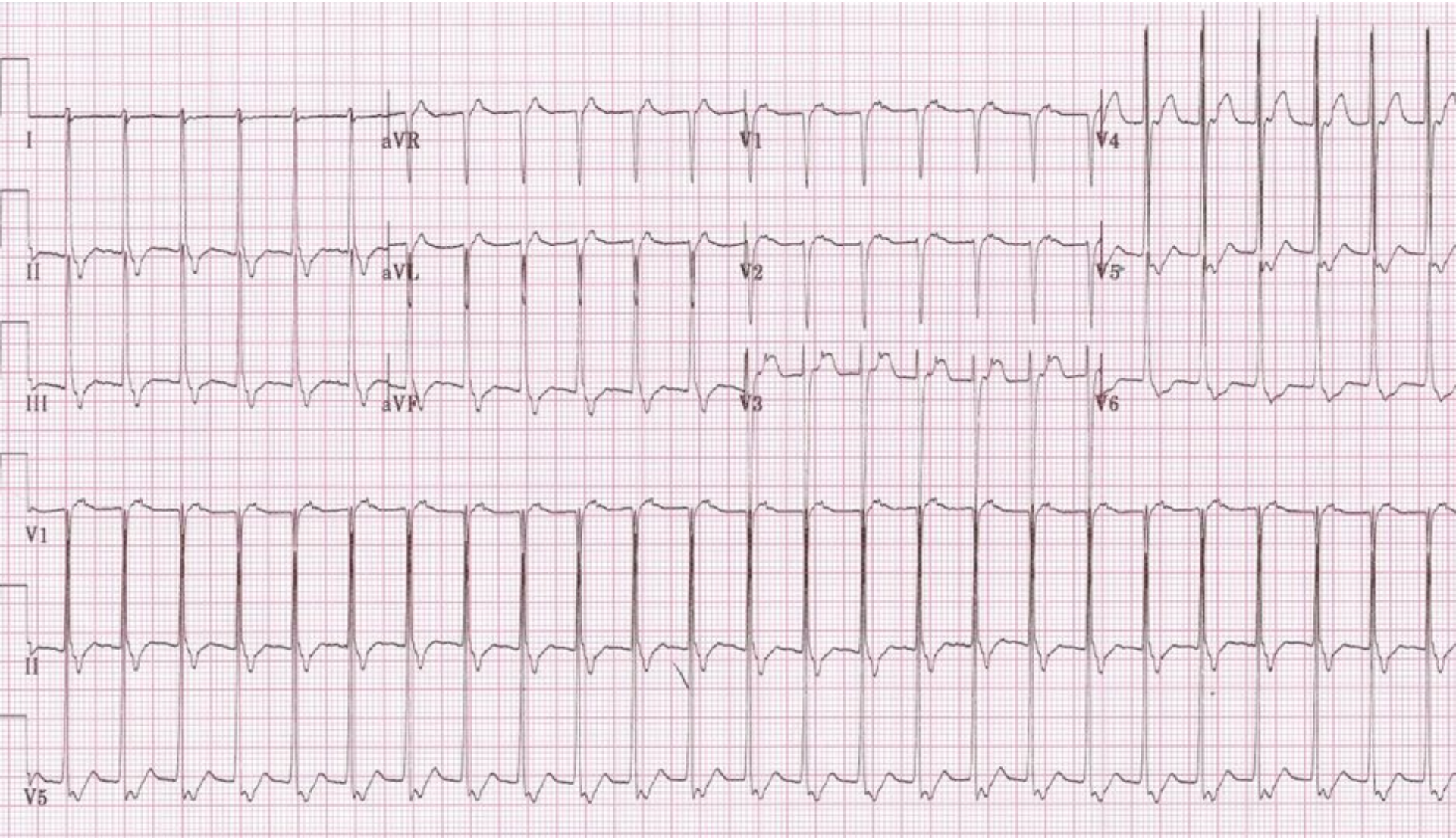
Sinus carotis massage



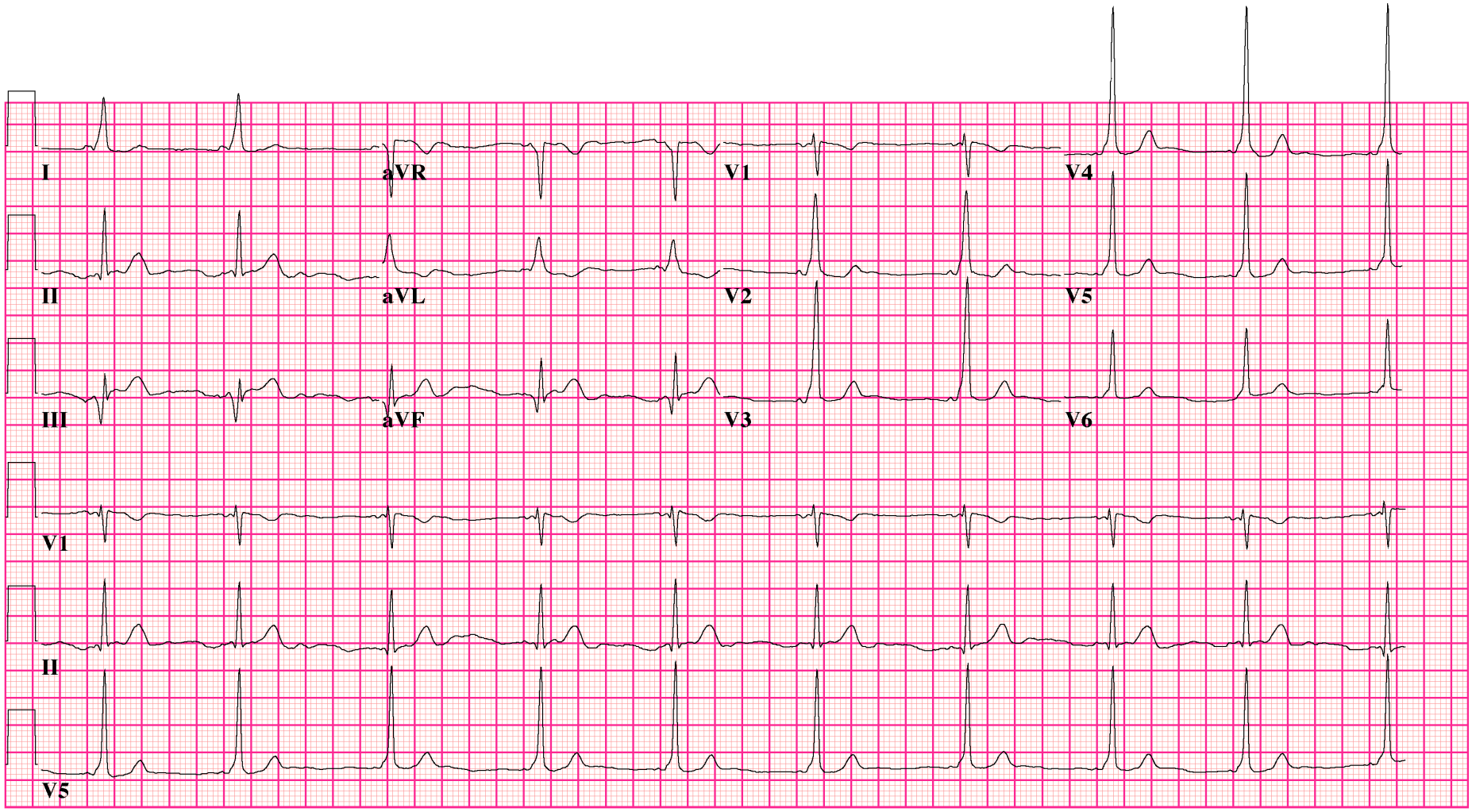
AVRT via accessoire verbinding




I
Wolff-Parkinson White syndrome - ECGPEDIA.ORG


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5

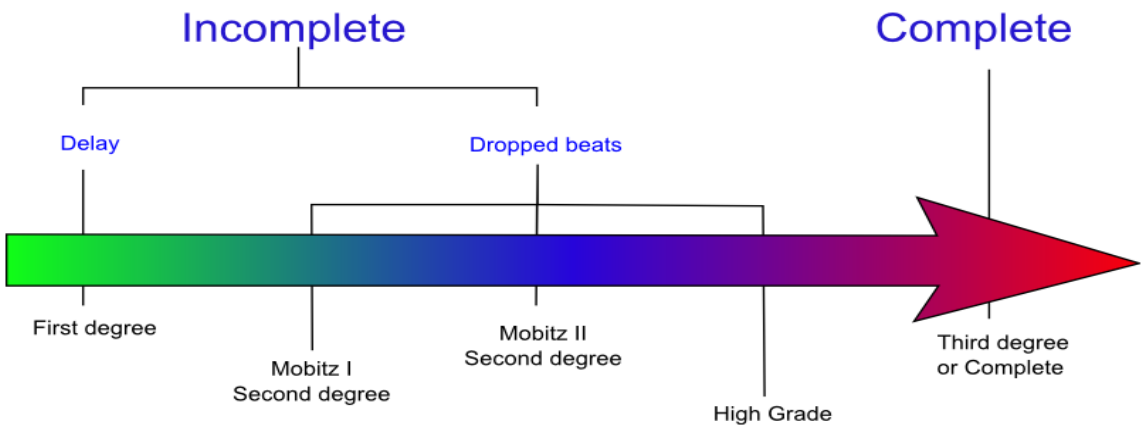
Pre-exitatie

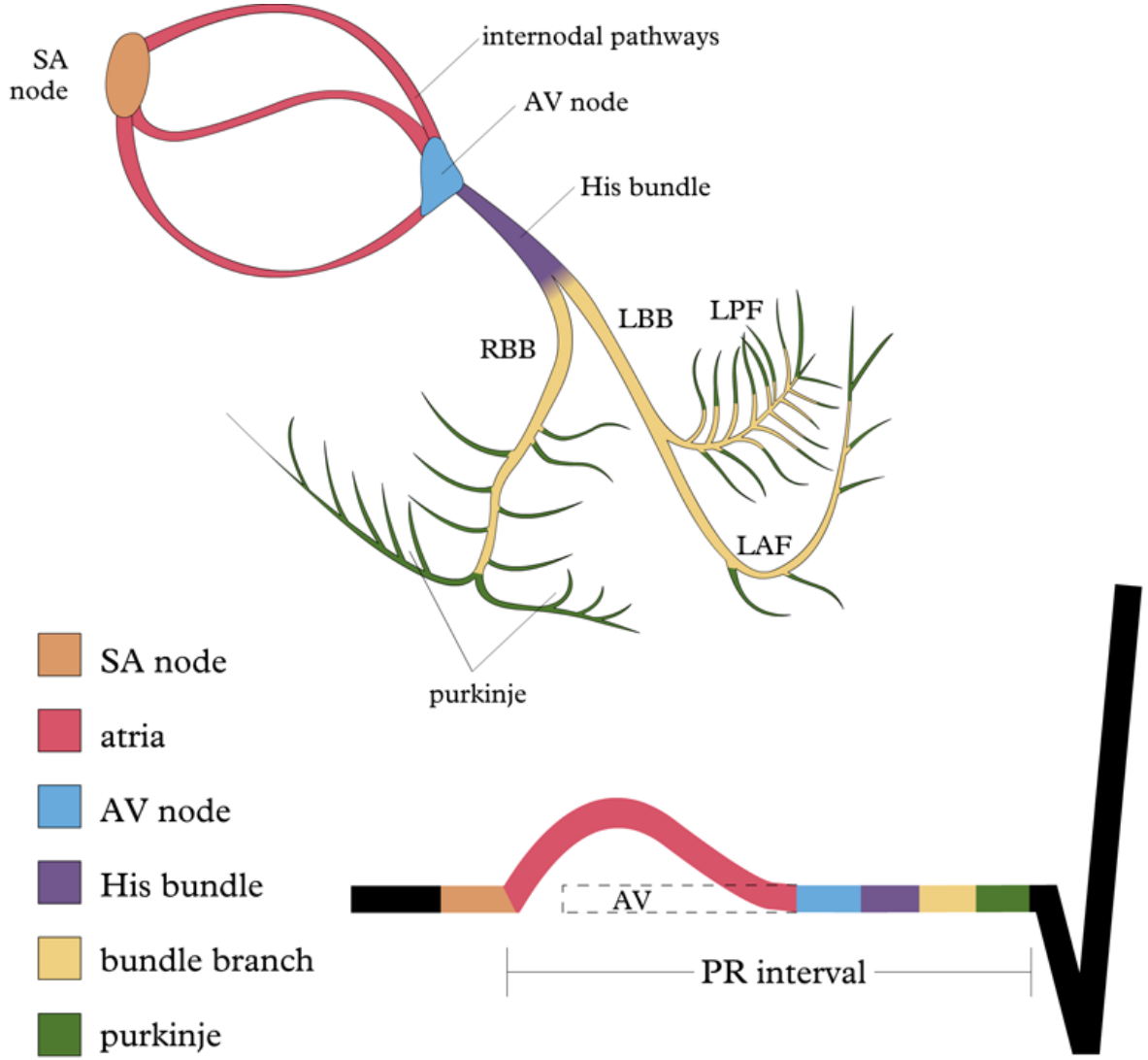


GELEIDINGSSTOORNISSEN

Geleidingsstoornissen

- 1e graads: verlengde PQ tijd > 200ms
- 2e graads
  - Type I (Wenkebach): PQ tijd neemt toe van complex tot complex tot er een complex uitvalt.
  - Type II (Mobitz): PQ tijd is normaal, maar niet alle p-toppen worden gevolgd (plotselinge uitval)
- Hooggradig AV blok
- 3e graads: totaal blok





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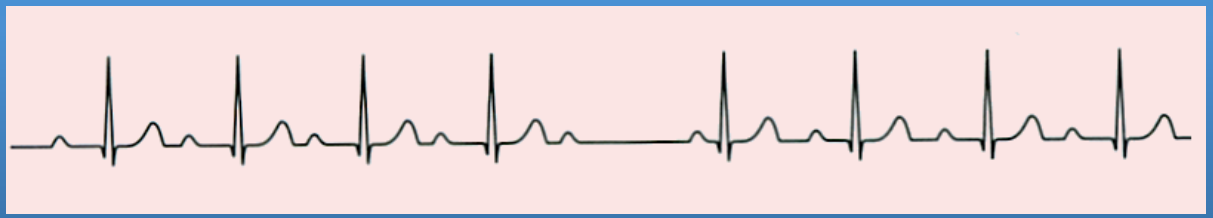
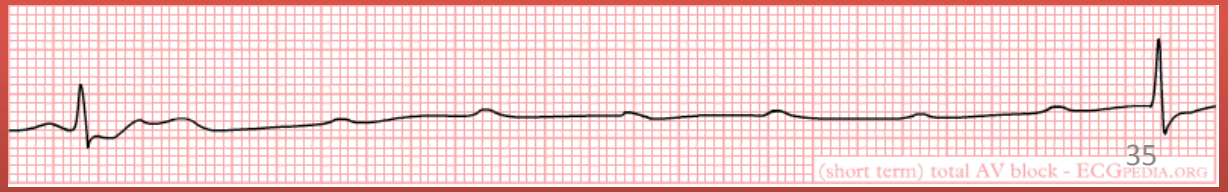
1e graads AV blok

