



UNIVERSITY AT ALBANY
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Human Health Effects Resulting From Exposure to Non-Ionizing Electromagnetic Radiation From EMS Meters

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My Credentials

- ▶ I am a public health physician who graduated from Harvard Medical School. I chose research and public health rather than clinical practice.
- ▶ After training at the US National Institute of Mental Health I worked for the US Department of Defense for eight years, then became Director of the Wadsworth Laboratories of the New York State Department of Health where I administered a research project on health effects of high voltage power lines. After that study was completed in 1987 I became the spokesperson on health effects of electromagnetic fields (EMFs) for the State of New York.
- ▶ I later moved to the University at Albany as Dean of the School of Public Health and Professor of Environmental Health Sciences. When I stepped down as Dean I became Director of the Institute for Health and the Environment, which has been designated as a Collaborating Centre of the World Health Organization,

My Research and Areas of Expertise

- ▶ I am an active researcher who has published more than 450 peer-reviewed scientific papers and six books, two on EMFs. My studies originally were on basic physiology of the brain, and then later to how environmental chemicals and contaminants alter brain function. More recently I have moved from animal models to direct study of humans.
- ▶ While study of EMFs has never been my primary focus, I have written extensively on the subject, have testified before the US House of Representatives and the President's Cancer Panel on health effects of EMFs.
- ▶ I am the Co-Editor of the Bioinitiative Report, an encyclopedic web-based summary of the scientific evidence for harm.



A Summary of My Opinions:

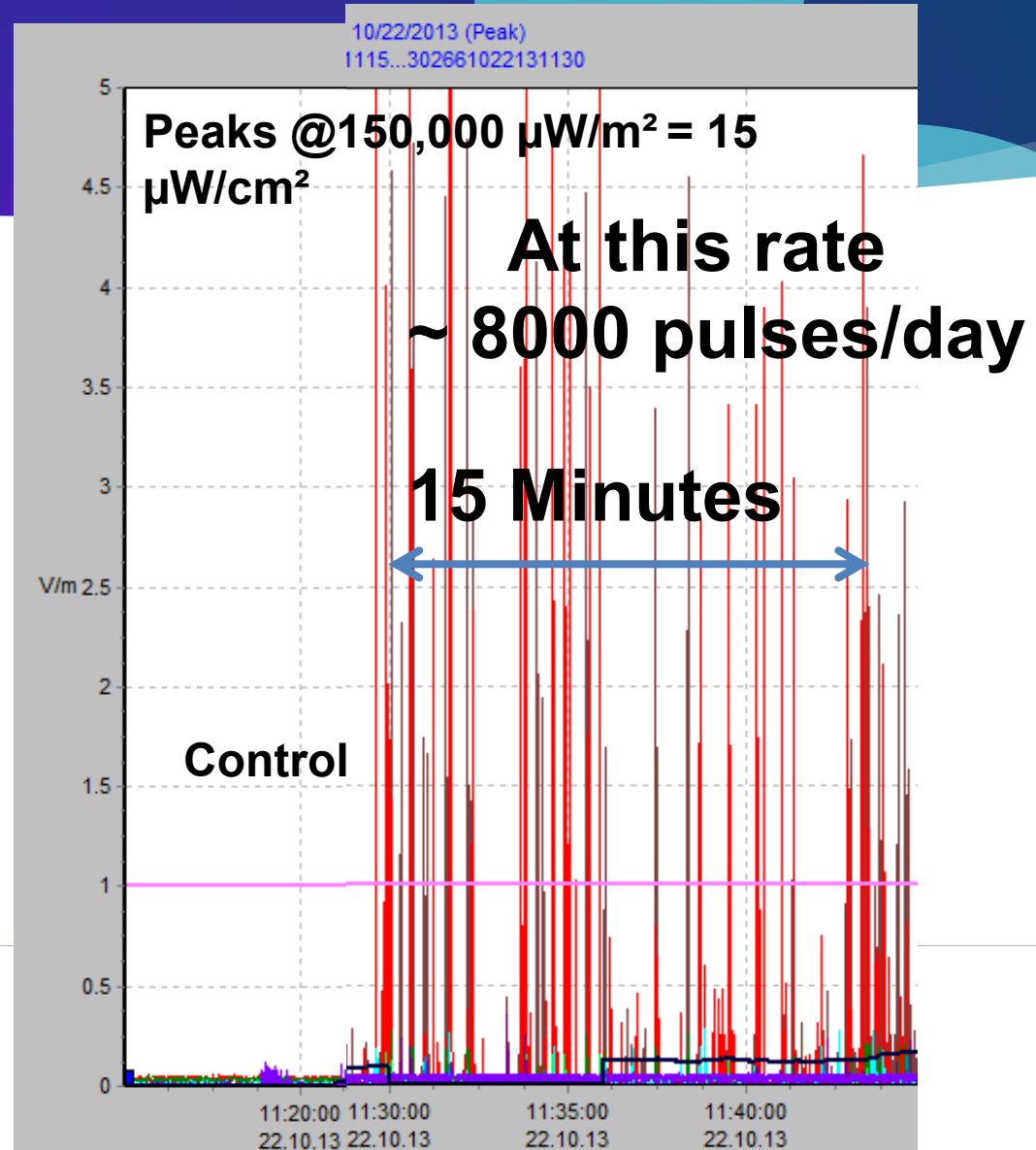
- ▶ EMFs cause human disease at exposure intensities that do not cause measurable tissue heating. The diseases of greatest concern are certain kinds of cancer, adverse effects on cognition and reproduction and a syndrome called electrohypersensitivity (EHS).
- ▶ The most provocative portion of EMF signals are those that have rapid transient changes in intensity, not the background sine waves. Such intense transients are characteristic of “smart” or EMS meters.
- ▶ The position of the International Committee for Non-Ionizing Radiation Protections (ICNIRP) and the World Health Organization (WHO Geneva) that there are no adverse health effects of radiofrequency radiation other than tissue heating is false and not supported by scientific evidence.

