30 May 2024

[redacted]

AEMC
Level 15
60 Castlereagh Street
Sydney NSW 2000

Dear AEMC Team,

**Accelerating smart meter deployment rule change**

I am writing to express my views on the draft determination and rule for accelerating smart meter deployment.

I am opposed to the installation of smart electricity meters that emit radio frequency (RF) radiation, also referred to as radiofrequency electromagnetic fields (RF-EMF) without consent or including an opt-out provision. These should be installed only on an informed opt-in basis, and include appropriate alternatives which must include options of electricity meters without emitting radio frequency fields.

**Problems related to radiofrequency (RF) radiation exposure**

RF radiation has been repeatedly demonstrated to have biological and harmful effects to people and the natural environment as this continues to proliferate and increase with the exponential expansion of Digital Television Towers, Base Station (Cell Towers), Satellite microwave communications, mobile phones, Wi-FI, Bluetooth enable devices etc.

- Independent public health and medical experts worldwide are requesting immediate reductions in both public exposure to microwave wireless radiation and a halt to the densification of wireless infrastructure.
- The transmissions to and from wireless installations are radiofrequency emissions that are an environmental pollutant found to cause cancer (in both experimental animals and humans), DNA damage, neurological damage and other adverse health and environmental effects (e.g., on birds, bees, and trees) according to internationally recognized authoritative research. The prestigious institutions that have conducted these studies include the U.S. National Toxicology Program, the United States premier testing institute, and the Ramazzini Institute, a foremost testing centre in Italy.
- The International Classification of Diseases (ICD-10), a global standard for diagnostic health information for health practitioners, lists exposure to radiofrequency radiation as a classifiable condition.
- Many eminent scientists and doctors have expressed concerns about the effects of RF radiation on people and the environment. For example:
- An ‘International Appeal’, signed by 248 scientists, states that ‘Numerous recent scientific publications have shown that EMF affects living organisms at levels well below most international and national guidelines. Effects include increased cancer risk, cellular stress, increase in harmful free radicals, genetic damages, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans. Damage goes well beyond the human race, as there is growing evidence of harmful effects to both plant and animal life.

- According to the 2020 Consensus Statement of UK and International Medical and Scientific Experts on Health Effects of Radiofrequency Radiation (RFR), 'The main risks associated with exposure to such (wireless) non-ionising radiation in the peer-reviewed scientific literature include: increased cancer risk, cellular stress, increase in harmful free radicals, genetic damage, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans.

Please see the submitted documentation with this letter, and below link reference compilation of scientific studies and papers compiled by the BioInitiative Report (Updated 2022):

*Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)*

https://bioinitiative.org/wp-content/uploads/pdfs/BioInitiativeReport-RF-Color-Charts.pdf

- Various countries have made determinations recognising that RF radiation is a health risk, even at exposure levels well below current publish exposure guideline limits in Australia.
- Global Insurance companies have recognised the risks of RF radiation and do not provide coverage for Telco liability in relation to RF exposure.
- Further, Australia's radiation exposure limits (adopted by ARPANSA and based on ICNIRP) is based on flawed science and does not protect the public.
- The exposure guidelines developed by ICNIRP, are based on the outdated and proven erroneous assumption that thermal effects are the only harm from radiofrequency radiation. These guidelines do not protect people or wildlife from biological effects of chronic low level non thermal exposures.
- The International Commission on the Biological Effects of Electromagnetic Fields (ICBE-EMF has examined the relevant science and concluded that 'Exposure limits for RF radiation are based on numerous assumptions; however, research studies published over the past 25 years show that most of those assumptions are not supported by scientific evidence.
- The legislation must require electricity companies to compensate customers for any harm caused by their RF-radiation-emitting smart meters.
- The legislation must be changed to ensure that all wireless smart meters are labelled with information that they emit radiofrequency radiation that is a Class 2B carcinogen.
- The legislation must be changed to require electricity companies to roll out non-radiation-emitting smart meters.
- The number of notices that retailers send to customers before a new meter deployment should not be reduced from two to one. The minimum number of business days required for notices should also not be reduced from what is currently required.

Thank you for the opportunity to submit my comments and I look forward to receiving your response.

Yours faithfully,

[redacted]

Douglas Maher

# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| Power Density (Microwatts/centimeter2 - uW/cm2) | | Reference |
|---|---|---|
| As low as ($10^{-13}$) or 100 femtowatts/cm2 | Super-low intensity RFR effects at MW reasonant frequencies resulted in changes in genes; problems with chromatin conformation (DNA) | Belyaev, 1997 |
| 5 picowatts/cm2 ($10^{-12}$) | Changed growth rates in yeast cells | Grundler, 1992 |
| 0.1 nanowatt/cm2 ($10^{-10}$) or 100 picowatts/cm2 | Super-low intensity RFR effects at MW reasonant frequencies resulted in changes in genes; problems with chromatin condensation (DNA) intensities comparable to base stations | Belyaev, 1997 |
| 0.00034 uW/cm2 | Chronic exposure to mobile phone pulsed RF significantly reduced sperm count, | Behari, 2006 |
| 0.0005 uW/cm2 | RFR decreased cell proliferation at 960 MHz GSM 217 Hz for 30-min exposure | Velizarov, 1999 |
| 0.0006 - 0.0128 uW/cm2 | Fatigue, depressive tendency, sleeping disorders, concentration difficulties, cardio- vascular problems reported with exposure to GSM 900/1800 MHz cell phone signal at base station level exposures. | Oberfeld, 2004 |
| 0.003 - 0.02 uW/cm2 | In children and adolescents (8-17 yrs) short-term exposure caused headache, irritation, concentration difficulties in school. | Heinrich, 2010 |
| 0.003 to 0.05 uW/cm2 | In children and adolescents (8-17 yrs) short-term exposure caused conduct problems in school (behavioral problems) | Thomas, 2010 |
| 0.005 uW/cm2 | In adults (30-60 yrs) chronic exposure caused sleep disturbances, (but not significantly increased across the entire population) | Mohler, 2010 |
| 0.005 - 0.04 uW/cm2 | Adults exposed to short-term cell phone radiation reported headaches, concentration difficulties (differences not significant, but elevated) | Thomas, 2008 |
| 0.006 - 0.01 uW/cm2 | Chronic exposure to base station RF (whole-body) in humans showed increased stress hormones; dopamine levels substantially decreased; higher levels of adrenaline and nor-adrenaline; dose-response seen; produced chronic physiological stress in cells even after 1.5 years. | Buchner, 2012 |
| 0.01 - 0.11 uW/cm2 | RFR from cell towers caused fatigue, headaches, sleeping problems | Navarro, 2003 |

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|---|---|
| Stress proteins, HSP, disrupted immune function | Brain tumors and blood-brain barrier |
| Reproduction/fertility effects | Sleep, neuron firing rate, EEG, memory, learning, behavior |
| Oxidative damage/ROS/DNA damage/DNA repair failure | Cancer (other than brain), cell proliferation |
| Disrupted calcium metabolism | Cardiac, heart muscle, blood-pressure, vascular effects |

# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| Power Density (Microwatts/centimeter2 - uW/cm2) | | Reference |
|---|---|---|
| 0.01 - 0.05 uW/cm2 | Adults (18-91 yrs) with short-term exposure to GSM cell phone radiation reported headache, neurological problems, sleep and concentration problems. | Hutter, 2006 |
| 0.005 - 0.04 uW/cm2 | Adults exposed to short-term cell phone radiation reported headaches, concentration difficulties (differences not significant, but elevated) | Thomas, 2008 |
| 0.015 - 0.21 uW/cm2 | Adults exposed to short-term GSM 900 radiation reported changes in mental state (e.g., calmness) but limitations of study on language descriptors prevented refined word choices (stupified, zoned-out) | Augner, 2009 |
| 0.05 - 0.1 uW/cm2 | RFR linked to adverse neurological, cardio symptoms and cancer risk | Khurana, 2010 |
| 0.05 - 0.1 uW/cm2 | RFR related to headache, concentration and sleeping problems, fatigue | Kundi, 2009 |
| 0.07 - 0.1 uW/cm2 | Sperm head abnormalities in mice exposed for 6-months to base station level RF/MW. Sperm head abnormalities occurred in 39% to 46% exposed mice (only 2% in controls) abnormalities was also found to be dose dependent. The implications of the pin-head and banana-shaped sperm head. The occurrence of sperm head observed increase occurrence of sperm head abnormalities on the reproductive health of humans living in close proximity to GSM base stations were discussed." | Otitoloju, 2010 |
| 0.38 uW/cm2 | RFR affected calcium metabolism in heart cells | Schwartz, 1990 |
| 0.8 - 10 uW/cm2 | RFR caused emotional behavior changes, free-radical damage by super-weak MWs | Akoev, 2002 |
| 0.13 uW/cm2 | RFR from 3G cell towers decreased cognition, well-being | Zwamborn, 2003 |
| 0.16 uW/cm2 | Motor function, memory and attention of school children affected (Latvia) | Kolodynski, 1996 |
| 0.168 - 1.053 uW/cm2 | Irreversible infertility in mice after 5 generations of exposure to RFR from an 'antenna park' | Magras & Zenos, 1997 |
| 0.2 - 8 uW/cm2 | RFR caused a two-fold increase in leukemia in children | Hocking, 1996 |
| 0.2 - 8 uW/cm2 | RFR decreased survival in children with leukemia | Hocking, 2000 |
| 0.21 - 1.28 uW/cm2 | Adolescents and adults exposed only 45 min to UMTS cell phone radiation reported increases In headaches. | Riddervold, 2008 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| Power Density (Microwatts/centimeter2 - uW/cm2) | | Reference |
|---|---|---|
| 0.5 uW/cm2 | Significant degeneration of seminiferous epithelium in mice at 2.45 GHz, 30-40 min. | Saunders, 1981 |
| 0.5 - 1.0 uW/cm2 | Wi-FI level laptop exposure for 4-hr resulted in decrease in sperm viability, DNA fragmentation with sperm samples placed in petri dishes under a laptop connected via WI-FI to the internet. | Avendano, 2012 |
| 1.0 uW/cm2 | RFR induced pathological leakage of the blood-brain barrier | Persson, 1997 |
| 1.0 uW/cm2 | RFR caused significant effect on immune function in mice | Fesenko, 1999 |
| 1.0 uW/cm2 | RFR affected function of the immune system | Novoselova, 1999 |
| 1.0 uW/cm2 | Short-term (50 min) exposure in electrosensitive patients, caused loss of well-being after GSM and especially UMTS cell phone radiation exposure | Eltiti, 2007 |
| 1.3 - 5.7 uW/cm2 | RFR associated with a doubling of leukemia in adults | Dolk, 1997 |
| 1.25 uW/cm2 | RFR exposure affected kidney development in rats (in-utero exposure) | Pyrpasopoulou, 2004 |
| 1.5 uW/cm2 | RFR reduced memory function in rats | Nittby, 2007 |
| 2 uW/cm2 | RFR induced double-strand DNA damage in rat brain cells | Kesari, 2008 |
| 2.5 uW/cm2 | RFR affected calcium concentrations in heart muscle cells | Wolke, 1996 |
| 2 - 4 uW/cm2 | Altered cell membranes; acetycholine-induced ion channel disruption | D'Inzeo, 1988 |
| 4 uW/cm2 | RFR caused changes in hippocampus (brain memory and learning) | Tattersall, 2001 |
| 4 - 15 uW/cm2 | Memory impairment, slowed motor skills and retarded learning in children | Chiang, 1989 |
| 5 uW/cm2 | RFR caused drop in NK lymphocytes (immune function decreased) | Boscolo, 2001 |
| 5.25 uW/cm2 | 20 minutes of RFR at cell tower frequencies induced cell stress response | Kwee, 2001 |
| 5 - 10 uW/cm2 | RFR caused impaired nervous system activity | Dumansky, 1974 |
| 6 uW/cm2 | RFR induced DNA damage in cells | Phillips, 1998 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| Power Density (Microwatts/centimeter2 - uW/cm2) | | Reference |
|---|---|---|
| 8.75 uW/cm2 | RFR at 900 MHz for 2-12 hours caused DNA breaks in leukemia cells | Marinelli, 2004 |
| 10 uW/cm2 | Changes in behavior (avoidance) after 0.5 hour exposure to pulsed RFR | Navakatikian, 1994 |
| 10 - 100 uW/cm2 | Increased risk in radar operators of cancer; very short latency period; dose response to exposure level of RFR reported. | Richter, 2000 |
| 12.5 uW/cm2 | RFR caused calcium efflux in cells - can affect many critical cell functions | Dutta, 1989 |
| 13.5 uW/cm2 | RFR affected human lymphocytes - induced stress response in cells | Sarimov, 2004 |
| 20 uW/cm2 | Increase in serum cortisol (a stress hormone) | Mann, 1998 |
| 28.2 uW/cm2 | RFR increased free radical production in rat cells | Yurekli, 2006 |
| 37.5 uW/cm2 | Immune system effects - elevation of PFC count (antibody producing cells | Veyret, 1991 |
| 45 uW/cm2 | Pulsed RFR affected serum testosterone levels in mice | Forgacs, 2006 |
| 50 uW/cm2 | Cell phone RFR caused a pathological leakage of the blood-brain barrier in 1 hour | Salford, 2003 |
| 50 uW/cm2 | An 18% reduction in REM sleep (important to memory and learning functions) | Mann, 1996 |
| 60 uW/cm2 | RFR caused structural changes in cells of mouse embryos | Somozy, 1991 |
| 60 uW/cm2 | Pulsed RFR affected immune function in white blood cells | Stankiewicz, 2006 |
| 60 uW/cm2 | Cortex of the brain was activated by 15 minutes of 902 MHz cell phone | Lebedeva, 2000 |
| 65 uW/cm2 | RFR affected genes related to cancer | Ivaschuk, 1999 |
| 92.5 uW/cm2 | RFR caused genetic changes in human white blood cells | Belyaev, 2005 |
| 100 uW/cm2 | Changes in immune function | Elekes, 1996 |
| 100 uW/cm2 | A 24.3% drop in testosterone after 6 hours of CW RFR exposure | Navakatikian, 1994 |
| 120 uW/cm2 | A pathological leakage in the blood-brain barrier with 915 MHz cell RF | Salford, 1994 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| Power Density (Microwatts/centimeter2 - uW/cm2) | | Reference |
|---|---|---|
| 500 uW/cm2 | Intestinal epithelial cells exposed to 2.45 GHz pulsed at 16 Hz showed changes in intercellular calcium. | Somozy, 1993 |
| 500 uW/cm2 | A 24.6% drop in testosterone and 23.2% drop in insulin after 12 hrs of pulsed RFR exposure. | Navakatikian, 1994 |

| **STANDARDS** | | |
|---|---|---|
| 530 - 600 uW/cm2 | Limit for uncontrolled public exposure to 800-900 MHz | ANSI/IEEE and FCC |
| 1000 uW/cm2 | PCS STANDARD for public exposure (as of September 1,1997) | FCC, 1996 |
| 5000 uW/cm2 | PCS STANDARD for occupational exposure (as of September 1, 1997) | FCC, 1996 |
| **BACKGROUND LEVELS** | | |
| 0.003 uW/cm2 | Background RF levels in US cities and suburbs in the 1990s | Mantiply, 1997 |
| 0.05 uW/cm2 | Median ambient power density in cities in Sweden (30-2000 MHz) | Hamnierius, 2000 |
| 0.1 - 10 uW/cm2 | Ambient power density within 100-200' of cell site in US (data from 2000) | Sage, 2000 |

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| Stress proteins, HSP, disrupted immune function | Brain tumors and blood-brain barrier |
| Reproduction/fertility effects | Sleep, neuron firing rate, EEG, memory, learning, behavior |
| Oxidative damage/ROS/DNA damage/DNA repair failure | Cancer (other than brain), cell proliferation |
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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure

## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 0.000064 - 0.000078 W/Kg | Well-being and cognitive function affected in humans exposed to GSM-UMTS cell phone frequencies; RF levels similar near cell sites | TNO Physics and |
| 0.00015 - 0.003 W/Kg | Calcium ion movement in isolated frog heart tissue is increased 18% (P<.01) and by 21% (P<.05) by weak RF field modulated at 16 Hz | Schwartz, 1990 |
| 0.000021 - 0.0021 W/Kg | Changes in cell cycle; cell proliferation (960 MHz GSM mobile phone) | Kwee, 1997 |
| 0.0003 - 0.06 W/Kg | Neurobehavioral disorders in offspring of pregnant mice exposed in utero to cell phones - dose-response impaired glutamatergic synaptic transmission onto layer V pyramidal neurons of the prefrontal cortex. Hyperactivity and impaired memory function in offspring. Altered brain development. | Aldad, 2012 |
| 0.0016 - 0.0044 W/Kg | Very low power 700 MHz CW affects excitability of hippocampus tissue, consistent with reported behavioral changes. | Tattersall, 2001 |
| 0.0021 W/Kg | Heat shock protein HSP 70 is activated by very low intensity microwave exposure in human epithelial amnion cells | Kwee, 2001 |
| 0.0024 - 0.024 W/Kg | Digital cell phone RFR at very low intensities causes DNA damage in human cells; both DNA damage and impairment of DNA is reported | Phillips, 1998 |
| 0.0027 W/Kg | Changes in active avoidance conditioned behavioral effect is seen after one-half hour of pulsed radiofrequency radiation | Navakatikian, 1994 |
| 0.0035 W/Kg | 900 MHz cell phone signal induces DNA breaks and early activation of p53 gene; short exposure of 2-12 hours leads cells to acquire greater survival chance - linked to tumor agressiveness. | Marinelli, 2004 |
| 0.0095 W/Kg | MW modulated at 7 Hz produces more errors in short-term memory functioin on complex tasks (can affect cognitive processes such as attention and memory) | Lass, 2002 |
| 0.001 W/Kg | 750 MHz continuous wave (CW) RFR exposure caused increase in heat shock protein (stress proteins). Equivalent to what would be induced by 3 degree C. heating of tissue (but no heating occurred) | De Pomerai, 2000 |
| 0.001 W/Kg | Statistically significant change in intracellular calcium concentration in heart muscle cells exposed to RFR (900 MHz/50 Hz modulation) | Wolke, 1996 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 0.0021 W/Kg | A significant change in cell proliferation not attributable to thermal heating. RFR induces non-thermal stress proteins (960 MHz GSM) | Velizarov, 1999 |
| 0.004 - 0.008 W/Kg | 915 MHz cell phone RFR caused pathological leakage of blood-brain barrier. Worst at lower SAR levels and worse with CW compared to Frequency of pathological changes was 35% in rats exposed to pulsed radiation at 50% to continuous wave RFR. Effects observed at a specific absorption (SA) of > 1.5 joules/Kg in human tissues | Persson, 1997 |
| 0.0059 W/Kg | Cell phone RFR induces glioma (brain cancer) cells to significantly increase thymidine uptake, which may be indication of more cell division | Stagg, 1997 |
| 0.014 W/Kg | Sperm damage from oxidative stress and lowered melatonin levels resulted from 2-hr per day/45 days exposure to 10 GHz. | Kumar, 2012 |
| 0.015 W/Kg | Immune system effects - elevation of PFC count (antibody-producing cells) | Veyret, 1991 |
| 0.02 W/Kg | A single, 2-hr exposure to GSM cell phone radiation results in serious neuron damage (brain cell damage) and death in cortex, hippocampus, and basal ganglia of brain- even 50+ days later blood-brain barrier is still leaking albumin (P<.002) following only one cell phone exposure | Salford, 2003 |
| 0.026 W/Kg | Activity of c-jun (oncogene or cancer gene) was altered in cells after 20 minutes exposure to cell phone digital TDMA signal | Ivaschuk, 1997 |
| 0.0317 W/Kg | Decrease in eating and drinking behavior | Ray, 1990 |
| 0.037 W/Kg | Hyperactivity caused by nitric oxide synthase inhibitor is countered by exposure to ultra-wide band pulses (600/sec) for 30 min | Seaman, 1999 |
| 0.037 - 0.040 W/Kg | A 1-hr cell phone exposure causes chromatin condensation; impaired DNA repair mechanisms; last 3 days (longer than stress response) the effect reaches saturation in only one hour of exposure; electro- sensitive (ES) people have different response in formation of DNA repair foci, compared to healthy individuals; effects depend on carrier frequency (915 MHz = 0.037 W/Kg but 1947 MHz = 0.040 W/Kg) | Belyaev, 2008 |
| 0.05 W/Kg | Significant increase in firing rate of neurons (350%) with pulsed 900 MHz cell phone radiation exposure (but not with CW) in avian brain cells | Beason, 2002 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure

## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 0.09 W/Kg | 900 MHz study of mice for 7 days, 12-hr per day (whole-body) resulted in significant effect on mitochondria and genome stability | Aitken, 2005 |
| 0.091 W/Kg | Wireless internet 2400 MHz, 24-hrs per day/20 weeks increased DNA damage and reduced DNA repair; levels below 802.11 g Authors say "findings raise questions about safety of radiofrequency exposure from Wi-Fi internet access devices for growing organisms of reproductive age, with a potential effect on fertility and integrity of germ cells" (male germ cells are the reproductive cells=sperm) | Atasoy, 2012 |
| 0.11 W/Kg | Increased cell death (apoptosis) and DNA fragmentation at 2.45 GHz for 35 days exposure (chronic exposure study) | Kesari, 2010 |
| 0.121 W/Kg | Cardiovascular system shows significant decrease in arterial blood pressure (hypotension) after exposure to ultra-wide band pulses | Lu, 1999 |
| 0.13 - 1.4 W/Kg | Lymphoma cancer rate doubled with two 1/2-hr exposures per day of cell phone radiation for 18 months (pulsed 900 MHz cell signal) | Repacholi, 1997 |
| 0.14 W/Kg | Elevation of immune response to RFR exposure | Elekes, 1996 |
| 0.141 W/Kg | Structural changes in testes - smaller diameter of seminiferous | Dasdag, 1999 |
| 0.15 - 0.4 W/Kg | Statistically significant increase in malignant tumors in rats chronically exposed to RFR | Chou, 1992 |
| 0.26 W/Kg | Harmful effects to the eye/certain drugs sensitize the eye to RFR | Kues, 1992 |
| 0.28 - 1.33 W/Kg | Significant increase in reported headaches with increasing use of hand-held cell phone use (maximum tested was 60 min per day) | Chia, 2000 |
| 0.3 - 0.44 W/Kg | Cell phone use results in changes in cognitive thinking/mental tasks related to memory retrieval | Krause, 2000 |
| 0.3 - 0.44 W/Kg | Attention function of brain and brain responses are speeded up | Preece, 1999 |
| 0.3 - 0.46 W/Kg | Cell phone RFR doubles pathological leakage of blood-brain barrier permeability at two days (P=.002) and triples permeability at four days (P=.001) at 1800 MHz GSM cell phone radiation | Schirmacher, 2000 |
| 0.43 W/Kg | Significant decrease in sperm mobility; drop in sperm concentration; and decrease in seminiferous tubules at 800 MHz, 8-hr/day, 12 weeks, with mobile phone radiation level on STANDBY ONLY (in rabbits) | Salama, 2008 |

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# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure

## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 0.5 W/Kg | 900 MHz pulsed RF affects firing rate of neurons (Lymnea stagnalis) but continuous wave had no effect | Bolshakov, 1992 |
| 0.58 - 0.75 W/Kg | Decrease in brain tumors after chronic exposure to RFR at 836 MHz | Adey, 1999 |
| 0.6 - 0.9 W/Kg | Mouse embryos develop fragile cranial bones from in utero 900 MHz The authors say "(O)ur results clearly show that even modest exposure (e.g., 6 min daily for 21 days" is sufficient to interfere with the normal mouse developmental process" | Fragopoulou, 2009 |
| 0.6 and 1.2 W/Kg | Increase in DNA single and double-strand DNA breaks in rat brain cells with exposure to 2450 MHz RFR | Lai & Singh, 1996 |
| 0.795 W/Kg | GSM 900 MHz, 217 Hz significantly decreases ovarian development and size of ovaries, due to DNA damage and premature cell death of nurse cells and follicles in ovaries (that nourish egg cells) | Panagopoulous, 2012 |
| 0.87 W/Kg | Altered human mental performance after exposure to GSM cell phone radiation (900 MHz TDMA digital cell phone signal) | Hamblin, 2004 |
| 0.87 W/Kg | Change in human brainwaves; decrease in EEG potential and statistically significant change in alpha (8-13 Hz) and beta (13-22 Hz) brainwave activity in humans at 900 MHz; exposures 6/min per day for 21 days (chronic exposure) | D'Costa, 2003 |
| 0.9 W/Kg | Decreased sperm count and more sperm cell death (apoptosis) after 35 days exposure, 2-hr per day | Kesari, 2012 |
| < 1.0 W/Kg | Rats exposed to mobile phone radiation on STANDBY ONLY for 11-hr 45-min plus 15-min TRANSMIT mode; 2 times per day for 21 days showed decreased number of ovarian follicles in pups born to these pregnant rats. The authors conclude "the decreased number of follicles in pups exposed to mobile phone microwaves suggest that intrauterine exposure has toxic effects on ovaries." | Gul, 2009 |
| 0.4 - 1.0 W/Kg | One 6-hr exposure to 1800 MHz cell phone radiation in human sperm cells caused a significant dose response and reduced sperm motility and viability; reactive oxygen species levels were significantly increased after exposure to 1.0 W/Kg; study confirms detrimental effects of RF/MW to human sperm. The authors conclude "(T)hese findings have clear implicatiions for the safety of extensive mobile phone use by males of reproductive age, potentially affecting both their fertility and the health and wellbeing of their offspring." | De Iuliis, 2009 |
| 1.0 W/Kg | Human semen degraded by exposure to cell phone frequency RF increased free-radical damage. | De Iuliis, 2009 |