2e graads AV blok I
Wenkebach



2e graads AV blok II
Mobitz

3e graads AV blok
Totaal AV blok



Courtesy of W.G. de Voogt, MD, PhD, Amsterdam, The Netherlands

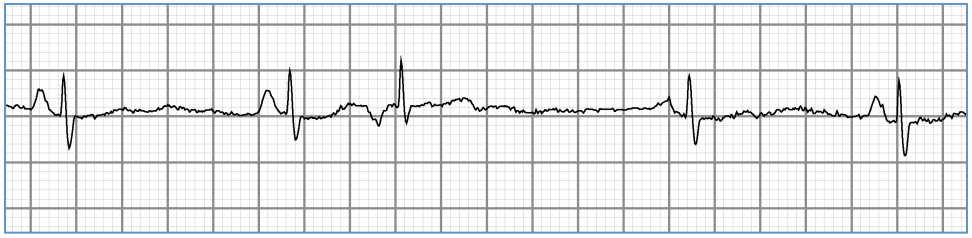
Extrasystolen

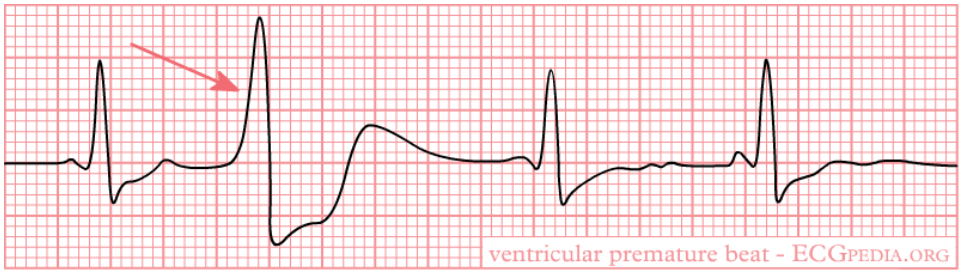
-Boezemextrasystole

Non-compensatoire pauze

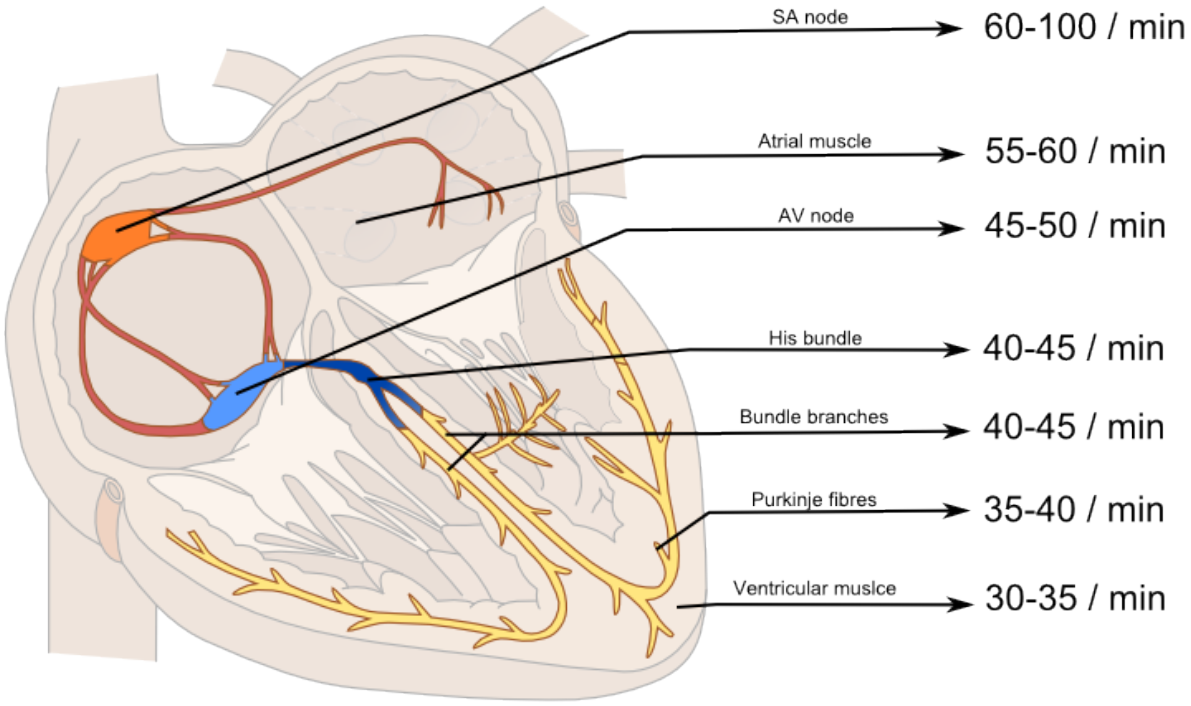
-Ventrikelextrasystole

Compensatoire pauze



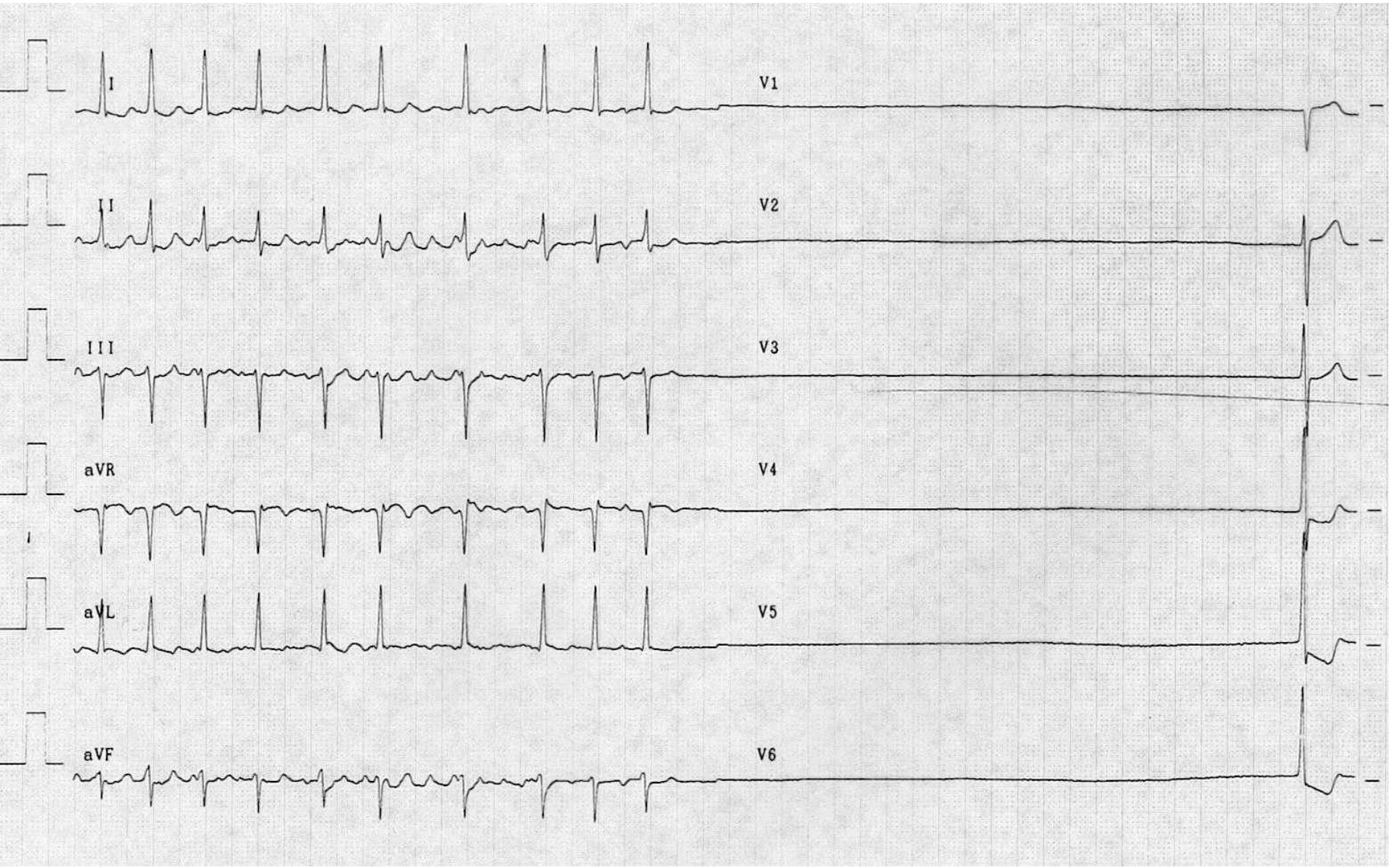


Escaperitme



Sick sinus syndrome

- Symptomatische trage sinusbradycardie in afwezigheid van sinusknoopvertragende medicatie
- Sinusarrest of SA exit blok
- Combinaties van een sino-atriale of atrioventriculaire geleidingsstoornissen
- Brady-tachy syndroom;



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AMC, The Netherlands

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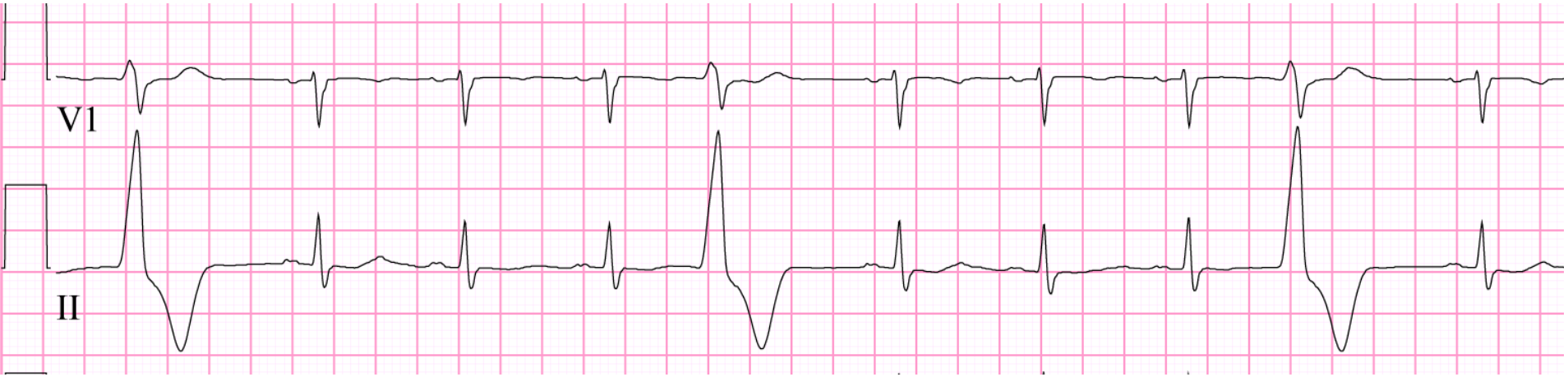
VENTRICULAIRE RITMESTOORNISSEN

PVC



VT

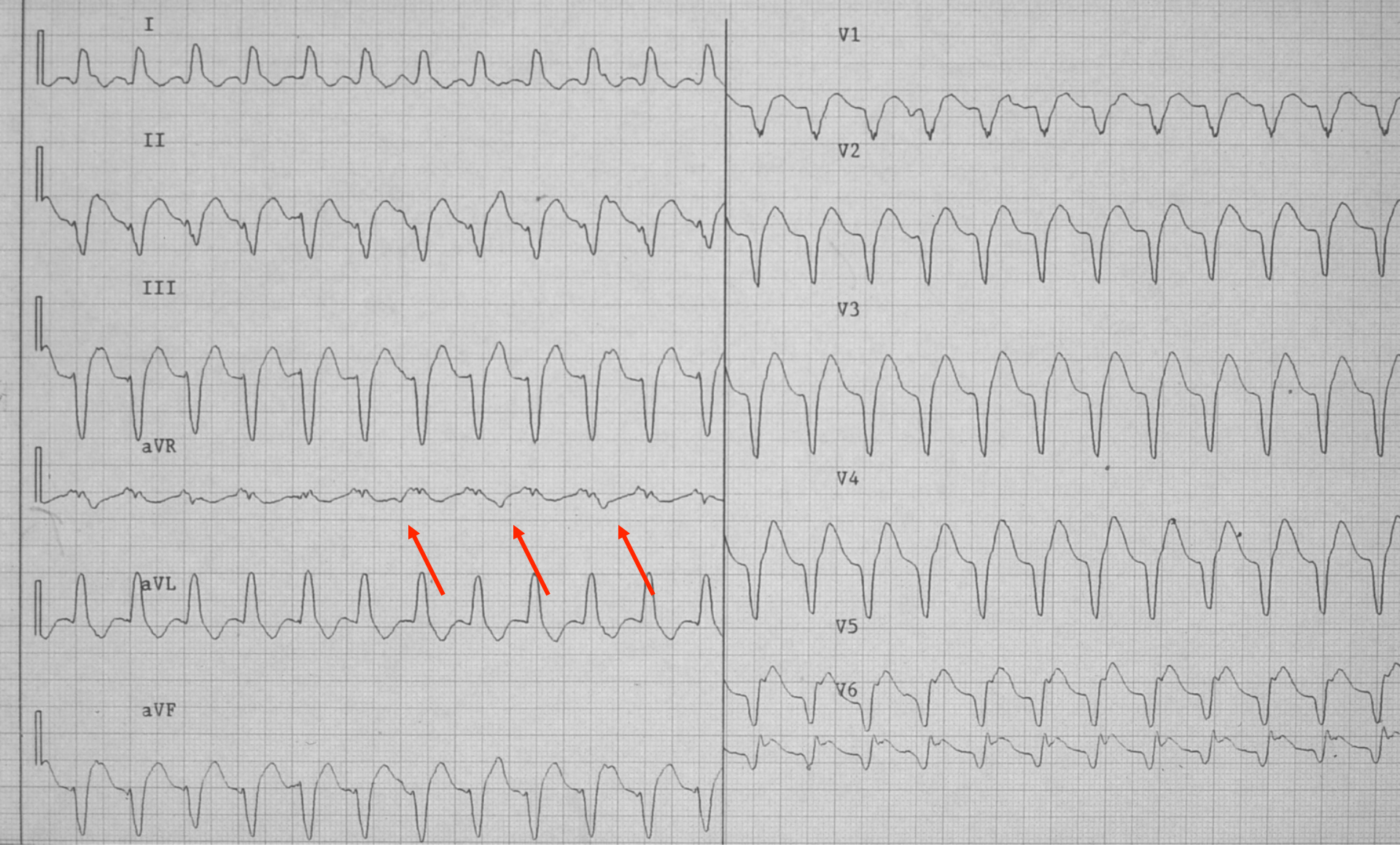
Klinische kenmerken

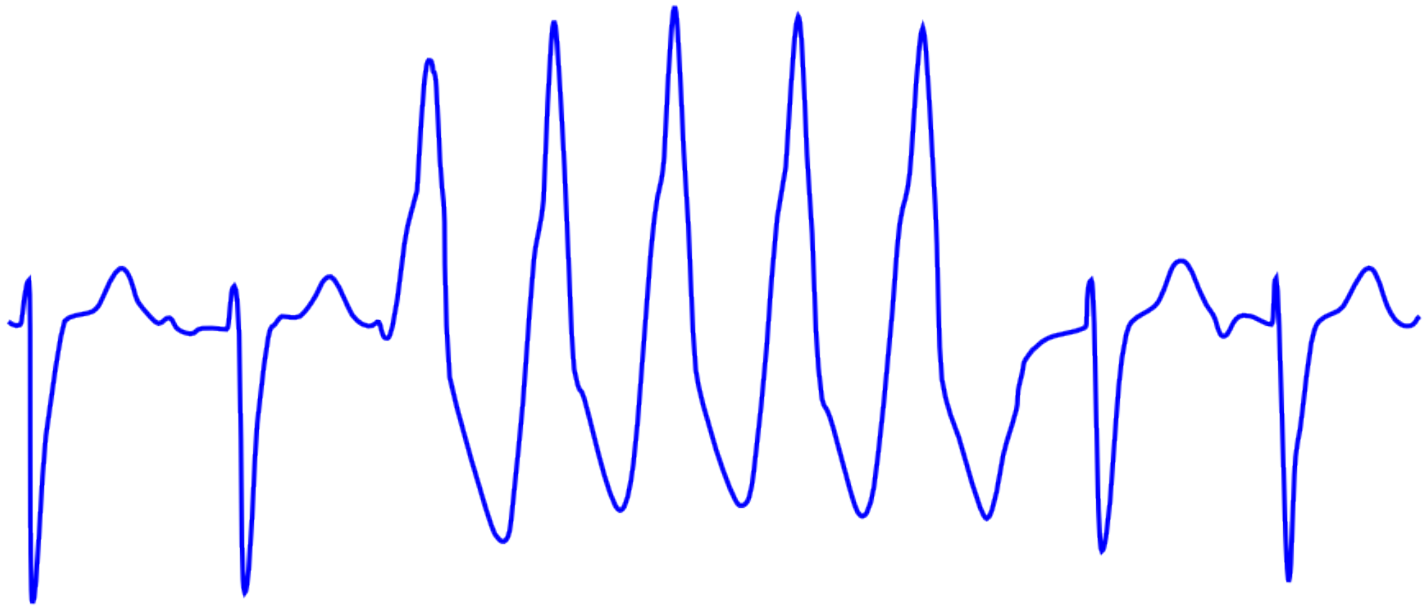
Definities

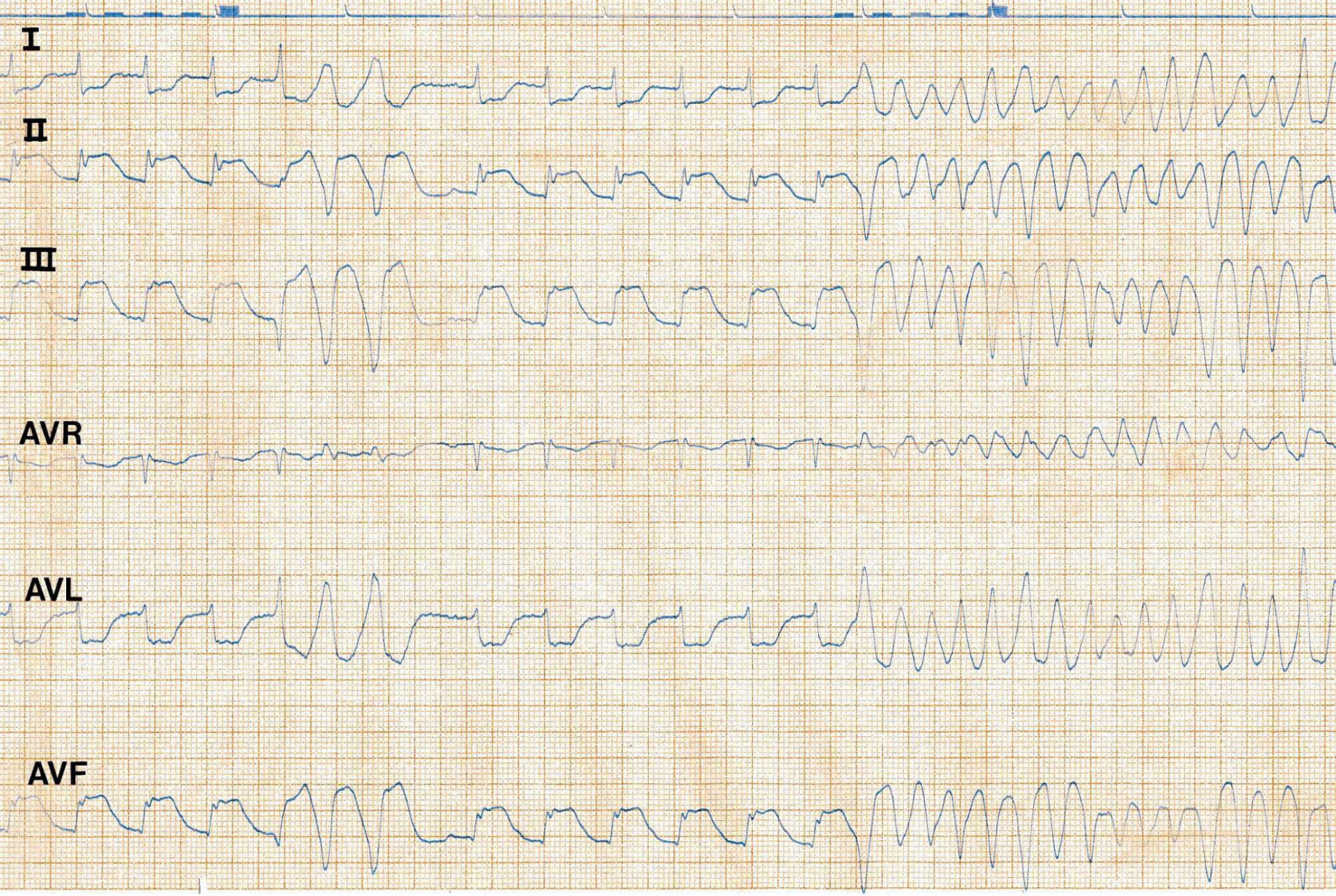
- **Non-sustained VT**: 3 of meer slagen, max 30 seconde
- **Sustained VT**: > 30 seconde (of minder indien gecardioverteerd)
- **Monomorfe VT**: alle ventriculaire slagen hebben dezelfde configuratie
- **Polymorfe VT**: de ventriculaire slagen veranderen van configuratie.

