

The Dangers of Microwave Radiation from Mobile Phones and Other Wireless Devices, and the 5G Network or Smart Grid

Dear Sir/Madam,

If you care about your health, the health of those you love, and of your community, then please take a little time to read the following pages—it will probably be some of the most important time you will ever spend.

The following information is divided into two sections: 1) a discussion of the adverse effects of microwave radiation from mobile phones and other wireless technology on our health 2) a discussion of the proposed 5G network and its *certain and severe* adverse effects on human, animal, insect and plant health. While the first section is very important, the second section is critical.

Almost certainly, some of what you will read below about the dangers of radiofrequency and microwave radiation will be confronting. Be bold, stay with it, open your mind and heart to what is written, and then do your *own* research. The videos, articles and websites listed at the end of this paper are a good place to start. Peace and best wishes.

Section 1: The Dangers to Our Health from Our Current Levels of Exposure to Microwave Radiation

1.1: The Nature of Electromagnetic and Microwave Radiation

First, a little bit of basic technical information. Electromagnetic radiation (EMR or EMF) is composed of electric and magnetic radiation or fields which, in turn, are composed of waves. The electromagnetic *spectrum* is the range of wavelengths and wave frequencies (related to the wavelengths) over which electromagnetic radiation spans. *Microwave* radiation is that part of the electromagnetic spectrum which extends from 300 megahertz (MHz) to 300 gigahertz (GHz). Hertz is an international standard of wave frequency of one cycle or wave per second; this simply means that one wave will pass a given point each second. One KHz is 1000 hertz (or cycles or waves) per second, one MHz is a million hertz per second, and one GHz is a billion hertz per second. The electromagnetic radiation from our mobile phones—and other wireless gadgets such as wifi (routers), ipads, tablets, wireless computers, baby monitors, cordless phones and smart meters—falls mainly in the one to three gigahertz/GHz range, and thus is mainly *microwave radiation*. Radiofrequency radiation, which ranges from 3 KHz to 300 GHz, is also part of the electromagnetic spectrum. Microwave radiation forms *part* of the radiofrequency radiation range. Hence, microwave radiation is often called radiofrequency radiation.

1.2. The Inadequacy of the Australian and International Safety Standards for Microwave Radiation

Contrary to what we may hear from the government, the telecommunications companies, and the regulators of the telecommunications industry, the microwave radiation from mobile phones, and more generally, from wireless technology, is definitely *not* safe. There are now some 10,000 studies emphatically showing that microwave or radiofrequency radiation, at or below our existing levels of exposure, is harmful to our health. These date back to the 1950s. [49]. For example, in 1971 the U.S. Navy collated some 2,600 studies which showed the harmful effects of radiofrequency radiation. [49 p. 29; 6; 41; 29]. The website bioinitiative.org provides reviews and synopses of some 3,600 peer-reviewed scientific studies showing the harmful effects of electromagnetic radiation. The Oceania Radiofrequency Scientific Advisory Association (ORSAA) is the only *independent* scientific organization in the Australian-New Zealand region currently investigating the scientific evidence for the biological and health effects of wireless radiation. Currently, the ORSAA database contains over 3,100 peer-reviewed studies. An earlier snapshot of this database in 2018 showed that 1,283 (or 67.1%) of 1,913 studies reported statistically significant and adverse biological effects of electromagnetic radiation. [44]. Professor Devra Davis' website ehtrust.org, the Physicians For Safe Technology website www.mdsafetech.org, and the Environment and Communities Safe from Radiation website www.ecsfr.com.au also provide an abundance of such studies. The 2019 book *Hidden Dangers: How Governments, Telecom and*

Electric Power Utilities Suppress the Truth about the Known Hazards of Electro-Magnetic Field (EMF) Radiation by Jerry G. Flynn, retired Canadian Armed Forces captain, and electronic warfare specialist, provides summaries, excerpts, and references to around 1,000 studies and reports which show the harmful effects from electromagnetic radiation. In particular, it also highlights the *collusion* between governments, telecommunications companies and the military in Western countries—from the 1950s onward—to keep the harmful effects of electromagnetic radiation from being disclosed to the public. [49]. *Importantly, almost all of these studies, found in the sources listed above, show harm to our health from electromagnetic radiation at exposure levels which are at, or below, our existing and supposedly safe levels of exposure.*

A watt is a standard unit of electrical power. The heat produced by microwaves is in part due to the wattage or power they use. For example, an average microwave oven uses around 1,200 watts to cook and heat food. Microwave radiation produces heat, and obviously too much heat will damage the body. Therefore, like other countries Australia—specifically, the regulatory body known as the Australian Communications Media Authority (ACMA) using guidelines from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)—has set an upper limit to the wattage we may be exposed to from microwave radiation. The Australian standard for public exposure at frequencies between 300 megahertz/MHz and 300 gigahertz/GHz—which is the microwave radiation frequency range—has been set at 450 to 1000 microwatts per square centimetre depending on the exact frequency. [33; 44; 50]. The first point to be aware of is that the safety standard set for microwave radiation in Australia is a *heat* or *thermal* safety standard and *only* a thermal standard. However, in addition to heat damage, an *overwhelming* body of research shows that microwave radiation *also* causes many other and serious types of damage to the body which, in turn, cause a vast range of illnesses, injuries and disabilities. For example, exposure to electromagnetic radiation, *below* that which causes heat damage, leads to adverse effects such as genetic damage, oxidative stress (or build-up of free-radicals), leakage of the blood-brain barrier (which protects the brain from toxins), hormonal disruptions (e.g. to the sex hormones and melatonin), damage to mitochondria (the energy-producing centres of the cells), adverse changes to calcium signalling, and inflammation. In turn, these and other adverse effects cause illnesses such as cancer, infertility, lowered immunity, flu-like symptoms, breathing difficulties, neurological problems such as insomnia, depression and anxiety, and asthma, diabetes and autism or their exacerbation. (These and other adverse effects and illnesses are discussed in detail below.) Based on the current research, which takes into account not only heat or thermal damage to the body but also these many other forms of adverse effects on the body from microwave radiation, many countries, such as Russia, China, Hungary, Italy, France, Poland and Switzerland, have set exposure limits to microwave radiation at just 10 microwatts per square centimetre (sq/cm). Luxemburg, Bulgaria, Belgium and Ukraine have set the limit even lower at 2.4 microwatts per sq/cm, while in Austria the exposure limit is 0.001 microwatts per sq/cm while outdoors and 0.0001 microwatts per sq/cm while indoors. [49 p. 59, 86-7; 29]. This means that these countries have a safety exposure limit which is 100 to 10,000 times higher, or more strict, than Australia, which has an exposure level of up to 1000 microwatts per sq/cm. Why is the Australian safety standard set so low or lax? To repeat: because the primary regulatory body here in Australia, ARPANSA, has *failed* to take into account factors other than heat damage when assessing the negative impact of microwave radiation on the body—it has simply ignored the vast body of research which emphatically shows that microwave radiation, at levels below that which causes heat or thermal damage, causes many other adverse health effects. Shortly, we shall see that even the safety exposure level to prevent heat or thermal damage is based on very crude research and testing.

Progressively, this paper will undoubtedly show that the the safety standard and upper ceiling of 1000 microwatts per sq/cm set by ARPANSA is woefully inadequate to protect the health of the Australian public from damage from microwave radiation. Perhaps we should not be overly surprised that ARPANSA, and in turn the Australian Communications Media Authority (ACMA) which looks to ARPANSA for guidance, have *not* properly considered the impact of microwave radiation on human biology *for they lack the expertise to fully do so*. The “ACMA typically refers those with health complaints associated with RF [radiofrequency] exposure/overexposure to ARPANSA, justifying this denial of responsibility on the basis of ACMA not being a health authority. In fact, neither ARPANSA nor ACMA are health authorities because both organisations lack the necessary requisite medical and biological science expertise.”—ORSAA. [44]. Basically, our safety exposure limits to microwave radiation are being set by people *unqualified* to fully assess the impact of

microwave radiation on human biology and health. To properly assess the impact of microwave radiation exposure on health we require people who are experts on the interface between microwave radiation and human biology, and we also need other specialists such medical specialists and epidemiologists who can assess the prevalence and spread of disease and ill-health in populations.

Before we move on, what is a safe level of microwave exposure for the public? In 2007 an international team of 29 *independent* and world-leading researchers in the fields of medicine, bio-electromagnetic radiation, and health policy undertook a relatively exhaustive review of some 2,000 peer-reviewed studies on health and electromagnetic radiation. Their conclusion indicated that there should be a “scientific benchmark of 0.003 uW/cm²” for public exposure, that is, an exposure limit of just 0.003 microwatts per centimetre squared. They also suggested applying a ten-fold reduction to compensate for chronic exposure, if needed, and for children as a sensitive subpopulation. This translates into a recommended precautionary public exposure level of just 0.0003 microwatts per square centimetre. (This is about the same as the current exposure level and safety standard in Austria.) This review, the *Bioinitiative Report*—updated in 2012, 2014 and 2017—has become one of the most referred to pieces of research in the field of electromagnetic radiation and health. [8]. (Its importance shall warrant returning to it at various points in this paper.)

The heat or thermal safety standard for microwave radiation adopted by Australia, specifically that set by ARPANSA, is primarily based on the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines set in 1997/8 (and still used today). However, not only do these guidelines only consider heat or thermal damage, even here they are based on *rudimentary* testing. For example, with regard to mobile/cell phones, the standard of microwave radiation exposure which was found to be acceptable was that while conducting a six or 30 minute mobile phone call a man’s head and brain did not overheat. Which man? This research used a model head, not a human head—which would have been unethical—filled with fluid meant to simulate a human brain. It gets worse: the design of this model head was based on a single male of 220 pounds/lbs in peak condition and selected from the highest 98th percentile of U.S. military recruits in 1989. This then is the ‘research’ which forms the basis for the thermal safety standard for mobile phone use in Australia today! The short-comings of this basic testing, hardly worthy of the name ‘research’, are numerous and obvious: Here are several: 1) subsequent research has found that a *child’s* brain absorbs up to five times as much microwave radiation as that of an adult 2) the bone marrow of a child’s skull absorbs about 10 times as much microwave radiation as that of an adult 3) most of us, particularly children, have smaller heads than a 220lb male, and therefore, microwave radiation penetrates more deeply into our heads 4) the above thermal standard is for microwave exposure for a six or 30 minute phone call, but most people are making much longer calls; indeed, most of us have *chronic, cumulative* and *simultaneous* exposure to microwave radiation from mobile phones *and many other sources*. There has been little research done on the effects of this real-life chronic and cumulative exposure from mobile phones and other sources, especially for children, pregnant women, embryos and sensitive individuals. [1; 49 p. 59]. Further, as we shall see, pulsed (or erratic) electromagnetic radiation, characteristic of wireless technology, and in particular 5G, is far more harmful to the body than continuous electromagnetic radiation. However, neither ICNIRP, nor other agencies which set international exposure standards such as the IEEE, WHO and FCC (discussed shortly), take into consideration this crucial factor in assessing safety standards. [49 p. 61]. Not surprisingly, at the ICNIRP International Conference held in London in 2008, Professor Paolo Vecchia, then chairman of ICNIRP, said of their safety exposure guidelines: 1) they are *not* mandatory prescriptions for safety 2) they are *not* the last word on the issue 3) and they are *not* defensive walls for industry or others (which can be claimed as safe standards). [21]. Also not surprisingly, the authors of the *Bioinitiative Report*, mentioned earlier, concluded that the existing ICNIRP, IEEE and FCC guidelines do not protect the public. [49 p. 81]. In 2008, after the publication of the first edition of the *Bioinitiative Report*, the Parliament of the European Union—representing 28 countries and 500 million people—voted 522 to 216 to agree with the *Bioinitiative Report*, which stated that ICNIRP’s current safety standards were obsolete and must be renewed. [49 p. 72]. The European Parliament stated: “The European Parliament...notes that the limits on exposure to electromagnetic fields which have been set for the general public are *obsolete...*” [20]. (My italics.)