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| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 1.0 W/Kg | Motility, sperm count, sperm morphology, and viability reduced in active cell phone users (human males) in dose-dependent manner. | Agarwal, 2008 |
| 1.0 W/Kg | GSM cell phone use modulates brain wave oscillations and sleep EEG | Huber, 2002 |
| 1.0 W/Kg | Cell phone RFR during waking hours affects brain wave activity. (EEG patterns) during subsequent sleep | Achermann, 2000 |
| 1.0 W/Kg | Cell phone use causes nitric oxide (NO) nasal vasodilation (swelling inside nasal passage) on side of head phone use | Paredi, 2001 |
| 1.0 W/Kg | Increase in headache, fatigue and heating behind ear in cell phone users | Sandstrom, 2001 |
| 1.0 W/Kg | Significant increase in concentration difficulties using 1800 MHz cell phone compared to 900 MHz cell phone | Santini, 2001 |
| 1.0 W/Kg | Sleep patterns and brain wave activity are changed with 900 MHz cell phone radiation exposure during sleep | Borbely, 1999 |
| 1.4 W/Kg | GSM cell phone exposure induced heat shock protein HSP 70 by 360% (stress response) and phosphorylation of ELK-1 by 390% | Weisbrot, 2003 |
| 1.46 W/Kg | 850 MHz cell phone radiation decreases sperm motility, viability is significantly decreased; increased oxidative damage (free-radicals) significantly decreased; increased oxidative damage (free-radicals) | Agarwal, 2009 |
| 1.48 W/Kg | A significant decrease in protein kinase C activity at 112 MHz with 2-hr per day for 35 days; hippocampus is site, consistent with reports that RFR negatively affects learning and memory functions | Paulraj, 2004 |
| 1.0 - 2.0 W/Kg | Significant elevation in micronuclei in peripheral blood cells at 2450 MHz (8 treatments of 2-hr each) | Trosic, 2002 |
| 1.5 W/Kg | GSM cell phone exposure affected gene expression levels in tumor suppressor p53-deficient embryonic stem cells; and significantly increased HSP 70 heat shock protein production | Czyz, 2004 |
| 1.8 W/Kg | Whole-body exposure to RF cell phone radiation of 900-1800 MHz 1 cm from head of rats caused high incidence of sperm cell death; deformation of sperm cells; prominent clumping together of sperm cells into "grass bundle shapes" that are unable to separate/swim. Sperm cells unable to swim and fertilize in normal manner. | Yan, 2007 |

| | |
|---|---|
| Stress proteins, HSP, disrupted immune function | Brain tumors and blood-brain barrier |
| Reproduction/fertility effects | Sleep, neuron firing rate, EEG, memory, learning, behavior |
| Oxidative damage/ROS/DNA damage/DNA repair failure | Cancer (other than brain), cell proliferation |
| Disrupted calcium metabolism | Cardiac, heart muscle, blood-pressure, vascular effects |

# Reported Biological Effects from Radiofrequency Radiation at Low-Intensity Exposure
## (Cell Tower, Wi-Fi, Wireless Laptop and 'Smart' Meter RF Intensities)

| SAR (Watts/Kilogram) | | Reference |
|---|---|---|
| 2.0 W/Kg | GSM cell phone exposure of 1-hr activated heat shock protein HSP 27 (stress response) and P38 MAPK (mutagen-activated protein kinase) that authors say facilitates brain cancer and increased blood-brain barrier permeability, allowing toxins to cross BBB into brain | Leszczynski, 2002 |
| 2 W/Kg | 900 MHz cell phone exposure caused brain cell oxidative damage by increasing levels of NO, MDA, XO and ADA in brain cells; caused statistically significant increase in 'dark neurons' or damaged brain cells in cortex, hippocampus and basal ganglia with a 1-hr exposure for 7 consecutive days | Ilhan, 2004 |
| 2.6 W/Kg | 900 MHz cell phone exposure for 1-hr significantly altered protein expression levels in 38 proteins following irradiation; activates P38 MAP kinase stress signalling pathway and leads to changes in cell sie and shape (shrinking and rounding up) and to activation of HSP 27, a stress protein (heat shock protein) | Leszczynski, 2004 |
| 2.0 - 3.0 W/Kg | RFR accelerated development of both skin and breast tumors | Szmigielski, 1982 |
| 2 W/Kg | Pulse-modulated RFR and MF affect brain physiology (sleep study) | Schmidt, 2012 |

| STANDARDS | | |
|---|---|---|
| 0.08 W/Kg | IEEE Standard uncontrolled public environment (whole body) | IEEE |
| 0.4 W/Kg | IEEE Standard controlled occupational environment (whole body) | IEEE |
| 1.6 W/Kg | FCC (IEEE) SAR limit for 1 gram of tissue in a partial body exposure | FCC, 1996 |
| 2 W/Kg | ICNIRP SAR limit for 10 grams of tissue | ICNIRP, 1996 |

| | |
|---|---|
| Stress proteins, HSP, disrupted immune function | Brain tumors and blood-brain barrier |
| Reproduction/fertility effects | Sleep, neuron firing rate, EEG, memory, learning, behavior |
| Oxidative damage/ROS/DNA damage/DNA repair failure | Cancer (other than brain), cell proliferation |
| Disrupted calcium metabolism | Cardiac, heart muscle, blood-pressure, vascular effects |

# 2020 Consensus Statement of UK and International Medical and Scientific Experts and Practitioners on Health Effects of Non-Ionising Radiation (NIR)

**Author: Dr. Erica Mallery-Blythe. Release date: 10/11/2020.**
(Signed by groups representing over 3,500 medical doctors)

**On Behalf of:**
Physicians' Health Initiative for Radiation and Environment (PHIRE)
British Society for Ecological Medicine (BSEM)

**Endorsed by further Medical Groups:**
Alborada Foundation (Spain)
American Academy of Environmental Medicine (AAEM)
Australian College of Nutritional and Environmental Medicine (ACNEM)
European Academy for Environmental Medicine (EUROPAEM)
Italian Association of Doctors for the Environment (ISDE Italia)
Kompentenzinitiative (Germany)
National Association of Environmental Medicine (NAEM USA)
Ralf Meyer Akademie Komplementarmedizin

**Endorsed by Scientific Groups:**
EM Radiation Research Trust (RRT)
Environmental Health Trust (EHT)
International EMF Alliance (IEMFA)
International Guidelines on Non-Ionising Radiation (IGNIR)
Oceania Radiofrequency Scientific Advisory Association (ORSAA)

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# 2020 Consensus Statement of UK and International Medical and Scientific Experts and Practitioners on Health Effects of Non-Ionising Radiation (NIR)

**The statement reflects the consensus from the most recent independent expert global forums [1,2,3,4,5,6] on the acute and chronic health effects resulting from Radiofrequency Radiation (RFR) exposure.**

**The statement clarifies the medical community's serious concerns surrounding the deployment of 5G and the continued use of RFR in public spaces.**

## Urgent action is required to protect the health of humans and wildlife.

### Public Health Crisis:

1. RFR has been proven to damage biological systems at intensities below ICNIRP* guidelines.
2. Public exposure to RFR is already harmful and will rise with the deployment of 5G.
3. Exposure is unavoidable, contravening the Human Rights Act for those who do not consent.
4. Multiple international governmental health advisory groups are biased by conflicts of interest.

*ICNIRP: International Commission on Non-Ionising Radiation Protection

### Required Urgent Actions:

1. Immediate moratorium on 5G, wireless smart metering and any other new RF emissions.
2. Establishment of public safety limits to be biologically protective against adverse health effects.
3. Withdrawal of Wi-Fi, wireless phone and other RFR emissions from within / near all schools.
4. Designation of low NIR* areas to protect those who are unwell or do not consent to exposure.
5. Education programmes to inform medical professionals about NIR related illnesses / effects.
6. A zero tolerance approach to industrial influence on public health policy and assured exclusion of those with conflicts of interest from official advisory bodies.

*NIR: Non-Ionising Radiation.

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## Introduction

During the last four decades, there has been an exponential increase in ambient radiofrequency radiation (RFR) that continues to rise at an unprecedented rate. In addition, the increases occupy an unnatural portion of the frequency spectrum and now reach intensities of up to $10^{18}$ (quintillion) times higher than natural, background levels of RFR (see Figure 1 below).