The Unique Characteristics of EMF from Smart Meters

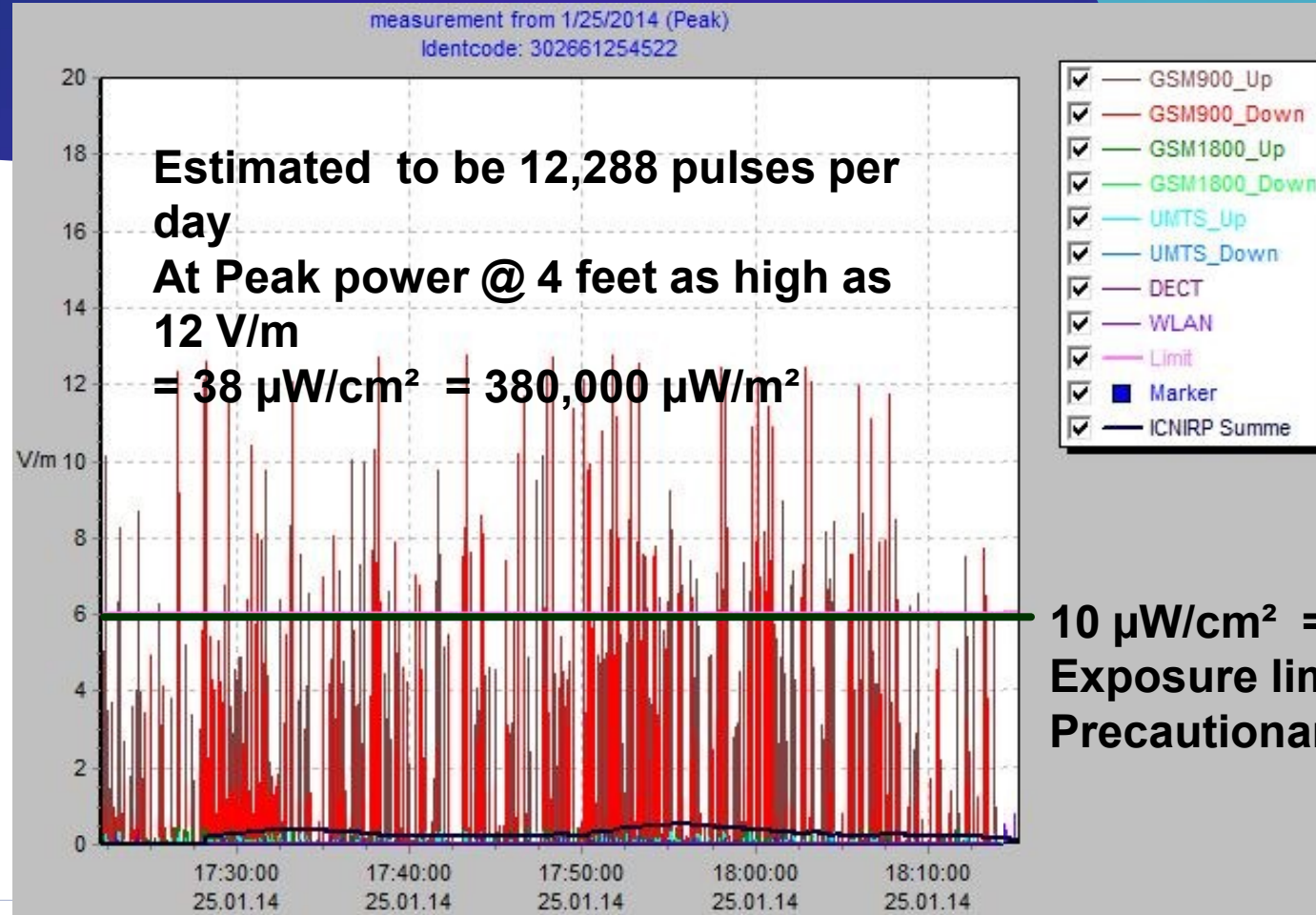
- ▶ Smart meters used pulsed radiofrequency radiation with extremely high peak power. While information could be sent to the utility by a wired connection, they operate in a wireless mode.
- ▶ The average number of pulses for electric meters is usually between 10,000 to 190,000 per day. It has a peak power of about 2.5 watts. Each pulse is about 50 milliseconds in duration but consists of many very brief (~5 msec) pulses.
- ▶ The large number of very brief but very intense pulses appears to be the factor that causes symptoms in sensitive individuals.