Klinische kenmerken

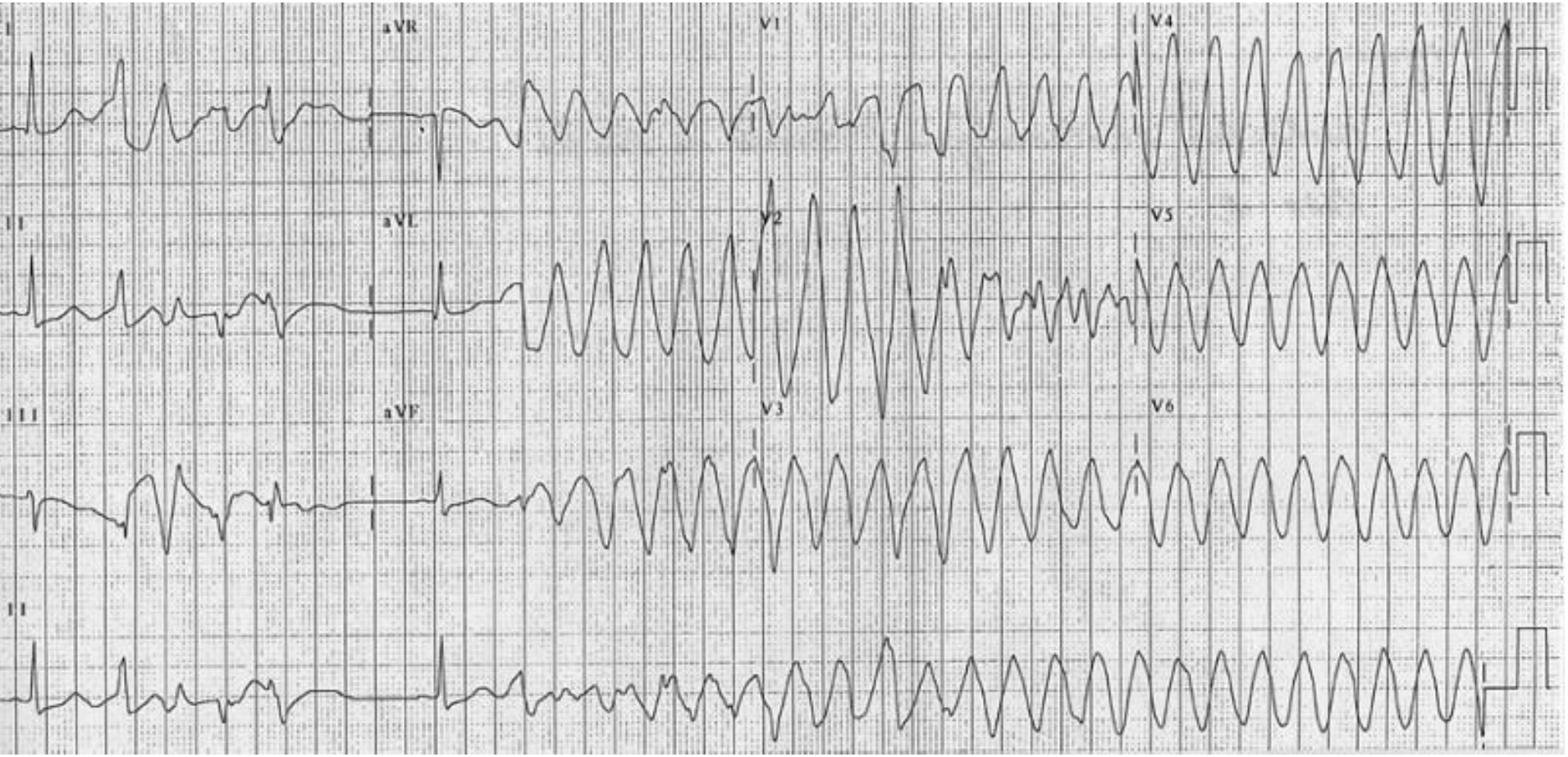
- Patiënt ouder dan 65 jaar
- Myocardinfarct in VG
- “Horizontal entrance”
  - A priori kans op VT hoog!


I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6





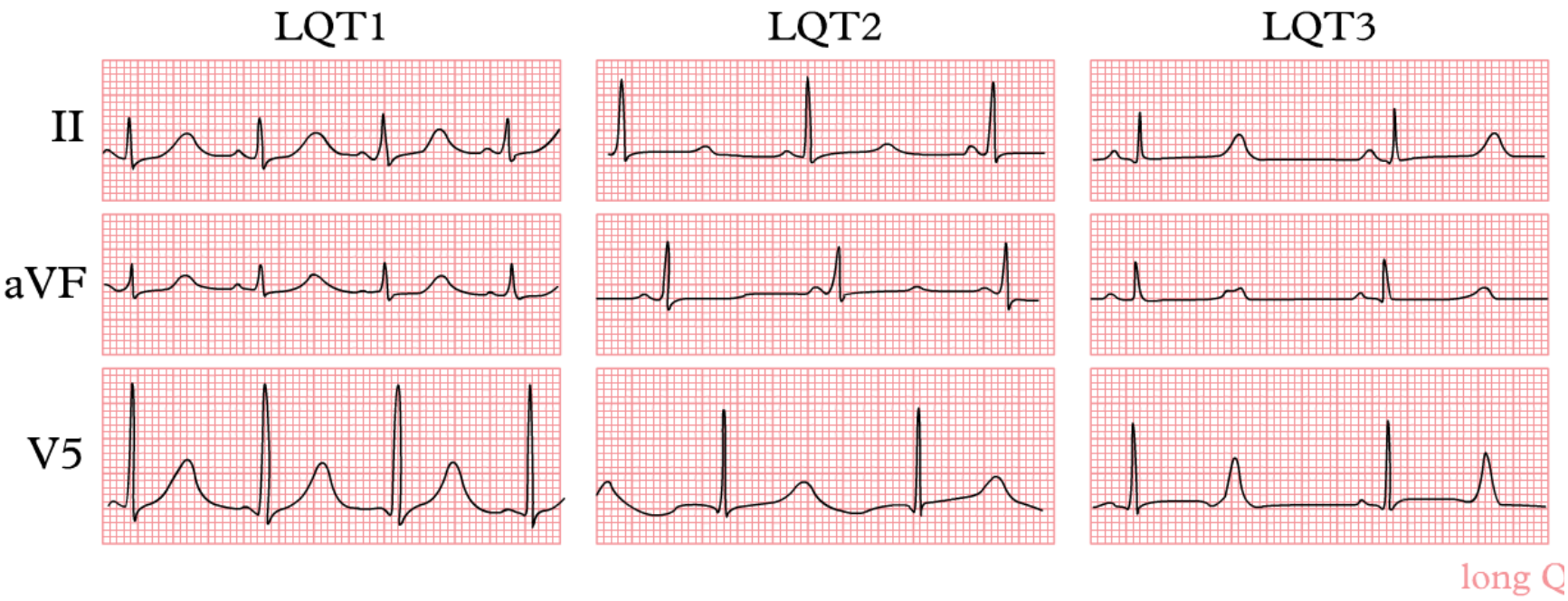
Ventrikelfibrilleren



Torsade de Pointes

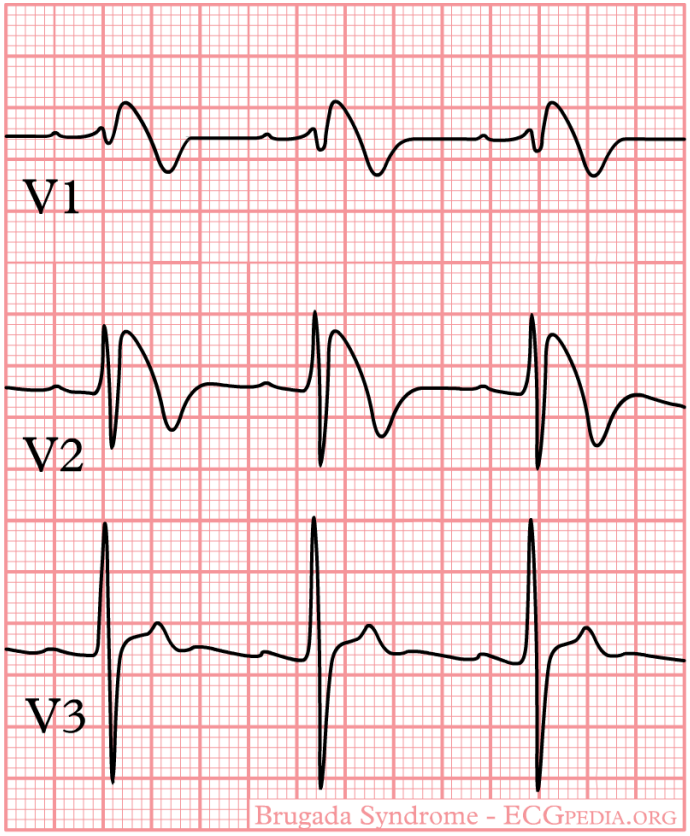
Aritmiesyndromen

LQTS

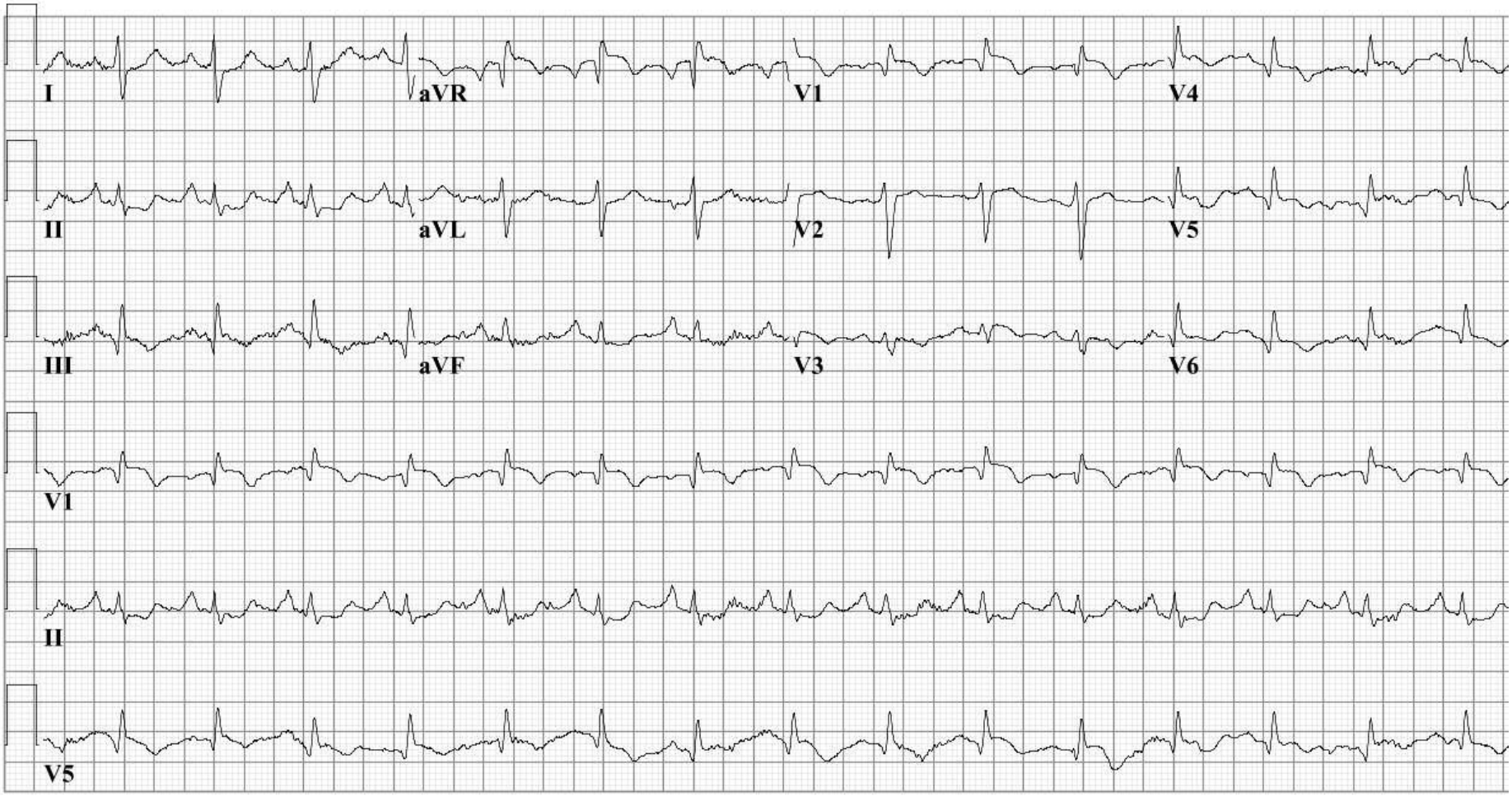


Aritmiesyndromen

Brugada



EXTRACARDIAAL VEROORZAAKTE ECG AFWIJKINGEN



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longembolie

- Sinustachycardie
- 70% heeft ECG afwijking, meestal ST-T afwijking
- S1Q3T3
- RBTB
- T top omkering V1-V3

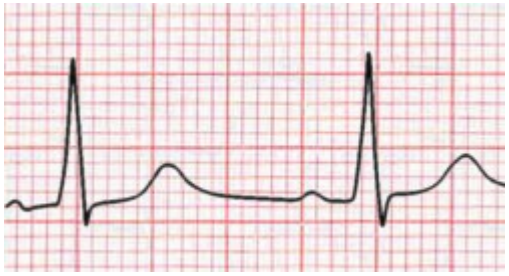
Slechtere prognose bij:

- Atriale ritmestoornissen
- RBTB
- Q's in onderwand
- Precordiale T top omkering en ST verandering

COPD / cor pulmonale

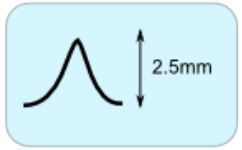
- **Rechter as: R/S ratio V1 > 1**

V1



- **P top hoogte in II > 2.5mm**

Right atrial enlargement
(= **P** Pulmonale)