Who then is ICNIRP? It was created in 1992, principally by Dr Michael Repacholi and Professor Anders Ahlbom. [49 p. 38]. ICNIRP is simply a German, *private, self-appointed*, non-governmental organisation composed of *telecommunications engineers with almost no medical expertise and serious conflicts of interest* including the fact that most of its funding comes from the telecommunications industry! [49 p. 36; 41; 43; 44]. Why do so many countries listen to ICNIRP to set their respective guidelines? When asked in a recent interview (September 2019) “Why does everyone takes ICNIRP’s position on EMF [electromagnetic frequencies] as a gold standard?” the current chairman of ICNIRP, Eric Van Rogen, replied “Er, I don’t know. They choose to do so.” [43].

In the U.S. it is the Federal Communications Commission or FCC which is supposed to regulate the safe rollout of telecommunications technology. It has set safety exposure levels for microwave radiation which are similar to those of Australia. The FCC looks primarily to the Institute of Electrical and Electronic Engineers (IEEE) to set its safety standards for exposure. Australia also looks to the IEEE to some extent to set its exposure standards. Like ICNIRP, the IEEE’s recommended level of safe exposure only takes into account thermal or heat damage from electromagnetic radiation (EMR/EMF) and is likewise set at 1000 microwatts per square centimetre. Also like ICNIRP, this so-called safety exposure level was set some 30 years ago in 1996! A recent review by the FCC left their standards unchanged. Who then is the IEEE, and are they any better than ICNIRP? No. The IEEE is an association of 423,000 engineers in 160 countries. Again, these engineers have little knowledge of the relationship between electromagnetic radiation and human health. Further, the FCC also has no EMF scientists of its own. [49 pp. 26, 37-8, 41, 46, 50, 53, 59]. When the FCC set its exposure standards it did so at a level 10,000 higher, or more lax, than the levels which, according the U.S. Environmental Protection Agency, were known to be causing illnesses all over the world. [49 p. 39]. (In due course, we will see that the FCC is a captured agency—captured and controlled by the telecommunications industry.) The World Health Organisation sets safety exposure standards for microwave radiation which are basically the same as ICNIRP and the IEEE; indeed, the WHO’s safety standards were set by Dr Michael Repacholi who, at that time, was heading ICNIRP. [49 p. 38]. Throughout his 2019 book *Hidden Dangers: How Governments, Telecom and Electric Power Utilities Suppress the Truth about the Known Hazards of Electro-Magnetic Field (EMF) Radiation*, Jerry G. Flynn, a retired Canadian Armed Forces captain, and electronic warfare specialist, provides an abundance of information to show that ICNIRP, IEEE and the WHO all work and *collude* together to set so-called safety standards that are primarily designed to protect, not the public, but to protect and facilitate both the telecommunications industry and the U.S. military and their allies—a large part of the military industrial complex. For example, in 2016 all but one of the World Health Organisation’s Radiofrequency Environmental Health Criteria Group, responsible for setting radiofrequency radiation standards, was an ICNIRP member. [49 pp. 93-4].

In 2015 The International EMF Scientist Appeal was submitted to the United Nations by a group of some 248 scientists from 42 countries. They were experts in the study of biological and health effects of electromagnetic radiation. They recommended a radical revision of the safety standards for wireless technology. Why? Based upon peer-reviewed and published research they had serious concerns regarding the ubiquitous and increasing exposure to electromagnetic fields generated by our wireless devices including mobile and cordless phones and their base stations, wifi, broadcast antennas, smart meters and baby monitors. They stated that numerous and recent scientific publications have shown that microwave radiation adversely affects living organisms *at levels well below most international and national guidelines*. These effects include increased cancer, cellular stress, increased harmful free radicals, genetic damage, structural and functional changes of the reproductive system, learning and memory deficits, neurological disorders, hormonal and endocrine disorders, and negative impacts on general well-being in humans. Damage includes harmful effects to both plant and animal life. [12; 49 p. 121]. Since 2002 no less than 41 *major* appeals or expressions of concern regarding the *inadequacy* of international safety guidelines for microwave or radiofrequency radiation have been made by national and international groups of independent scientists and doctors, who are experts in the field of electromagnetic radiation, to governing bodies and regulatory agencies. [39].

Before we leave this section please note: any study which compares microwave radiation from mobile phones, wifi or any other electronic devices to the current Australian safety standard—and many other national safety

standards—to thereby conclude that the levels of radiation from these devices are safe, is *fundamentally flawed, because* the Australian safety standard is clearly set far too high—to put it bluntly, the standard is rubbish. And, the telecommunications industry knows it...

1.3. The Telecommunications Industry *Knows* that Their Wireless Products are Unsafe

Retired electronic warfare specialist, Jerry Flynn points out in his work *Hidden Dangers: How Governments, Telecom and Electric Power Utilities Suppress the Truth about the Known Hazards of Electro-Magnetic Field (EMF) Radiation*, states that because of the ridiculously poor safety exposure standards for technology emitting radiofrequency or microwave radiation, each and every one of today's wireless radiofrequency products have been exempted from having any *independent* safety testing apart from that needed to prevent thermal or heat damage. [49 p. 21]. In particular, he highlights that no manufacturers of mobile phones have *once* stated that their products are safe. [49 p. 144]. He, and others, also point out that Lloyd's of London, the world's foremost insurer of risk, and other large insurance agencies such as Swiss RE and A.M. Best *refuse* to cover or insure manufacturers for any adverse health effects from wireless devices, including wifi mobile phones and mobile phone towers; and recommend to other insurance companies to do the same. [24; 28; 41; 49 p. 65, 83, 162]. An agent from Lloyd's stated: "The Electromagnetic Fields Exclusion (Exclusion 32) is a General Insurance Exclusion and is applied across the market as the standard. The purpose of the exclusion is to exclude cover for the illnesses caused by continuous long-term non-ionising radiation exposure i.e. through mobile phone usage." [23]. The implication is crystal clear: the insurance industry *knows* that their wireless technology cause ill-health, and that if they were to insure for these products, then sooner or later they would be faced with a flood of insurance claims. Indeed, telecommunications companies such as Verizon, Vodafone, AT&T etc. are warning their investors and shareholders of the risks of harm from electromagnetic radiation, and thus potential lawsuits and loss of revenue, as expressed in their annual reports, but, are not warning us their customers/consumers. [28; 49 p. 86]. We shall now see conclusive evidence that even our current levels of exposure to microwave radiation are damaging to our health, and why the manufacturers will not say that their wireless products are safe, and why the insurance companies will not got near them.

1.4. The Research Evidence for the Adverse Health Impacts of Microwave Radiation

First, let's look at some preliminary and general points regarding the research. 87% of the studies looking at the effects of mobile/cell phones on brain activity are sponsored by the mobile phone industry—and, of course, the industry has little interest in research which produces adverse findings with regard to its products. A meta-study (or overview of the research) conducted by Bekelman et al. in 2003, entitled *Scope of Financial Conflicts of Interest in Biomedical Research: A Systematic Review*, found that the majority of telecom industry sponsored research studies show no adverse effects of mobile phones on health, while the majority of non-industry sponsored studies *do* show adverse effects. Likewise, data compiled by Dr Henri Lai, a molecular and cellular engineer at the University of Washington, found that 70% of non-industry studies found harmful effects from microwave radiation while only 32% of industry studies found harmful effects. Likewise, in a review of 85 papers on DNA/genetic damage of the type of EMR from cell/mobile phones, he found that 75% of industry studies found no genotoxic effects, while 80% of the *independent* studies showed harmful effects. [49 p. 56, 140; 22; 9; 28]. Likewise, an analysis of 900 plus studies in the ORSAA database in 2017 found 62% of industry and 69% of government regulatory agency studies found no adverse effects of microwave radiation on health, whereas 77% of studies conducted by *independent* researchers did find adverse effects. [44]. Also, the studies conducted by both governments and the telecommunications industry are typically short-term in nature, whereas the adverse health effects from exposure to microwave radiation, such as cancer, tend to manifest ten to 30 years after exposure begins. [49 p. 21]. Further still, the telcos have actively suppressed and corrupted research into the adverse health impacts of microwave radiation. Some of this has been exposed in the books *Cell Phones: Invisible Hazards in a Wireless Age* by Dr George Louis Carlo, and *Disconnect: The Truth About Cell Phone Radiation* by Professor Devra Davis. The take home lesson: when assessing the health impacts of microwave radiation look at the *independent* research; we shall see that independence here means independent of the telecommunications industry and often, unfortunately, independent of government regulatory agencies also, for the latter have often been captured by the former.

The list of injuries, diseases and disabilities caused by electromagnetic radiation is extensive. One of the most comprehensive summaries of the *huge* range of adverse effects on health produced by microwave radiation, backed by studies, is given by Steve Weller of ORSAA in his presentation entitled *Radiofrequency Bio-Effects. Do We Have A Problem?* [44]. Another comprehensive source of the health problems caused by radiofrequency or microwave radiation is the aforementioned *Bioinitiative Report*. Let us consider some *specific* areas of concern.

1.4.1. Cancer

Most epidemiological studies find no risk of brain cancer from mobile phone use... until after ten years of ‘heavy’ use. Professor Devra Davis, a world-renowned epidemiologist (someone who studies disease rates, spread and causes in populations) at the forefront of reviewing research into the dangers of electromagnetic radiation, stated: “With respect to mobile phones and brain cancer the reality is that every single well-designed study ever conducted finds an increase in risk of brain cancer with the heaviest users; and the risk is between 50% to eight-fold—that’s a fact.” [32]. In a presentation at Melbourne University in 2015 she cited the following examples. Research in Europe has found that people who use mobile phones for half an hour a day over ten years have *double* the rate of brain cancer. Similarly, children who begin using mobile phones in adolescence have, after 10 years, *four to eight* times the rate of brain cancer (malignant glioma). Another study showed that people who have used a mobile for 25 years have a four times greater risk for brain cancer. [1; 2; 32]. Please see Devra Davis’ website, ehtrust.org (specifically, ehtrust.org/scientific-documentation-cell-phone-radiation-associated-brain-tumor-rates-rising/) for a relatively comprehensive and up-to-date overview of the studies demonstrating increased rates of brain and head cancers in the general population, and also, studies which demonstrate also significant correlations between increased mobile phone use and increased rates of these types of cancer.

Glioblastoma Multiforme (GBM) is the type of brain cancer most linked to mobile phone use. Studies in England, U.S., Australia, Denmark and Sweden have found that GBM has, in recent years, significantly increased (doubled) in the population. [2; 44; 49 p. 148]. For example, a study entitled *Brain Tumours: Rise in Glioblastoma Multiforme Incidence In England 1995-2015 Suggests An Adverse Environmental or Lifestyle Factor* published in the *Journal of Environmental and Public Health* in 2018, found that the incidence of this type of brain cancer more than doubled in England between 1995-2015. A recent (2018) study by Ken Karipidis of ARPANSA, and his colleagues, entitled *Mobile Phone Use and Incidence of Brain Tumour Histological Types, Grading, or Anatomical Location: A Population-Based Ecological Study*, found that the incidence of brain tumours in Australia had *not* increased between 2003-13. The study has been severely criticised for conveniently omitting people 60 years of age and over, where this group has been found in other studies to have the *majority* of brain tumours. I would add, the Karipidis study *also* conveniently omits the younger and vulnerable 20 years and below age group. Regarding the Karipidis study, Alasdair Philips, the author of previously mentioned study, *Brain Tumours: Rise in Glioblastoma Multiforme Incidence In England 1995-2015 Suggests An Adverse Environmental or Lifestyle Factor*, stated: “Frankly, I find their limited analysis shocking and I don’t understand how it cleared peer review.” [38]. In addition to their atrocious safety standards for microwave radiation, this is a further indication that ARPANSA is not doing its job in protecting the health of Australians. I will continue to return to ARPANSA; we will see progressive evidence that this regulatory body, like its U.S. counterpart the FCC, is a captured agency.