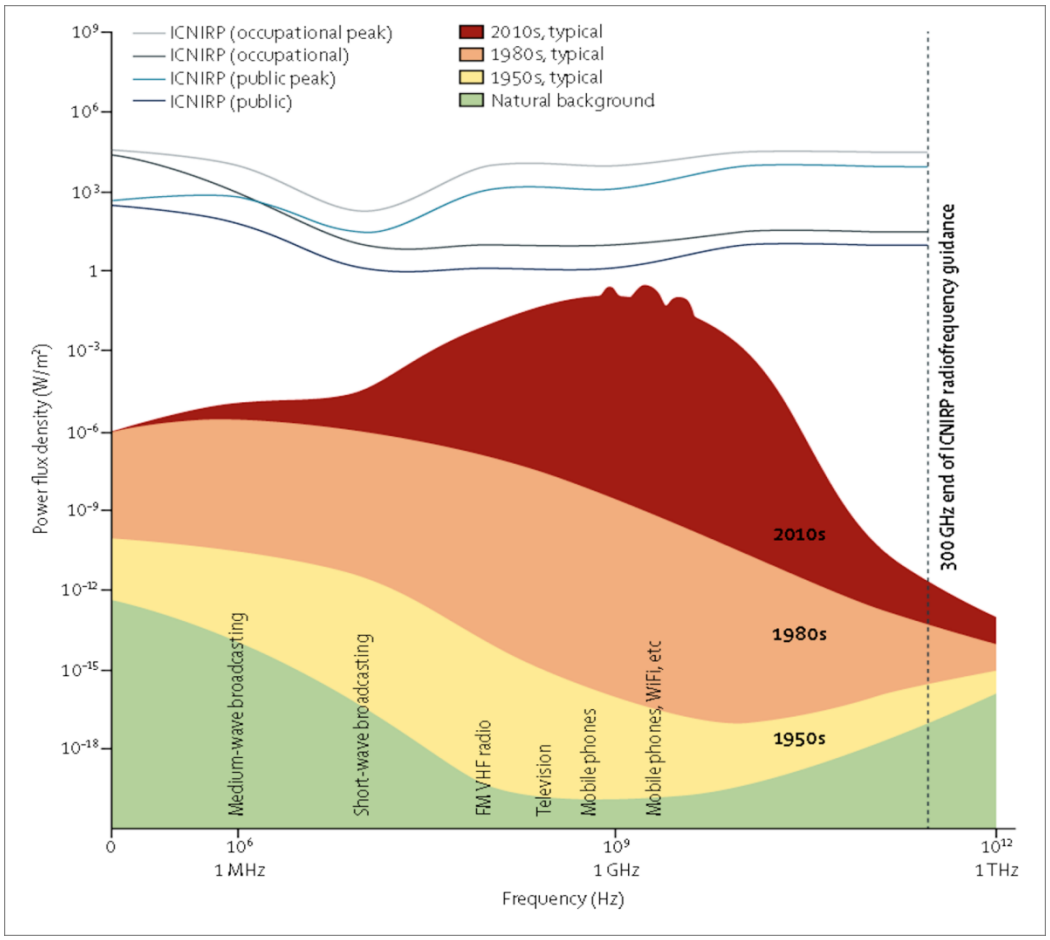


**Figure 1: Typical maximum daily exposure to radiofrequency electromagnetic radiation from man-made and natural power flux densities in comparison with International Commission on Non-Ionizing Radiation Protection safety guidelines**
Permission: Alasdair Philips, Powerwatch (https://www.powerwatch.org.uk). Published: Bandara P, Carpenter D (2018). 'Planetary electromagnetic pollution: it is time to assess its impact'. *The Lancet Planetary Health;* Vol 2, Issue 12.[110]

RFR is emitted by mobile phones, base stations, Wi-Fi enabled routers and computers, cordless land line phones, security systems, fitness watches, baby monitors, many other modern devices including wearable tech, internally emitting devices and products advertised for use close to foetuses or newborn babies. 5G will include higher frequencies transmitted by directional phased array antennas which have not been pre-market safety tested under realistic conditions in combination with existing emissions. Additionally the planned Internet of Things (IoT) will lead to higher cumulative exposures. International independent experts agree that this evolution is not safe for deployment.[7,8] Existing emissions have already been shown to damage biological systems within lifelike exposure parameters.[9-12] Detrimental effects include increased cancer risk, increase in harmful free radicals, genetic damage, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, and negative impacts on general well-being in humans.[7] The addition of higher frequencies and overall increased exposures are therefore predicted to cause further health damage.[13,14]

The following pages summarise some of the evidence supporting our concerns.

## Background

### 1) Cancer risk noted from human epidemiological research corroborated by largest new animal studies:

In 2011, the World Health Organisation (WHO) via the International Agency for Research on Cancer (IARC) classified RFR as Group 2B 'Possibly carcinogenic to humans'.[15] Glioblastoma Multiforme (GBM), an associated rapidly progressive fatal brain cancer, and acoustic neuroma, satisfy the Bradford Hill criteria for causation from RFR exposure based on human epidemiological studies.[16] Human epidemiological evidence has continued to accumulate since.[17-23] In 2018 the highly credible US National Toxicology Program (NTP) published findings from the largest animal study so far conducted,[24,25] declaring the evidence for carcinogenesis 'clear' and putting pressure on IARC to urgently reassess and elevate RFR to Group 1 'Known Human Carcinogen'.[26,27] Furthermore, the large-scale Ramazzini Institute study,[28] which used far field radiation designed to emulate base station type RF emissions, was published shortly afterwards and independently confirmed promotion of carcinogenesis in cells of glial derivation. Legal authorities continue to validate the causal link between RFR and tumours.[29] Incidence rates for these kinds of brain tumours are rising in the UK,[30] Netherlands,[31] Australia,[32] and USA.[33,34]

### 2) Global medical, scientific, political and ethical warnings are escalating:

Accompanying this warning from WHO / IARC are warnings from numerous international medical doctors groups,[8,35-43] scientific panels,[9-11,44-55] and governmental bodies.[56-66]

### 3) Enough valid research has been conducted to justify action to protect against health effects:

Many hundreds of peer-reviewed scientific papers have now been published demonstrating biological effects occurring in response to exposure to NIR at a range of frequencies. It should be noted that modulations to RF communications fall within the Extremely Low Frequency (ELF) range. It remains unclear whether it is the RF or ELF frequencies that are most bioactive, but that academic question does not need to be answered at this point in order to be clear that the technology is not safe, as both existing and proposed emissions contain both portions of the spectrum integrated in this way. The evidence base for certain types of biological interference is extremely strong. In excess of 90% of publications noted oxidative stress, both in vitro and vivo (animal studies).[67] Oxidative stress can damage multiple biological systems and is implicated in many diseases of high public health importance such as Alzheimer's, cancer, cardiovascular disease and infertility.

### 4) ICNIRP 'safety' guidelines are not protective:

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines (devised in 1998) only avoid acute, thermally induced (tissue heating) effects).[68] They do not protect against chronic effects, or the copiously documented non-thermal, low intensity effects of NIR, which can occur several hundred thousand times below current ICNIRP guidelines.[9] Additionally, non-compliance with these guidelines has been demonstrated.[69,70] Concerns regarding conflicts of interest have also been raised.[71,72] Analysis of proposed 5G emissions has shown that the exposure limits "tolerated by ICNIRP may lead to permanent tissue damage even after short exposures".[73] Their updated guidelines[74] address this issue but actually allow higher overall cumulative exposures and hence concerns persist.[75] They have been shown to make "extensive incorrect and misleading statements" in important literature appraisals[76] and various independent expert research groups have suggested evidence-based replacement guidelines.[9,77,78,94]

### 5) A growing global movement to protect citizens by authorities has begun:

Some countries have chosen to adopt safety limits orders of magnitude below ICNIRP guidelines based on scientifically observed biological effects. Furthermore, some, such as France,[61] have already banned or restricted Wi-Fi in certain child education settings. Others, such as Cyprus, have government-led, targeted public information campaigns and medical statements published to better inform and educate their citizens.[65] These important steps are overdue in the UK and public health agencies are currently failing in their duty to safeguard and inform the UK population regarding the proven hazards of these emissions.

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**6) Health authority guidance is often out of date, biased and inaccurate:**

Resources from advisory groups including Public Health England (PHE) and WHO, are lacking appraisal of the latest research regarding this fast-moving subject. Additionally, there are often conflicts of interest within such groups and many of their public statements do not stand up to scientific scrutiny.[71,76] Specifically, the Advisory Group on Non-Ionising Radiation (AGNIR) report of 2012 that was used to construct current UK policy is out of date and has been found to be "inaccurate", "biased" and "misleading".[79] The group has disbanded but, nonetheless, the report is still being used to inform current policy.[80]

**7) Sensitive sub-groups are neglected:**

Age, gender, genetics, Electromagnetic Hypersensitivity (EHS) (see below) and co-morbidities may all affect individual vulnerability. Pregnant females and their foetuses are also especially vulnerable.

