

# Official advice on the safety of radiofrequency radiation, risk assessment and adverse effects

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5<sup>th</sup> November 2018 PHIRE Meeting, London

# Official advice affects us all



# Official advice in the UK for radiofrequency radiation:

## Public Health England (PHE)

Advised by:

**Advisory Group on Non-ionising Radiation (AGNIR) up to May 2017** (PHE advice still based on 2012 report)

**since May 2017, Committee on Medical Aspects of Radiation in the Environment (COMARE)**

# PHE is responsible for:

“We are responsible for:

- making the public healthier ... by promoting healthier lifestyles, advising government and supporting action by local government, the NHS and the public
- protecting the nation from public health hazards
- improving the health of the whole population by sharing our information and expertise, and identifying and preparing for future public health challenges
- researching, collecting and analysing data to improve our understanding of public health challenges, and come up with answers to public health problems

We do this through world-leading science, knowledge and intelligence, advocacy, partnerships and providing specialist public health services.”

# PHE Code of Conduct

“PHE is the authoritative national voice and expert service provider for public health.”

“PHE staff shall:

- conduct ourselves openly and transparently, with integrity, impartiality and honesty – we shall never deceive or knowingly mislead others including customers, the public, colleagues, the Department of Health, Ministers or Parliament
- not misuse our official position or information acquired in our official duties to further our private interests or those of others
- deal with public enquiries efficiently, promptly and without bias or maladministration and offer the public the highest standards of conduct and service.”

# The independent Advisory Group on Non-ionising Radiation (AGNIR)

Terms of reference:

- to review work on the biological effects of non-ionising radiation relevant to human health and to advise on research priorities.
- Last report on radiofrequency radiation 1st April 2012:

*"Health effects from radiofrequency electromagnetic fields"*

# Response of HPA/PHE to AGNIR 2012 report

1<sup>st</sup> April 2012:

*"The HPA [now PHE] welcomes this comprehensive and critical view of scientific studies prepared by the independent Advisory Group on Non-ionising Radiation."*

(The Health Protection Agency (HPA) became PHE on 1st April 2013)

## Independent from whom?

- 43% of people in AGNIR were from HPA(PHE)/Department of Health (DH), the groups to which AGNIR were reporting
- 21% AGNIR in 2012 were part of ICNIRP, the body who set the international exposure guidelines. AGNIR were reporting on whether they could find evidence of effects below ICNIRP guidelines
- Chair of AGNIR was Chair of ICNIRP Committee on epidemiology
- AGNIR was not independent of the group they were reporting to or of the guidelines they were assessing
- Incorrect information from HPA/PHE

# Conclusions of AGNIR 2012 report and response of HPA/PHE

- AGNIR 2012:

*"the evidence considered overall has not demonstrated any adverse health effects of RF field exposure below internationally accepted guideline levels."*

- HPA (PHE):

*"Therefore, a recommendation to follow the ICNIRP guidelines will remain central to HPA's advice on exposures to RF fields."*

Not surprising, since AGNIR Chair and some other members were also part of ICNIRP.

- Conflict of Interest
- No matter what the evidence was, it would be difficult for ICNIRP members to admit to effects below ICNIRP guidelines



# Assessment of AGNIR 2012

Open Access

Sarah J. Starkey\*

## Inaccurate official assessment of radiofrequency safety by the Advisory Group on Non-ionising Radiation

DOI 10.1515/reveh-2016-0060

Received September 30, 2016; accepted October 16, 2016

**Abstract:** The Advisory Group on Non-ionising Radiation (AGNIR) 2012 report forms the basis of official advice on the safety of radiofrequency (RF) electromagnetic fields in the United Kingdom and has been relied upon by health protection agencies around the world. This review describes incorrect and misleading statements

(1). Conclusions from subsequent ICNIRP reviews have supported the guidelines. Within the United Kingdom (UK), Public Health England (PHE) commission scientific reviews by the Advisory Group on Non-ionising Radiation (AGNIR) to assess the safety of RF fields. AGNIR reviews, along with PHE in-house assessments of exposures, form the basis of PHE's advice on the safety of RF signals. This guides the UK government, organisations and decision makers when assessing the safety of wireless devices and