Smart Meters Signals

► Thanks to Karl Marek

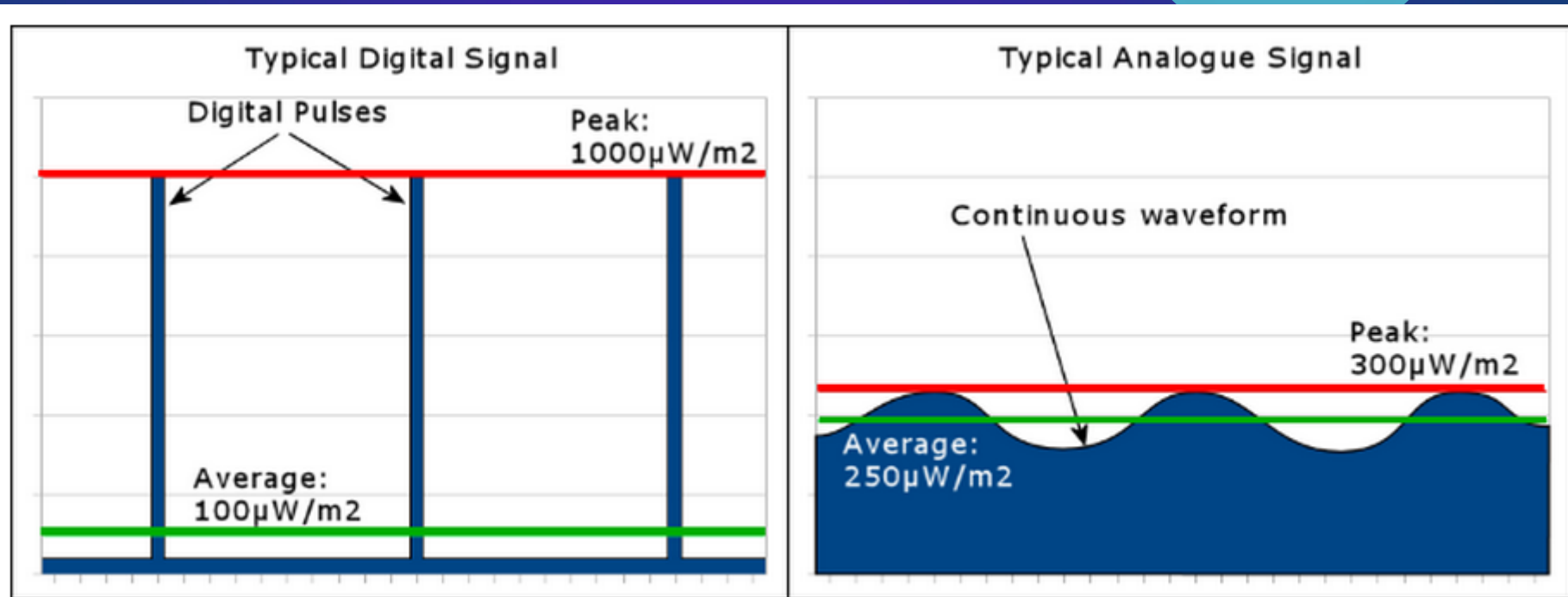


Daily Pulses Generated by Smart Meter



- ▶ Depends on Duty Cycle and other meters in the Mesh network
- ▶ Data from 5 meters shows 340 pulses in 40 minutes = 12,288/day
- ▶ Emissions are brief (5 msec), but fast pulses affect nervous system

Peak Levels in Digital Signals are Higher



- ▶ Smart Meters send out high intensity short pulses
- ▶ Peak pulse intensities trigger biological systems more powerfully
- ▶ Average power levels underestimate the problem

Animal Studies of RF-EMF Exposure at Non-Thermal Intensities and Cognitive Function

- ❑ Animal studies show that prenatal exposure to 800-1900 MHz RFR leads to hyperactivity and impaired memory in offspring and damage to the brain areas controlling learning (Aldad et al., 2012).
- ❑ Exposure of adult animals to 900 MHz RFR has been found to damage the blood-brain-barrier and cause cognitive impairment (Tang et al., 2015).
- ❑ Male rats exposed to 900, 1899 and 2450 MHz RFR showed impaired cognitive ability and the degree increased with the frequency (Deshmukh et al., 2015).

Symptoms of Electro-Hypersensitivity (EHS)

- ▶ EHS is characterized by fatigue, headache, weakness, tinnitus, memory impairment, sleep disturbances and a general feeling of ill health. These symptoms are elicited upon exposure to various intensities of both power line and RF EMFs, and can be very disabling in some people.
- ▶ EHS frequently co-exists with chronic fatigue syndrome, multiple chemical sensitivity, Gulf War Illness, fibromyalgia and several other less common diseases.
- ▶ The cause of each of these disorders is uncertain, but at least for some of them there is an initial triggering event.

Historical Perspectives on EHS

- ▶ Western countries have considered that there can be no adverse biological effects of electromagnetic fields (EMFs), including radiofrequency (RF) fields, that are not mediated by tissue heating.