Children are more vulnerable due to multiple factors:[81] It is noteworthy that brain tumours have overtaken leukaemia as a leading cause of cancer death in young people.

a) Children absorb more radiation:
   - The brain of a child (age 5-8yrs) can absorb 2x the radiation of an adult.[82]
   - Exposure in bone marrow can be up to 10x greater than an adult.[83]

b) Outcomes in children may be worse as:
   - Children have systems which are still developing.
   - Children have a longer time ahead for latent effects to manifest.

There is inconsistent advice regarding radiation exposure for children in the UK. The Chief Medical Officers (CMO) state that:
"Children and young people under 16 should be encouraged to use mobile phones for essential purposes only".[84] This advice is also underpinned by a medical doctors' appeal (signed by more than 1,000 physicians)[40] stating "Children below the age of 8 should not use cell phones and cordless phones; children and adolescents between the ages 8 and 16 should also not use cell phones or only use them in the case of an emergency".
However, this advice has never been effectively communicated to the public and children are still encouraged to use RFR emitting tablets, computers and numerous other wireless devices (sometimes including mobile phones) in school. The same caution should apply for tablets and other similar RFR sources as their maximum Specific Absorption Rates (SARs) are comparable and in some cases higher.

Additionally, these devices are often held near to sensitive areas such as the reproductive organs. Wi-Fi shares the same carcinogenic status as other forms of RFR under the IARC classification and is also "an important threat to human health" in numerous ways, additional to its carcinogenicity.[85] Hard wired alternatives should clearly be implemented in schools.[86,60-65]

Those with Electromagnetic Hypersensitivity (EHS) are also acutely vulnerable:

EHS is a multisystem medical condition characterised by physical symptoms associated with anthropogenic NIR exposure. Similar constellations of symptoms may also be seen in the general population in cases of relatively high exposure.

Some have suggested a 'nocebo response' (symptoms induced by fear of exposure) as the mechanism behind the reaction. This explanation does not withstand scientific scrutiny. EHS is proven to be a physical response under blinded conditions,[87,88] biomarkers are being identified,[89] and mechanisms that may explain the reaction are evolving.[90-93]

Advice from multiple international medical doctors groups and governmental bodies is to decrease exposures in order to relieve symptoms (also see point 2 above). Additionally, guidelines for EHS diagnosis and management have been peer-reviewed and published which make clear that the mainstay of medical management is avoidance of anthropogenic NIR.[94-96] Disability and compensation cases for those with EHS are already being won and will continue to escalate.

## 8) Human Rights:

There are clear human rights violations, particularly for vulnerable groups.[97] In essence many of these also apply to any individual who does not consent to exposure in their home, place of work or public building and yet is being given no choice. People all over the world are making their unwillingness to be exposed abundantly clear via protests, letters,[98] and where there is resource, legal actions.[70,99-103]

At its core, this is an issue of consent and there can be no defensible argument for forcibly exposing those who do not consent. That is a breach of the Nuremburg Code as well as numerous Human Rights. The 'Rights of a Child' and unborn child are currently also being contravened by these exposures and parents who strive to protect their children currently have no avenue to achieve this without complete public isolation. Indeed, they may even be unable to prevent their children's exposures in their own property given the penetration of NIR over large distances and through walls.

There are adults and children who have severe acute symptoms and in some cases they can prove life threatening. Additionally, the extreme measures some are forced to take to avoid exposures (such as primitive camping for example) can also lead to lack of access to medical care, social support, isolation from basic necessities such as food, water and shelter and to hostile exposures such as extremes of temperature.

It is noteworthy also that as individuals prove they have been harmed by RFR exposures, which is certainly already happening,[29] there is also likely no insurance coverage, which enhances the injustice of this situation. Following in-depth analysis of the scientific literature and thorough risk assessment, underwriters consider risks of RFR to be "high impact".[104] Governmental and other public bodies could therefore be forced to 'self insure'. This would present the very unethical situation that the taxpayer could ultimately pay for health damages incurred by exposures that they never consented to and in many cases actively refused.

## 9) Precautionary Principle and public Health:

The application of the Precautionary Principle[105] has been called for over many years, by multiple credible, professional organisations and most recently by the European Parliament.[66] This is now crucial in order to protect both public health and the economy given the already apparent escalating health and social care costs. RFR has been proven to damage biological systems at levels well below those claimed to be safe within the ICNIRP guideline levels. Public exposures to existing levels of RFR are already harmful and will rise substantially with the deployment of 5G.[106,107]

In truth, we are now beyond the point of precaution and protection of vulnerable groups is an emergency. RFR has been repeatedly shown to cause widespread, multisystem health detriment,[67] and effects on the immune system have been demonstrated in some peer-reviewed published studies.[108]

Given the extraordinary pressure on public health provision in 2020, the simple measure of halting further RFR exposures via 5G is a reasonable and proportionate measure in order to optimise the biological resilience of the population.

Given the current planetary environmental crisis and impact of electromagnetic fields also on the health of wildlife,[109-111] and with higher 5G frequencies affecting insects in particular,[112] it is not just protection of human health from harmful effects of anthropogenic radiation which constitutes an emergency but actually that of all global life.

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## Conclusion

The short-sighted reason given for the race to deploy 5G is economic growth. This argument is fallacious given that a physically and mentally unhealthy community will never be able to fulfil their true potential for economic growth and productivity. Even small impairments to certain health parameters can equate to very large public health detriment when large numbers of individuals are affected. In this case the entire population will be affected and this could therefore have highly damaging implications both for the overall health of nations and, consequently, for their economies.

There need to be sincerely progressive remedies to facilitate technological evolution in ways which are not damaging to biological systems, and these can only be pursued once the current science is honestly appraised and medically ethical solutions are actively sought. Right here and right now, hard wired alternatives present a safer, sustainable and accessible path forward.

**We the undersigned state that the above 'Urgent Action Points' must be addressed immediately by the UK Government and other governments internationally, in order to prevent avoidable human injury, disease, deaths and potentially irreversible environmental damage. Citizens must retain the right not to be exposed against their will. Where prevention of harm may have already failed we also request clear communication to the public regarding who is responsible and liable for health damages. We request a response from Public Health England and Her Majesty's Government to clarify accountability and the measures which will be taken to address the above 'Urgent Action Points' within 28 days of receipt of this communication.**



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## References

**(All are clickable hyperlinks)**


[1] Paris Appeal (2015). 5th Congress Program/Presentations; 5th Paris Appeal Congress, Belgian Royal Academy of Medicine, 18th May 2015

[2] Physicians' Health Initiative for Radiation and Environment (PHIRE) (2018). Press Conference on Health Effects of Non-Ionising Radiation (NIR) and the implementation of 5G; PHIRE Conference, London, UK, 5th Nov 2018

[3] British Society for Ecological Medicine (BSEM) (2019). 5G and Health - The Facts, Risks and Remedies; 5G International Medical Conference, London, UK, 27th Sept 2019

[4] Kompetenz Initiative (2019). Biological Effects of Wireless Technology; International Public Symposium 4th - 6th Oct 2019, Electoral Palace, Mainz, Germany

[5] Radiation Research Trust (RRT) (2019). Can Wireless Communications Damage Your Health?. International Conference on 5G, London, UK, 28th Sept 2019

[6] EMF Conference (2019). Three day international medical conference with 'Continuing Medical Education' (CME) accreditation for attendees; California, USA

[7] 5G Appeal (2017). Scientists warn of potential serious health effects of 5G; As of 19th Apr 2020, signed by 353 scientists and medical doctors

[8] International Society of Doctors for Environment (ISDE); Di Ciaula A (2018). 5G networks in European Countries: appeal for a standstill in the respect of the precautionary principle

[9] BioInitiative Working Group; Sage C, Carpenter D, et al. (2012). BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation; As updated in 2014, 2018, 2019 and 2020

[10] The EMF Call (2018). Call for Truly Protective Limits for Exposure to Electromagnetic Fields (100 kHz to 300 GHz). As of 26th Nov 2018, signed by 164 scientists and medical doctors together with 95 non-governmental organizations

[11] International EMF Scientist Appeal (2015). International Appeal – Scientists call for Protection from Non-ionizing Electromagnetic Field Exposure; As of 30th Apr 2020, signed by 253 EMF scientists (all published in this field) from 43 nations

[12] Kostoff N, Heroux P, Aschner M, et al. (2020). Adverse Effects of 5G mobile networking technology under real-life conditions. *Toxicology Letters;* 323: 35-40. doi: 10.1016/j.toxlet.2020.01.020

[13] Russell C (2018). 5G wireless telecommunications expansion: Public health and environmental implications. *Environmental Research;* 165: 484-495. doi: 10.1016/j.envres.2018.01.016

[14] Di Ciaula A (2018). Towards 5G communication systems: Are there health implications?. *International Journal of Hygiene and Environmental Health;* 221(3): 367-375. doi: 10.1016/j.ijheh.2018.01.011