Reviews on Environmental Health 31(4): 493-503, December 2016

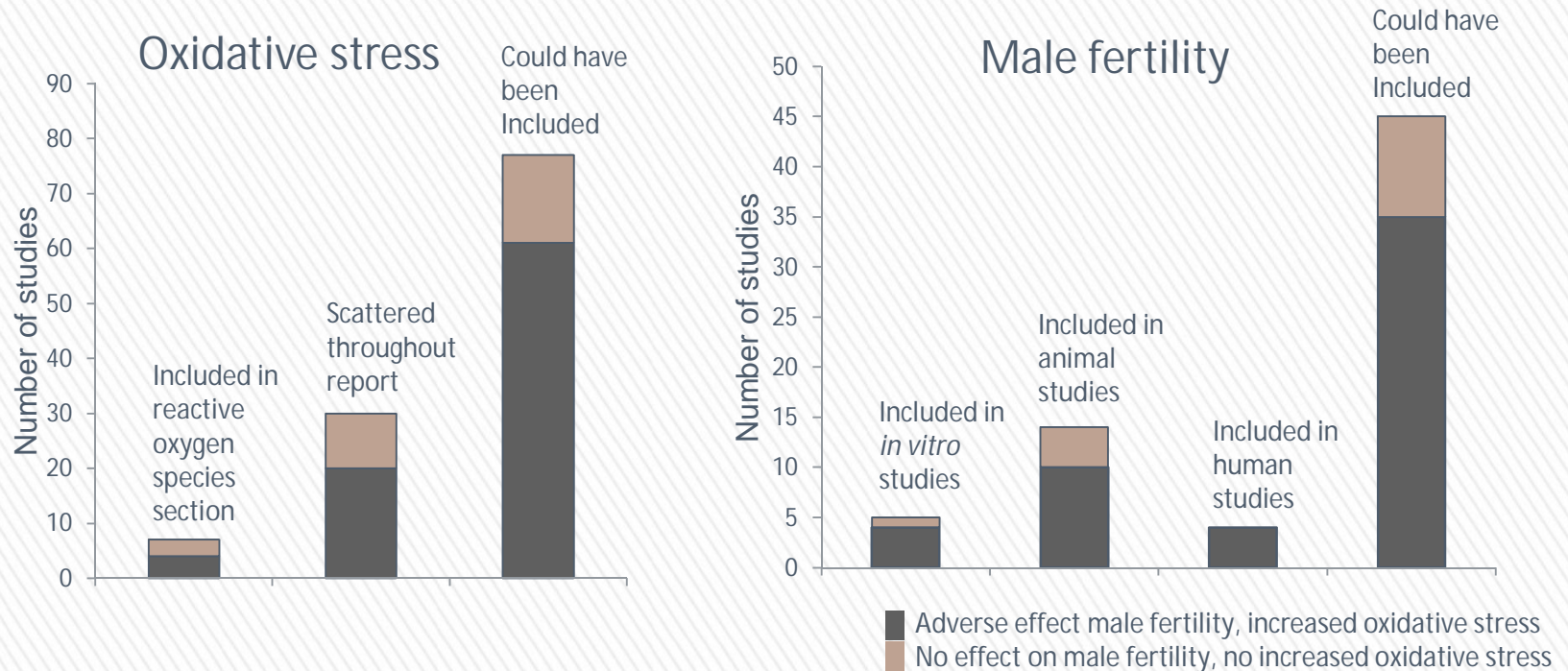
<https://doi.org/10.1515/reveh-2016-0060>

(Email address on paper is no longer in use,  
alternative is [contact@wirelessriskassessment.org](mailto:contact@wirelessriskassessment.org))

S Starkey, PHIRE Meeting, 5th November 2018 ©

# Male fertility and oxidative stress

AGNIR Report considered studies from 2003-2010, plus chosen ones from 2011  
 At least 40 studies omitted for oxidative stress; 22 for male fertility



If omitted studies had been included:

79% of studies (61/77) would have demonstrated evidence of increased oxidative stress,

78% (35/45) adverse effects on sperm, male reproductive organs or altered testosterone concentrations.