- **(i)RBTB**

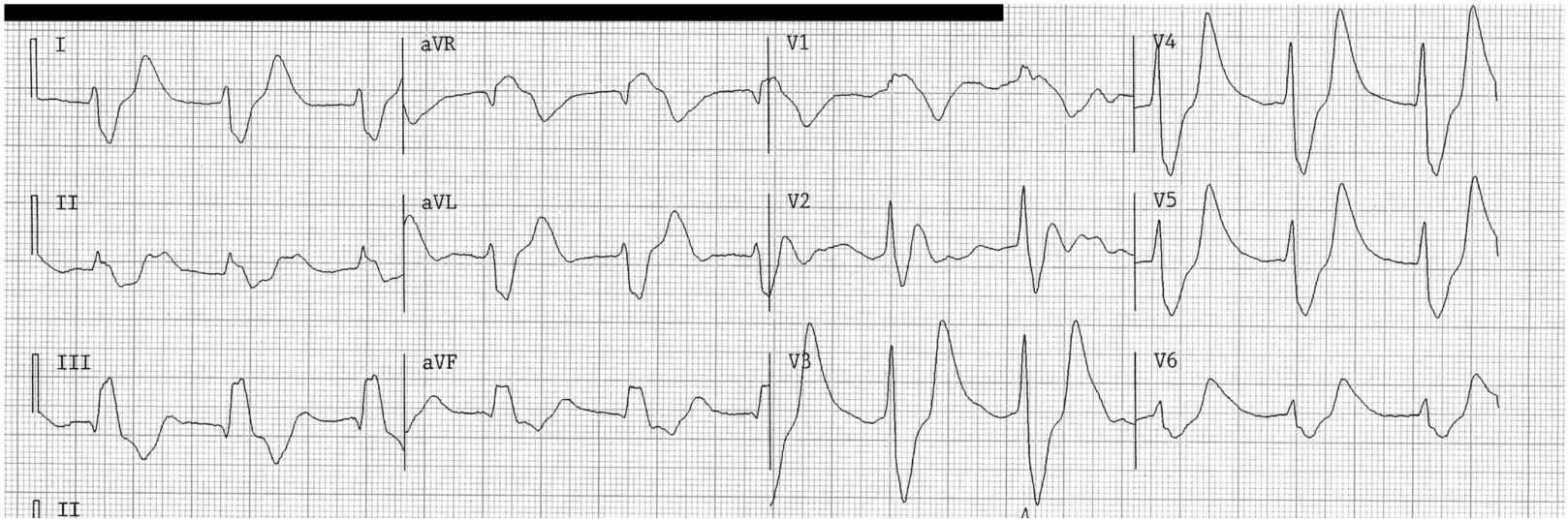
Hypokalemia

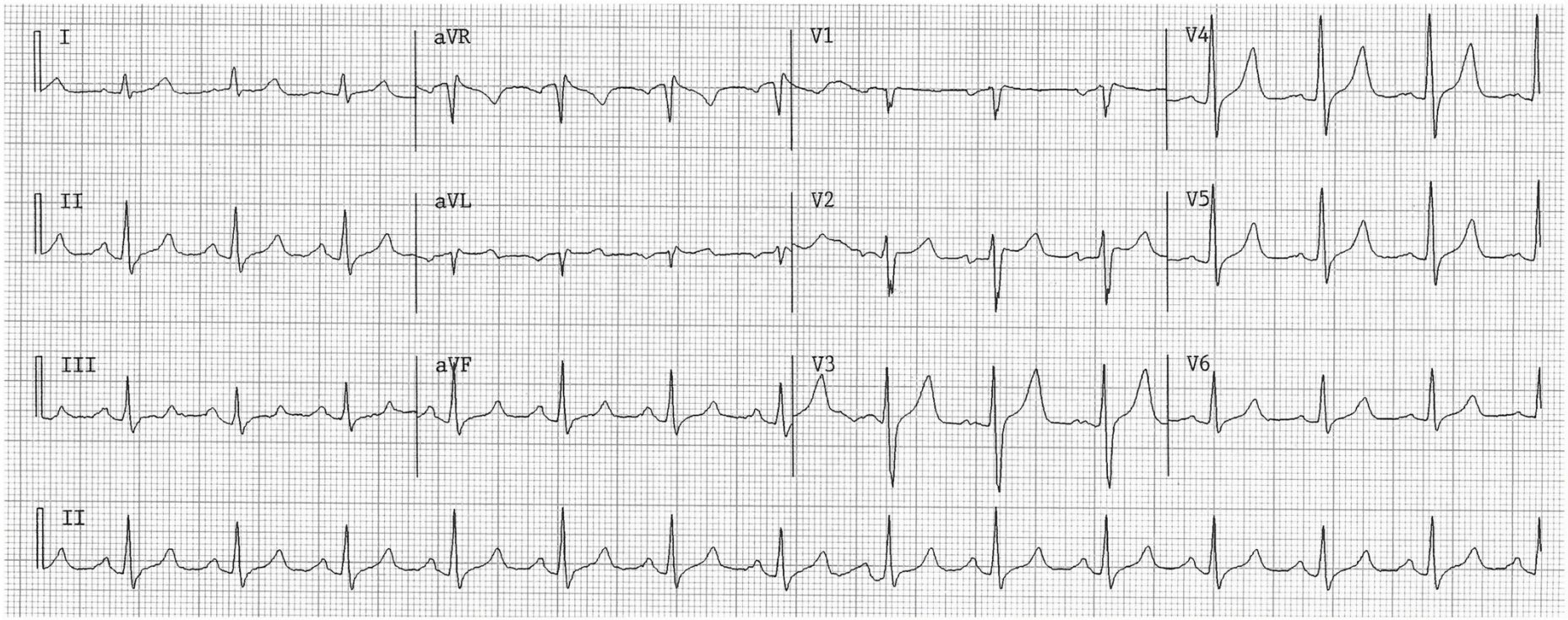
2.8 2.5 2.0 1.7

Hyperkalemia

6.5 7.0 8.0 9.0

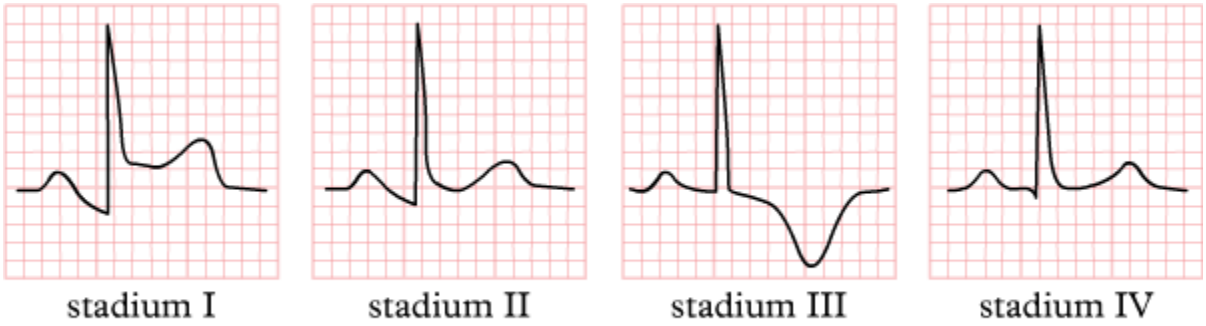
K^+ 7.5



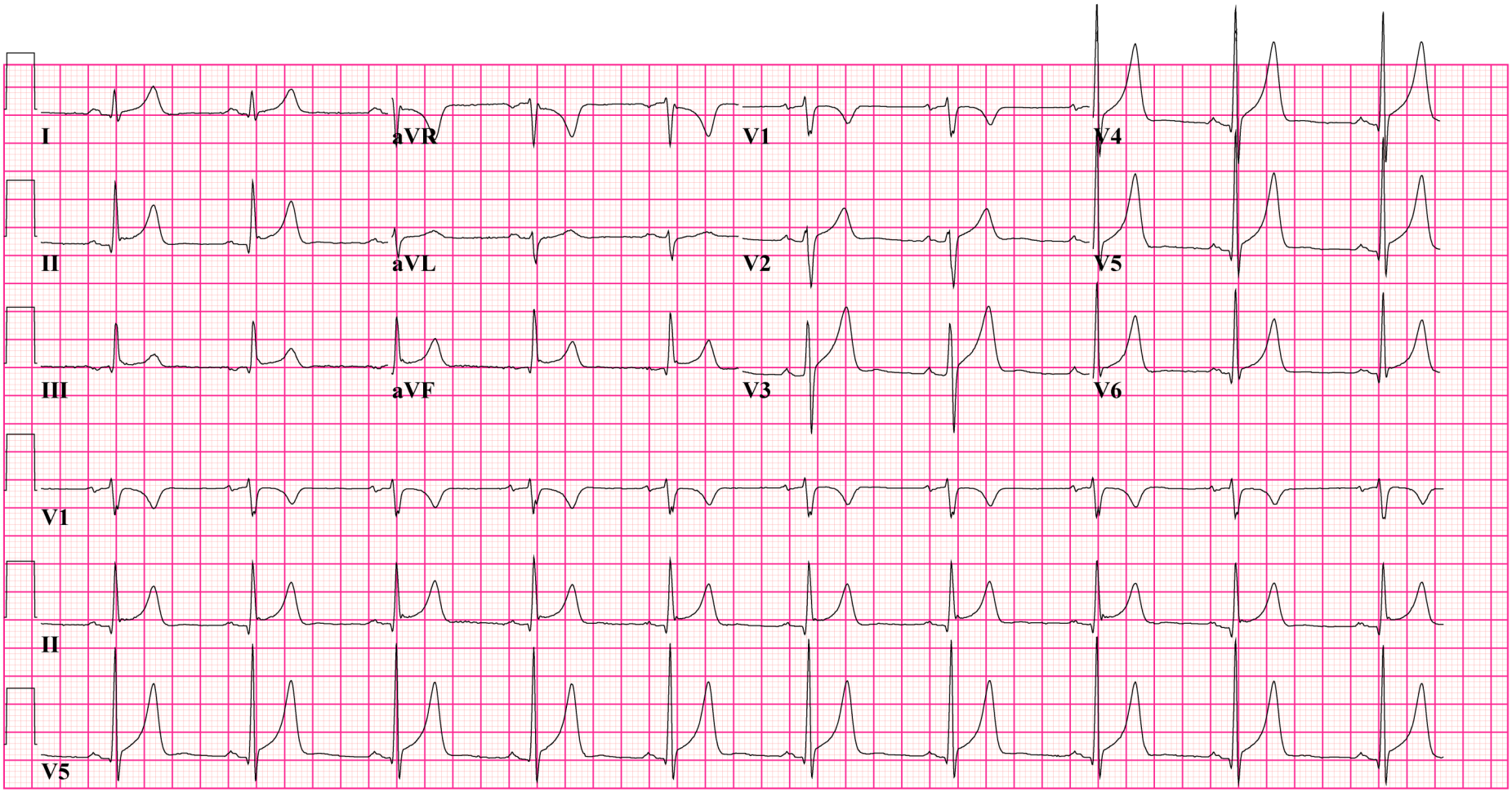


Pericarditis

- Diffusie ST elevatie
- Pta depressie



Acute Pericarditis



25mm/s 10mm/mV 40Hz 005E 12SL 233 CID: 4

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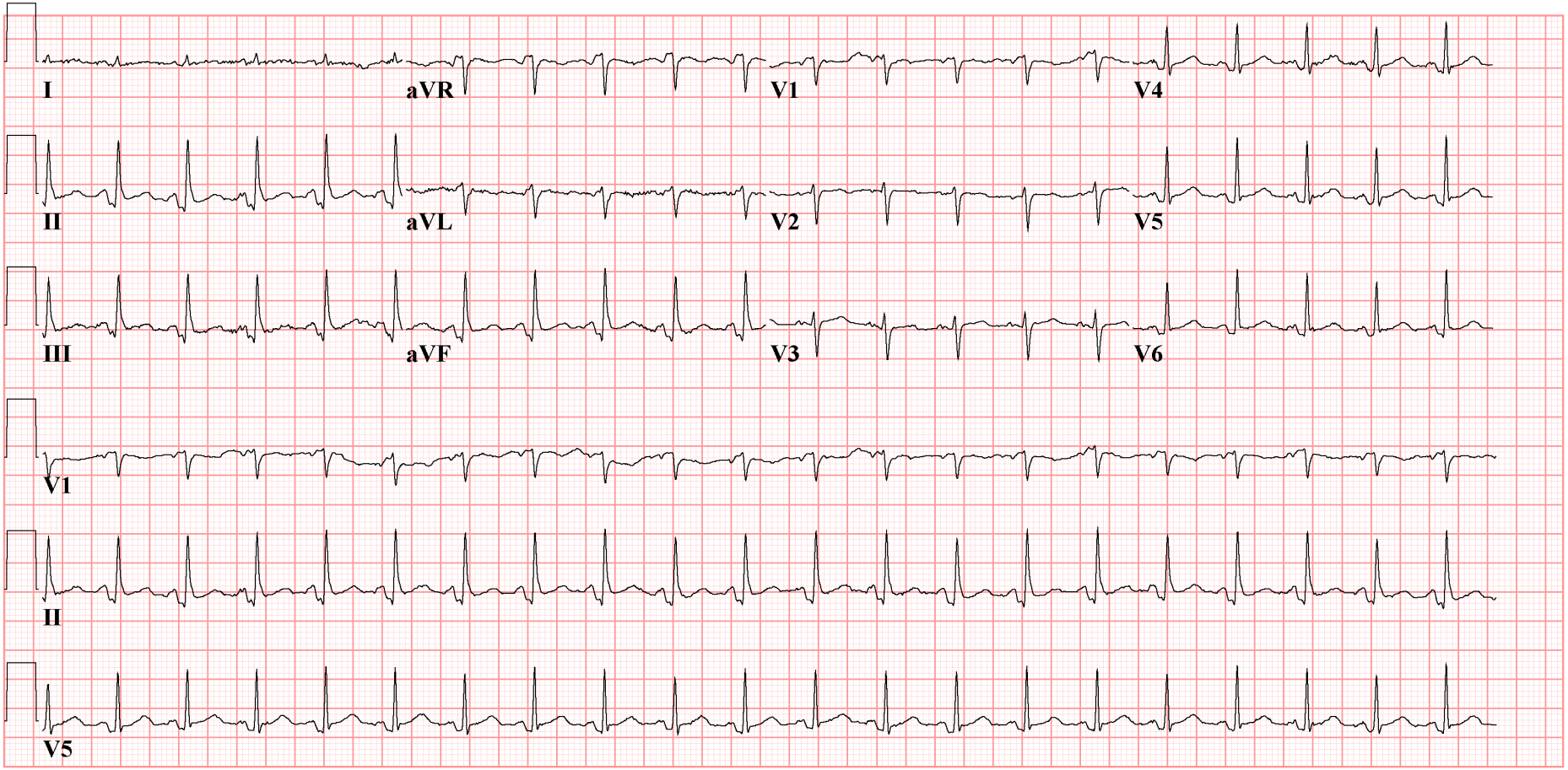
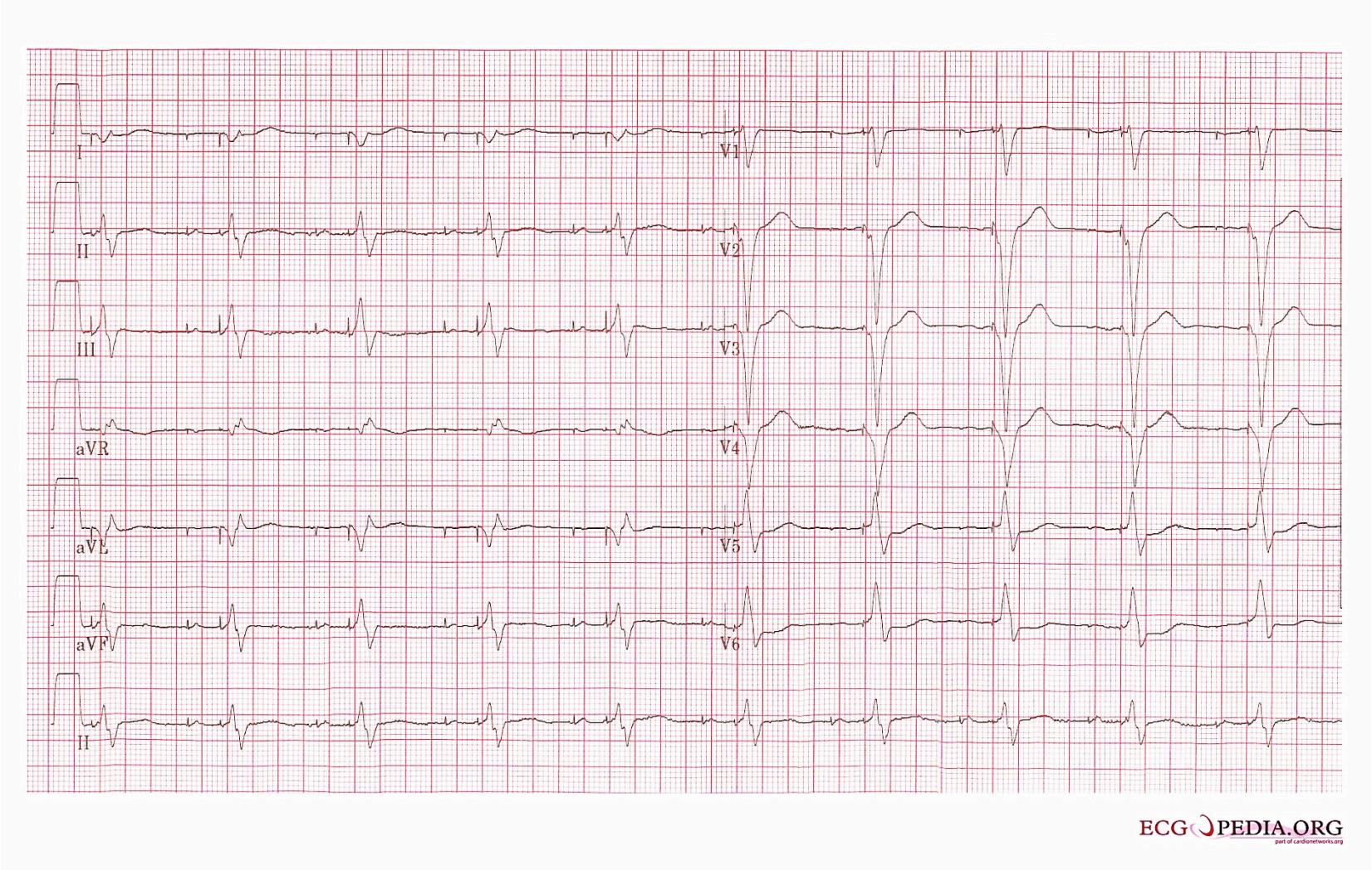
part of cardionetworks.org

Langer bestaande Pericarditis



Pacemakerritme



ISCHEMIE EN INFARCT

Diagnose infarct

Diagnostische criteria voor myocardinfarct:

-Hartenzymen verhoogd &

-Eén van de volgende:

-Typische klachten van drukkende snoerende pijn op de borst, eventueel met uistraling naar de kaak en/of arm en vegetatieve verschijnselen.