In 2017 Hardell and Calberg published a meta-study (or overview of the research) entitled *Use of Wireless Phones and Evidence for Increased Risk of Brain Tumours* which looked at *case-controlled* research concerned with the association between mobile phone use and brain cancers. The researchers concluded: “By now carcinogenicity [i.e. causing cancer] has been shown in human epidemiological studies replicated in animal studies... RF [radio-frequency] radiation should be regarded as a human carcinogen Group 1 according to the IARC definition, based on scientific evidence.” (My interpolations.) Hardell is probably the world’s *foremost* scientist in this field. [49 p. 142].

The National Toxicology Program Study in the U.S.—a 16 year, 28 million dollar study—released its findings in 2018. It found that microwave radiation, at levels similar to those at which human’s brains are currently subject to when using mobile phones, causes brain and heart cancer and DNA damage in rats, and that rates increased with exposure. Perhaps not surprisingly to some, ICNIRP did not see this extensive, immaculately conducted and conclusive study as a reason to revise their 1997/9 safety guidelines—which ARPANSA uses—for public exposure to microwave radiation. An extensive paper by Dr Ronald Melnick, a senior scientist who led the design and conduct of the NTP Study, clearly shows that ICNIRP’s criticisms of the NTP Study are riddled with falsities and inaccuracies. [2; 41]. A meta-study conducted by the Bioinitiative organisation, composed world-class and independent scientists, found that after ten years of mobile phone use the risk of brain tumours increased by 20% when both sides of the head were used, and by 200% when then phone was used on predominantly one side. In the case of high-grade malignant glioma it was an increase of 220% and 470% respectively. [8]. In 2010 the World Health Organisation released the results of its 10 year *Interphone Study* into the relationship between mobile phone use and cancer. The study combined the results of case-controlled studies conducted by 13 teams from around the world. Despite evident pro-phone bias—for example, it did not look at the vulnerable below 30 years of age group nor the above 60 years of age group—it *still* found that regular mobile phone use—half hour per day for ten years—increases the risk of *glioma* brain cancer by 40%. [8; 44; 49 p. 130].

There are numerous short YouTube videos clearly showing that mobile/cell phones commonly emit ten microwatts or more of microwave radiation per square centimetre, for example, see *Dangers of Cellular Phones Cell Phone Radiation Time To Wake Up* (from the EMF Safety Zone) and *IPhone Cell Phone Radiation How Much Is Emitted And What Mode Is Safe?* Adverse impacts on our health occur at just one microwatt per square centimetre. (See the section below on wifi for details.) Indeed, a 2018 French study has found that nine of ten cell phones *exceed* safe radiation limits by as much as 300% more than the manufacturers claim. [49 p. 146]. The radiation from mobile phones is at 900 MHz. This is what Jerry G. Flynn, retired Canadian Armed Forces captain, and electronic warfare specialist, says about this situation: “900 MHz is known by militaries of the world to be one of the most dangerous frequencies known to man, as it (the radiation) penetrates all organ systems of the body.” [49 p. 169].

In 2011 the World Health Organization’s International Association for Research on Cancer (IARC) classified microwave radiation as a possible 2B carcinogen for humans (the same category as DDT, lead, diesel exhaust and some pesticides.). Professor Devra Davis’s team has found microwave radiation from mobile phones to be a *probable* human carcinogen (reported in the *Journal of Pathophysiology*, 2013). [12]. Dr Anthony Miller, former advisor to the World Health Organisation, has stated: “The animal evidence, together with extensive human evidence, coupled with rising incidence of brain cancers in young people in the U.S., conclusively confirms that radiofrequency radiation is a Category 1 human carcinogen.” [26].

In light of the above it is not surprisingly that Austria, China, Germany, India, UK, Israel, Finland, Belgium, Ireland, Spain, Sweden and Canada (Toronto) have issued health warnings for children: “use cell phones in emergencies only—but only on speaker phone.” [49 p. 139]. Likewise, in 2012 Russia warned pregnant women, and children under 18, *never* to use mobile phones. [49 p. 139].

Finally, a meta-study entitled *Oxidative Mechanisms of Biological Activity of Low Level Radiofrequency Radiation* (2016) reviewed 100 studies of which 93 concluded that wireless radiation *below our thermal standard* causes oxidative stress, in turn, DNA/genetic damage, in turn predisposing us to various diseases. [6; 44].

1.4.2. Mobile Phone Towers Shown to Cause Cancer, Neurological Problems and EHS

At least 15 studies have now shown that the rates of cancer, neurological disorders and the symptoms of Electrical Hypersensitivity Syndrome (EHS) are about three to four times greater than normal for people living around mobile phone towers. (See below for details of EHS.) These increased rates of disease and disorder occur within a 400-500 metre radius around the tower, and increase as one gets closer to the tower. [30; 36;

39; 42; 44; 49 p. 150ff]. For example, a 2010 study by Vini G. Khurana et al., published in *The International Journal of Occupational and Environmental Health* and entitled *Epidemiological Evidence for Health Risk from Mobile Phone Base Stations*, found that eight out of ten studies concluded that there increased cancer rates and neurological-behavioural symptoms in populations living less than 500 metres from a tower. [42]. Likewise a ten year (1994-2004) German study entitled *The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer* revealed that after five years of operation of a mobile phone tower, the relative risk of cancer tripled for residents in the proximity of the installation i.e. within 400 metres, compared to those outside of this area. [49 p. 153]. The world's largest animal study of mobile/cell tower radiation was complete by the esteemed Ramazzini Institute in 2018. It found that the exposure to 1.8 GHz at 5, 25 and 50 V/m produced highly malignant tumours in the brains and hearts of rats. All of these exposures were below FFC limits. [49 p. 160]. Likewise, a ten year study between 1996 and 2006 in Belo Horizonte, Brazil's third largest city, found that 80% of cancer victims lived less than one third of a mile from a mobile phone tower. [49 p. 156]. No such studies have yet been conducted in Australia. [44]. New Zealand does *not* allow anyone to live within 500 metres of a mobile tower. [31]. In 2006 Greece prohibited cell/mobile phone towers with 500 metres of schools. [49 p. 153]. In 2012/3 India's largest state, Rajasthan, and the nation's largest city, Mumbai, were ordered by the State High Court to remove cell/mobile phone towers from schools, playgrounds, hospitals, colleges and orphanages. The decision was upheld by the Supreme Court of India. [49 p. 157]. The International Fire Fighters Association has officially opposed mobile phone towers on their stations since 2004 after a study found neurological damage in fire fighters from antennas on their fire stations. Fire fighters in California lobbied for and successfully won exemption from phone towers being placed on or near their fire stations. This occurred as a consequence of the adverse physical and mental health impacts of microwave radiation from these towers on fire fighters and, in turn, on their capacity to do their work. More recently, in 2017, they were also successful in getting exemption from 5G towers being placed on their stations. [49 p. 159]. Taiwan has just removed 1,700 mobile phone towers from heavily populated areas because they are causing cancer, neurological problems, suicide and miscarriages. [45]. There is *no independent* testing of mobile phone tower emissions in Australia. [41]. In 2007 John Patterson, a mild-mannered telecommunications engineer, and one of Australia's leading radiation experts, borrowed an old tank and proceeded to smash down six mobile phone towers in Sydney as a dramatic statement against the devastating impact they were having on the community. He only did this after his measurements of, and warnings about, the dangerous levels of microwave radiation from mobile phone towers were not heeded by a series of agencies and authorities. [48; 28]. (Go to www.rfnsa.com.au for the location of, and emissions from, mobile phone towers in Australia.)

1.4.3. Infertility

As discussed above the *Bioinitiative Report* released in 2007 and progressively updated since that time is one of the most exhaustive and independent reviews of the adverse effects of radiofrequency and microwave radiation on health. In the conclusions sections it states that "There is a veritable flood of new studies reporting sperm damage in humans and animals, leading to substantial concerns for fertility, reproduction and health of the offspring (unrepaired de novo mutations in sperm). Exposure levels are similar to those resulting from wearing a cell phone on the belt, or in the pants pocket, or using a wireless laptop computer on the lap." [8]. They go on to say "Several international laboratories have replicated studies showing adverse effects on sperm quality, motility and pathology in men who use and particularly those who wear a cell phone, PDA or pager on their belt or in a pocket." For example, they cite Agarwal et al, 2008; Agarwal et al, 2009; Wdowiak et al, 2007; De Iuliis et al, 2009; Fejes et al, 2005; Aitken et al, 2005; Kumar, 2012. Other studies conclude that usage of cell phones, exposure to cell phone radiation, or storage of a mobile phone close to the testes of human males affect sperm counts, motility, viability and structure—for example, Aitken et al, 2004; Agarwal et al, 2007; Erogul et al., 2006. Animal studies have demonstrated oxidative and DNA/genetic damage, pathological changes in the testes of animals, decreased sperm mobility and viability, and other measures of deleterious damage to the male germ line—for example, Dasadag et al, 1999; Yan et al, 2007; Otitolaju et al, 2010; Salama et al, 2008; Behari et al, 2006; Kumar et al, 2012. [8]. (Please see the *Bioinitiative Report* for details of the studies cited.) Not surprisingly, fertility clinics are now regularly advising men to get their mobile phones out of their pockets. [1; 30; 8].

The eggs in the ovaries are ten times more susceptible to DNA damage from microwave radiation than other cells. And the eggs in the ovaries of the developing foetus have virtually no protection against this radiation (unlike an adult). Human females only ever have one set of eggs in the ovaries; thus, if they are damaged they are not replaced. [28; 45]. Peer-reviewed studies have shown that electromagnetic fields, again, below our so-called safety guidelines, produce lower number of eggs and fertility in women. They also produce lower levels of the sex hormones estrogen, progesterone and testosterone and, in turn, lower libido. [41]. Research on pregnant mice and rats shows that mobile phone radiation created offspring with significant behavioural problems including poorer memory, hyperactivity, increased anxiety, loss of appropriate fear, reduced and damaged cells in the brain's hippocampus and hypothalamus, and liver damage. *Nature Publications*, one of the world's leading scientific journals has stated that existing levels of radiation will cause higher rates of miscarriage. World Health Organisation documents by Professor John R. Goldsmith, advisor to the WHO, state that at *current* levels of exposure to radiofrequency radiation we can expect 47.7% of pregnant women to have miscarriages or genetically damaged children. This has been confirmed by the European Academy of Environmental Medicine. [45; 49 p. 85]. Likewise, a joint statement signed by more than 200 doctors, scientists and public health professionals from around the world warned pregnant women to avoid using or being near wireless products for fear that EMR will adversely affect the child's development, brain, behaviour, memory etc. [49 p. 94]. Again, in 2012 Russia warned pregnant women, and children under 18, *never* to use mobile phones. [49 p. 139].

1.4.4. Adverse Impact on Children

There are no studies showing a safe level of microwave radiation for children. As discussed earlier in section 1.2, even our *thermal* safety standard for mobile phone use in Australia used a model head based on a 220 lb adult *male* (and not a small child). The American Academy of Paediatrics, in a letter to Congressman Dennis Kucinich dated 12/12/2012 stated that “Children are disproportionately affected by environmental exposures, including cell phone radiation. The differences in bone density and the amount of fluid in a child's brain compared to an adult's brain could allow children to absorb greater quantities of RF [radiofrequency] energy deeper into their brains than adults. It is essential that *any new standards* for cell phones or other wireless devices be based on protecting the youngest and most vulnerable populations to ensure they are safeguarded through their lifetimes.” (My italics). [8]. “Electromagnetic fields and radiation is a matter of dose—and it accumulates over the years as present studies show. Therefore children should categorically not use mobile phones.”—The Austrian Medical Association. [49 p. 133].

