



# The EMF Plague

by Donna Fisher © January 2017

Part 1 of 2

**Scientific evidence demonstrates that microwave radiation from mobile phones and Wi-Fi damages our DNA and harms our health.**

## Legislating against Wi-Fi

In January 2015, the French National Assembly made history by passing a new national law to reduce exposure to wireless radiation electromagnetic fields (EMF). According to the law, Wi-Fi and wireless devices are now banned in "the spaces dedicated to home, to rest and activities of children under 3 years", Wi-Fi must be minimised in "schools for children up to 11 years" and Wi-Fi routers must be turned off when not in use for educational purposes.<sup>1</sup>

Among other measures, children must be supplied with protections. At the request of the buyer, equipment reducing mobile phone radiation exposure to the head for children under 14 years must be made available. In addition, Wi-Fi hotspots must be labelled and places

where Wi-Fi is provided have to be clearly marked with a pictogram.<sup>2</sup>

Prior to this, in 2013, the Israeli Ministry of Education issued new guidelines regarding Wi-Fi use in schools to stop the installation of wireless networks in classrooms prior to the first grade. In first and second grades, Wi-Fi use is limited to a maximum of three hours per week, and in third grade a maximum of eight hours per week. A hard-wired direct cable connection must be used if the teacher has a computer in the classroom.<sup>3</sup>

## EMF Effects on Gene Expression and Biology

In a 2007 study<sup>4</sup>, changes were seen in gene expression following Wi-Fi exposure within a matter of a few hours for cultured human cells under controlled laboratory

conditions: 221 genes altered their expression after a two-hour exposure and 759 genes after a six-hour exposure.<sup>5</sup> Our genes have already been affected.

Wi-Fi, one antenna from a smart meter, some cordless phones (often labelled as "pulsed digital 2.4 GHz"), some wireless baby monitors, and microwave ovens operate at the frequency of 2.45 GHz.

Dr Magda Havas, Associate Professor of Environmental and Resource Studies at Trent University, Ontario, Canada, comments on exposure to Wi-Fi in schools: "We've got an analogy of a classroom being the inside of a microwave oven."<sup>6</sup>

Neurosurgeon Keith Black, MD, states: "What microwave radiation does in most simplistic terms is similar to what happens to food in microwaves, essentially cooking the brain."<sup>7</sup>

Professor Konstantin Meyl, hailed as a modern-day Nikola Tesla, notes that 2.45 GHz is an important biological frequency window that nature uses in cell communication. Meyl comments: "Only a half-knowing company would allow the sale of devices that produce sparks in nature in the midst of perhaps the most important biological window for humanity."<sup>8</sup>

On the use of wireless baby monitors, Dr Havas asks: "What parents in their right mind would knowingly expose their infant to constant microwave radiation?"<sup>9</sup>

In his book *Overpowered*, Dr Martin Blank, from Columbia University's Department of Physiology and Cellular Biophysics, gives a warning about baby monitors: "Given that such monitors are generally positioned relatively close to the child, the baby's actual radiation exposure from a baby monitor is likely more than that from a nearby cell phone antenna."<sup>10</sup>



Wi-Fi in classrooms bombards children with RF EMF.



The Environmental Health Trust, led by Dr Devra Davis, founding director of the Board on Environmental Studies and Toxicology of the US National Research Council, states that children are not little adults. A child's skull is thinner, and certain tissues of a child's head, including the bone marrow and the eye, absorb significantly more energy than those in an adult head. Children are more sensitive to environmental contaminants including microwave radiation. They have rapidly developing body systems, and their stem cells are more active and more affected by microwave radiation compared with those of adults.<sup>11</sup>

A mobile phone exposes your head to microwave radiation, a computer connected to Wi-Fi exposes your entire upper body to radiation, and a computer on your lap exposes your reproductive organs as well. Most people don't want to live near mobile phone antennas or Wi-Fi antennas because of health concerns. Yet when wireless routers for Wi-Fi are used inside buildings, their effect is similar to the antenna being inside the building rather than outside and is potentially much worse with respect to exposure since you are closer to the source of emissions.<sup>12</sup>

Wi-Fi systems in school districts are usually of a much higher strength because they are designed to operate hundreds of computers simultaneously, unlike home-based systems that operate only one or several computers. Wireless routers in classrooms are akin to having mini mobile phone towers indoors.<sup>13</sup>

In her "Open Letter to Parents, Teachers, School Boards Regarding Wi-Fi Networks in Schools", Dr Magda Havas states: "[B]iological effects include increased permeability of the blood brain barrier, increased calcium flux, increase in cancer and DNA breaks, induced stress proteins, and nerve damage. Exposure to this energy is associated with altered white blood cells in school children; childhood leukemia; impaired motor function, reaction time, and memory; headaches, dizziness, fatigue, weakness, and insomnia".<sup>14</sup>

The blood-brain barrier (BBB) plays a vitally important role in the protection of the brain from pathogens, toxins and heavy metals.