-ST elevatie of depressie

-Nieuwe pathologische Q

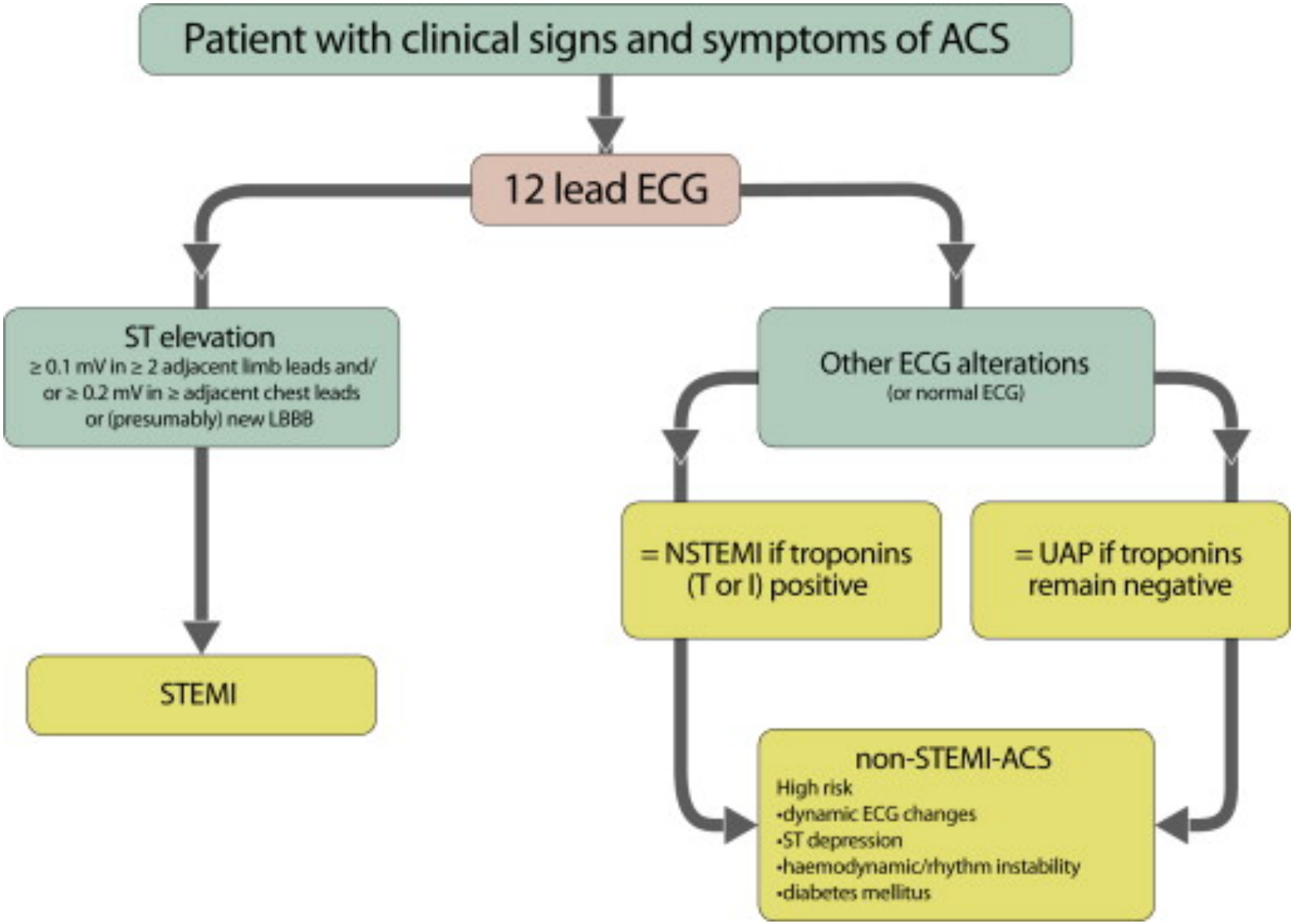
-(na coronaire interventie)

Dus: ECG is ondergeschikt aan enzymen!

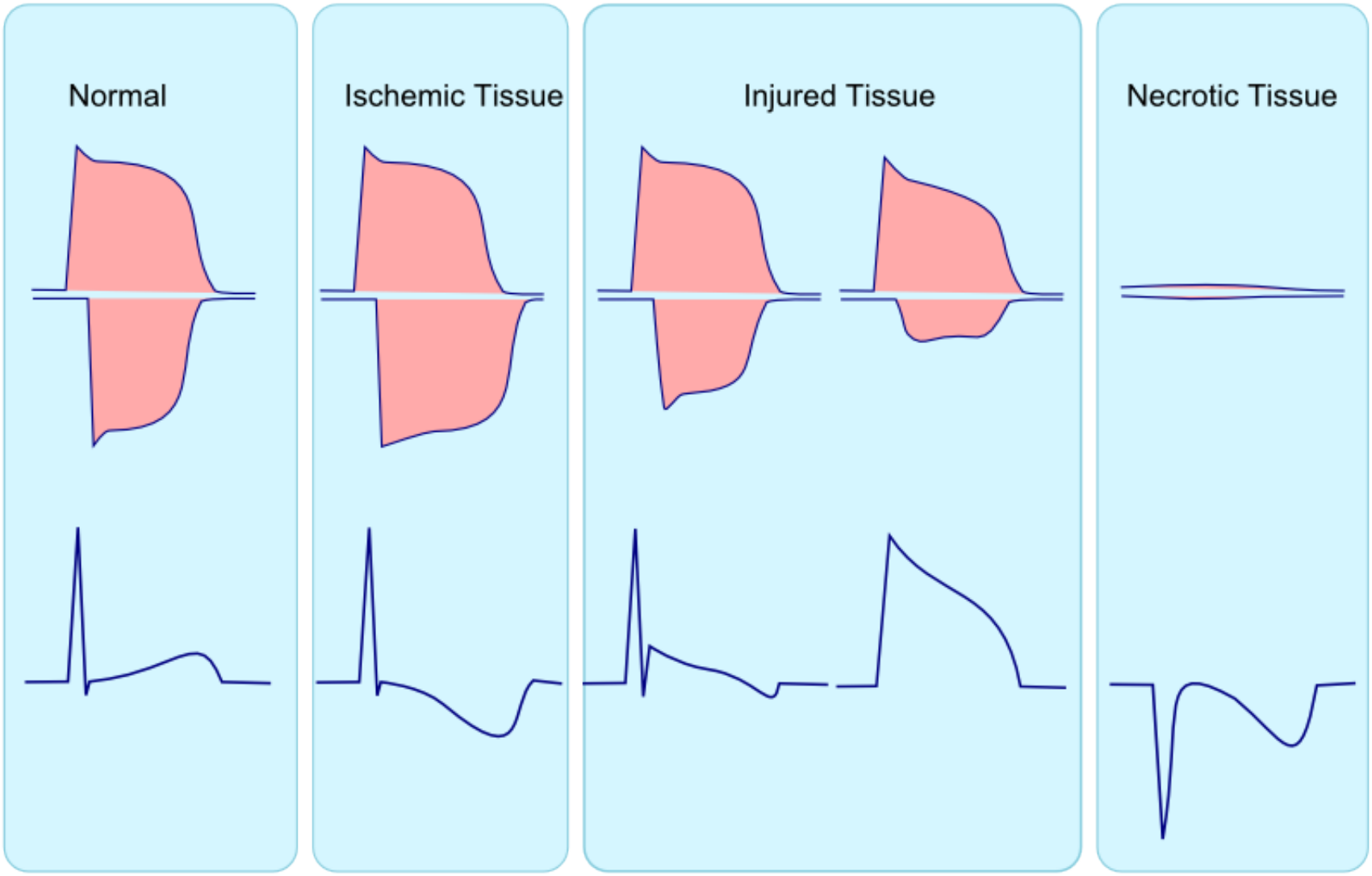
Maar wel essentieel in de acute fase!

ECG uitingen van ischemie

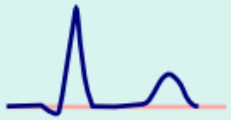
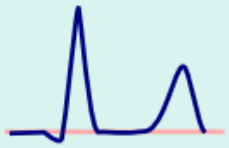
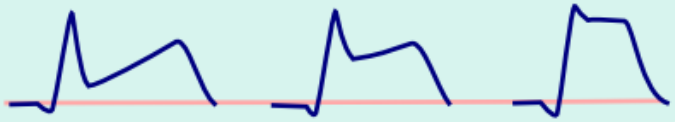
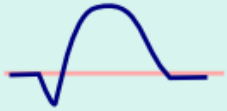
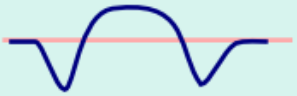
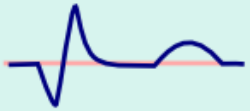
- ST elevatie
- ST depressie
- T top inversie
- QRS verbreding
- Asdraai
- R top afname
- Q vorming
- QTc verlenging



ESC resuscitation guideline 2010



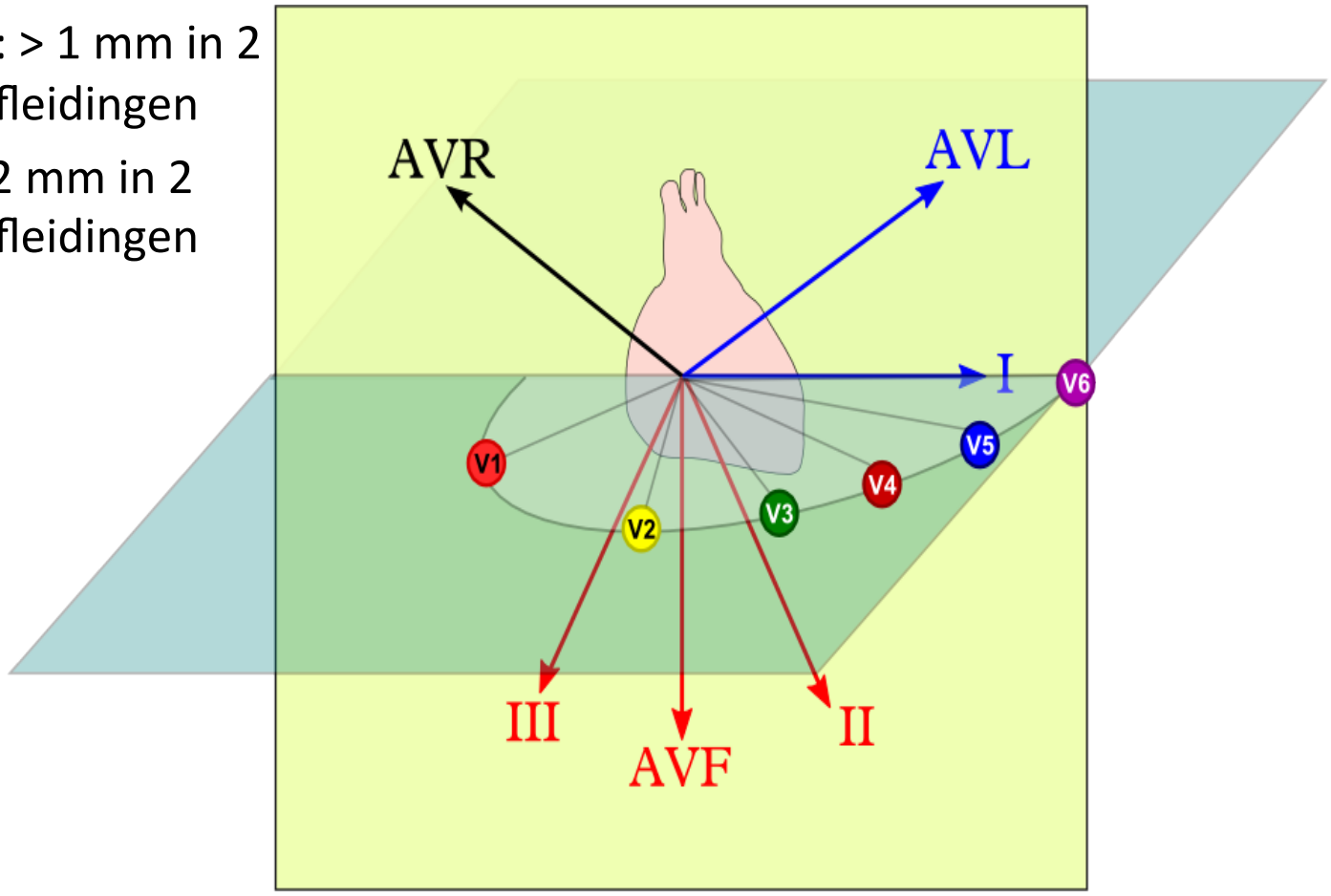
Natuurlijk beloop ECG bij AMI

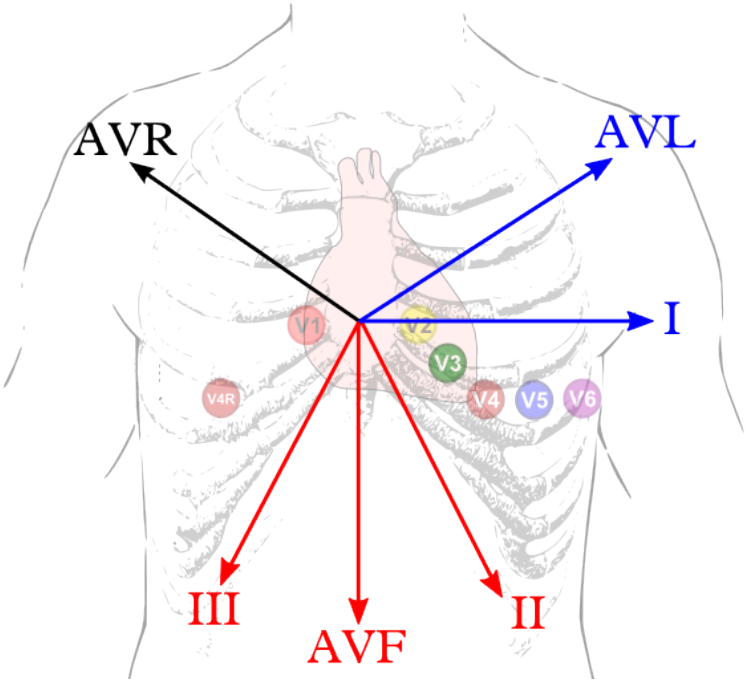
Normal		
Peaked T wave		minutes
Progression of ST segment elevation		minutes - hours
Loss of R wave, Q wave formation		hours - days
T wave inversion		days
T wave normalisation persisting Q wave		days - weeks - months

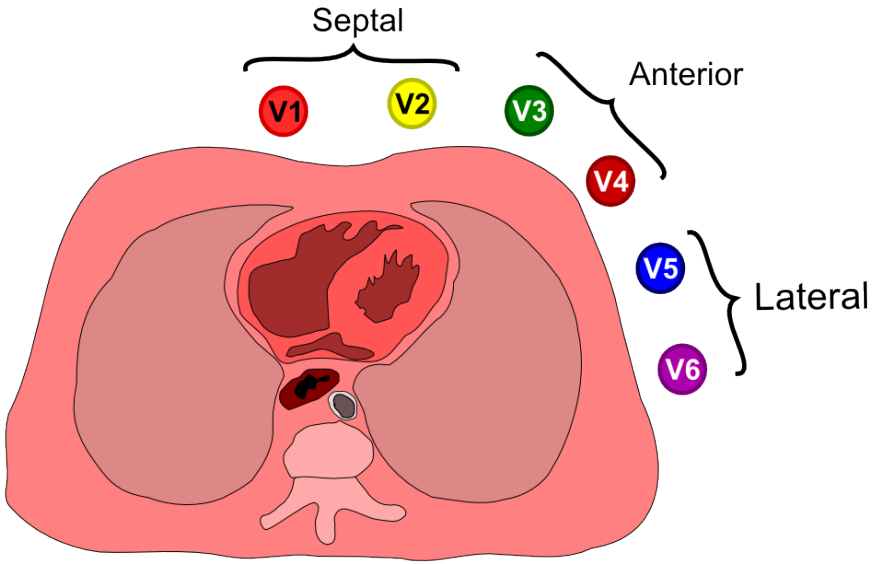
Significante ST elevatie

Extremiteiten: > 1 mm in 2 belendende afleidingen

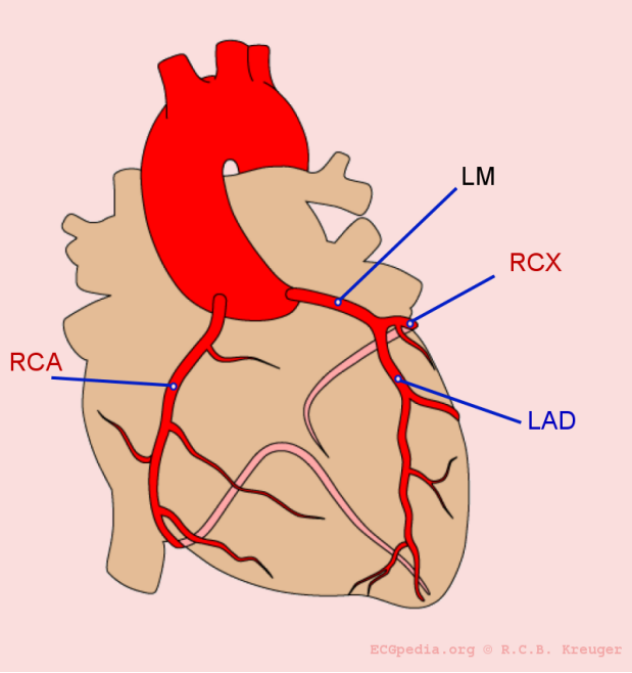
Voorwand: > 2 mm in 2 belendende afleidingen




AVR
AVL
I
III
AVF
II
V1
V2
V3
V4R
V4
V5
V6

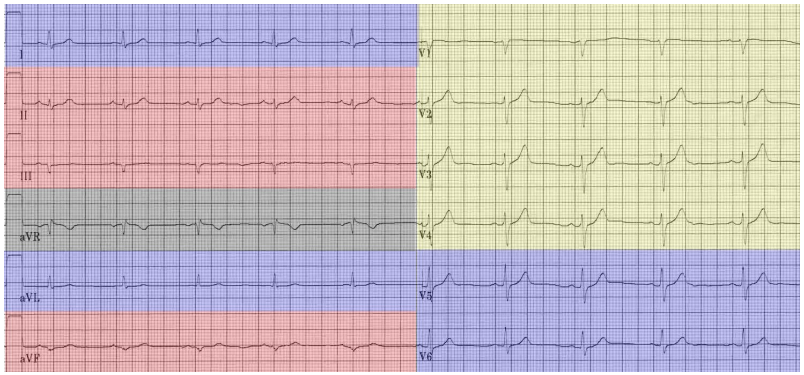

Septal
Anterior
Lateral
V1
V2
V3
V4
V5
V6

De ST elevatie wijst het infarctgebied aan



- **Voorwand**: V1-V4. Stroomgebied: LAD. *vaak tachycard.*
- **Onderwand**: II, III, AVF. Stroomgebied: 80% RCA (bradycard, elevatie III>II; depressie I en / of AVL), anders RCX (in 20%).
- **Rechter ventrikelfinfarct:** ST↑ in V4R. *vullen indien hypotensief*
- **Posterior**: hoge R en ST-depressie in V1-V3 (namelijk resp Q en ST elevatie in tegenoverliggende posterior wand)
- **Lateraal:** elevatie in I, AVL, V6. Stroomgebied: LAD (D-tak)
- **Hoofdstamocclusie:** diffuse ST depressie met ST elevatie in AVR. Z*eer hoog risico*

- **LM:** left main; **LAD:** left anterior descending; **RCX:** ramus circumflexus; **RCA:** right coronary artery



I Lateraal	V1 Septaal
II Inferior	V2 Septaal
III Inferior	V3 Anterior
aVR Hoofdstam	V4 Anterior
aVL Lateraal	V5 Lateraal
aVF Inferior	V6 Lateraal

Belendende afleidingen passen bij stroomgebieden

Waarom is dit belangrijk?