## Male fertility and oxidative stress

Conclusions in Executive Summary were:

*"Despite many studies investigating effects on male fertility, there is no convincing evidence that low level exposure results in any adverse outcomes on testicular function."*

For male fertility in humans, *"The limited available data on other non-cancer outcomes shows no effects of RF field exposure"*.

Oxidative stress wasn't even mentioned in the conclusions.

➤ Conclusions were left out, were incorrect or inaccurate

## Techniques used in report to give the impression that there were no effects below ICNIRP guidelines

- Only include a few studies on each aspect in each section, it looks as though there isn't much evidence – as happened for male fertility.
- If a lot of studies describe adverse effects, only include a few in the report and do not mention the subject in the conclusions (people probably won't notice) – as happened for oxidative stress.
- Ignore results from exposures to real devices and dismiss any that haven't described the dosimetry (calculated estimates of RF exposures in tissues) in exactly the right way – as happened for male fertility.
- Emphasise where results are not identical – you can say that they are 'not consistent' and cast doubt on the evidence, even if the methodologies were different – this happened for the brain, nervous system, auditory function and fertility.
- You can strengthen the case for 'no effects' by stating that a well conducted study found no effect, implying others were not well conducted, even if it is not true. E.g., *"One well-conducted study reported no effects on testicular function in rats exposed to 848 MHz CDMA signals."* Readers might not notice that 78% studies found effects.
- Where all or most studies report effects, say that it isn't yet enough to make a conclusion or it isn't 'convincing' – as happened for human male fertility studies.
- Explain why you think studies might be flawed and then take a massive leap and conclude that there is no evidence at all – people probably won't notice that you have pretended that that evidence has disappeared – as happened for male fertility.

## Other examples in the report

- **Cognitive effects in humans:** *"Studies of cognitive function and human performance do not suggest acute effects of exposure to RF fields from mobile phones and base stations."*

But, 8 studies which had described adverse effects on cognition were hidden (4 omitted and 4 scattered in other sections)

- Evidence omitted or hidden in other sections, leading to an incorrect conclusion

- **Effects on membranes (excluding the blood-brain barrier):** *"In general, most studies report finding effects on cell membranes... However, ... the variety of cellular systems and exposures makes comparisons of the effects on the cell membrane problematic and without independent replication it is difficult to assess the robustness or even the validity of the findings."*

But, all 17 studies included (100%) reported effects on membranes. Report twisted this around to suggest that the effects were not robust. This was highly misleading.

- Misleading conclusion, evidence belittled

## Other examples in the report

- Direct effects on proteins: *"In general, most of the studies that have investigated changes in protein function or structure due to exposure to RF fields have found effects. However, ... the effects have not been demonstrated to be robust by independent replication"*.

But 15/16 studies included (94%), from 14 different groups, reported effects on proteins. Report twisted this around to suggest that the effects were not robust. This was highly misleading.

➤ Misleading conclusion, evidence belittled

- Executive Summary stated, *"There are now several hundred studies in the published literature that have looked for effects on isolated cells or their components when exposed to RF fields. None has provided robust evidence for an effect."*

97% of studies on cell membranes and proteins described effects, but the conclusion made the evidence disappear and dishonestly gave the impression that there were no effects.

➤ Incorrect, inaccurate and misleading conclusion

## Other examples in the report

- Executive Summary stated, "*There has been no consistent evidence of effects on the brain, nervous system or the blood-brain barrier, on auditory function, or on fertility and reproduction.*"

But, 4/5 studies included described loss of cells in the brain following prenatal or early neonatal RF exposures in animals. 78% male fertility studies described adverse effects. Term '*Consistent*' was used to incorrectly imply that there was no evidence.

- Highly misleading, implying that there was no evidence

- Pregnancy. Executive Summary stated, "*data on other non-cancer outcomes show no effects of RF field exposure*".

But, 3 studies on maternal exposures during pregnancy described behavioural or psychomotor effects in children. This evidence just disappeared in the conclusion.

- Incorrect conclusion

## Other examples in the report

- **Genetic damage.** Executive Summary stated, *"In particular, there has been no convincing evidence that RF fields cause genetic damage or increase the likelihood of cells becoming malignant."*

But, at least 40 genotoxicity studies were omitted. If these had been included **52% (61/118)** would have **described evidence for genotoxicity**. A more accurate conclusion could have been that RF signals appear to be genotoxic under certain circumstances, but not others. AGNIR use subjective term 'convincing' to suggest that there is no evidence.

