ICNIRP
INTERNATIONAL COMMISSION ON
NON-IONIZING RADIATION PROTECTION

ITU Regional Seminar
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ICNIRP, 5G, Guidelines & Health

Rodney Croft

Chair, International Commission on
Non-Ionizing Radiation Protection (ICNIRP);
University of Wollongong, Australia

r.croft@icnirp.org

ICNIRP
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What is the ICNIRP?

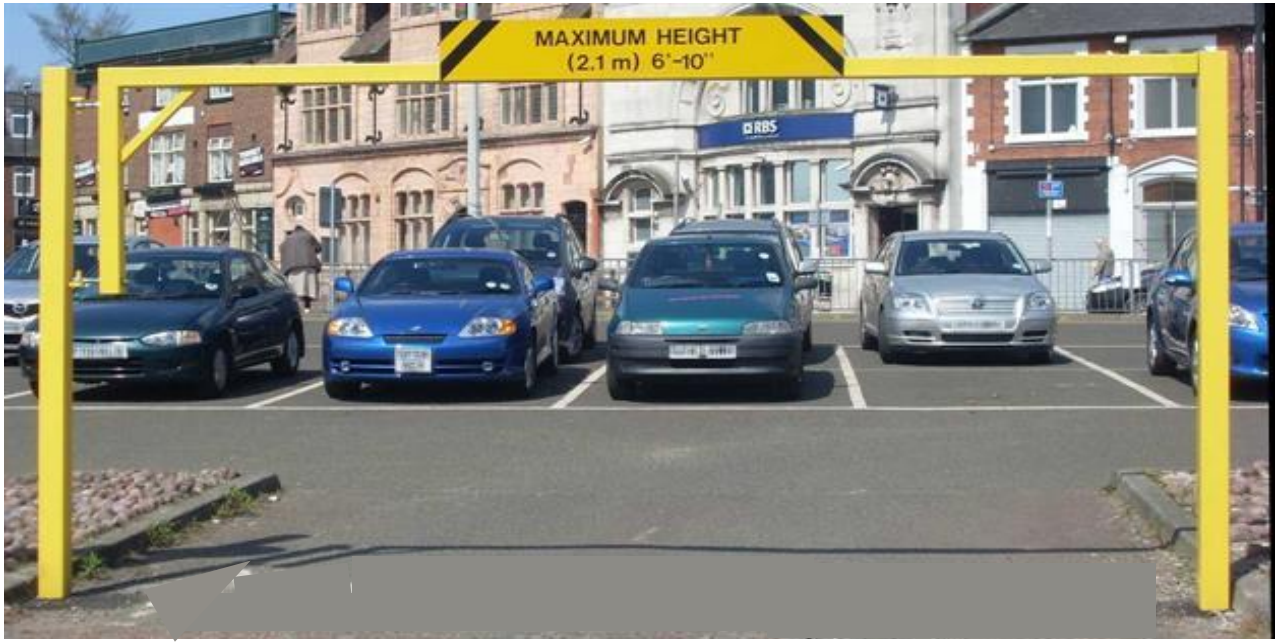
- Not-For-Profit NGO in official relations with World Health Organization & International Labour Organization
- To develop and disseminate science-based advice on limiting exposure to NIR, including radiofrequency EMFs relevant to 5G
- Independent from industry (similar CoI rules to WHO); members financial disclosures available at www.ICNIRP.org

Guidelines & Health

- Society is very fortunate
  - We can operate 5G infrastructure without any risk to health
  - Although the media may suggest otherwise, the science is very clear on this point
- Why are Guidelines important?
  - Normative
    - provide clear rules to enable nations to manage NIR safety
  - Risk Communication
    - clear, accurate information is central to risk communication
    - guidelines form the core from which engaging, empathic etc. communications can be built from

How is 3G/4G/5G safety ensured?

- ICNIRP Guidelines for limiting exposure to electromagnetic fields (100 kHz-300 GHz); Health Phys. 2020, 118(5):483-524
- Providing that exposure from 5G devices complies with the Guidelines, no harm will occur



How are restriction values determined?