In 2010 Andreas Christ and his team reported that children's hippocampus, hypothalamus and cerebellum (parts of the brain) absorb 1.3 to 3.5 times higher amounts electromagnetic radiation than adults. The bone marrow of a child's skull absorbs ten times more microwave radiation than that of adults. The eyes of children absorb much higher levels of microwave radiation than do adults. [1]. More generally, a child's head absorbs five times as much radiation *vis-à-vis* an adult. [49 p. 127].

In South Korea, where mobile phones were in use earlier than other countries, they have now diagnosed what is called ‘digital dementia’. This is where children who are heavy technology users have an improperly developed right hemisphere of the brain, and consequent decreased empathy, decreased feeling and expression of emotion, less eye contact, memory loss, and increased attention disorders.

About 1 in 100 children have autism spectrum disorder in Australia, and in the U.S. it is about 1 in 40—up from 1 in 10,000 in 1990. Also, since this time dementia has risen *eightfold* in the U.S. and twofold in Australia. Dr Martha Herbert, Paediatric Neurologist, Neuroscientist, and on the Board of the Faculty of Harvard/Massachusetts General Hospital, was asked to review the literature pertinent to Autism Spectrum Disorder and electromagnetic radiation (EMR). Her 60 page document with 550 citations—found in the *Bioinitiative Report*—found that it appears that EMR contributes to the causation of Autism and many other disorders including cancer and diabetes; and that children are more vulnerable to EMR than adults. [42]. Dr Dietrich Klinghardt, a physician and naturopath with 45 years of experience, has conclusively shown in his

clinical work that autism in children can be *reversed* by reducing microwave radiation along with detoxification of heavy metals. (The microwave radiation and the metals work synergistically to produce more damage to the body than either alone.) In as yet unpublished study, he has also shown that children with autism are more likely to be born to mothers with large wifi exposure during pregnancy. [41; 28].

1.4.5. Wifi Systems with Particular Reference to Children

Wifi routers emit 0.1 to 5 microwatts per square centimetre, or more, depending on how hard they are working. They emit at 2.45 GHz—the same frequency as your microwave oven. Scientific studies show that at just *one* microwatt per square centimetre (sq/cm) of exposure to microwave radiation there can be sperm DNA/gene fragmentation and decreased sperm viability, pathological leakage of the blood-brain barrier (which protects the brain from foreign particles and thus damage), headaches, dizziness, irritability, fatigue, weakness, insomnia, chest pain, difficulty breathing and indigestion. [49 p. 107]. In particular, in the *Bio-initiative Report* (discussed earlier) it was concluded that at two microwatts per sq/cm there was damage to the DNA of brain cells, and at four microwatts change affecting memory and learning. [7; 8]. In the documentary *Take Back Your Power* it is stated that altered calcium metabolism occurs in the heart at four microwatts per sq/cm, and that DNA/genetic damage occurs at six microwatts per sq/cm. And yet, as mentioned earlier, the Australian limit for exposure to microwave radiation—set by ARPANSA—has been set at 450-1000 microwatts per square centimetre! Why so high? Because, as previously discussed in this paper, the only factor considered for safety at present is a heat or thermal standard—other adverse biological effects have not been taken into consideration; and the testing on which even this crude standard was based, back in 1997/8, was rudimentary. Again, please note: any study which compares microwave radiation from wifi or other electronic devices to the current Australian safety standard to thereby conclude that the levels of radiation from these devices are safe, is *fundamentally flawed*, because the Australian safety standard is clearly set far too high. ARPANSA itself has stated: “research relating to children is limited and the possibility of harm cannot be ruled out.” Well actually, there is now quite a bit of research. No less than 26 studies have shown that wifi in school rooms can cause cancer. [45]. And yet, in Australia there is no testing/measuring for radiation levels *when wifi is installed* in schools, with one poorly executed exception—Karipidis *et al.*, 2017—no *studies* of wifi radiation levels in schools, and also, no testing of any long term adverse health effects of wifi on children. Unlike home-based wifis that only operate a handful of computers, wifi systems in schools are usually of a higher strength because they are designed to operate many computers simultaneously. In the short video *Wi-Fi In Schools—The Facts*, produced by the organisation Wifi In schools Australia, a large number of countries, districts, organisations, educational institutions, etc. are discussed or listed which have either banned wifi or recommended against its use, particularly in schools. For example, the German government has recommended against wifi in schools; in 2015 France banned wifi in preschools and legislated that wifi must be shutoff when not in use in primary schools; in 2018 France also banned mobile phones in kindergarten and schools until the age of 15 years; both the German government and the Austrian Medical Association have recommended to ban wifi in schools; the Israeli Health Minister supports a ban of wifi in schools, and the Israeli Ministry of Education has issued guidelines limiting wifi and mobile phone use in schools; the Russian National Committee on Non-Ionizing Radiation Protection has repeatedly recommended that wifi not be used in schools; the American Academy of Environmental Medicine, representing 60,000 paediatricians, issued a public warning in 2012 that wifi should not be in schools; and in 2017 Cyprus banned wifi from kindergarten and elementary schools; etc. [4; 30; 42; 49 pp. 87-8, 146, 162ff]. A two-page list of world-class scientists who oppose wireless technology in schools can be found at wifiinshools.org.uk/resources/safeschools2012.pdf. Also see www.wifi-in-schools-australia.org, and www.parentsfor safetechnology.org for more information.

1.4.6. Electromagnetic Hypersensitivity Syndrome (EHS)

EHS is now recognised as a syndrome which occurs due to chronic exposure to electromagnetic radiation. For example, in 2005 the World Health Organisation recognised EHS as a growing worldwide concern. [49 p. 210]. Dr Gro Harlem Brundtland, who was the Director General of the World Health Organisation and three time prime minister of Norway, is one high profile person who has publicly stated that she suffers from EHS. [49 p. 22]. In 2007 researchers have estimated that about three percent of the world’s population suffers from

severe EHS symptoms—this means some 210 million plus people worldwide—and 35% have moderate symptoms. Likewise, in 2005 the UK government recognised EHS as an illness and said at least 3% of the population were severely affected. Australia recognised EHS in 2013. Further, EHS is a *growing* problem along with increased and chronic exposure to electromagnetic radiation. Various professionals in the field of EMR impacts on health believe that based on current trends soon some 50% of the world’s population will be more or less affected by EHS. [49 pp. 210-12]. EHS can be acute or chronic. Dr Karl Hecht has published a detailed history of EHS compiled from a review of more than 1,500 Russian scientific papers and the clinical case histories of more than 1,000 of his own patients. Objective and subjective symptoms may include: sleep disorders, abnormal blood pressure and heart rate/beat (arrhythmia, bradycardia and tachycardia), digestive disorders, hair loss, tinnitus, skin rash, dizziness, nausea, headache memory loss, inability to concentrate, flu-like symptoms, fatigue, lowered libido, cardiac pain, anxiety and depression. EHS also involves a stress response where blood sugar is *rapidly* elevated—something which has severe implications for people with diabetes. Two ground-breaking studies in 2015 isolated the unique constellation of physiological markers identifying EHS. [12; 41; 42].

1.4.7. Flora and Fauna

Finally, the rest of biological environment is also adversely affected by radiofrequency and microwave radiation, something we should expect due to the great similarity of physiology. A meta-study conducted by the Ministry of Environment and Forestry in India in 2010, entitled *Report on Possible Impacts of Communication Towers on Wildlife Including Birds and Bees*, concluded that out of 919 research studies carried out on birds, plants, bees, animals and humans, 593 of them showed adverse impacts from microwave radiation. A good deal of the numerous studies which demonstrate that electromagnetic radiation is harmful to animals, birds, insects and plants is summarised at the Physicians For Safe Technology website (www.mdsafetech.com) and also Professor Devra Davis’ website ehtrust.org. In particular, we should note that bee populations have been declining rapidly around the world—they are in free fall in many areas. This has been called ‘bee colony collapse disorder’. The research is clear that bee populations and behaviour are adversely effected by electromagnetic radiation, in particular, the capacity of bees and birds to navigate is disturbed. The short video *5G Licensed to Kill* shows the negative effects of electromagnetic radiation on insects. Sooner or later, birds, bees, insects and plants grow sick and die within or vacate areas of high electromagnetic radiation. [2; 36; 11; 30; 8, 28; 45].

1.5. Mechanisms By Which Microwave Radiation Causes Harm.

How does microwave radiation actually damage biological organisms to cause disease and disorder? Many studies have isolated some of the fundamental *mechanisms* including: DNA (genetic) single and double-strand breaks (which lead to cancer); build-up of free radicals (or oxidative stress) leading to disease and DNA (genetic) damage; increased blood-brain barrier permeability/leakage (where this barrier shields the brain from toxins) leading to neuronal (nerve cell) damage; damage to other blood-organ barriers such as between the gut and the blood; adverse hormonal effects including reduced melatonin (leading to insomnia and increased cancer risk) and lowered sex hormones; disruption of brain glucose metabolism; generation of stress proteins (leading to myriad diseases); disruption to the mitochondria (of cells) which continuously produce some 90% of our energy; disruption to adenosine triphosphate (also essential for energy production); disruption to nitric oxide (needed for signalling in cells); adverse changes in calcium flux and signalling (see next paragraph); changes to DNA function and expression (without DNA breaks or mutation); and chronic inflammatory processes. Many of these adverse effects work synergistically to enhance one another. There is increasing evidence that some of these effects will be *irreversible* and then *inherited*. [22; 36; 8; 39; 41; 44; 49 p. 71].

Dr. Martin Pall is Professor Emeritus of Biochemistry and Basic Medical Sciences at Washington State University. He is an expert in how wireless radiation impacts the electrical systems in our bodies. He has shown that electromagnetic fields (EMFs) act by activating channels in the membrane that surrounds each of our cells, called voltage-gated calcium channels (VGCCs). The electromagnetic fields (EMFs) put forces on the voltage sensors that controls the VGCCs around 7.2 million times greater than the forces on other charged

groups in our cells. This greatly disturbs calcium flow into and out of cells. Dr Pall states that it is this disruption to the calcium channels or VGCCs—forcing too much calcium into cells and then later out of cells—which is why *even weak* EMFs have such *large* biological effects on the cells of our bodies in turn leading to the various adverse effects of microwave radiation, such as oxidative stress and DNA damage (now emphatically shown in scientific studies). Further, EMFs work this way on human, animal and plant cells so that this is a *universal* or near universal mechanism of action. He has published seven studies on this topic which can be found on over 360,000 websites. Dr Pall states: “Thousands of published studies show biological and health effects from electromagnetic fields. We know the mechanism that can explain these effects. The mechanism is a function of the electromagnetics of each cell—and not solely about heating effects from the radiation.” [4; 39; 41].

One of the *most important* points to remember when considering the mechanisms by which electromagnetic radiation disrupts health is the fact that at the physical level we are essentially electromagnetic beings. As science, specifically quantum physics, has long shown, all matter, including the human body, is composed of charged particles which arise out of electromagnetic radiation/fields. Our bodies are composed of charged particles, and the interactions between these particles, based on their neutral, positive or negative charges, determine the chemical reactions in our bodies. In turn, the sum of these chemical reactions determines our physical health and, in turn, our psychological health. Here are some specific examples of the electromagnetic nature of our bodies: our bodies (and the Earth) radiate and are dependent upon a natural electromagnetic pulse of 7.83 hertz per second; our genetic material or DNA (in each cell) is literally an antenna which absorbs and transmits electromagnetic energy at the same frequency of 7.83 hertz; our nervous system communicates by electrical impulses; our heart functions at 2 hertz, and has an electromagnetic field that can be detected by instruments at a distance of a few metres from the body; and our brain functions on frequencies of 0 to 100 hertz. [49 p. 7]. The body is a delicately balanced bio-electromagnetic system which is acutely sensitive to and influenced by surrounding electromagnetic radiation (or fields).