- Subjective and misleading conclusion, implying that there was no evidence

- **Brain activity.** *"the EEG studies... do provide some evidence that RF fields could influence brain function... it remains unclear whether these RF effects, if they exist, are material to human health or not."*

RF signals alter brain activity, but **evidence is dismissed by introducing uncertainty about its relevance to human health**. The effects then disappear in the overall conclusion.

- Inaccurate and misleading conclusion; expertise on how it could relate to human health could have been sought\*

\*e.g. [Fröhlich and McCormick 2010 Neuron 67:129-143](#); [Kilb et al/2011 Eur J Neurosci 34:1677-1686](#); [Palva and Palva 2011 Front Psychol 2:204](#).



# Looking back to AGNIR 2012 report overall conclusion:

*" the evidence considered overall has not demonstrated any adverse health effects of RF field exposure below internationally accepted guideline levels."*

78% studies - damage to male reproductive health

97% studies - effects on proteins or cell membranes

79% studies - increase in the damaging condition of oxidative stress

80% studies - loss of cells in brain from prenatal or neonatal exposures

52% studies - evidence of genetic damage, genotoxicity

...etc.

- Conclusion was false and not evidence based; it was incorrect and misleading
- UK radiofrequency exposures and use of wireless devices, including by babies and children, are based on this scientifically inaccurate and misleading report
- Evidence of harm has been covered up

A few months after the paper was published, AGNIR was quietly disbanded.

But the inaccurate AGNIR report is still being used by PHE to support their advice.

COMARE is now PHE's advisory group, but it has the same secretariat as AGNIR (a contributor to the inaccurate AGNIR report and also part of ICNIRP). The secretariat is responsible for advising COMARE when they need to look at the science.

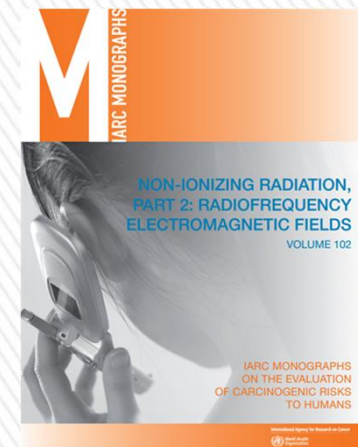
- UK official advisory group is still under the control of ICNIRP

# PHE are withholding information

- WHO IARC classification of radiofrequency fields as a possible human carcinogen (2B) was not mentioned in the AGNIR 2012 report
- PHE have removed the IARC 2B classification from their current website
- They are therefore withholding appropriate specialist advice (maladministration)
- Prevents decision makers or public being able to make informed decisions

## ➤ IARC Monograph 102

<https://monographs.iarc.fr/wp-content/uploads/2018/06/mono102.pdf>



## PHE have said that there is no reason why schools or other places should not to use Wi-Fi

- But PHE have never admitted that adverse effects of Wi-Fi exist, even though many studies have described harmful effects of Wi-Fi signals
- The evidence has been withheld from the public, preventing them from making an informed choice

Some Wi-Fi studies are listed at <http://wifiinschools.org.uk/30.htm>



# Members of ICNIRP were also authors of the inaccurate AGNIR report



- International radiofrequency exposure guidelines are written by ICNIRP and include authors of the inaccurate AGNIR report
- 5 people who contributed to the AGNIR 2012 report are currently (or were previously) in ICNIRP
- ICNIRP members have produced incorrect, inaccurate and misleading scientific information upon which public health and wireless infrastructure decisions have been based. This calls into question the validity of international exposure guidelines

# ICNIRP use the same techniques as AGNIR

July 2018, ICNIRP published a draft Health Risk Assessment (Literature, Appendix B)

- Oxidative stress. No studies on oxidative stress were mentioned.