- Identify harm threshold (lowest exposure level that can still cause harm)
  - e.g. 4 W/kg causes 1°C body core temperature rise
- Apply reduction factors to exposure threshold
  - e.g. reduce 4 W/kg by a factor of 50 and set general public exposure restriction to 0.08 W/kg
  - i.e. too low to cause detectable increase in body core temperature

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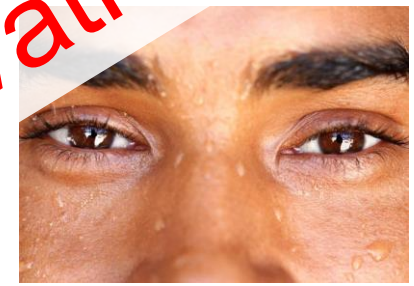
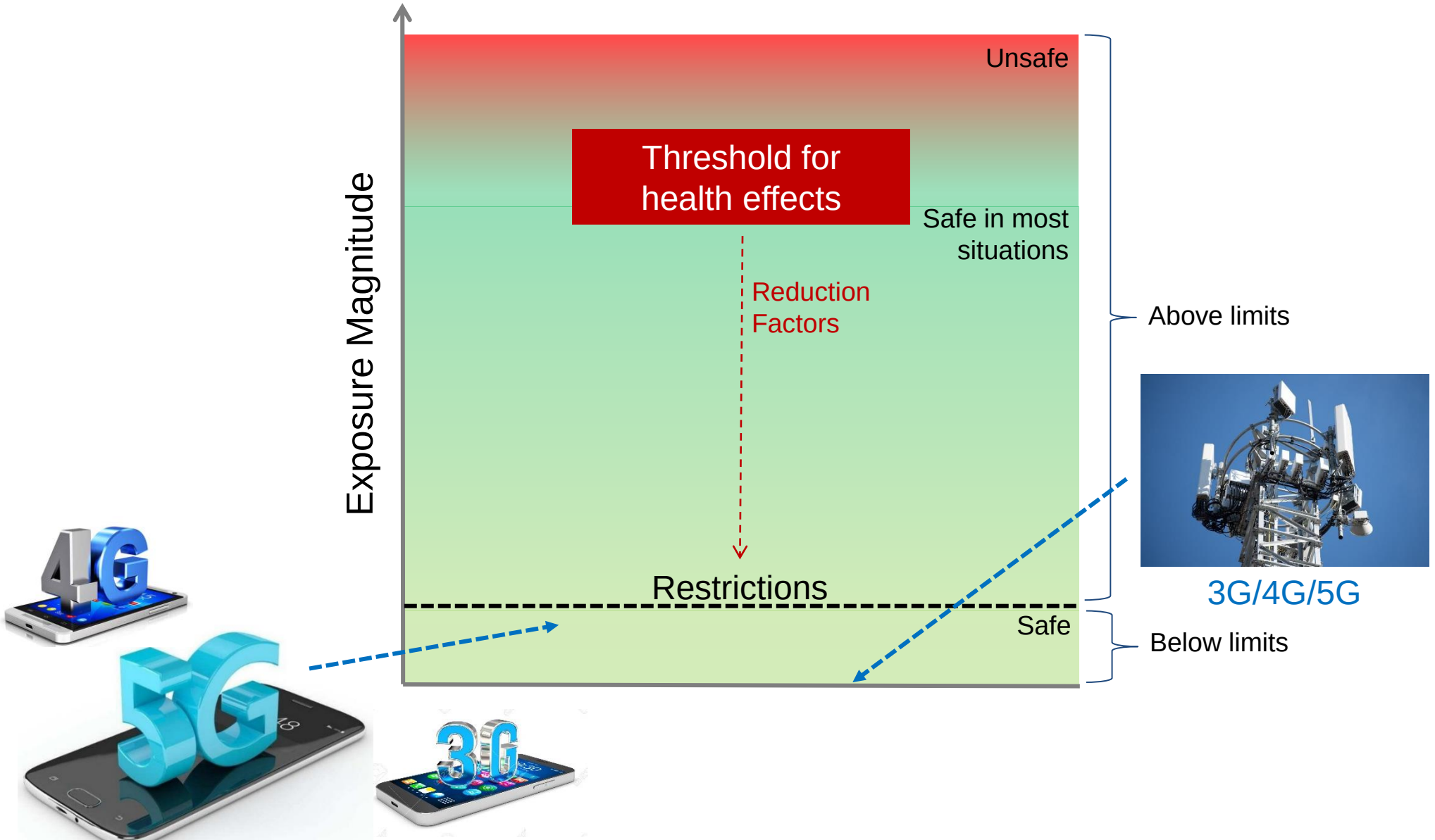


Each step is determined conservatively


Exposure Magnitude
Unsafe
Threshold for health effects
Safe in most situations
Reduction Factors
Restrictions
Safe
Above limits
Below limits
3G/4G/5G