- ▶ The Soviets, on the other hand, reported years ago that individuals experienced headache, fatigue, difficulty in concentration, depression, emotional instability and irritability when exposed to RF fields at intensities much lower than those causing measureable tissue heating.

Health Effects of RF Radiation

- ▶ Beginning in 1953 the US Embassy in Moscow was irradiated with microwaves at up to 0.18 W/m^2 and frequencies from 0.6 to 9.5 GHz. These are non-thermal intensities.
- ▶ While no immediate elevations of cancer were found, many people developed “microwave sickness”, consisting of headaches, insomnia, irritability and emotional lability.
- ▶ “Microwave sickness” is EHS!

Recent Studies on Irradiation of US Embassy Personnel

- ▶ In 2016 US Embassy personnel in Havana, Cuba, began to report unusual symptoms and clinical signs, including hearing sounds, tinnitus, visual problems, vertigo and cognitive difficulties. As of June, 2020, many of these persons continued to suffer from these and other health problems.
- ▶ Since that time similar symptoms were experienced by US Embassy personnel in Guangzhou, China and Moscow, Russia.
- ▶ The US National Academy of Sciences released a report entitled “An Assessment of Illness in U.S. Government Employees and their Families at Overseas Embassies” in 2020 (DOI:10.17226/25889).
- ▶ They concluded “Overall, directed pulsed RF energy, especially in those with the distinct early manifestations, appears to be the most plausible mechanism in explaining these cases among those that the committee considered.”

Early EHS Studies in the West

- ▶ In 1965 Frey (Psychol Bull 63: 322) reviewed Western studies showing effects of RF on brain and behavior, and concluded that there were changes not mediated by tissue heating.
- ▶ Rea et al. (J Bioelect 101: 241: 1991) studied 100 people who reported effects of low energy EMFs and tested them in a blinded fashion. Twenty-five responded to applied EMFs but not to “blanks”. Thus they concluded that at least 25% of reported EHS persons showed true responses to applied fields.