1.6. Some Key Ways to Protect Yourself from Microwave Radiation

- 1) Decrease microwave radiation exposure as much as possible.
- 2) Distance is your friend. Distance between you and the source of radiation is your friend.
- 3) Don't carry or use a mobile or cordless phone *against* your body. Mobile phone safety standards are set with the phone *away* from, not on, the body. The worst time to have a mobile by your head is when you answer it, for at this time it goes to maximum power. Ipads, tablets and laptops are tested for safety at a distance of 20 cm from the body, and are *not* meant to be *on* the body when used.
- 4) Put the mobile on airplane mode when not using (so it is not sending and receiving signals.)
- 5) Don't use the mobile in the car, train or elevator—your phone must work harder to get the signal and produces more microwave radiation, which also bounces around in the enclosed, metal area.
- 6) Don't sleep with the mobile phone or other wireless gadgets switched on in your vicinity, in particular the wifi must be off.
- 7) Get rid of the wifi and instead put devices on cords. Alternatively, devices can be linked to a wifi using ether net cables but where the wireless (radiation) component of the wifi is switched off.
- 8) There are now organisations that can come to your home, school, business etc. to measure microwave radiation levels and, if needed, recommend safety measures which you can take.
- 9) Don't use a *normal* headphone with a mobile phone, for the microwave radiation is focused by and runs up the cord into the ear and brain. It is estimated that microwave radiation to the brain in this situation is increased threefold. [30].
- 10) Clothing which protects against EMR can be purchased.
- 11) Educate yourself and others about microwave radiation. Good places to start are ehtrust.org, and mdsafetech.org.

Section 2: The Proposed 5G Network and Its Consequences

The 5G Network is being rolled out in the U.S., Australian and many other countries. The telecommunications companies began the rollout in Australia beginning in 2018 with the Commonwealth Games. The Department of Communications and the Arts website shows that the Australian government is supporting and facilitating this roll out. ***5G is not simply an upgraded version of 4G but a fundamentally new kind of network, and the danger it presents to human health, and to the health of animals and plants is also much greater.***

2.1. An Overview of the 5G Network

Let us begin with a basic and brief overview of the 5G network or what is sometimes called the Smart Grid. (We will see that it would be more aptly named the dumb grid.) The 5G network will in part consist of a dense network of mobile phone towers and smaller transmitter-receivers throughout the whole area in which the network is operating. These smaller transmitter-receivers will be installed every 100-300 metres along each street. The high number of towers and transmitters-receivers is due to the fact that the high frequencies used by the 5G network travel relatively poorly. Next, these towers and transmitter-receivers will be wirelessly communicating with an ever-growing host of other wireless and smart devices including smart phones, computers, wifi, and not least, smart meters. A smart meter is a new type of electricity meter attached to a home (business, etc.). A smart meter is able to wirelessly measure the input, output and workings of pieces of wireless technology or equipment in the home and then communicate this, wirelessly, to a phone tower or transmitter-receiver which is part of the 5G network or Smart Grid. The information is then relayed to the electricity or utility company. Increasingly, technology and equipment in the home will have sensors and microprocessors so that it can wirelessly communicate with a smart meter which, in turn, will communicate with the 5G network or Smart Grid. Further, new sensors are being rolling out to be installed in almost everything from clothing, appliances, building materials, automobiles, cosmetics, toys, computers, furniture, etc. Over time, it is expected that all pieces of technology and equipment, plus a myriad of other things, will be wirelessly linked to and communicating with the 5G network or Smart Grid, hence it is also called the ‘Internet of All Things.’

The 5G network is being sold to the public on various grounds including: 1) the increasing use of technology requires that we open up new parts of the microwave spectrum (which is the case with 5G) 2) it will give our technology greater and faster capacity 3) it will serve to make life much easier in many ways—as our pieces of technology will operate in a more smart or ‘intelligent’ way via the Smart Grid. For example, your devices will turn themselves on at appropriate times without you having to worry about them. 4) it will be great boon the economy. Of course, the telecommunications worldwide will eventually rake in *trillions* of dollars from 5G. But, as per usual, things are not what they are advertised to be...

2.2. The Danger to Health from the 5G Network

For several reasons, the new 5G network and related technology will constitute a massive increase in our exposure to microwave radiation—where even our current exposure has already been proven to be harmful—and also, to particularly destructive forms of microwave radiation. First, we will be subjected to microwave radiation of higher frequencies and (related) shorter wavelengths. As previously discussed, our current 2G to 4G technology uses part of the electromagnetic spectrum called microwave radiation (which is a subset of radiofrequency radiation). Most of our current technology—such as mobiles, wifi routers, ipads, tablets, wireless computers and speakers, cordless phones, smart meters and phone towers—roughly uses microwave radiation in the one to three gigahertz/GHz range, and uses microwaves which are about 77 cm to 92 cm long. Hertz is an international standard of wave frequency of one cycle (or wave) per second. However, the 5G network in Australia will use that part of the microwave spectrum between 3.4-7 GHz and 24.5-27.5 GHz. But, this will be only the beginning, and progressively parts of the microwave spectrum up to 90 GHz will be used. As we move up into the gigahertz range the wavelengths and related frequencies of the microwave radiation will be much smaller, moving from our current centimetre range into the *millimetre* range. This means that our bodies will be subjected to a much higher bombardment of microwaves than before,

to be precise 3.4-7 billion and 24.5-27.5 billion waves (or cycles or hertz) per second (and later, up to 90 billion waves per second). The natural range of the Earth and the human body is only 7.83 hertz/cycles per second. Anyone with a partly open mind and heart should immediately see that this radical departure from nature *will* cause ill-health effects. It may be countered that the increase in frequencies do not matter, for human beings and biological life on this planet is already naturally subject to much higher electromagnetic frequencies, for example, those of natural light. However, by way of counter-objection three points can be made. First, our bodies, and biological life in general, are naturally adapted to the frequencies which we find in nature. Needless to say, our wireless technology and the 5G network will be using a range of frequencies to which we have *not* been *naturally* subjected to by nature. Second, and related, science (quantum physics) has now clearly shown that each part of the human body has its own frequency—for example, as we have seen, the heart works at 2 hertz and the brain between 0-100 hertz. Therefore, it is very safe to assume that introducing new frequencies into the human body will have unknown and adverse health effects. Third, the electromagnetic radiation to which are subjected by nature is *continuous* or regular, but, this is not the case with microwave radiation characteristic of our wireless technology, and will be even less so with 5G. As discussed shortly, our technology and the 5G network uses *pulsed or erratic* microwave radiation which is particularly harmful to the body.

Next, the higher frequencies used by the 5G network travel poorly, therefore, in addition to the large phone towers of the network which transmit and receive these frequencies, there will be an intensive network of smaller ‘towers’ or transmitter-receivers placed every 100-300 meters or so on lamp posts, buildings, etc., throughout the entire area in which the network is operating. Professor Trevor Marshall, an Australian biomedical scientist specialising in electromagnetic radiation, estimates that the new 5G towers and transmitter-receivers will *increase* our exposure to microwave radiation by at least 100 times. [41]. ‘Incidentally’, once the general population understands the hazards of 5G, the value of any home near a 5G mini-tower or transmitter-receiver will plummet. ‘Incidentally’, trees (and moisture) absorb and block millimetre waves and so millions have been cut down or are proposed to be cut down in European countries installing 5G—70 million in the UK alone. [41; 45]. The Sydney Council is opposing the rollout of 5G on this ground and also aesthetic grounds saying “We know, for example that 5G millimetre wave radio spectrum is adversely affected by trees and other physical assets and this adds a critical reason to collaboratively decide on cell heights and locations. We will not be willing to sacrifice trees in favour of network performance. Similarly, we need to consider the aesthetic and physical impacts of a potentially large volume of physical infrastructure which is located based on network performance only.” (See www.emfacts.com)

Next we must consider the *beam-forming* capacity of 5G. Our *current* mobile phone towers *radiate* microwaves in all directions simultaneously, and communicate with our phones in this manner. The 5G network will *also* use radiating microwaves from towers and transmitter-receivers (lining streets), but, *in addition*, our smart phones and other smart devices will communicate with the 5G towers and transmitters using *beams*. [41]. The 5G smart phones (and other devices) will have a series of what are called phased array antennas which synchronise together to send signals to the 5G towers and transmitters-receivers via *pulsed beams* of energy. Likewise, the 5G towers and transmitters will communicate with 5G phones and other smart devices in the same manner—by firing beams at the device (and at you if you get between a tower and a device; think about that in a crowded situation). Thus, depending on the exact situation we will literally have thousands or millions of microwave beams shooting or pulsing about the city, neighbourhood, within homes, *and through us*, 24 hours a day, 365 days a year.

These beams of energy will be particularly destructive to our health, all biological health, for at least two reasons. First, the phased array antennae systems used in the 5G network and related technology will serve not only to focus microwave radiation into a beam, they will also serve to *increase* the power or wattage of the beam to, among other things, increase the distance the signal can travel. Accordingly, the Federal Communications Commission (FCC), the main telecommunications regulatory body in the U.S., has allowed a limit of 20 *watts* (not microwatts) for this purpose. Indeed the FCC has allowed the limit to be 300 watts for other equipment such as wifis! [30; 49 p. 97]. What will the limit be here in Australia? Remember, the *current* maximum exposure limit here in Australia is 1000 *microwatts*—equivalent to 10 *watts*—per square

centimetre. If ARPANSA lifts Australian exposure limits to 20 to 300 watts per square centimetre does this mean they suddenly found that their previous limit of 10 watts (or 1000 microwatts) was too safe? Of course, whatever ARPANSA comes up with, the higher power of the microwave radiation will mean more adverse health effects.

Apart from their increased power, the beams used by the 5G network are particularly destructive to health for another reason. They are part of pulsed or erratic microwave radiation. Pulsed or erratic microwave radiation is typical of all wireless communication but *particularly* 5G. It is something which is known to have especially adverse effects for our health. [1; 41]. “Pulsed EMFs [electromagnetic frequencies] are, in most cases, much more biologically active than are non-pulsed (often called continuous wave) EMFs.”—Professor Martin Pall. In particular, pulsed microwave radiation causes a defensive reaction in the membranes (or outer walls) of cells which, in turn, causes shutdown of transport channels in the cell membranes, in turn, preventing needed exchanges between cells and their environment, and communication with other cells. [23]. “My prediction is that everything we know that microwaves do, 5G will do vastly stronger, because of the incredible pulsation.” “The whole role of pulsation is totally ignored in the safety guidelines and totally ignored by the regulatory agencies.”—Professor Martin Pall. [41]. As previously stated, ARPANSA’s ‘safety’ standards consider neither the adverse effects of *pulsed* microwave radiation nor *chronic* exposure to microwave radiation—both of which will increase immensely with 5G. .

In short, the 5G network means that you, your family and friends, your pets, all animals and wildlife, all plants, your neighbourhood and your home will be *blanketed* by the high frequency microwave field of the 5G network—radiating and beaming between phone towers, transmitter-receivers, smart meters, smart phones and other smart technology, and any item with a sensor or microprocessor communicating with a smart meter—24 hours a day, 365 days a year. This will include exposure to pulsed, high frequency and focused beams of microwaves hitting your body at rates of between 3.4 to 90 billion waves or hertz a second, where these beams will commonly be between 20 to 300 watts of power (or 2 to 30 times above the current ‘safe’ limit); and all of this will be in *addition* to our existing 3G-4G exposure. What will be the consequences for our health if we are bathed in high frequency microwave radiation all day every day, inside and outside of the home? As we will see shortly, the people rolling out 5G can’t or won’t say.