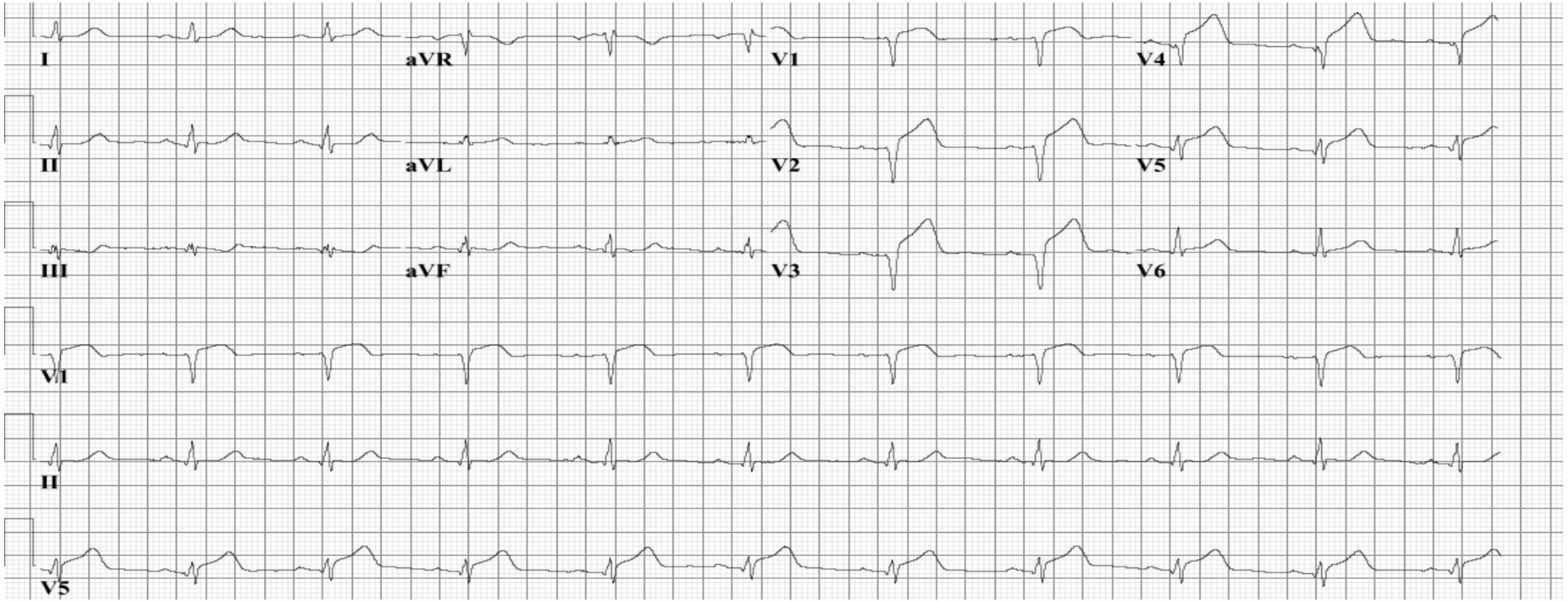
- Identificeren van patienten voor die voor spoed PTCA in aanmerking komen
- Vaststellen risico op complicaties
  - Ritmestoornissen
  - Geleidingsstoornissen
  - Pompfalen

DD bij ST elevatie:

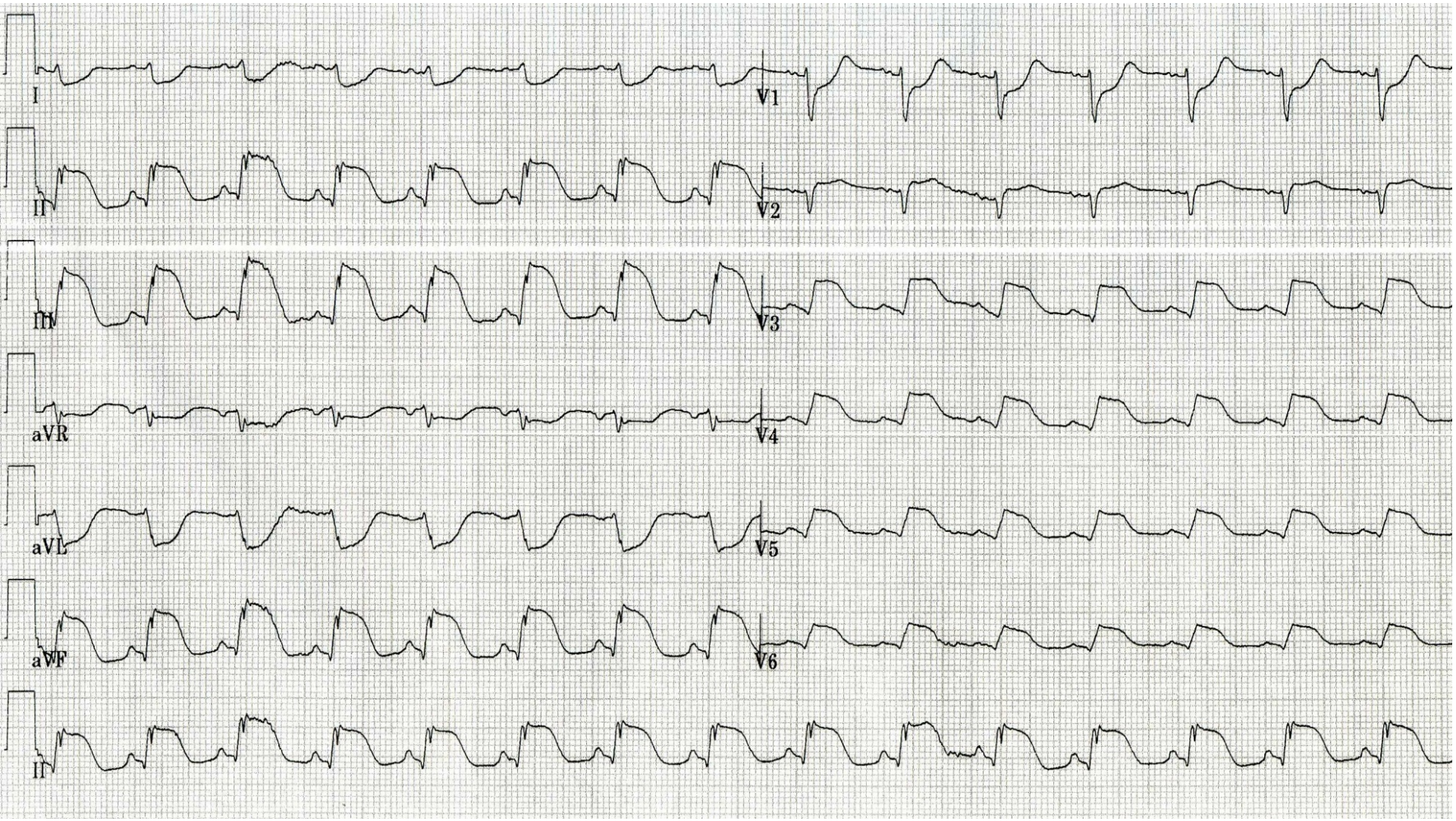
- Acuut infarct
- Vroege repolarisatie
- LVH
- Pericarditis
- LBTB

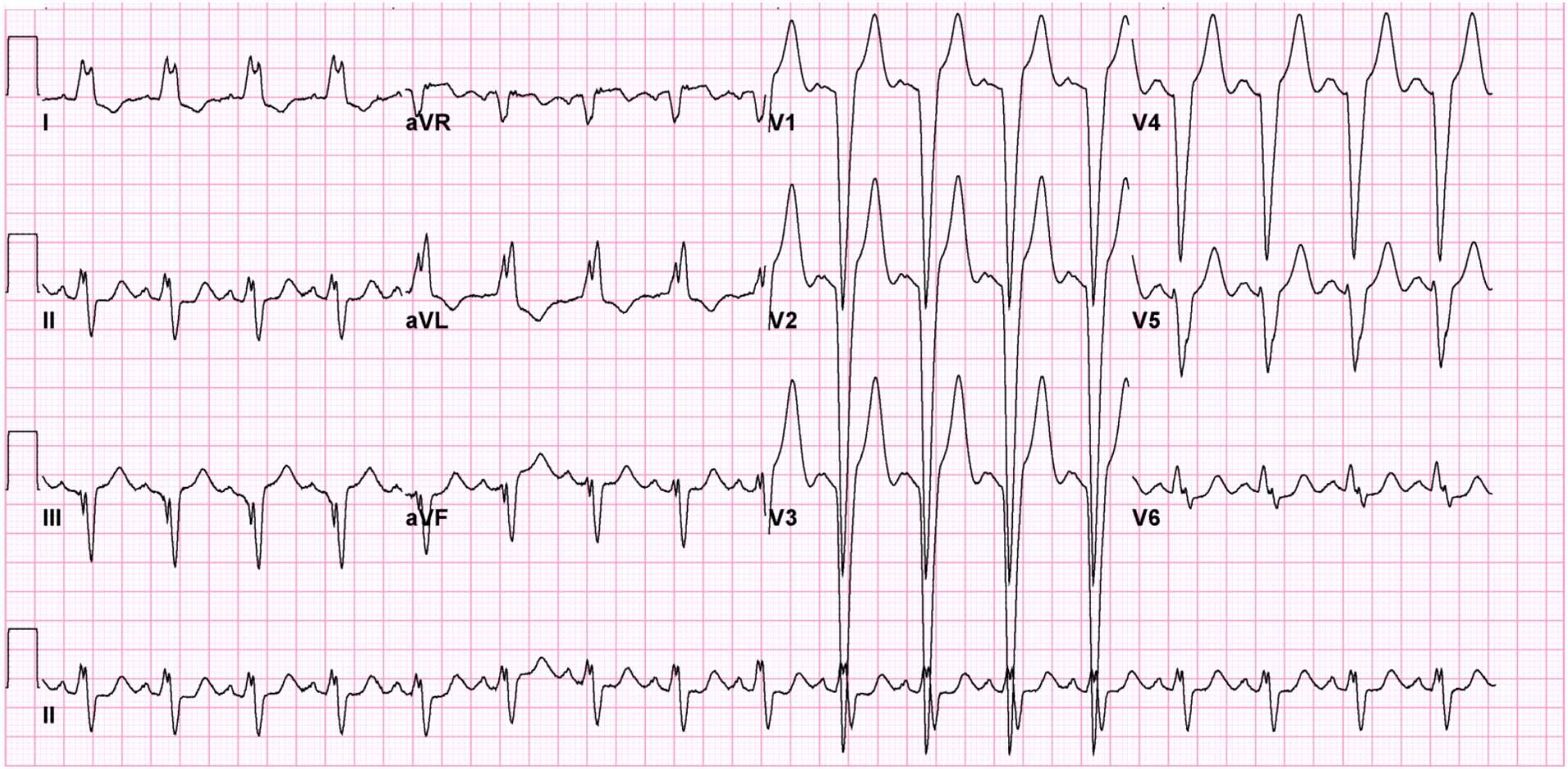
NB! Geen ST elevatie in rust sluit ischemie niet uit!