Reports of Excessive Exposure to Radar

- ▶ Forman et al. (JOM 24: 932: 1982) reported on two men accidentally exposed to microwaves. Both exhibited symptoms of headaches, insomnia, irritability and emotional lability even after a 12-month follow-up.
- ▶ Schilling (OEM 54: 281: 1997) reported on three men acutely exposed to 785 MHz RF who immediately developed EHS symptoms that lasted over a 3-year follow-up. Later (OM 50: 49: 2000) he reported on six antenna engineers acutely exposed in two separate incidents. Four developed EHS with no improvement over 3-4 years follow-up. Headache, loss of stamina, malaise and lassitude were the major symptoms.

Microwaves and Tissue Heating

- ❑ Current national and international standards are based on the assumption that there are no adverse effects of RF that are not mediated by tissue heating.
- ❑ This assumption is wrong, as clearly documented by cellular, animal and human research.
- ❑ It is hard to understand why more steps are not taken to protect the health of the public, but conflicts of interest and opposition from the engineering and physics community are factors.

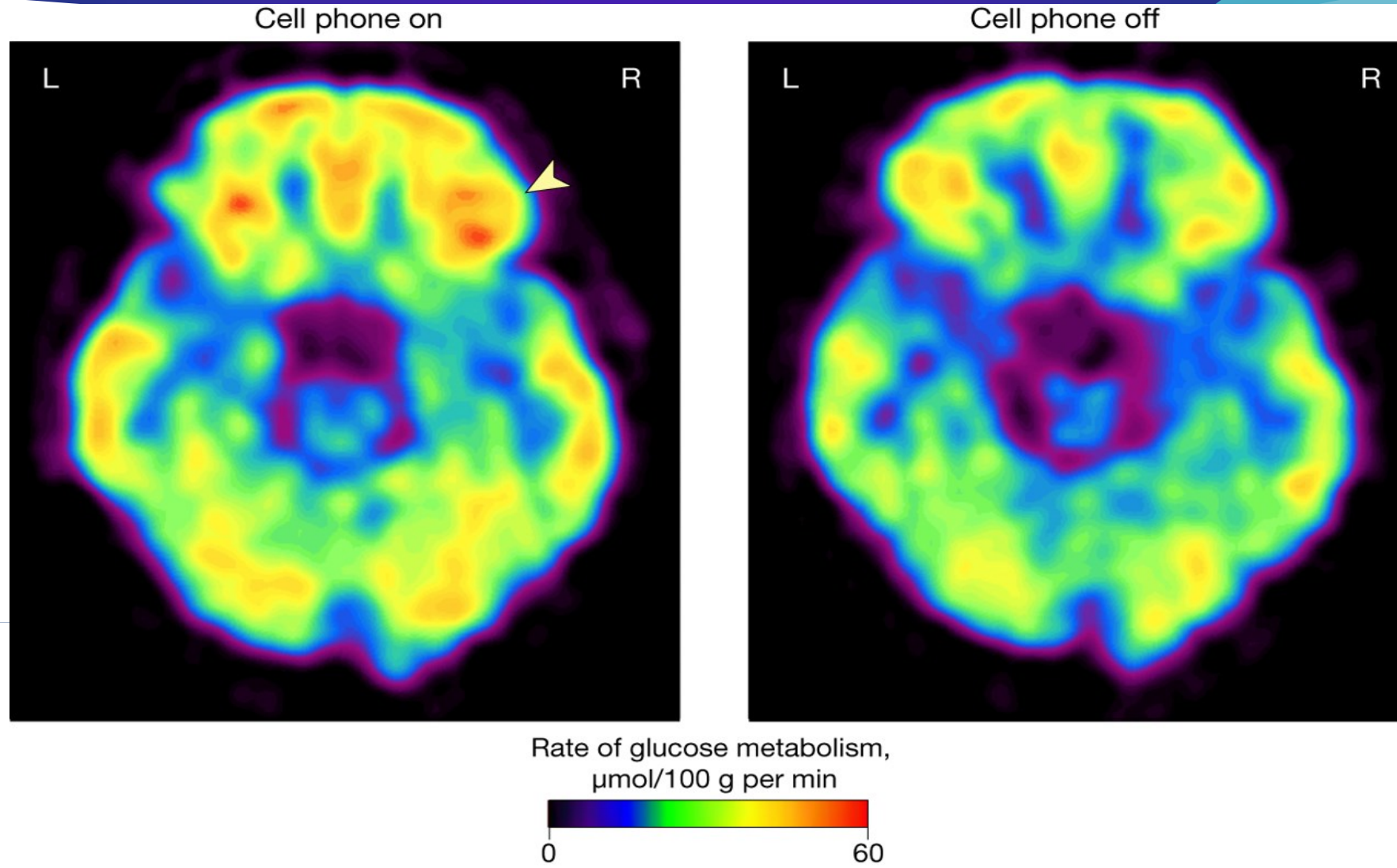
Evidence for Non-thermal Health Effects of RF