In 2019 the website www.everythingrf.com reported that *initially* the 5G network in Australia will use 3.4-7 GHz and 24.5-27.5 GHz. The site further reports that South Korea is looking at 26.5 to 29.5 GHz; China 24.25 to 27.5 GHz and 37 to 43.5 GHz, and also lower megahertz bands; the European Union 24.25 to 27.5 GHz, and also 3.4-3.8 GHz; and USA a range of bands including 27.5 to 28.35 GHz and 64-71 GHz. (By the way, the full-body scanners used at airports use microwave radiation between 24 to 92 GHz depending on the exact make of the scanner.) It is important to note that these are the *initial* microwave bandwidths for 5G network only: as more and more pieces of technology are connected to the 5G network more and more areas of bandwidth will inevitably be opened up. Donald Trump is already talking about 6G. Indeed, the FCC in the U.S. voted to open up the terahertz (submillimeter) wave spectrum (95 GHz plus) that could one day be used for 6G devices. [49 p. 110].

2.3. Smart Meters

Smart meters deserve a special mention. A smart meter continuously sends out an erratic, pulsed signal as it seeks wireless information from, and sends it to, the appliances in your house, to other smart meters in the neighbourhood, to the 5G network (and ultimately to the electricity/utility company). The number of pulses varies from meter to meter and over time. Under court order the U.S. utility company Pacific Gas and Electric admitted that their smart meters generate between 14,000 to 190,000 pulses a day, and do so all day every day. (See <http://emfsafetynetwork.org/pges-big-confession/>) In 2015 the Victorian Government commissioned an *independent* study which reviewed three different types of smart meters in 55 properties. It found that smart meters pulsed between 129 to 176,201 times per hour! [37]. The frequency range emitted by a smart meter is 902-28 MHz, 2.4 GHz—by what is called a ZigBee transmitter—and, in the case of collector

smart meters (see below), 850-1900 MHz [49 pp. 172-3]. It should be appreciated that the smart meter sends out each pulse in all directions to irradiate the *whole* home. There has been little to no research done on the health impact of smart meters *per se*. [37]. However, the electromagnetic radiation emitted by smart meters falls within the microwave radiation range, and, as this paper has discussed, there are thousands of studies which show the adverse effects of microwave radiation on our health. In particular, we should remember that *pulsed* microwave radiation is particularly bad for our health. Readings show that smart meters give off microwave radiation from 0.1 microwatts to 8 microwatts per square centimetre (up to 53 microwatts) at a distance of one foot from the meter, and decreasing as one moves away. Readings show that two such meters together can give off 8-40 microwatts, and a bank of 5 meters 4-70 microwatts per square centimetre. Scientific studies show that DNA/genetic damage occurs at exposures of six microwatts per square centimetre or less, and there is a host of adverse effects below this level. [29; 40]. (See the prior section on children and wifi.) There is a great amount of anecdotal evidence from people reporting adverse health effects once smart meters have been installed. The Cell Phone Task Force organisation, at the website of the same name, has collected together many such reports. [30]. Dr Daniel Hirsch, a physicist at the University of California, has concluded that at a minimum, a smart meter will expose the occupants of a home to 45 times that of a mobile phone if standing ten feet away, and 450 times if standing three feet away. [49 p. 176]. Professor Igor Belyaev, one of the world's leading EMF/EMR experts, stated, as keynote speaker at the 5th Paris Appeal Congress in November 2015, that "EMF exposures from Smart meters and other wireless devices cause cancer and drug companies will reap the profits." [49 p. 183]. As part of the proposed Smart Grid/5G network some houses will have what are called 'collection smart meters' which will receive the microwave signals from many (500-5,000) homes and then relay it to the Smart Grid. Collection meters will have higher and more frequent emissions of microwave radiation. How much radiation (or microwatts) will be associated with these meters? No one knows. [24; 30; 49 p. 173]. The plan is to install all homes with smart meters. In the *Sydney Morning Herald's* 2012 article *Smart Meter Data Shared Far and Wide*, it is stated that "The state government aims to install smart meters - which log electricity use every half-hour - in all Victorian homes by the end of next year." However, in 2013 Italy completely banned smart meters. Likewise in California alone, where the smart meter roll out began some four years ago, more than 50 local governments have put a *moratorium* on smart meters, and some have made it a *criminal offence* to install them. Many other U.S. states have banned them, have legislation pending against them, or offered customers opt out opportunity. Likewise in Canada, most states are calling for a moratorium to assess safety. [24; 49 p. 180-85]. In 2019 the Australian Energy Market Commission made a final rule to allow metering coordinators to *deactivate* the electromagnetic communications on already-installed smart meters in response to customer objections. [17]. Smart meters, due to their design, are also are a well-established fire hazard. [49 pp. 182-5].

2.4. THERE HAS BEEN NO SAFETY TESTING OF THE 5G NETWORK?

But, health and safety standards for the 5G network have been tested and set right? No. No *official* safety testing has been done with the 5G network, and thus no safety standards are in place. Further, Tom Wheeler, the former chairman of the Federal Communications Commission, the main regulatory body in the U.S. for telecommunications, has explicitly stated that they will *not* wait for safety testing! (See the short video listed in the references for these and other shocking comments by this arrogant and corrupt bureaucrat.) [10]. Incidentally, Wheeler worked as a high-ranking CEO and lobbyist in the telecommunications industry before being appointed to the FCC. For example, from 1992-2004 he was president and CEO of the Cellular Telecommunications and Internet Association where his job was to lobby all governments in the U.S. on behalf of the wireless and telecom companies. [49 p. 20]. But, no conflict of interest right? The current FCC chairman, Ajit Pai, is an ex-Verizon attorney! [49 p. 19]. The Harvard Ethics Department has reported the FCC to be a captured industry, that is, controlled by the telecommunications industry. [41]. Not surprisingly, in January 2019 the U.S. House Commerce Committee accused the FCC of colluding with the companies it was supposed to oversee in order to protect the rollout of 5G. [49 p. 49]. The telecommunications industry confessed before a recent U.S. Senate inquiry—the U.S. Senate Commerce, Science, and Transportation Committee hearing on the future of 5G technology—that there are *no* studies currently being undertaken by the industry to ascertain the safety of 5G. [28; 49 pp. 19-20, 108]. The wireless industry does not have a single study indicating 5G is safe. [27]. Ask yourself 'Why is it that no safety testing is being done?' Official and

independent testing of the safety of the 5G network, where the results were made public, would be the *end* of its rollout. ‘Incidentally’, the new Communications Minister in Australia—responsible for regulating 5G—is Paul Fletcher, *a former Optus director* for eight years—not surprisingly many experts have pointed to a fundamental conflict of interest.

In 2019 the European Union 5G Conference participants, when asked whether there would be any serious health effects from 5G, stated that it is “impossible to say” since “the 5G network was not up and running.” This effectively means that the position of the peak governing body of Europe, the European Union (EU), is that 5G may have serious effects, that 5G is actually an *experiment* on the human population, and we will see what the outcomes will be. [20]. Similarly, a recent report by the European Union Parliament stated, “The problem is that currently it is not possible to accurately simulate or measure 5G emissions in the real world...concern is emerging over the possible impact on health and safety arising from potentially much higher frequency exposure to radiofrequency electromagnetic radiation arising from 5G.” Dr Sharon Goldberg, physician and medical educator (she can be seen on YouTube) said of 5G: “This is experimenting on humans.” [41]. Even ICNIRP regards 5G as an experiment. [43]. Would you like to offer yourself and your children, perhaps your baby, as experimental subjects to ascertain if 5G is safe? No? But this is *exactly* what will be occurring when 5G is rolled out, when it is placed up and down every street in our neighbourhood—*think* about that.

Not surprisingly counties, cities, states and countries are banning or putting a moratorium on the rollout of the 5G network until its health impact can be properly assessed. The Belgian Environment Minister, Celine Fremault, announced that Brussels is halting 5G rollout, saying “The people of Brussels are not guinea pigs whose health I can sell at a profit.” [49 p. 110-11]. Likewise, moratoriums are occurring in four cantons in Switzerland including Geneva; Florence, Italy (and 13 other council regions in Italy); Portland, Oregon (in the U.S.); cities and counties throughout the U.S. states of Ohio, Louisiana and California. The Russian Ministry of Defence is refusing to transfer frequencies for 5G thereby effectively delaying its rollout. [25; 27; 47; 49 p. 101, 110-11]. Please see the article *5G Cell Phone Radiation: How the Telecom Companies Are Losing the Battle to Impose 5G Against the Will of the People* by Claire Edwards for a comprehensive summary of the international opposition to 5G. [43; 46].

Some of the research of Dr Martin Pall, Professor Emeritus of Biochemistry and Basic Medical Sciences at Washington State University, was discussed earlier (section 1.5). He stated: “Putting in tens of millions of 5G antennae without a single biological test of safety has to be about the stupidest idea anyone has had in the history of the world.” [28]. But does he have any evidence? His 90 page paper entitled *5G: Great Risk for EU, U.S. and International Health! Compelling Evidence for Eight Distinct Types of Great Harm Caused by Electromagnetic Field (EMF) Exposures and the Mechanism that Causes Them*, presents no less than 158 studies to back up his claim that radiofrequency radiation causes eight major categories of biological harm. The general applicability of these studies to the radiation from the 5G network is obvious. [39].

In another document which has been entitled, *Prof Pall Response to ARPANSA Letter 4th March 2019*, Dr Pall makes a detailed reply to a letter from ARPANSA. The letter from ARPANSA is dated 18/12/18 (Ref: MC18-025581) and addressed to various parties including the Oceania Radiofrequency Scientific Advisory Association (ORSAA)—an independent research body on radiofrequency radiation. The document and letter can both be found at www.stopsmartmeters.com.au and also the ORSAA website. The letter from ARPANSA seeks to assure us, the Australian public, that its safety standards, including for 5G, are adequate. Among other things, Dr Pall discusses ARPANSA’s following claim: “The ARPANSA RF [radiofrequency] Standard is based on scientific research that shows that the levels at which harmful effects occur and it sets limits well below these harmful levels, with various elements of precaution, based on international guidelines. The ARPANSA RF Standard is designed to protect people of all ages and health status against all known adverse effects from exposure to RF EME [electromagnetic emissions].” Dr Pall says the following about this claim of ARPANSA: “ARPANSA provides not one iota of evidence that its exposure standard is based on scientific research or that it protects us from any, let alone all harmful effects, nor that it protects people of all ages and health status against all known adverse effects of RF (the word they [ARPANSA] are using for microwave

frequency) exposures. *What is absolutely clear*, is that what ARPANSA needs to do is to carefully examine each of the thousands of studies which apparently falsify their statement when these studies report various effects that occur at levels *well below* average exposure levels of the ARPANSA safety guidelines and show that each of those thousands of studies is deeply flawed and therefore fails to falsify the ARPANSA claims.” Overall, this document/reply by Dr Pall is essentially a detailed refutation and condemnation of both ARPANSA’s and ICNIRP’s ‘safety’ guidelines. Dr Pall then proceeds to provide evidence which he believes shows “intentional scientific misrepresentation” i.e. fraud, by ARPANSA (in the letter) regarding the evidence for the adverse health effects of microwave radiation. [17; 39]. Likewise in 2017 ORSAA found that regarding the adverse effects of microwave radiation on health ARPANSA had, in its TR-164 Report, not “faithfully or correctly represented” the scientific findings of its *own* database. [44]. So much then for looking to ARPANSA for the protection of the public

There is one further, ‘small’, detail that I should mention: the 5G network will include putting 50,000 plus satellites into low-space Earth orbit (200-750 miles from Earth), including some 20,000 by 2020, which will ‘blanket’ the Earth in 5G wifi radiation from 12 GHz to 50 plus GHz. At least four major companies are involved: Spire Global plans to put up 972 satellites; Boeing 2,956; Space X 12,000 (broadcasting at 37.5 to 51.4 GHz); and Oneweb 4,560. The radiation from these satellites will pollute the ionosphere which is part of the electromagnetic circuit which surrounds and passes through the Earth. [30; 23; 43; 49 p. 103, 115]. Safety testing?