Changes in new Guidelines relevant to 5G

- Covers aspects of protection that were not relevant in 1998, but are becoming more relevant
  - e.g. far more detailed protection for frequencies 6-100 GHz

Changes in new Guidelines relevant to 5G

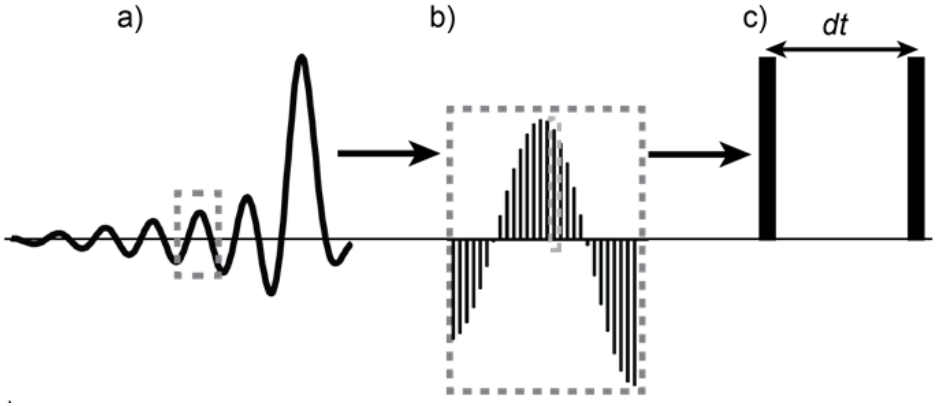
- Whole body exposure restrictions (body core temperature)
  - Were previously only up to 6 GHz
  - Extended (conservatively) up to 300 GHz to cover 5G and potential future 5G technologies

Changes in new Guidelines relevant to 5G

- Local exposure restrictions (>6 minutes; local heating)
  - Changed cross-over frequency (from SAR to power density) to 6 GHz (avoid inappropriate use of SAR at 6-10 GHz)
  - Spatial averaging area reduced from 20- to 4-cm^2 (>6 GHz)

Changes in new Guidelines relevant to 5G

- Local exposure restrictions (<6 minutes; local heating)
  - New restriction to more-adequately protect against sequences of pulses or continuous wave exposures



Changes in new Guidelines relevant to 5G

- Addition of reference levels for more exposure scenarios
  - Reference levels provide a less onerous means of assessing compliance (but were only available for whole-body exposure)
  - ALL basic restrictions now have a matching reference level

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Common misconceptions about the Guidelines

But what about...

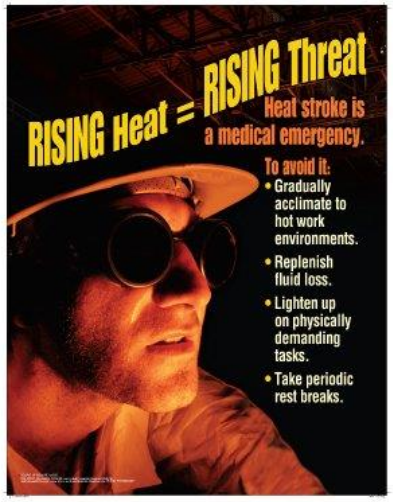
- All this seems quite mundane, but what about all the stuff that we've heard in the media?

- Have we missed something here?

The Independent, UK:
Mobile phones "more dangerous than smoking"

But what about (#1)

- "the GDLs only protect against *thermal* effects"
  - all potential effects are considered; the GDLs specifically looks for ANY evidence of health effects, regardless of the mechanism
  - however, where a mechanism is known (such as *thermal*), this enables us to use a larger body of science to ensure appropriate restrictions



But what about (#2)

- "but there is evidence that RF causes diseases such as cancer"
  - although there are *reports* of this, the consensus is that there is no evidence of this (e.g. WHO EHC PCD)

But what about (#2a)

- "but the International Agency for Research into Cancer (IARC) classified RF EME as *possibly carcinogenic*"

International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
N° 208

31 May 2011

IARC CLASSIFIES RADIOFREQUENCY ELECTROMAGNETIC FIELDS AS POSSIBLY CARCINOGENIC TO HUMANS

Lyon, France, May 31, 2011 -- The WHO/International Agency for Research on Cancer (IARC) has classified radiofrequency electromagnetic fields as possibly carcinogenic to humans (Group 2B), based on an increased risk for glioma, a malignant type of brain cancer[1], associated with wireless phone use.