- ▶ Strong evidence for elevations in brain and other cancers with long-term mobile phone use.
- ▶ Evidence for reduction in male fertility from use of wireless laptops held in the lap.
- ▶ Evidence for changes in brain metabolism and cerebral blood flow upon RF exposure at non-thermal intensities.
- ▶ Evidence for reduced cognitive function and memory and sleep disturbances in persons exposed to non-thermal RFs.
- ▶ Evidence that some individuals develop electro-hypersensitivity to non-thermal levels of RF.

Changes in Brain Function with RFR

- ❑ Aalto et al. (2005) used positron emission tomography to record changes in brain blood flow when using a mobile phone. They found that blood flow decreased in cortex near the phone but increased at distant sites.
- ❑ Volkow et al. (2011) monitored brain metabolism when an active but muted mobile phone was held to the head and demonstrated local increase in metabolism.
- ❑ Placement of a mobile phone over the ear resulted in EEG changes, while none were seen if the phone was on the chest (Roggeveen et al., 2015).

Glucose metabolism and cell phones (Volkow et al., 2011)

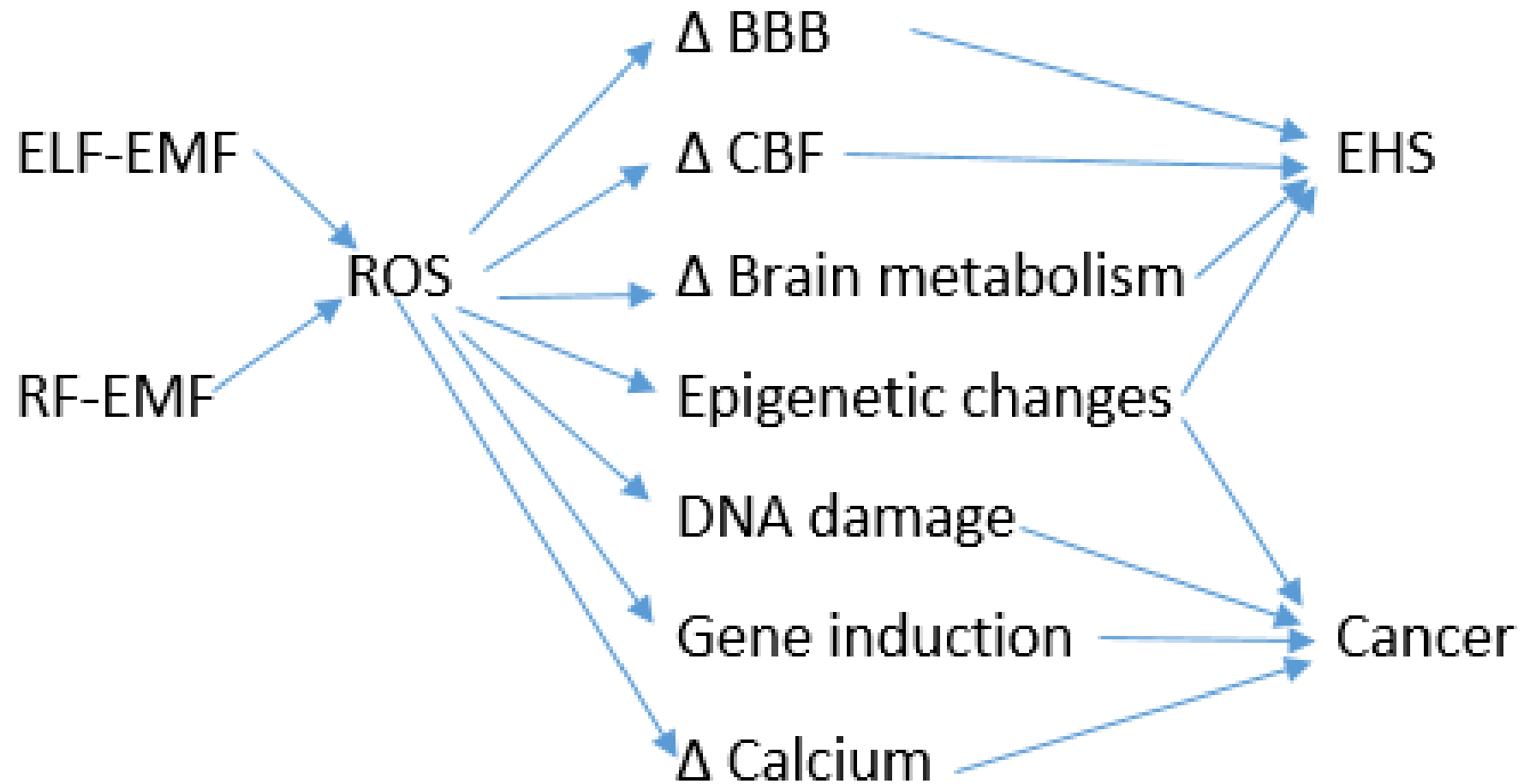


Cognitive Function in Humans

- ❑ Birks et al. (2017) reported that among 83,884 child-mother pairs, increased mobile phone use during pregnancy led to more hyperactivity and inattention in offspring.
- ❑ Lead exposure is known to increase risk of ADHD. Byun et al. (2013) reported that mobile phone use in children led to an increase in ADHA symptoms in a dose-dependent manner, but only in children with high blood lead levels.
- ❑ Schoeni et al. (2015) studied 234 adolescents for one year and found that mobile phone use and RF-dose were negatively correlated with memory performance.

Mechanisms Responsible for Non-thermal Effects of RFR

- ❑ Oxidative stress leading to DNA damage.
- ❑ Induction of various genes, includes heat shock proteins.
- ❑ Epigenetic changes in DNA
- ❑ Local changes in metabolism
- ❑ Altered calcium metabolism



Problems with ICNIRP