2.5. The Adverse Health Effects of 5G

Based on the current research that irrefutably shows the *current* levels of microwave radiation exposure to be harmful to our health and to that of all biological life, insects, birds, animals and plants, it is a no-brainer that the vast increases in microwave radiation exposure associated with 5G will result in far greater ill-health. Thus, in September 2017 over 180 scientists and doctors from 37 countries (including Australia) sent a declaration to officials of the European Commission demanding a moratorium on the roll out of 5G technology. Their central concern is that numerous peer-reviewed scientific studies have now proven the adverse effects of electromagnetic radiation from wireless technology, and that 5G will massively increase our exposure. (See ehtrust.org for details of this letter.) Likewise, in May 2018 the International Society of Doctors for the Environment and more than 200 doctors and scientists called for a stop to the rollout of 5G. [49 p. 100]. Currently, another appeal, the International Appeal: Stop 5G on Earth and Space, is underway. As of 7th October 2019 it had over 153,000 signatories from 207 countries. (See www.5gspaceappeal.org.)

Regarding the adverse health effects of the high frequency microwave radiation of the 5G network on human, animal and plant health, we can justifiably say that all of the adverse effects seen with our current level of microwave radiation will be greatly magnified. Unfortunately, as yet there is little *5G-specific* research in the public domain. No doubt much exists within military and intelligence circles. What follows is a brief summary of some of the specific and major health concerns related to 5G. Much of this information has come from the article *5G Radiation Dangers—11 Reasons to be Concerned* found on the website electricssense.com, and the article *A 5G Wireless Future: Will It Give Us a Smart Nation or An Unhealthy One?* by Dr Cindy Russell. [11; 13].

1) Skin Problems. The sweat glands in our skin act as helical antennas for high frequency microwave radiation or millimetre microwave radiation, which means that they easily conduct this radiation. A recent study which used 60 GHz waves (in the 5G range) concluded that “the analyses of penetration depth show that more than 90% of the transmitted power is absorbed in the epidermis and dermis layer.” Further, our nociceptors i.e. pain receptors, in the skin recognise these waves as damaging stimuli. This means that 5G microwave radiation will cause skin problems including pain, and increased skin diseases including cancer. However, the 5G microwave radiation will not stop at the skin. The assumption that millimetre waves do not penetrate beyond the skin ignores that nerves, blood vessels and other electrically conducting structures can carry electromagnetic radiation induced currents deep into the body. [12] Also, the nature—the power and phase—of 5G microwave radiation means that it will possibly result in an effect called Brillouin precursors where the

microwaves re-radiate (or propagate) into the body. [30]. Indeed, studies have already shown various effects of 5G radiation in humans and animals which make it clear that the radiation is penetrating two or more centimetres into the body. Furthermore, our blood circulates close to the skin and will be heavily and negatively impacted by the radiation, including clumping of red blood cells and reduced circulation. [41]. Not surprisingly, declassified Russian studies from around 1975 showed that millimetre waves (characteristic of 5G) adversely affect human skin, blood, bone marrow, and tissue respiration. [49 p. 57].

2) Thermal Injury to the Eyes. Experiments conducted at the Medical Research Institute of Kanazawa Medical University showed that 60 GHz millimetre-wave antennas produce thermal injuries in the eyes of rabbits, with thermal effects reaching below the eye's surface.

3) Arrhythmias. A 1992 Russian study found that frequencies in the range 53-78 GHz (again, that which 5G proposes to use) impacted the heart rate variability (an indicator of stress) in rats. Another Russian study on frogs whose skin was exposed to millimetre microwave radiation found heart irregularities (arrhythmias).

4) Compromised Immune System. A 2002 Russian study revealed that exposing healthy mice to low-intensity, extremely high-frequency electromagnetic radiation severely compromised their immune systems. It was concluded that “the whole-body exposure of healthy mice to low-intensity... has a profound [negative] effect on the indices of nonspecific immunity.” There are now a whole series of studies which show that microwave radiation in general elevates autoimmune diseases. [41].

5) Antibiotic Resistance in Bacteria. A 2016 Armenian study observed millimetre microwave radiation mirroring the future environment brought about by 5G. Their study conducted on E-coli and other bacteria stated that the waves had depressed their growth as well as “changing properties and activity” of the cells. They found that the interaction of the millimetre microwave radiation with bacteria altered their sensitivity to “different biologically active chemicals, including antibiotics.” More specifically, the combination of this type of radiation and antibiotics showed that it may be leading to antibiotic resistance in bacteria.

6) Contaminated Food Supply. One of the features of 5G is that it is particularly susceptible to being absorbed by plants and rain (or moisture in general). Another study found that millimetre microwave radiation of low intensity “invokes peroxidase isoenzyme spectrum changes of wheat shoots.” Peroxidase is a stress protein existing in plants. The indications are that 5G will be particularly harmful to plants—perhaps more so than to humans. Plant irradiation is bad news for the planet's flora, and for us: it could contaminate our food supply. Studies have already proven the negative impact on bee colonies due to existing levels of microwave radiation. Microwave radiation of 24 GHz, a common frequency in the proposed 5G network, is known to decimate bees. [45]. This frequency will be used in the 5G network in Australia. Imagine what the 5G network, which will continually blanket everything in radiation, is going to do to our food industry as the bees disappear. [11; 13; 36; 28].

2.6. Monitoring and Surveillance of the Population

Finally, there is a whole other side of the 5G network or Smart Grid which involves matters of *monitoring and surveillance*. This area of concern easily shades off into speculation about conspiracies. However, here is one thing that is *certain*: anyone or any organisation which has access to the 5G network or Smart Grid, whether legally or *illegally*, will be able to use the capacities (listed below) which the network can offer. And make no mistake: the Smart Grid will be hackable and will be hacked. Even the most secure networks in the world such as those of the CIA and the National Security Agency (NSA) are hacked. Indeed, Smart meters themselves can be hacked. In doing so, the hacker can ascertain if you are at home...or not. [22].

What then can the person or organisation that has entry, legally or illegally, into the 5G network do?

1) All of your personal data on the network, and eventually there will be a *lot* of it, can be stolen.

2) All pieces of technology and equipment in your home and connected to the 5G network or Smart Grid, in particular through a smart meter, can be individually monitored regarding their operation e.g. power used, time of use. From this data, software can be used to build a detailed profile of the people—their habits, needs, character, etc.—using this technology and equipment—including whether or not you are at home. Companies have already developed this type of software, and are selling it to telecommunications and utility companies. The consumer or occupant profiles developed through this software can then be used by the telecommunications companies, utility/electricity companies, and others, for various profit-driven purposes such as advertising and, when requested, for legal, security and surveillance purposes. For some elaboration of this profiling process by the telecommunication companies please see *The Role of Smart Meters in Mass Surveillance*, especially the short advertisement within the video by the software data-analysis company Onzo. [15].

3) All of your technology connected with the 5G network can be remotely shut down.

4) Smart devices such as phones, smart meters, and smart televisions can be used to provide *audio and visual* surveillance of the user and his or her surroundings. A quick search on the internet soon reveals that many/most new smart devices will be increasingly equipped with these two-way audio and visual receivers. Get use to in-house spying.

5) The frequencies used in the 5G network also have the capacity for 3-D mapping of your home and your personal location in real time. [28]. (This 3D scanning is similar to the function of airport scanners which use the same frequencies as the 5G network.)

6) Finally, please take the time to think about, and even better, research, the implications of what it means for there to exist throughout the country a 5G network that uses phased-array antennae (in its towers, phones, satellites, etc.) to focus or target, augment and pulse beams of microwave energy at mobile phones, other devices, and at the individuals who use them, and also, the implications of such a directed energy system if it was used by people without integrity. ‘Incidentally’, 5G technology with its capacity for pulsed and directed beams of energy was originally created by the military for, among other things, as a directed energy weapon, where various frequencies can induce disease, injury, pain and death.

Of course, no-one will be putting us under surveillance...right? Well, not in the U.S. James Clapper, former head of the NSA or National Security Agency, one of the major intelligence agencies in the U.S., said in 2016, to a Senate panel as part of his annual assessment of threats against the U.S: “In the future, intelligence services might use the [internet of things] for identification, surveillance, monitoring, location tracking, and targeting for recruitment, or to gain access to networks or user credentials,” (I think we should read ‘will’ instead of ‘might’.) But the U.S. government has known about the potential to exploit the 5G network for a long time. Back in 2012 the then CIA director David Petraeus made clear that intelligence agencies would use the internet of things (5G network) to spy on people. At the In-Q-Tel CEO Summit in 2012 he stated: “The current ‘Internet of PCs’ [personal computers] will move, of course, toward an ‘Internet of Things’—of devices of all types—50 to 100 billion of which will be connected to the Internet by 2020.... Items of interest will be located, identified, monitored and remotely controlled through technologies such as radio-frequency identification, sensor networks, tiny embedded servers, and energy harvesters – all connected to the next-generation Internet [i.e. 5G network] using abundant, low-cost, and high-power computing.... In practice, these technologies could lead to rapid integration of data from closed societies [i.e. societies where 5G exists], and provide near-continuous, persistent monitoring of virtually anywhere we [e.g. the CIA] choose.” (My interpolations.) But this surveillance won’t happen in Australia...right? Well, we do know that the 5G network will need to be under some degree of continuous intelligence surveillance because, eventually, all of the nation’s technology, data, communications, utilities, telecommunications companies, and other essential services will be using it or connected to it. (For some of the above details concerning surveillance see the article *The Government Just Admitted It Will Use Smart Home Devices for Spying*, by Trevor Timm, in *The Guardian*.)

One final point regarding surveillance: not only is it intended that every piece of technology will be directly or indirectly connected to the 5G network or Smart Grid, but *everything* will be. Every food item, every piece of clothing, every household item, every medicine, every food item, every building material, etc., etc., everything, will have an embedded microprocessor or sensor—much of it at the microscopic nano-metre scale—so that it can be monitored, measured and tracked (via the Smart Grid). [10; 41; 28]. (One nano-metre equals one billionth of a metre.) Whether it is intended or not, the Smart Grid will be a mechanism for *total* surveillance and so, the end of privacy. And when our privacy ends, due to continuous surveillance, we consciously and unconsciously restrict our freedom of expression and action.

2.7. What Can Be Done About 5G?

1) An important part of the solution here is that the Australian government should move forward on its previous commitment to support the installation of fibre optic cables buried in the ground to every business, home, school, and hospital. This is a safe, faster (10,000 to potentially 10 million times faster) and more secure [41], and therefore, sane option for people. *5G should not be considered as an option.*

2) Further, in light of the avalanche of scientific studies which now conclusively show so many adverse and non-thermal effects of microwave radiation on health, the Australian government must review, revise and *greatly* upgrade the safety standards for exposure to microwave radiation for both currently and future wireless technology. In particular, there must be greater safety standards for children.

3) It is important to note that in the Australia government's position is that "Carriers [i.e. telecommunications companies] have specific powers and immunities relating to telecommunications infrastructure, deployment and installation. These laws help carriers to rollout telecommunications infrastructure quickly in a nationally-uniform way, rather than having to follow state, territory and local government requirements." [19]. But, the Australian barrister Raymond Broomhall has *successfully stopped* the rollout of 5G transmitter-receivers by TPG in Qld, NSW and Victoria. 900 existing transmitter-receivers and plans for a further 1,600 have been scrapped, without plans for further development. How this was accomplished is laid out in some detail in the following YouTube videos: *Call for Action Against 5G: Max Igan Talks To Barrister Ray Broomhall*; *5G Action Event Perth 1/2 Raymond Broomhall and George Mellick*; *Barrister Raymond Broomhall: Presented By Environment and Community Safe From Radiation*. [34; 35; 37]. Collectively, these videos constitute an *initial* resource for anyone or any organisation who/which wants to legally challenge the rollout of the 5G network and, more generally, any electromagnetic infrastructure that is destructive to health.