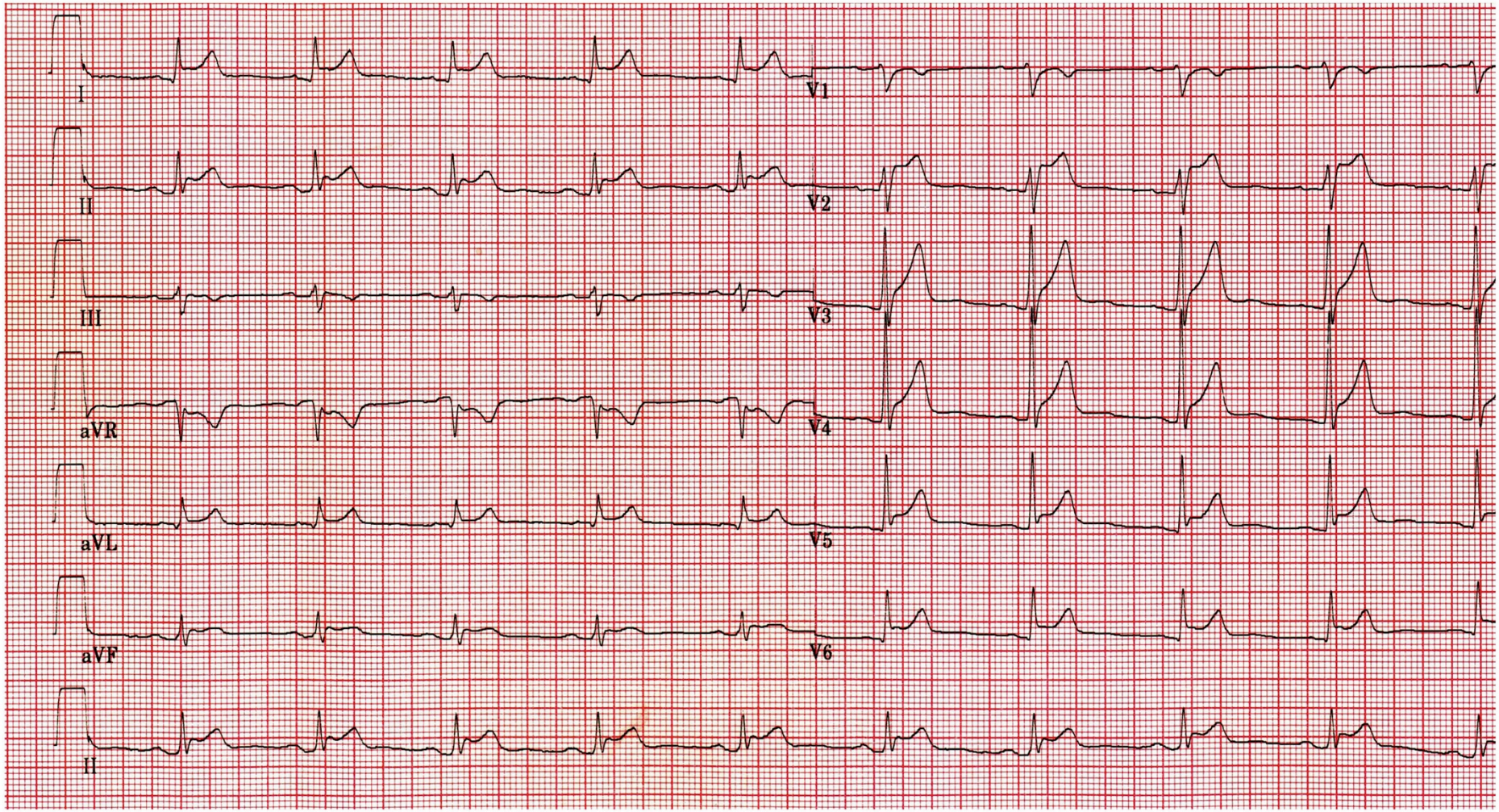
Acuut infarct



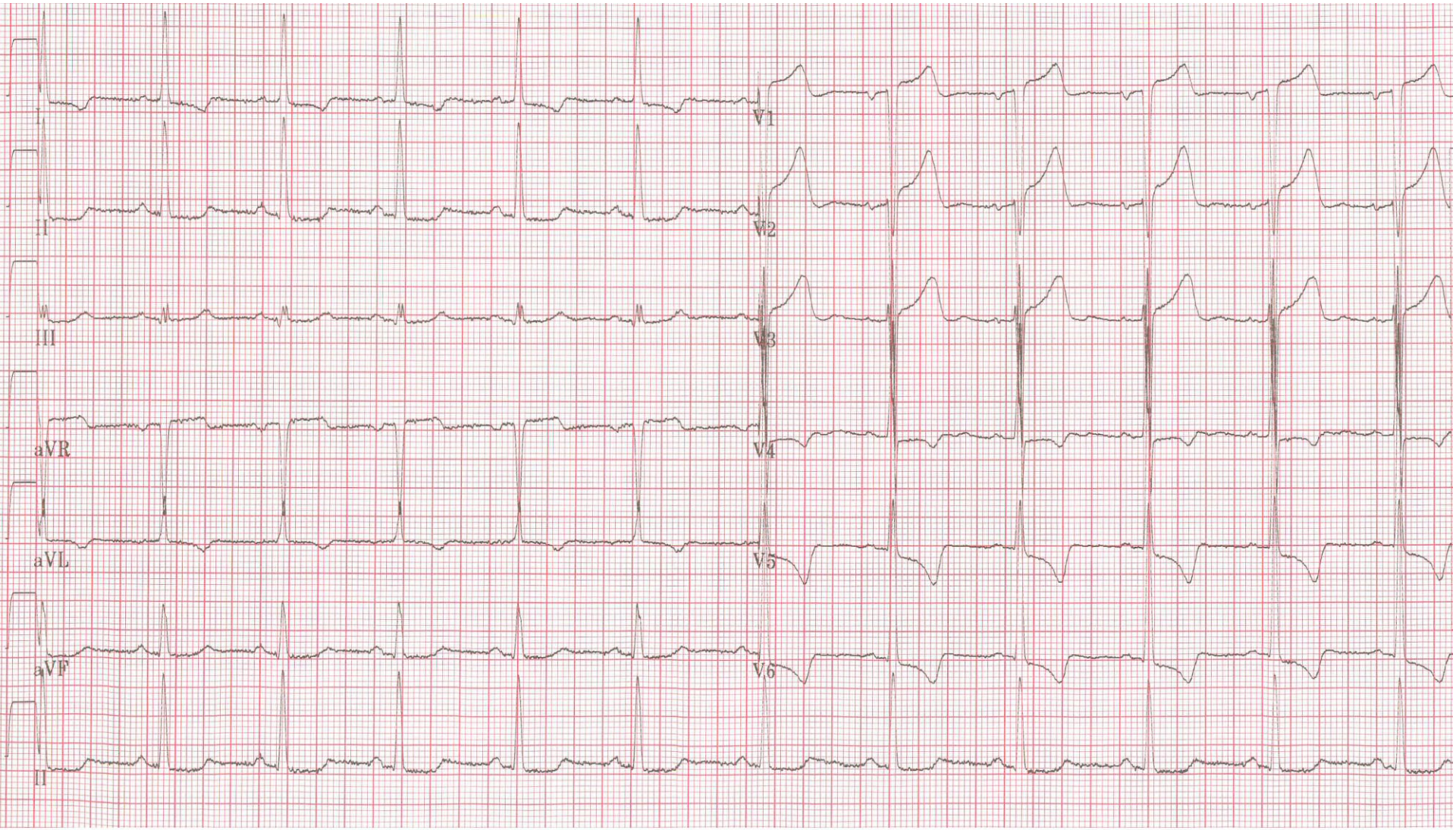
Acuut infarct

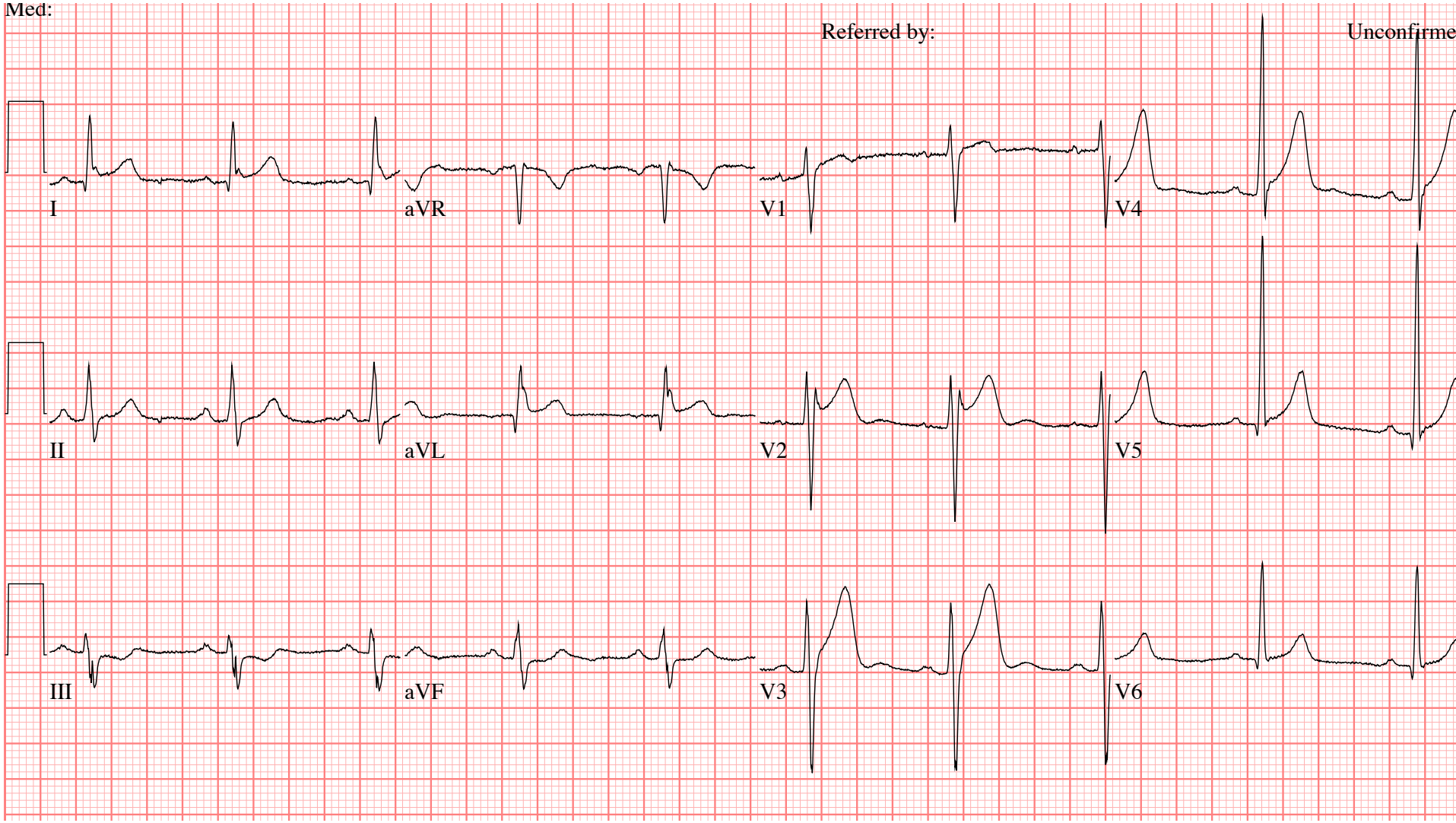



I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II

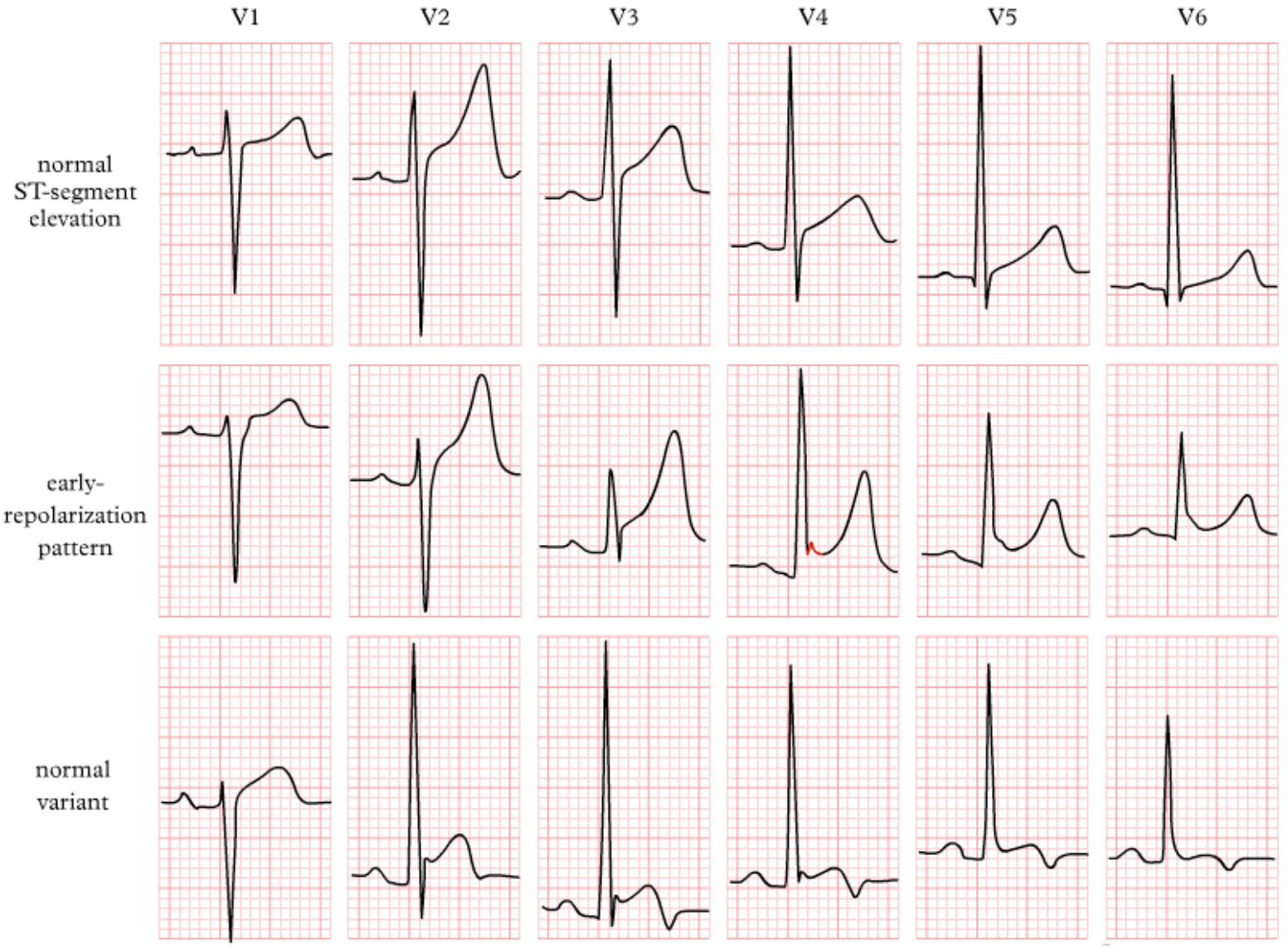


I.A.M. Otte, RN, AMC, The Netherlands



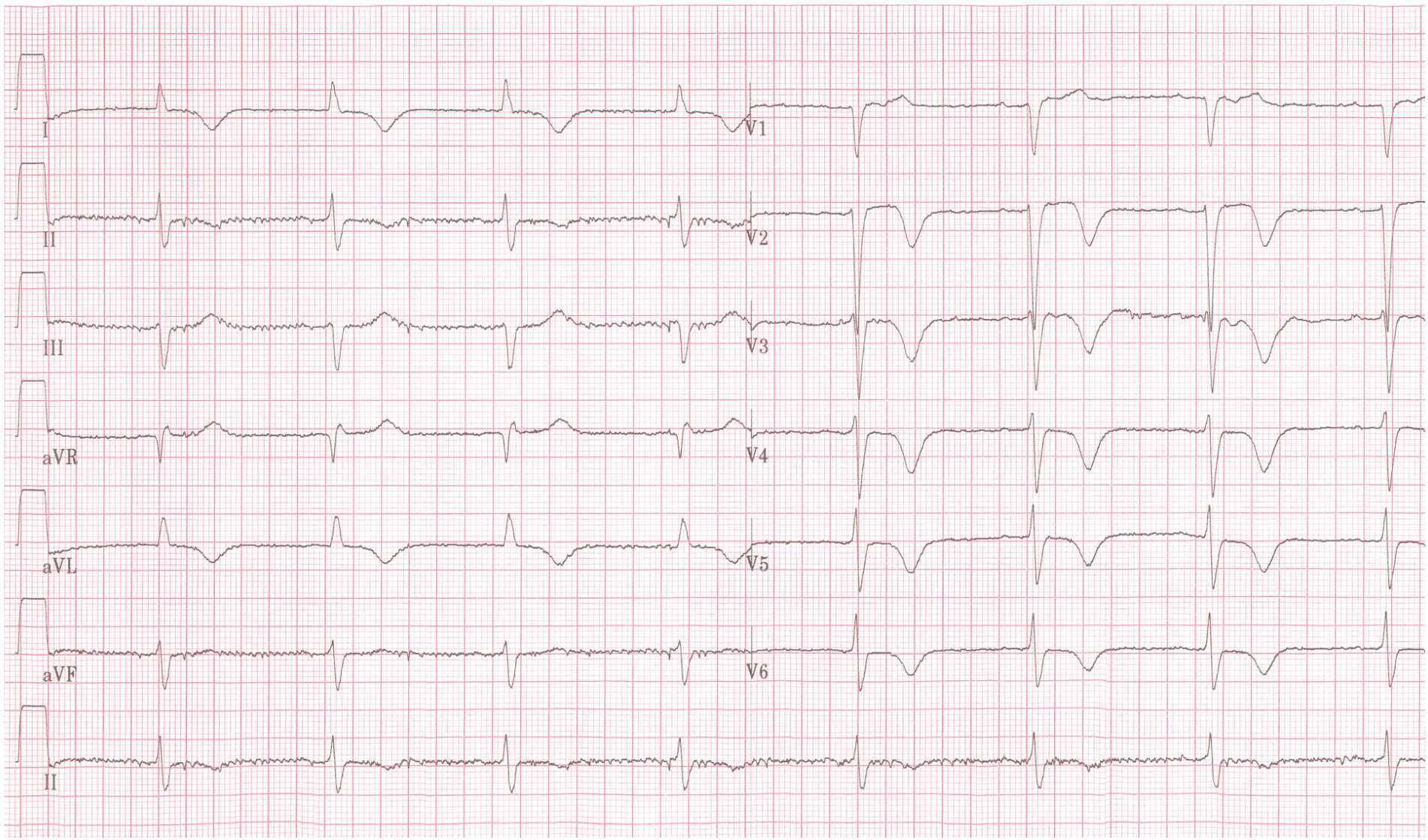

Med:
Referred by:
Unconfirme
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6

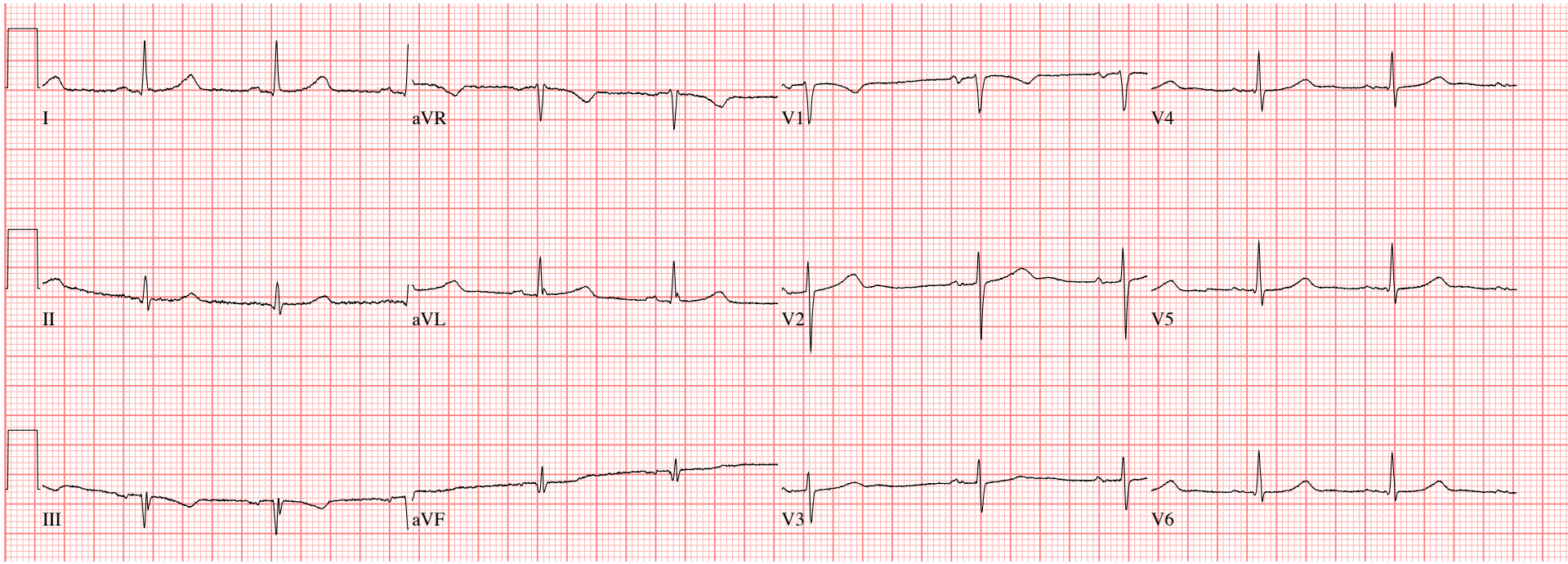
Normale Varianten

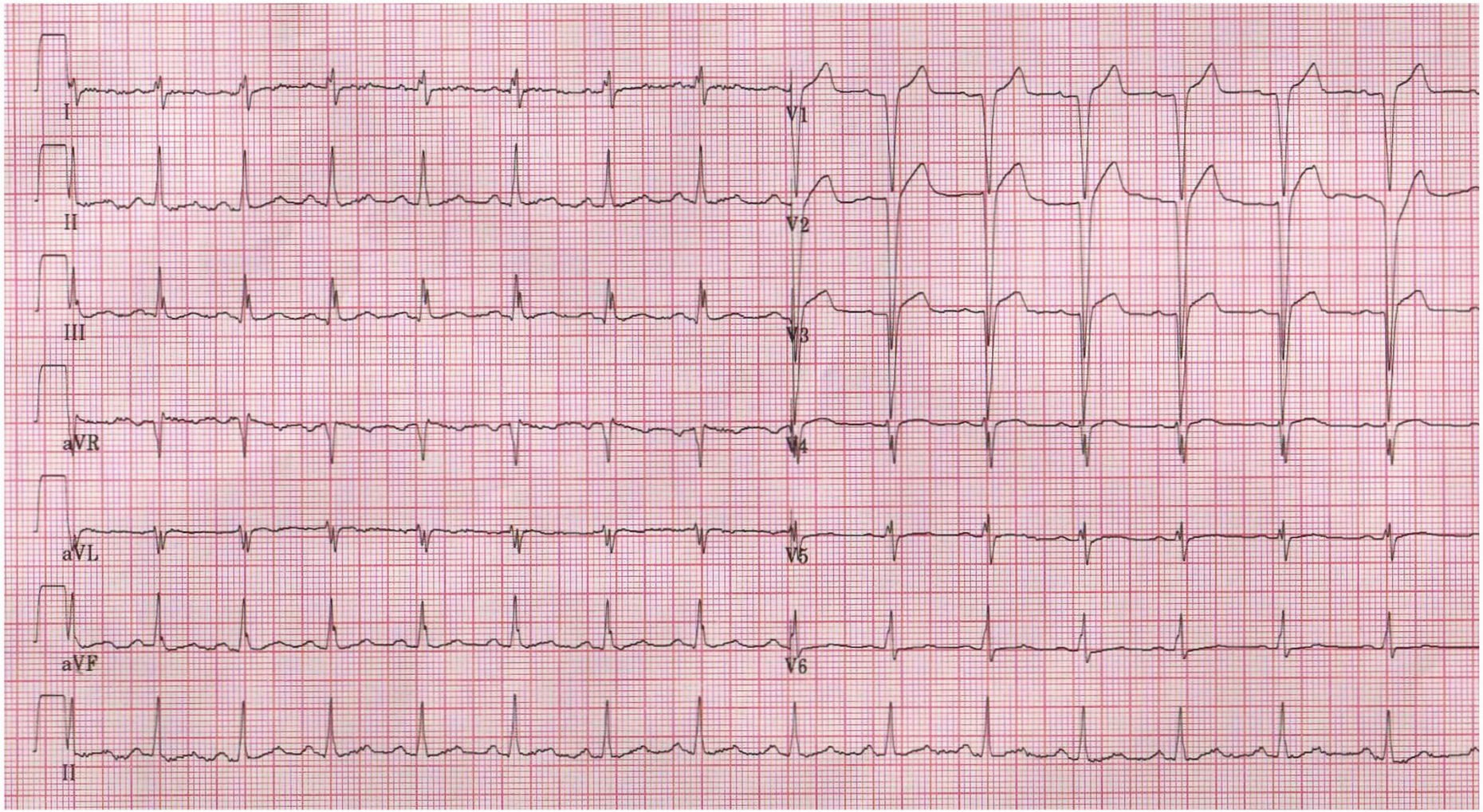


Doorgemaakt infarct

- Eerste dagen: negatieve T toppen
- Persisterende Q golven in infarctgebied:
  - Minimaal in 2 aanpalende afleidingen
  - >40ms breed en diep genoeg