*"There is a large body of literature concerning cellular and molecular processes that are of particular relevance to cancer. This includes studies of ... increased oxidative stress..."*

*"A number of studies of physiological functions that could in principle lead to adverse health effects have been conducted, primarily using in vitro techniques. These have ... assessed such functions as... oxidative stress-related processes. ... Although some effects have been reported for some of these endpoints, there is currently no evidence of effects relevant to human health."*

- Increased oxidative stress dismissed as not being relevant to health; the evidence therefore disappeared; they contradicted themselves
- Expertise on how it could relate to human health could have been sought\*

\*e.g. references included in [Reviews on Environmental Health 31\(4\): 493-503](#), (8 references: 7-14)

## Same techniques as AGNIR

- Swedish Radiation Safety Authority Report, April 2018 (Twelfth report from SSM's Scientific Council on Electromagnetic Fields), includes ICNIRP Chair as an author

*"Some cell and animal studies indicate that EMF exposure may cause oxidative stress even at low exposure levels. It is unclear what relevance this may have when it comes to direct health effects in humans."*

- Effects dismissed as not relevant to health, which allowed the evidence to disappear

# Many official advisory bodies are inter-related and linked to ICNIRP

## WHO EMF Project

van Deventer E., ICNIRP observer  
 van Rongen E., Chair ICNIRP  
 Feychting M., Vice-Chair ICNIRP  
 Mann S.M., ICNIRP, AGNIR...  
 Oftedal G., ICNIRP  
 Challis L., formerly AGNIR  
 Juutilainen J., ICNIRP  
 Loughran S., ICNIRP  
 Rösli M., ICNIRP  
 de Sèze R., ICNIRP  
 Sienkiewicz Z.J., ICNIRP  
 Peyman A., AGNIR  
 Rubin G.J., AGNIR, SCENIHR

They all include people from ICNIRP and report no health effects below ICNIRP guidelines

➤ Conflict of interest

## Swedish Rad. Safety Auth.

van Deventer E., WHO EMF  
 van Rongen E., Chair ICNIRP  
 Rösli M., ICNIRP  
 Scarfi M.R., SCENIHR

## ARPANSA (Australia)

Green A., ICNIRP  
 Karipidis K., ICNIRP  
 Wood A., ICNIRP, formerly ARPANSA

ICNIRP

## SCENIHR (EU Commission)

Rubin G.J., AGNIR, WHO EMF  
 Sienkiewicz Z.J., ICNIRP, AGNIR, PHE, WHO EMF  
 Schüz J., formerly ICNIRP

## COMARE (UK DH)

Mann S.M., AGNIR, PHE, ICNIRP, WHO EMF, COMARE

## AGNIR (UK, 2016)

Swerdlow A.J., formerly ICNIRP  
 Duck F.A., ICNIRP  
 Feychting M., Vice-Chair ICNIRP  
 Mann S.M., ICNIRP  
 O'Hagan J.O., ICNIRP  
 Sienkiewicz Z.J., ICNIRP  
 Rubin G.J., SCENIHR

## PHE/DH (UK)

Conney S.W., AGNIR, DH  
 Mann S. M., AGNIR  
 Maslanyj M.P., AGNIR  
 Meara J.R., AGNIR  
 O'Hagan J.O., AGNIR, ICNIRP  
 Peyman A., AGNIR  
 Seinkiewicz Z.J., AGNIR, ICNIRP, SCENIHR  
 Tedstone A., AGNIR



# WHO EMF Project and governments feedback to support ICNIRP

## WHO EMF Project

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 Peyman A., ICNIRP  
 Rubin G.J., ICNIRP, SCENIHR

Mutually beneficial:  
 ICNIRP guidelines allow  
 economic growth through  
 development of wireless  
 telecommunications

### AGNIR (UK, 2016)

Swerdlow A.J., formerly ICNIRP  
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 Seinkiewicz Z.J., AGNIR, ICNIRP, SCENIHR  
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 Sienkiewicz Z.J., ICNIRP, AGNIR, PHE, WHO EMF  
 Schüz J., formerly ICNIRP

### COMARE (UK DH)

Mann S.M., AGNIR, PHE, ICNIRP, WHO EMF, COMARE

# Some official bodies around the world are admitting to adverse effects below ICNIRP guidelines and some are taking action

E.g.