The essential approach which has been developed and used by Ray Broomhall is based around assault. While the telecommunications companies have been given the green light by the Federal government, they, and those assisting them, cannot circumvent the *criminal* codes of each State. The fundamentals of Ray's approach are as follows. A person/party shows that they have a fear, based on reasonable grounds, that electromagnetic radiation from an emitter such as a mobile phone tower or transmitter-receiver is causing, or will cause, the person/party harm (assault). The principle piece of evidence required here, and, if needed, which will be regarded by a court as both the substantial and objective basis for a person's/party's reasonable grounds of fear of harm, is a written statement by a doctor that the existing or proposed electromagnetic radiation emitter will or may be unsafe for, or cause harm to, the person/party concerned. Second, the organisation which owns or will own the emitter, and those assisting them, are put on legal *notice* of this situation. If the organisation does not cease its action which is causing or will cause harm, then a restraining order—such as Protection Order or Apprehended Violence Order or Peace and Good Behaviour Order—can be attained to have the organisation remove, shut down or cease the construction of the emitter. If it is breached, criminal prosecution and civil liability, including imprisonment, may or will result. It is important to appreciate that company directors, government officials, and any other parties involved in perpetrating the assault will or may be open to prosecution and liability. A basic outline of Ray Broomhall's action plan is available at www.wesaynoto5ginaustralia.com/raymond-broomhall-action

One last point: in any action against the rollout of electromagnetic infrastructure the precautionary principle plays a central role. Basically, the precautionary principle states that in situations of scientific (or other) complexity, uncertainty and ignorance, public policy providers have a *duty* to act in order to avoid, or reduce, *potentially* serious or irreversible threats to health or the environment. [49 p. 68].

4) We need to step up and get 5G stopped in Australia before it begins, for the further it advances the more difficult it will be to turn around. Whether your field is technology, engineering, health, medicine, education, science, politics, council administration, law, economics (5G will be an economic disaster when the health costs are factored in), media, human rights, child welfare, animal welfare, the environment, or general concern for your community, do what you are able to do in your sphere of influence.

5) Finally, please pass on this information to others. Don't be daunted by making an *apparently* small contribution: pass the information onto 10 other people, and ask each of them to pass it onto 10 people, and you have influenced a 1000 people; etc.

I'm not melodramatic, but if 5G and all that it implies is allowed to proceed, humanity will slip into a dark, very dark period. It is a time for people of integrity, compassion, courage, and plain common sense to stand up and oppose this real and imminent danger. One day, hopefully in old age, each of us will look back upon our lives and ask 'What have I contributed to the welfare of humanity, to my brothers and sisters, and to the health of this beautiful planet?' Maybe at that time you and I will be filled with the deep satisfaction that we had the opportunity, and took it, to stop this madness and, instead, found a better way forward.

Peace and best wishes to all who read these words.

References: Most of the above information comes from the following videos (on YouTube), websites and articles. (Informative & accessible places to start are marked with an asterisk *)

1. **The Truth about Cell Phone and Wireless Radiation.*' (A one hour video of a presentation by Professor Devra Davis. At least two versions are on YouTube. One version is of a presentation given at the University of Melbourne in 2015)
2. *Devra Davis's website is: ehtrust.org (A very comprehensive website on the dangers of microwave radiation from mobile phones and wireless technology.)
3. *Wifi In School—The Facts* (A short video produced by *Wifi In Schools Australia*, www.wifi-in-schools-australia.org).
4. *Wifi In Australian Schools—'She'll Be Right Mate'* (Article, Dee McLachlan, *Gumshoe News*)
5. *Everything You Need to Know About 5G* (A short, animated video which gives a basic introductory overview of the 5G Network.)
6. **Dangers of the 5G Wireless Network* (This one hour video will give you a succinct summary of the dangers of wireless microwave radiation and *some* of the dangers of the 5G Network.)
7. *What Is the Smart Grid?* (Short video by Alex Donnelly highlighting the dangers of microwave radiation from smart meters.)
8. **Bioinitiative.org* (Bioinitiative is an organisation of *independent* and highly qualified experts in medicine, bio-electromagnetic research and health policy. In 2007, and then updated in 2012 and 2017, this team of 29 experts from 10 countries produced the highly influential Bioinitiative Report which clearly highlighted the dangers of electromagnetic radiation at *existing* levels and the need for a radical revision of safety standards. The Report and website provide analyses and synopses of some 3,800 peer-reviewed studies showing the harmful effects of electromagnetic radiation. The Report is one of the most referred to studies regarding the effects of EM radiation. The website is visited about one million times a year.)
9. *Parentsforsafetechnology.org* (A website for parents which provides information about wireless technology and children.)
10. *5g FCC Chair Tom Wheeler Presentation with Annotized Concerns* (4-5 minute video providing 'highlights' of Wheeler's speech regarding the 5G rollout in the U.S., which Australia may well attempt to emulate.)
11. *A 5G Wireless Future: Will It Give Us a Smart Nation or An Unhealthy One?* (Article by Dr Cindy Russell on the dangers of 5G.)
12. **International Appeal: Stop 5G On Earth and In Space* (This is a current (May 2019) international petition which will be submitted to the UN, WHO, EU and world governments. Its administrator is Arthur Firstenberg.

It provides a clear overview of many of the fundamentals of 5G and its adverse health effects. See, www.5gspaceappeal.org)

13. www.electricsense.com (A website offering solutions to reduce exposure to microwave radiation. Includes the article entitled *5G Radiation Dangers—11 Reasons to be Concerned.*)
14. *The Dark Side of Smart Meters* (A clear presentation on the health risks of smart meters.)
15. *The Role of Smart Meters in Mass Surveillance* (A short ten minute video by Jerry Day showing how smart meters can monitor and surveil the home and your activity in the home.)
16. *The Government Just Admitted It Will Use Smart Devices for Spying* (Article by Trevor Timms in *The Guardian*, dated Feb. 2016.)
17. Stopsmartmeters.com.au (A website providing information on smart meters.)
18. See the BC Centre for Disease Control website for a cross country comparison of radiofrequency or microwave exposure limits.
19. *5G—Enabling the Future Economy* (October 2017 document from the Department of Communications & the Arts, Australian Government.)
20. *European 5G Conference 2019 Effectively Admits 5G Is A Massive Biological Experiment* (Article by Russell Cavanagh in *Digital Survivor: Independent Tech Journalism.*)
21. *AV9 – Mark Steele -5G: The Existential Threat...& the Opportunity* (Video presentation on the dangers of 5G by an expert in the field)
22. *AV5 – Mark Mitcham – The SMART Agenda: SMART For Whom?* (Hour plus presentation on the dangers of smart meters.)
23. *Wireless Technology: Ultra Convenient. Endlessly Entertaining. Criminally Instigated. Terminally Pathological.* (Extensive article on electromagnetic radiation, 5G, health and hidden agendas by Peter Tucci in *Activist Post: Alternative News and Independent Views.*)
24. **National Day of Action Against Smart Meters With Jerry Flynn.* (Very clear one hour plus video presentation by Jerry Flynn, an ex-Canadian military expert in the area of electromagnetic radiation, on its dangers and, in particular, the dangers of smart meters.)
25. *5G: The Dominoes Are Starting To Fall.* (Article by Claire Edwards showing some of the push back against 5G.)
26. www.whatis5g.info (A user-friendly website providing an overview of info. related to 5G.)
27. *5G: Swiss Telcos Ignore Official Laws and Launch 5G; Rule of Law Under Threat.* (Article by Josh De1 Sol Beaulieu at www.takebackyourpower)
28. **Apocalypse – The Extinction Event.* (A confronting video produced by Sacha Stone and which brings together information from diverse sources on the dangers of, and lack of safety research into, 5G.)
29. **Take Back Your Power.* (One and a half hour documentary by Josh De1 Sol on the dangers of electromagnetic radiation. Website: takebackyourpower.net)
30. **Cellphonetaskforce.org* (Non-profit website established in 1996 and which collates and publishes research exposing the dangers of electromagnetic radiation including 5G.)
31. *RF Exposures From Mobile Phones, Towers, WiFi and Other RF.* (Article at magneticsciences.com)
32. **ABC Catalyst Wi-Fried.* (Half hour ABC expose aired in 2016 clearly showing the difference of opinion between independent researchers on the one hand and regulatory bodies (such as ARPANSA) and the telcos on the other.)
33. Environmental and Community Safe From Radiation at www.ecsfr.com.au (Organisation which provides info. about the dangers of electromagnetic radiation and various actions to stop or mitigate these dangers, often emphasizing an Australian perspective.)
34. *Call For Action Against 5G: Max Igan Talks To Barrister Ray Broomhall.* (Video/YouTube of independent Australian researcher and activist Max Igan interviews Australian barrister Ray Broomhall about his successes in having 5G and other telecommunications rollout stopped in Australia by using the area of assault under the criminal law/code. Provides practical information on how any interested party can oppose the rollout of 5G and other electromagnetic infrastructure.)
35. *5G Action Event Perth ½ Raymond Broomhall And George Mellick.* (One hour video of a recent (April 2019) info. session given by two lawyers about how the dangers of 5G and practical steps needed to stop its rollout.)
36. **Physicians For Safe Technology* (www.mdsafetech.org) is an organisation of doctors and other health professionals who review and interpret the research regarding the adverse impacts of electromagnetic radiation on health and what protective measures are required.
37. *Barrister Raymond Broomhall: Presented By Environment and Community Safe From Radiation.* (Two hour video of a presentation by Ray discussing his successful approach to stopping the rollout of electromagnetic infrastructure.)
38. *Aussies Claim No Brain Tumor Link, Skepticism Abounds.* (Article in *Microwave News*, January 2019.)

39. *Emeritus Professor Martin Pall Slams ARPANSA Response.* (Article at www.stopsmartmeters.com.au This article contains links to the other works of Dr Pall referred to in my paper.)
40. *EMF Radiation Testing: 'Smart' Meter and Cell Phone.* (Article and video by Josh Del Sol Beaulieu at www.takebackyourpower.com)
41. **5G Crisis: Awareness and Accountability Summit* (A recently completed on-line summit hosted by Josh del Sol, including 40 or so one hour interviews with a range of international experts—including Ray Broomhall—discussing the dangers of the 5G network. The website is <http://5gsummit.com>)
42. **5G Action Even Perth—Dr Cooper.* (A video featuring Dr Russell Cooper, from Australia, presenting research on the impact of electromagnetic radiation on health.)
43. *5G Cell Phone Radiation: How the Telecom Companies Are Losing the Battle to Impose 5G Against the Will of the People.* (Article by Claire Edwards at *Global Research*, December 17, 2019)
44. www.orsaa.org (See especially presentation by Steve Weller entitled *Radiofrequency Bio-Effects. Do We Have A Problem?*)
45. *The Truth About 5G And Wifi Barrie Trower Conference.* (Video of recent (Dec. 2019) presentation by microwave expert.)
46. *Telecoms Face Major Global Resistance to 5G Rollout.* (Article by Claire Edwards in *Global Research*, January 16, 2020).
47. *Kaboom! Switzerland Halts 5G Rollout Over Health Concerns.* (Article in *Technocracy News*, February 13th, 2020).
48. *Knowledgebase Inconvenient Truth—The John Patterson Story.* (Article at *EMR Australia*, March 2nd, 2010).
49. **Hidden Dangers: How Governments, Telecom and Electric Power Utilities Suppress the Truth about the Known Hazards of Electro-Magnetic Field (EMF) Radiation.* (2019 book by Jerry G. Flynn, retired Canadian Armed Forces captain, and electronic warfare specialist.)
50. *We Say No To 5G In Australia* at www.wesaynoto5ginaustralia.com (A national association in Australia engaged in preventing the rollout of 5G.)