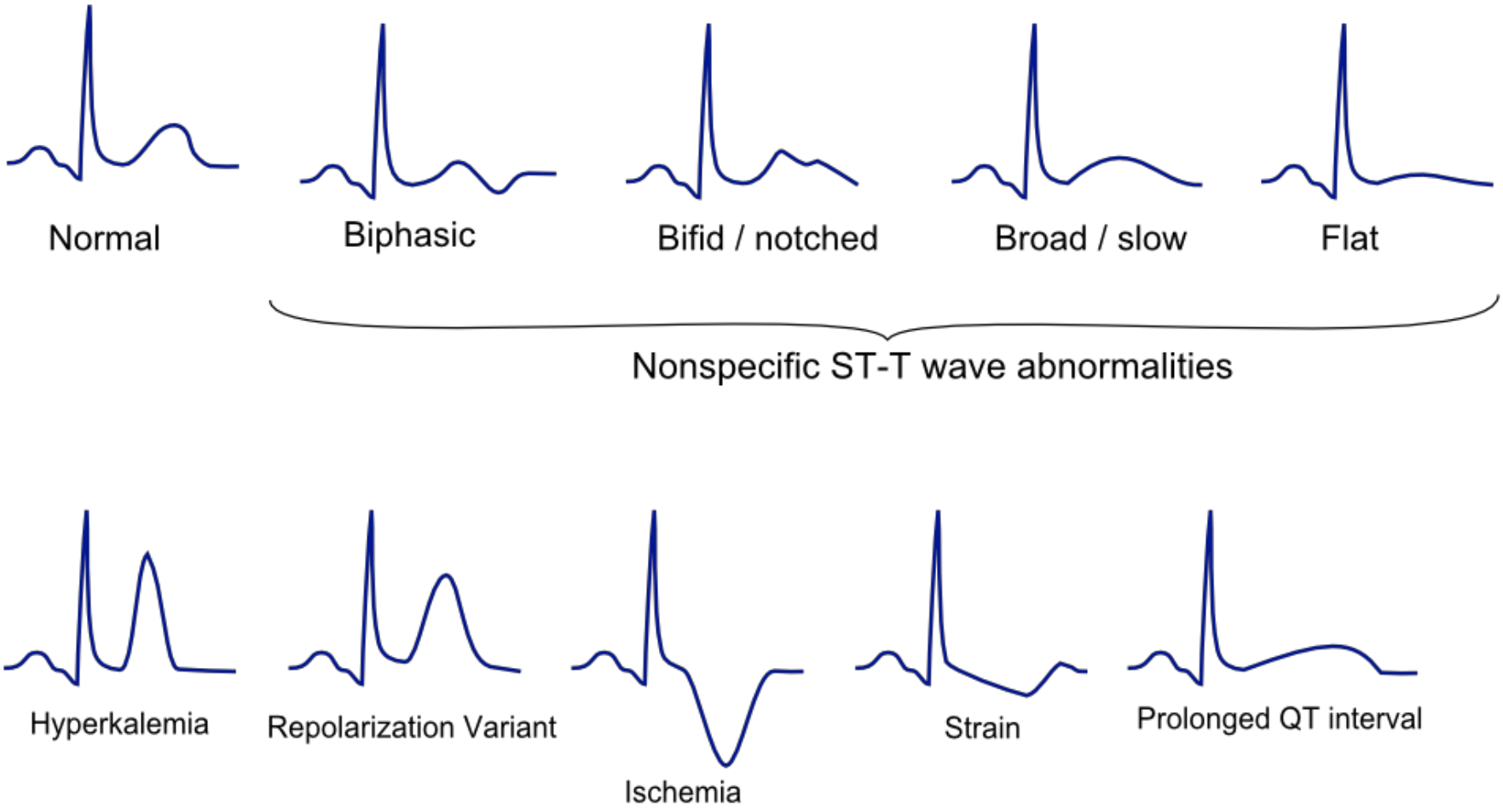


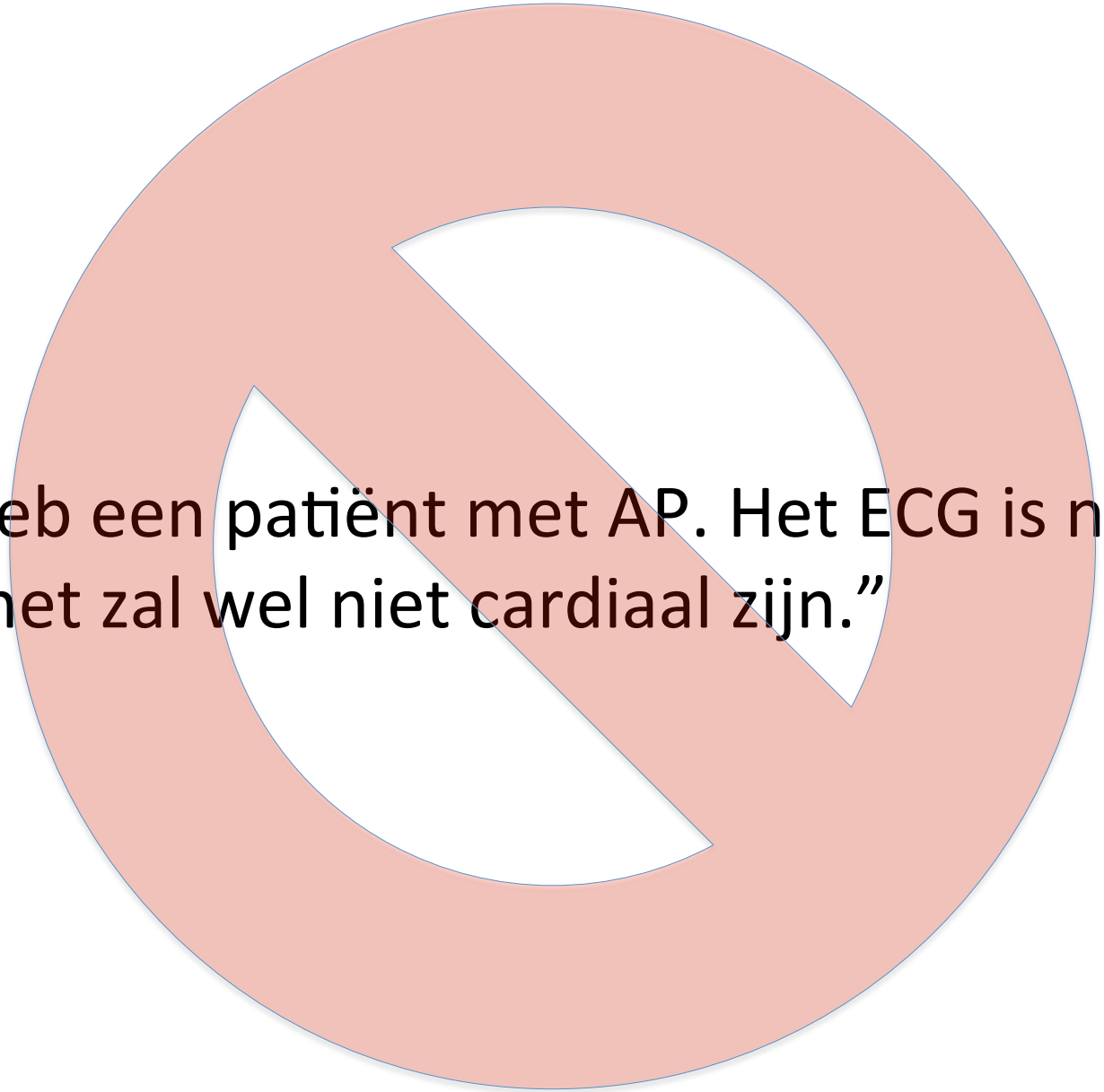

I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6



Courtesy of Vincent de Rover, RN & Device Technician, AMC, The Netherlands

ST Varianten





“Ik heb een patiënt met AP. Het ECG is normaal, dus het zal wel niet cardiaal zijn.”

Een normaal rust-ECG sluit ischemie niet uit!

Een inspanningstest en troponine T bij hevige klachten zijn veel sensitiever bij uitsluiten van ischemie.

MAJOR ABNORMALITIES

Major Abnormalities: i.p. verwijzen

- Boezemfibrilleren en boezemflutter
- Hooggradig AV blok
- LBTB, (RBTB), IVCD
- Pathologische Q golven
- Geïsoleerde ischemische afwijkingen (bv STT afwijkingen zonder Q golven)
- LVH met STT afwijkingen
- Linker / rechter boezemdilatatie
- wel major abnormality, maar zeldzaam in huisartsenpraktijk: (SVT, WPW, VT)

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Minor abnormalities

- Eerste en tweede graads AV blok type 1
- Geringe QRS verbreding (QRS 115-119 ms)
- Geïsoleerde smalle Q's en aspecifieke ST-T afwijkingen
- LVH zonder STT afwijkingen
- Frequente extrasystolen
- LAHB / LPHB

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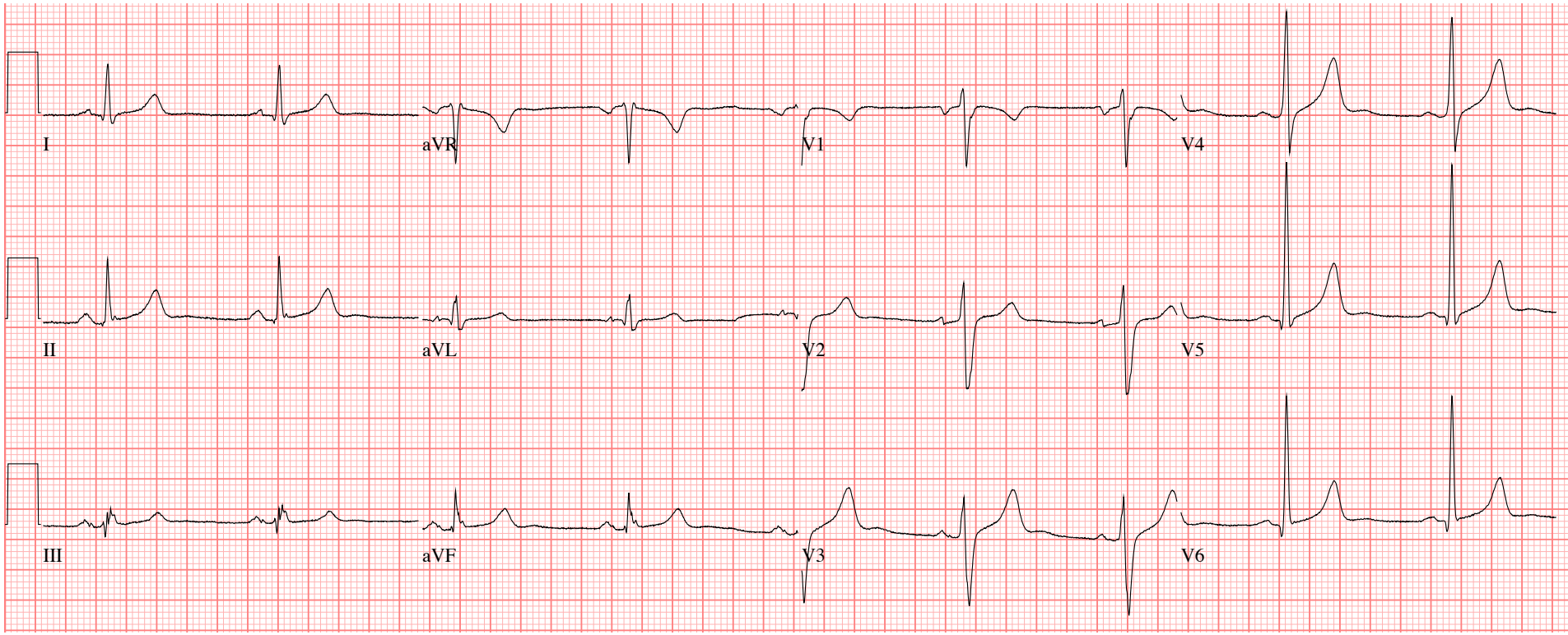
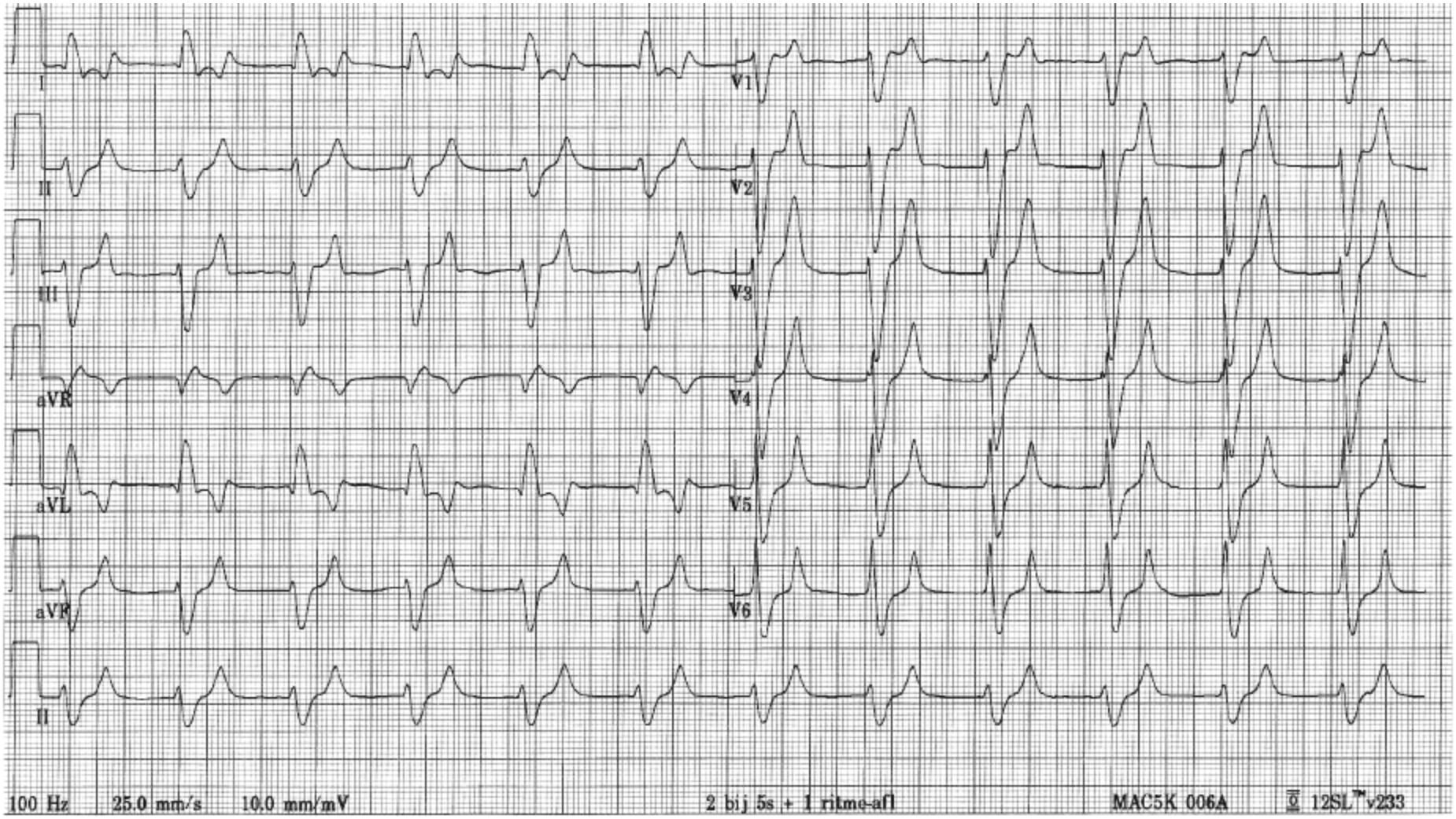
OEFEN ECG’S


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
II



Courtesy of W.G. de Voogt, MD, PhD, Amsterdam, The Netherlands

ECG PEDIA.ORG