[15] World Health Organization (2011). IARC classifies Radiofrequency Electromagnetic Fields as possibly carcinogenic to humans

[16] Carlberg M, Hardell L (2016). Evaluation of Mobile Phone and Cordless Phone Use and Glioma Risk Using the Bradford Hill Viewpoints from 1965 on Association or Causation. *BioMed Research International;* Article ID 9218486. doi: 10.1155/2017/9218486

[17] Bortkiewicz A, Gadzicka E, Szymczak W (2017). Mobile phone use and risk for intracranial tumors and salivary gland tumors – A meta-analysis. *International Journal of Occupational Medicine and Environmental Health;* 30(1): 27-43. doi: 10.13075/ijomeh.1896.00802

[18] Di Donato I, Federico A (2018). News on the journal Neurological Sciences in 2017. *Neurological Sciences;* 39: 15-21. doi: 10.1007/s10072-017-3241-x

[19] Yang M, Guo W, Yang C, et al. (2017). Mobile phone use and glioma risk: A systematic review and meta-analysis. *PLoS One;* 12(5): e0175136. doi: 10.1371/journal.pone.0175136

[20] Cardis E, Armstrong B, Bowman J, et al. (2011). Risk of brain tumours in relation to estimated RF dose from mobile phones: results from five Interphone countries. *Occupational and Environmental Medicine;* 68(9): 631-40. doi: 10.1136/oemed-2011-100155

[21] Momoli F, Siemiatycki J, McBride M, et al. (2017). Probabilistic Multiple-Bias Modeling Applied to the Canadian Data From the Interphone Study of Mobile Phone Use and Risk of Glioma, Meningioma, Acoustic Neuroma, and Parotid Gland Tumors. *American Journal of Epidemiology;* 186(7): 885-893. doi: 10.1093/aje/kwx157

[22] Luo J, Li H, Deziel N, et al. (2020). Genetic susceptibility may modify the association between cell phone use and thyroid cancer: A population-based case-control study in Connecticut. *Environmental Research;* 182: 109013. doi: 10.1016/j.envres.2019.109013

[23] Choi Y-J, Moskowitz J, Myung S-K, et al. (2020). Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. *International Journal of Environmental Research and Public Health;* 17(21): 8079. doi: 10.3390/ijerph17218079

[24] National Toxicology Program (2018). NTP Technical Report on the Toxicology and Carcinogenesis Studies in Sprague Dawley (Hsd:Sprague Dawley® SD®) Rats Exposed to Whole-body Radio Frequency Radiation at a Frequency (900 Mhz) and Modulations (GSM and CDMA) Used by Cell Phones; Technical Report 595 [Internet], Research Triangle Park (NC)

[25] Melnick R (2019). Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects. *Environmental Research;* 168: 1-6. doi: 10.1016/j.envres.2018.09.010

[26] Hardell L, Carlberg M (2019). Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz. *International Journal of Oncology;* 54(1): 111-127. doi: 10.3892/ijo.2018.4606


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[27] Peleg M, Nativ O, Richter E (2018). Radio frequency radiation-related cancer: assessing causation in the occupational/military setting. *Environmental Research;* 163: 123-133. doi: 10.1016/j.envres.2018.01.003
[28] Falcioni L, Bua E, Tibaldi M (2018). Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environmental Research;* 165: 496-503. doi: 10.1016/j.envres.2018.01.037
[29] Global Research (2020). The Court of Appeal of Turin Confirms the Link Between a Head Tumour and Mobile Phone Use
[30] Philips A, Henshaw D, Lamburn G, et al. (2018). Brain Tumours: Rise in Glioblastoma Multiforme Incidence in England 1995–2015 Suggests an Adverse Environmental or Lifestyle Factor. *Journal of Environmental and Public Health;* Article ID 7910754. doi: 10.1155/2018/7910754
[31] Ho V, Reijneveld J, Enting R, et al (2014). Changing incidence and improved survival of gliomas. *European Journal of Cancer;* 50(13): 2309-18. doi: 10.1016/j.ejca.2014.05.019
[32] Dobes M, Shadbolt B, Khurana V, et al (2011). A multicenter study of primary brain tumor incidence in Australia (2000-2008). *Neuro-oncology;* 13(7): 783-90. doi: 10.1093/neuonc/nor052
[33] Zada G, Bond A, Wang Y, et al. (2012). Incidence trends in the anatomic location of primary malignant brain tumors in the United States: 1992-2006. *World Neurosurgery;* 77(3-4): 518-24. doi: 10.1016/j.wneu.2011.05.051
[34] Lehrer S, Green S, Stock R (2011). Association between number of cell phone contracts and brain tumor incidence in nineteen U.S. States. *Journal of Neuro-Oncology;* 101(3): 505-7. doi: 10.1007/s11060-010-0280-z
[35] Irish Doctors Environmental Association (IDEA) (2005). IDEA Position on Electro-Magnetic Radiation
[36] Freiburger Appeal (2012). Radio-frequency Radiation Poses a Health Risk. Physicians Demand Overdue Precaution
[37] Swiss Physicians for the Environment (MfE) (2012). NIR Brief {text in Swiss German}
[38] American Academy of Pediatrics (AAP) (2013). Letter to Federal Communications Commission (FCC) and the Commissioner of the U.S. Food and Drug Administration (FDA)
[39] Doctors Call for Protection from Radiofrequency Radiation Exposure (2014). Declaration submitted to Health Canada
[40] European Cancer and Environment Research Institute (ECERI) et al. (2015). International Scientific Declaration on EHS & MCS (2015); Brussels, Belgium
[41] Cyprus Medical Association et al. (2017). Nicosia Declaration on Electromagnetic Fields / Radiofrequencies: Common Position Paper; Also by the Austrian Medical Chambers and the Cyprus National Committee on Environment and Children's Health
[42] American Academy of Environmental Medicine (AAEM) (2020). EMF Position Statement – Electromagnetic and Radiofrequency Fields Effect on Human Health
[43] Physicians for Safe Technology (2020). Digital Technology and Public Health
[44] University of Vienna et al. (1998). Vienna Resolution
[45] State of Salzburg (2000). Salzburg Resolution on Mobile Telecommunication Base Stations
[46] National Institute for Prevention and Work Safety et al. (2002). Catania Resolution
[47] EMF Team Finland et al. (2005) Helsinki Appeal
[48] International Commission for Electromagnetic Safety (ICEMS) et al. (2006). Benevento Resolution
[49] Johansson O (2007). The London Resolution. *Pathophysiology;* 16: 247–248. doi: 10.1016/j.pathophys.2009.03.005
[50] International Commission for Electromagnetic Safety (ICEMS) et al. (2008). The Venice Resolution
[51] International Commission for Electromagnetic Safety (ICEMS) et al. (2009). The Porto Alegre Resolution
[52] Fragopoulou A, Grigoriev Y, Johansson O, et al. (2010). Scientific panel on electromagnetic field health risks: consensus points, recommendations, and rationales. *Reviews on Environmental Health;* 25(4): 307-17. PMID: 21268443
[53] Scientists call for Protection from Radiofrequency Radiation Exposure (2014). Declaration submitted to Health Canada
[54] Scientific Committee on Health, Environmental and Emerging Risks (SCHEER) (2018). Statement on emerging health and environmental issues (2018)
[55] Oceania Radiofrequency Scientific Advisory Association (ORSAA) (2020)
[56] Stewart Report; Sir William Stewart et al. (2000). Independent Expert Group on Mobile Phones (IEGMP)
[57] Swiss Agency for the Environment, Forests and Landscapes (SAEFL) (2005). Electrosmog in the environment
[58] German Government (2007). Answer of the German Federal Government: Radiation exposure due to wireless Internet-Networks (WLAN) {text in German, with Translation}
[59] Parliamentary Assembly of the Council of Europe (2011). Resolution 1815, Final Resolution
[60] Russian National Committee on Non-Ionising Radiation Protection (RCNIRP) (2012). Programme of the Russian Committee on the protection from non-ionising radiation with regard to the need to introduce strict regulations on the use of Wi-Fi in kindergartens and schools {Translation}
[61] French National Assembly (2013). Orientation and programming for the re-foundation of the school of the Republic, Adopted Text No. 96 {text in French}
[62] French Government Agency for Food, Environmental and Occupational Health (ANSES) (2013). Update of the "Radiofrequencies and Health" expert appraisal
[63] Israeli Ministry of Education (2013). Integration of communication equipment and end devices in schools - health and safety implications {text in Hebrew}
[64] French National Assembly (2015). On sobriety, transparency, information and consultation on exposure to electromagnetic waves, Adopted Text No. 468 {text in French}
[65] Cyprus Government (2017). Ban on Wi-Fi in nursery schools and halted in elementary schools {Translation}; Video from the Government subtitled in English (thanks to Environmental Health Trust) {Translation}
[66] European Parliamentary Research Service; Karaboytcheva M (2020). Effects of 5G wireless communication on human health

