

Paris WHIST lab
18th day dedicated to EMF and health



In search of the missing “non-thermal” effect

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dépasser les frontières



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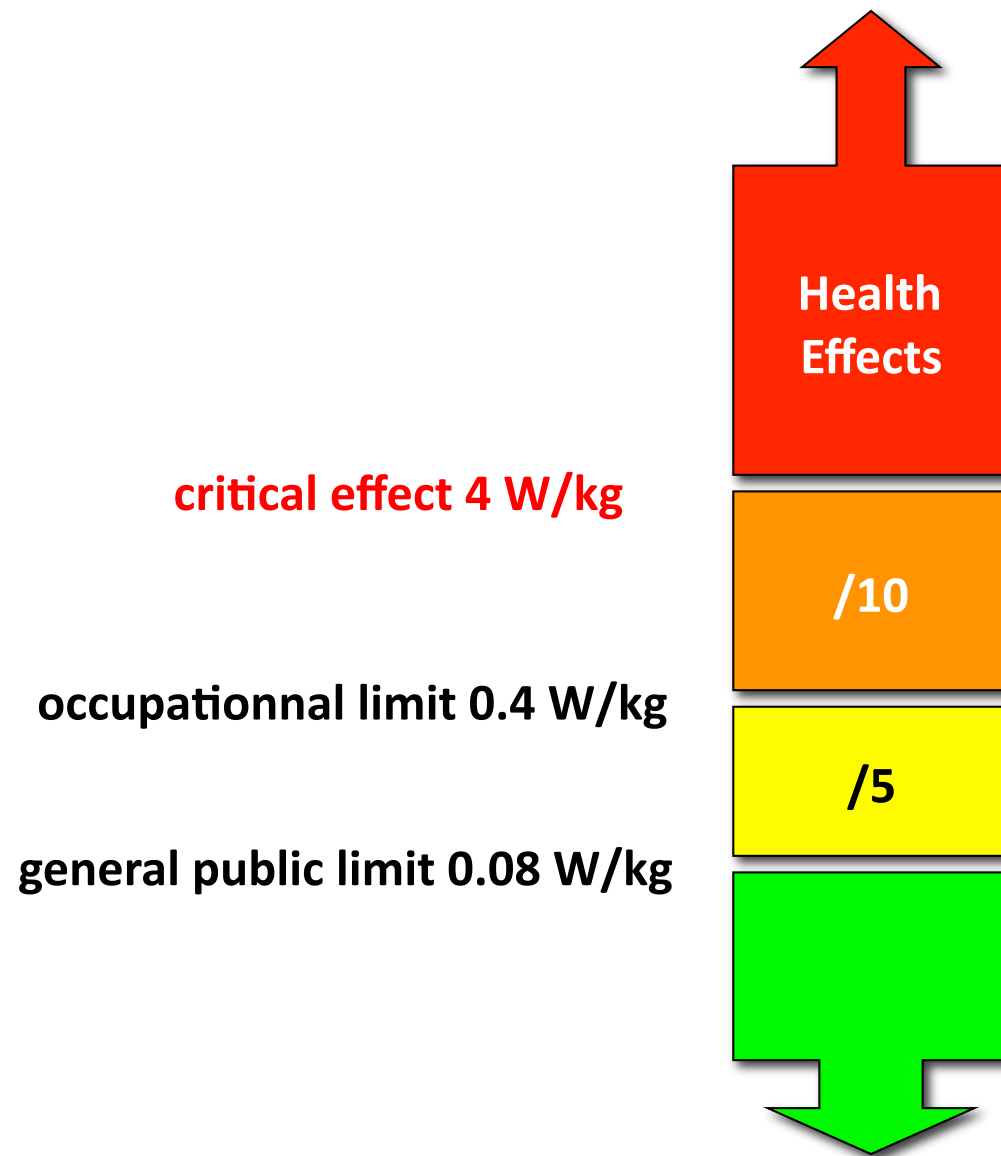
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What is the context?

- ! Definition of a thermal effect =
“one that is caused by temperature elevation of the tissue or organism”
- ! Based on animal and cell models:
In the last 15 years most of the lab studies have been performed at low SAR levels, i.e.,
 - !below the “critical effect” level
 - !at “non-thermal” levels



What is at stake?

- ! IF only “thermal effects” exist, then:
 - !the effect has a “threshold”
 - !extrapolation to new signals becomes straightforward
 - !life becomes much easier for ICNIRP, etc.
- ! IF “non-thermal” effects exist, leading to health effects, then:
 - !there might be no threshold
 - !much more research is needed...

What has been done?

- ! Thousands of experimental studies worldwide with varied:
 - !animal and cell models
 - !quality levels (exposure systems, statistics, etc.)
 - !sources of funding
 - !endpoints (genotoxicity, behaviour, etc.)
- ! often without coordination of research projects

What do we know? database

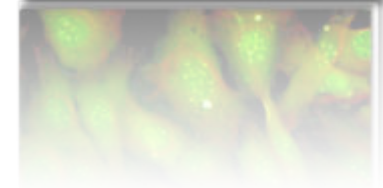
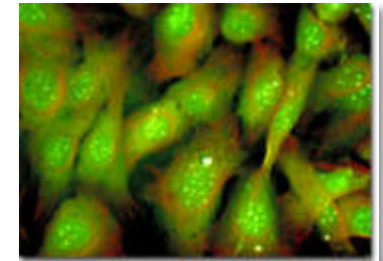
- ! Based on the results of thousands of studies, it seems like there are no well-established non-thermal effects (animal and cell models),
 - !e.g., EMF-NET, Acad. Sci. USA, ICNIRP, EFHRAN, SCENIHR
 - !e.g., Verschaeve et al. 2010, Juutilainen et al. 2011, Repacholi et al 2011
 - !EHC book being drafted by WHO

What do we know? IARC





- ! *“The IARC Working Group reviewed more than 40 studies that assessed the carcinogenicity of RF in rodents, including seven 2-year cancer bioassays.”*
- ! *“none of the chronic bioassays showed an increased incidence of any tumour type in tissues or organs of animals exposed to RF for 2 years.”*
- ! *“overall, the Working Group concluded that there is “limited evidence” in experimental animals for the carcinogenicity of RF.”*

What do we know? Co-exposures

- ! Some effects observed *in vitro* on the level of ROS (reactive oxygen species)
- ! Some effects observed *in vivo* using carcinogens



What is next?

- ! Where to start from?
 - !the mechanisms” 
 - !the “-omics” 
 - !therapeutic applications 
 - !Positive human data 

What if?

- ! If a “non-thermal” effect is discovered, the questions become:
 - !“how much lower is the corresponding level compared to the critical level (4 W/kg)?”
 - !“what are the consequences for guidelines, standards and regulations?”
 - !“what are the consequences for wireless communications systems?”

How to extrapolate to new signals?

- ! Statement drafted by the GLORE and COST-BM 704 groups
- ! open for consultation:
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Is there a future for research on non-thermal effects of RF?

- ! Yes, because:
 - ! It has been ongoing for decades
 - ! There is some incentive from societal pressure and deployment of new RF technologies
 - ! Scientific curiosity
 - ! Many more good reasons...
 - ! Many more bad reasons...