But what about (#2a)

- "but the International Agency for Research into Cancer (IARC) classified RF EME as *possibly carcinogenic*"
  - This is true, but not helpful for determining whether RF EME is causes cancer
  - That is, everything is 'possible', so we need to look at what they meant by this
    - Some epidemiological associations reported, but don't know if these are actually between *RF EME* and *cancer*
    - No evidence that RF EME 'causes' cancer
  - That is, no evidence that RF EME causes cancer

International Agency for Research on Cancer

World Health Organization

PRESS RELEASE
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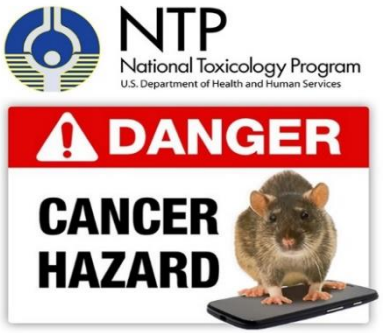
But what about (#2b)

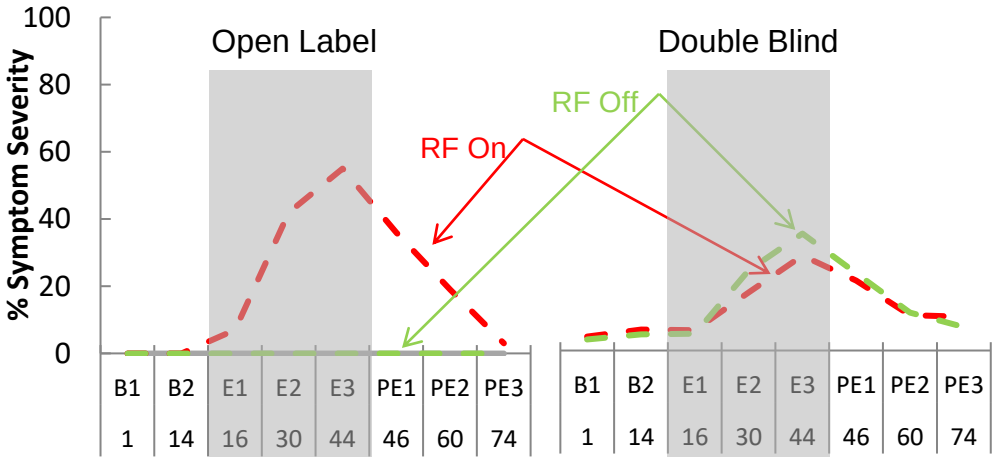
- "but the US National Toxicology Program concluded that RF EME caused cancer"
  - It is true that the NTP made this claim (NTP 2018)
  - However, the research was seriously flawed and that conclusion unjustified
    - ICNIRP (2019, Health Physics) have recently published a detailed critique of that study and conclude that it does not provide any evidence that RF EME causes cancer
  - However, IF there was evidence that RF did cause cancer, this would be fed into the Guidelines setting process and the limits amended accordingly



But what about (#3)

- "but the GDLs don't protect *electro-hypersensitive* people"
  - all potential effects are considered; even though some report RF hypersensitivity, there is no evidence that it is caused by RF
  - indeed, the only strong evidence coming out of this domain is that belief (and not exposure) is sufficient to cause symptoms

EHS sufferer in
"Better Call Saul"



Verrender et al 2015

But what about (#4)

- "but why do the GDLs ignore all those studies that show that RF causes harm?"
  - No research is ignored
  - Some excluded because not relevant (e.g. a biological effect without health consequence, such as the RF-EEG effect)
  - Some is not interpretable due to methodological limitations
  - Some has been shown to be erroneous (e.g. by failed replication attempts)
    - i.e. both 'X' and 'NOT X' cannot be true

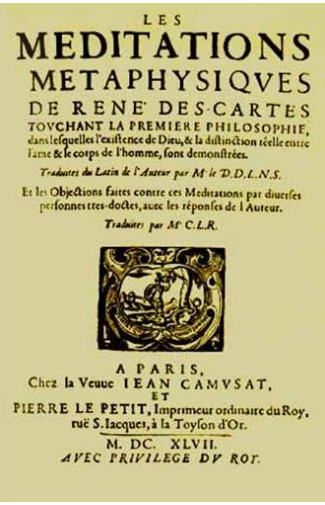
But what about (#5)

- "but the GDLs only consider acute effects"
  - reports of both acute and chronic effects are considered; however there is no evidence supporting the claims that there are chronic effects (such as cancer)
  - by basing the restrictions on the only substantiated effects, protection is provided against ALL effects of RF EME

But what about (#6)

- "but you CAN'T say it's safe with *absolute certainty*!"
  - This is a big issue, that goes beyond 'science'
  - What do we mean by 'certainty'?