[67] Yakymenko I, Tsybulin O, Sidorik E, et al. (2016). Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. *Electromagnetic Biology and Medicine;* 35(2): 186-202. doi: 10.3109/15368378.2015.1043557
[68] International Commission on Non-Ionizing Radiation Protection (ICNIRP) (1998). ICNIRP Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300GHz). *Health Physics;* 74(4): 494-522
[69] Ghandi O (2019). Microwave Emissions From Cell Phones Exceed Safety Limits in Europe and the US When Touching the Body. *IEEE Access;* 7: 47050-47052. doi: 10.1109/ACCESS.2019.2906017
[70] Phonegate Alert; Dr Arazi et al. (2016). Phonegate Alert – Protect Users Health
[71] Hardell L (2017). World Health Organization, radiofrequency radiation and health - a hard nut to crack (Review). *International Journal of Oncology;* 51: 405-413. doi: 10.3892/ijo.2017.4046
[72] Hardell L, Carlberg M (2020). [Comment] Health risks from radiofrequency radiation, including 5G, should be assessed by experts with no conflicts of interest. *Oncology Letters;* 20(4): 15. doi: 10.3892/ol.2020.11876
[73] Neufeld E, Kuster N (2018). Systematic derivation of safety limits for time-varying 5G radiofrequency on analytical models and thermal dose. *Health Physics;* 115(6): 705-711. doi: 10.1097/hp.0000000000000930
[74] International Commission on Non Ionising Radiation Protection (ICNIRP) (2020). RF EMF Guidelines 2020
[75] Gultekin D, Siegel P (2020). Absorption of 5G Radiation in Brain Tissue as a Function of Frequency, Power and Time. *IEEE Access;* 8: 115593-115612. doi: 10.1109/ACCESS.2020.3002183
[76] Melnick R (2018). Critique of the ICNIRP Note of 4th Sept 2018 Regarding Recent Animal Carcinogenesis Studies
[77] Barnes F, Greenebaum B (2020). Setting Guidelines for Electromagnetic Exposures and Research Needs. *Bioelectromagnetics;* 41: 392-397. doi: 10.1002/bem.22267
[78] International Guidelines on Non-Ionising Radiation (IGNIR) (2020). IGNIR's latest independent guidelines on EMF exposure
[79] Starkey S (2016). Inaccurate official assessment of radiofrequency safety by the Advisory Group on Non-ionising Radiation. *Reviews on Environmental Health;* 31(4): 493–503. doi: 10.1515/reveh-2016-0060
[80] Starkey S (2018). Official advice on the safety of radiofrequency radiation, risk assessment and adverse effects; Presentation at PHIRE Conference, London, UK
[81] Morgan L, Kesari S, Davis D, et al. (2014). Why children absorb more microwave radiation than adults: The consequences. *Journal of Microscopy and Ultrastructure;* (2)4: 197-204. doi: 10.1016/j.jmau.2014.06.005
[82] Wiart J, Hadjem A, Wong M, et al (2008). Analysis of RF exposure in the head tissues of children and adults. *Physics in Medicine & Biology;* (53)13: 3681. doi: 10.1088/0031-9155/53/13/019
[83] Christ A, Gosselin M, Christopoulou M, et al. (2010). Age-dependent tissue-specific exposure of cell phone users. *Physics in Medicine & Biology;* 55(7): 1767-83. doi: 10.1088/0031-9155/55/7/001
[84] NHS (2011). Mobile phones and base stations: Health advice on using mobile phones
[85] Pall M (2018). Wi-Fi is an important threat to human health. *Environmental Research;* 164: 405-416. doi: 10.1016/j.envres.2018.01.035
[86] American Academy of Environmental Medicine (AAEM) (2020). Wireless Radiofrequency Radiation in Schools
[87] Rea W, Pan Y, Fenyves E, et al. (1991). Electromagnetic Field Sensitivity. *Journal of Bioelectricity;* 10(1-2): 241-256. doi: 10.3109/15368379109031410
[88] McCarty D, Carrubba S, Chesson A, et al. (2011) Electromagnetic hypersensitivity: evidence for a novel neurological syndrome. *International Journal of Neuroscience;* 121(12): 670-6. doi: 10.3109/00207454.2011.608139
[89] Belpomme D, Campagnac C, Irigaray P (2015). Reliable disease biomarkers characterizing and identifying electrohypersensitivity and multiple chemical sensitivity as two etiopathogenic aspects of a unique pathological disorder. *Reviews on Environmental Health;* 30(4): 251-71. doi: 10.1515/reveh-2015-0027
[90] Stein Y, Udasin I (2020). Electromagnetic hypersensitivity (EHS, microwave syndrome) – Review of mechanisms. *Environmental Research;* 186: 109445. doi: 10.1016/j.envres.2020.109445
[91] Lai H (2019). Exposure to Static and Extremely-Low Frequency Electromagnetic Fields and Cellular Free Radicals. *Electromagnetic Biology and Medicine;* 38(4): 231-248. doi: 10.1080/15368378.2019.1656645
[92] Panagopoulos D, Messini N, Karabarbounis A, et al. (2000). A Mechanism for Action of Oscillating Electric Fields on Cells. *Biochemical and Biophysical Research Communications;* 272(3): 634-640. doi: 10.1006/bbrc.2000.2746
[93] Panagopoulos D, Karabarbounis A, Margaritis L (2002). Mechanism for action of electromagnetic fields on cells. *Biochemical and Biophysical Research Communications;* 298(1): 95-102. doi: 10.1016/S0006-291X(02)02393-8
[94] Belyaev I, Dean A, Horst E, et al. (2016). EUROPAEM EMF Guideline 2016 for the prevention, diagnosis and treatment of EMF-related health problems and illnesses. *Reviews on Environmental Health;* 31(3): 363-397. doi: 10.1515/reveh-2016-0011
[95] Austrian Medical Association (2012). Guideline of the Austrian Medical Association for diagnosis and treatment of EMF-related health problems and illnesses (EMF Syndrome)
[96] Belpomme D, Irigaray P (2020). Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat, and Prevent It. *International Journal of Molecular Sciences;* 21(6): 1915. doi: 10.3390/ijms21061915
[97] Jamieson I (2014). Electromagnetic Hypersensitivity & Human Rights – Commentary to the European Economic and Social Committee
[98] 5G Space Appeal (2018). An Emergency Appeal to the World's Governments by Scientists, Doctors, Environmental Organizations and Others
[99] Action Against 5G (2020). Legal Action Against 5G
[100] Court of Appeals for the D.C. Circuit (2020). Environmental Health Trust v. FCC (20-1025)
[101] Learmond-Criqui J, et al. (2020). 5G Judicial Review
[102] Children's Health Defense (2020). CHD v. FCC: 5G & Wireless Radiation Guidelines Lawsuit

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[103] Kompetenz Initiative (2020). Kompetenzinitiative mobile phones and health legal action 2020
[104] Swiss Re (2019). 'Off the leash – 5G mobile networks', in Swiss Re SONAR New emerging risk insights, p.29 {Excerpt}
[105] Commission of the European Communities (2000). Communication from the Commission on the precautionary principle
[106] Nasim I, Kim S (2019). Adverse impacts of 5G downlinks on human body. *2019 SoutheastCon;* 1-6. doi: 10.1109/SoutheastCon42311.2019.9020454
[107] Nasim I, Kim S (2019). Mitigation of human EMF exposure in downlink of 5G. *Annals of Telecommunications;* 74: 45-52. doi: 10.1007/s12243-018-0696-6
[108] Sage C (2020). Disrupted Immune Function from Exposure to Low-Intensity Non-Ionizing Radiation (Radiofrequency Radiation); Bioinitiative report update
[109] Balmori A (2014). Electrosmog and species conservation. *Science of the Total Environment;* 496: 314-316. doi: 10.1016/j.scitotenv.2014.07.061
[110] Bandara P, Carpenter D (2018). Planetary electromagnetic pollution: it is time to assess its impact. *The Lancet Planetary Health;* 2(12): 512-514. doi: 10.1016/S2542-5196(18)30221-3
[111] Waldmann-Selsam C, Balmori-de la Puente A, Breunig H, et al. (2016). Radiofrequency radiation injures trees around mobile phone base stations. *Science of the Total Environment;* 572: 554-569. doi: 10.1016/j.scitotenv.2016.08.045
[112] Thielens A, Bell D, Mortimore D, et al. (2018). Exposure of Insects to Radio-Frequency Electromagnetic Fields from 2 to 120 GHz. *Scientific Reports;* 8(1): 3924. doi: 10.1038/s41598-018-22271-3