- WHO IARC classified radiofrequency signals as a possible human carcinogen (2011)
- Government of Cyprus is informing public about health risks and the need to take action (e.g. video for teenagers: <https://www.youtube.com/watch?v=D5AwtCblb-k>). Cyprus is removing Wi-Fi from schools. Nicosia Resolution by Cyprus National Committee on Environment and Children's Health and Cyprus/Austrian Medical Associations <http://www.cyprus-child-environment.org/easyconsole.cfm/id/428>
- France has banned Wi-Fi in pre-schools and mobile phone use by pupils in schools.

# Scientists have been speaking out about the risks for years

Most recently:

- EMF Scientist Appeal [www.emfscientist.org](http://www.emfscientist.org)

Calling for greater protection of the public. 244 scientists from 41 nations, to UN, WHO and governments (2015)

- 5G Appeal [www.5Gappeal.eu](http://www.5Gappeal.eu)

Calling for halting of 5G rollout. 209 scientists and doctors, to the European Commission (2017)

- > Response from Commission was that the EU follows ICNIRP guidelines and advice from SCENIHR and “mobile communication technologies...will be the backbone of Europe's future economy.”

# WHO and UN did not respond to the EMF Scientists Appeal

UN supports: Convention on the Rights of the Child and Universal Declaration of Human Rights,

but it also has a specialised agency to promote and defend telecommunications throughout the world:

The International Telecommunications Union (ITU).

ITU has membership of 193 countries and almost 800 private-sector entities and academic institutions, including the mobile/wireless industry, governments, organisations who use wireless signals (e.g. BBC, BT, Vodafone, GSMA, UK Department for Digital, Culture, Media and Sports...).

The public trust UN, WHO and PHE to take action to keep them safe, but there are **CONFLICTS OF INTEREST** for wireless technologies because they are good for economic growth and groups have been set up to protect and promote them, including within the UN.

An organisation cannot protect human rights, whilst also actively protecting an industry which produces something which damages life.



**Challenge:**

**How do we effectively challenge and correct incorrect/inaccurate official advice when it is economically advantageous and needed, supported and protected by governments and industry?**

# Risk Assessment

Department for Education (England; 2018): *"It is for individual schools to decide whether or not to implement Wi-Fi technology in order to meet their needs.... Schools must take reasonable steps to ensure that staff and pupils are not exposed to risks to their health and safety by conducting a risk assessment and, if necessary, putting measures in place to minimise any known risk."*

Department for Education (NI; 2017): *"Schools need to perform risk assessments on the technologies within their school to ensure that they are fully aware of and can mitigate the potential risks involved with their use."*

- Schools are responsible and are expected to carry out a risk assessment before technologies are introduced and used

# Schools have a responsibility to safeguard children, not a responsibility to protect the telecommunications industry or inaccurate government reports

## [Working together to Safeguard Children \(2018\):](#)

Safeguarding children is defined as:

- protecting children from maltreatment
- preventing impairment of children's health or development
- ensuring that children grow up in circumstances consistent with the provision of safe and effective care
- taking action to enable all children to have the best outcomes

“Everyone who works with children has a responsibility for keeping them safe.”

# Example risk assessment for schools and other workplaces:

[www.wirelessriskassessment.org](http://www.wirelessriskassessment.org)

## Key for Risk Assessment Form

### Likelihood of hazard happening:

Low, highly unlikely to happen = Score 1

Medium, could happen, but unlikely = Score 2

High, likely to happen = Score 3

### Severity:

Slightly harmful, minor = Score 1

Harmful = Score 2

Serious e.g. irreversible damage, fatal or life threatening = Score 3

### Overall Risk = Likelihood x Severity:

Score: 6 & 9 = High, urgent action required

Score: 3 & 4 = Medium, action to an agreed timetable

Score: 1 & 2 = Low, or tolerable risk no action may be required

Risk factors shown in the table below are assuming no additional controls have been put in place. If suggested further actions are introduced, then risk levels could be reduced.

**SERVICE AREA:**

**SECTION/LOCATION:**

**NAME OF ASSESSOR(S):**

**DATE OF ASSESSMENT:**

**Job Type/Work Activity:**

**FREQUENCY/DURATION:**

What are the Hazards?	Who might be harmed and how? (Who is at special risk?)	What are you already doing? (Current control measures, including those for people at special risk)	What further action is necessary? (Further Control Measures)	Action by whom	Action by when	Done	Risk Factor		
							Likelihood	Severity	Risk Level

There are actions which schools can take to reduce exposures and educate pupils and parents about possible harmful effects.