But what about (#6)



- Logical certainty
  - Philosophical concept
    - Descartes
      - "May be deceived by a malignant demon"
      - Tried to overcome this with reference to 'God'
    - Hume
      - "May be deceived by human epistemic processes"
      - Concluded that certainty is impossible
    - It is now acknowledged that absolute certainty is impossible

If this is what we are talking about, then we cannot conclude that smoking causes cancer with certainty

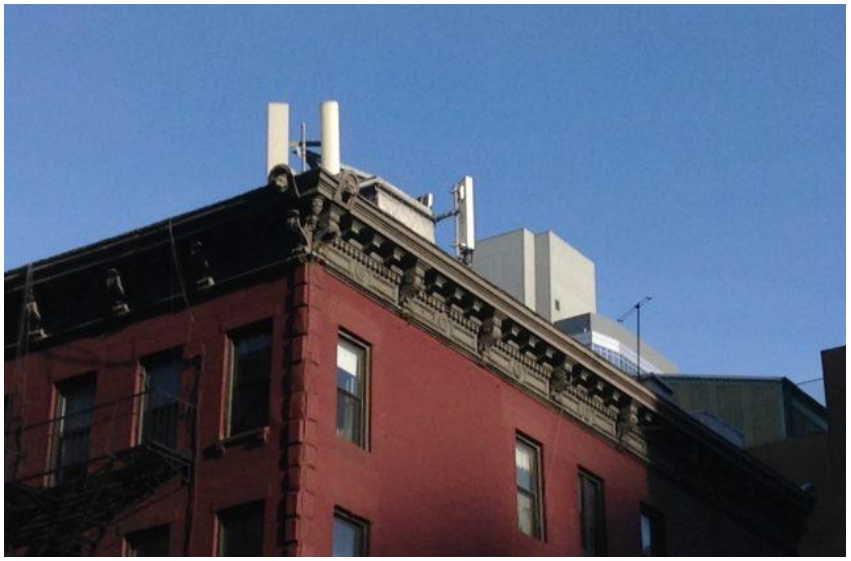
But what about (#6)

- Scientific certainty
  - Sufficient certainty to know that smoking causes cancer, certain vaccines reduce communicable disease risk, etc
  - This is the only useful interpretation of ‘certainty’

If this is what we are talking about, then it is appropriate to say that we are certain that 5G exposure will not cause harm

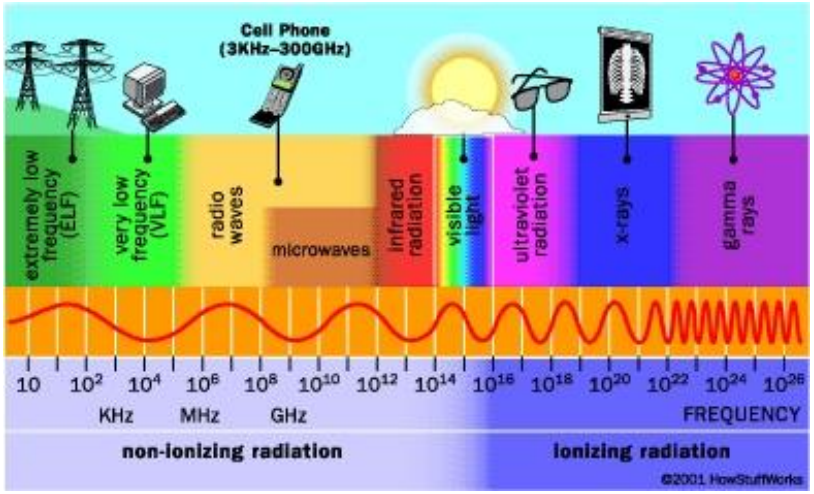
But what about (#7)

- "but they want to put a cell tower on top of my building, surely that can't be safe!?"
  - again, so long as exposure is within the GDLs, there will be no health effects from this
  - aesthetics is another matter…



But what about (#8)

- "but 5G is new and there is no research on that!"
  - This is a misunderstanding of how science works
  - The name that we give a technology is not relevant to safety
  - What is relevant is the physical agent (the electromagnetic field), and we understand this very well



WE WOULDN'T WANT TO IGNORE THE WARNING ON A CIGARETTE PACKET JUST BECAUSE IT WAS A NEW BRAND THAT HADN'T, ITSELF, BEEN TESTED!!!