- ▶ ICNIRP is a private organization which was created in 1992 with Michael Repacholi as Chair. It has a maximum of 12 members, and vacancies are filled upon the decision of other members. It has a long history of members with clear conflicts of interest.
- ▶ In 1996 Rapacholi moved to become the Coordinator of Radiation and Environmental Health at the World Health Organization (WHO) in Geneva. He initiated the appointment of ICNIRP as an official NGO to the WHO. Rapacholi has been one of the leading proponents of the false conclusion that there are no adverse health effects of EMFs except those caused by tissue heating.
- ▶ WHO Geneva (but not the International Agency for Research on Cancer) to this day maintains the position that since ICNIRP is an official NGO to WHO, they will support the position taken by ICNIRP regarding health risk from EMF exposures.

Problems with ICNIRP Continued

- ▶ The new guidelines for RF published in March 2020 again totally ignore the strong and convincing evidence for harm from exposure to non-thermal radiofrequency radiation. This is intellectually dishonest, deceitful and inexcusable.
- ▶ Published scientific studies by members, former members and associates of ICNIRP report conclusions that differ from those done by independent investigators. This reflects their bias and is intellectually dishonest.
- ▶ The position taken by ICNIRP and its associates pose great harm to the health of the people of the world. Even more disturbing is that the WHO accepts their distortions of scientific results.
- ▶ The overwhelming opinion of independent scientists is that there are adverse health effects of non-thermal EMFs.

Conclusions

- ▶ EHS is a real disease that is caused by exposure to radiofrequency EMFs at non-thermal intensities.
- ▶ Many organs systems are affected, and the common mechanism appears to be generation of reactive oxygen species (ROS).
- ▶ Unfortunately at present there is no treatment known to prevent symptoms in sensitive persons. Thus the only way to prevent symptoms is to avoid exposure.
- ▶ The denial of the overwhelming scientific evidence for harm from RF-EMFs by ICNIRP and WHO Geneva poses serious harm to the health of the people of the world.