They can do this even if PHE and ICNIRP continue to deny harmful effects.



# Most schools, local authorities, hospitals etc. are doing nothing to protect children and young people from harmful effects from wireless signals - they are following ICNIRP guidelines and (in UK) PHE advice

- Wi-Fi throughout schools, hospitals, public transport, homes...
  - children and young people have NO choice, NO escape
- Children being given wireless devices by responsible adults, including in schools – children and young people have NO choice, NO escape
- Wi-Fi in all University Accommodation 24h/day – young people have NO choice, despite current increasing mental health concerns and effects of wireless signals on brain activity, function, development and behaviour

We are failing to safeguard children and young people if we are exposing them to something which scientific studies have shown can cause physical harm and increased cancer risk.

# Adverse effects (only time for one example)

# Wireless radiofrequency signals can trigger cell death

## Significant loss of follicles in the ovaries:

Authors	Subjects	Exposures	Results
<a href="#">Bakacak et al 2015</a>	Adult rats, 4 month old, female	15 min/day, 15days; 900 MHz, 217 Hz pulses, 1.04 mW/cm <sup>2</sup>	53% significant decrease in mean number of follicles
<a href="#">Okatan et al 2018</a>	Rats, postnatal day 34, female	1 hour/day, 25 days, 900 MHz continuous wave, whole body SAR 0.0096 - 0.0098 W/kg	30% significant decrease in secondary follicle numbers, significant increase in oxidative stress
<a href="#">Gul et al 2009</a>	Pregnant Rats, offspring examined postnatal day 21	Mobile phone signal in speech mode 15min/day, in standby 11h 45min/day, positioned under cage	30% significant decrease in number of follicles/mm <sup>3</sup> in female offspring. Significant decrease in number of living pups per delivery
<a href="#">Türedi et al 2016</a>	Pregnant Rats, offspring examined postnatal day 34	Exposed days 13-21 of pregnancy, 1h/day, 900 MHz, 10 V/m, 0.265 W/m <sup>2</sup> , whole body SAR 0.01 W/Kg, examined postnatal day 34	45% significant decrease in number of primordial and 47% tertiary follicles in female offspring. Sig. increase in follicle cell degeneration
<a href="#">Margaritis et al 2014</a>	Fruit flies ( <i>Drosophila melanogaster</i> )	Exposed to Wi-Fi (2.4-2.48GHz, 2.1V/m, 1h/day 4 days); Bluetooth (2.4-2.48GHz, 0.3V/m 30min/day 6 days); DECT base (1880-1900MHz, 2.7V/m 30 min/day 5 days); GSM Mobile phone (900MHz, 22V/m, 6min/day 3 days)	All radiofrequency exposures significantly increased cell death in ovaries and significantly reduced reproductive capacity

# Are wireless signals killing ovarian follicles in humans, thereby damaging reproductive health?



No studies done. Evidence from animals points to a need to restrict use of devices near reproductive organs, to prevent irreversible physical harm to babies, children, young people and women of reproductive age.

# In summary

- We need inaccurate official reports and documents to be corrected or retracted, including AGNIR 2012
- Conflicts of interest to be properly addressed
- Mechanisms put in place so that inaccurate government information can be challenged, corrected or retracted, because important decisions and laws are based on it
- Official advice to be updated, based on accurate information and protecting the public, not the telecommunications industry
- Honest advisory bodies independent of ICNIRP, AGNIR, telecommunications industry and governments
- More scientists to speak out when official advice is inaccurate, to raise the quality of science being used to guide decision makers

- We need schools and people with safeguarding responsibilities to question official advice and do the right thing to protect those for whom they have responsibility

Example Risk Assessment for schools and other workplaces:

[www.wirelessriskassessment.org](http://www.wirelessriskassessment.org)

- Schools, Universities and hospitals to offer wired internet connections and to switch the Wi-Fi off
- Non-wireless working environments to be offered, especially for pregnant women
- Education of the public of possible adverse health effects, so that they can make informed decisions

Harming children and young people is wrong, no matter how economically advantageous or how difficult it is to make changes

Thank you for listening