## What is RF EMF?

Radio-frequency electromagnetic fields (RF EMF) are the artificial, human-made fields that emanate from Wi-Fi, mobile phones, mobile phone antennas, cordless phones, computers, wireless baby monitors, smart/digital meters, electrical wiring and equipment, power lines, substations, solar panel technology, wind turbines and other common sources. All wireless technologies emit RF EMF, and "dirty electricity" also falls under RF EMF. Some electrical currents flow along the ground, and scientists have documented their adverse health effects on both livestock and farmers.

RF EMF is generally recognised as being in the range of 30 kHz to 300 GHz. Because microwaves are also used for communication, RF and microwave (MW) emissions overlap considerably. Microwave energy is within the radio frequency band of the electromagnetic spectrum and is generally recognised as ranging from 300 MHz to 300 GHz.

All electronic products that can wirelessly send voice, images or data to another product or network emit microwave radiation—RF EMF.<sup>15</sup>

## EMF, Cancer and Other Health Issues

In his 1990 book *Cross Currents*, Robert O. Becker, MD, reports on a study by Drs Jerry Phillips and Wendell Winters. He comments: "At this time, the scientific evidence is absolutely conclusive: 60-Hz magnetic fields cause human cancer cells to permanently increase their rate of growth by as much as 1600 percent and to develop more malignant characteristics."<sup>16</sup> Dr Becker adds: "These results indicate that power-frequency fields are cancer promoters—that is, they promote the growth of human cancers... The promoting effect speeds up the clinical course of any established cancer and makes it that much more difficult to treat."<sup>17</sup> He further states that "it is quite possible that chronic exposure to such fields is a competent cause for the origin of cancers".<sup>18</sup>

Dr Havas confirms that in the presence of EMF, cancer cells are more likely to be much more aggressive.<sup>19</sup>

In 2008, Samuel Milham, MD, MPH, a former Adjunct Professor of Medicine and long-time chronic disease epidemiologist at the Washington State Department of Health, and Lloyd Morgan, an electronics engineer and former director of the Central Brain Tumor Registry of the United States, conducted the groundbreaking La Quinta Middle School, California, cancer cluster study. This study showed that if you are exposed to dirty electricity (radio waves running along potentially all electrical wiring—RF EMF) for six hours for 180 days a year, your cancer risk is increased by 25 per cent if you are exposed to above 2,000 Graham–Stetzer (GS) units and 15 per cent if you are exposed to above 1,000 GS units. Milham stated at the time that dirty electricity may be a universal carcinogen similar to ionising radiation, which is an established cause of cancer.<sup>20</sup>

Milham and Morgan noted that the relatively short latency time of melanoma and thyroid cancers in the cancer cluster at La Quinta Middle School suggests that these cancers may be more sensitive to the effects of high-frequency transients (RF EMF) than the other cancers seen in this population. Malignant melanoma and thyroid cancer have among the highest rates of increase in Western populations.<sup>21</sup>

On 31 May 2011, the International Agency for Research on Cancer (IARC) within the World Health Organization (WHO) classified RF EMF as Group 2B—possibly carcinogenic to humans—based on an increased risk for glioma, a type of malignant brain cancer associated with wireless phone use. (Lead and DDT are also included on



Wi-Fi video baby monitor (Photo: Binatoneglobal)

this list.) Dr Robert Baan, a member of the IARC, confirms that the Group 2B carcinogen status "holds for all types of radiation within the radiofrequency part of the electromagnetic spectrum, including the radiation emitted by base-station antennas, radio/TV towers, radar and Wi-Fi".<sup>22</sup>

In 2013, Lennart Hardell, MD, PhD, and Michael Carlberg from the Department of Oncology at the Örebro University Hospital, Sweden, concluded in a study conducted on mobile and cordless phones that RF EMF should be classified as a Group 1 carcinogen, that is, carcinogenic to humans. "Based on the Hill criteria, glioma and acoustic neuroma should be considered to be caused by RF-EMF emissions from wireless phones and regarded as carcinogenic to humans, classifying it as Group 1 according to the IARC classification. Current guidelines for exposure need to be urgently revised," the authors wrote.<sup>23</sup>

A 2010 paper by Dr Havas *et al.* documented definitive evidence that radiation from a cordless phone, which is common in many homes, causes heart arrhythmia and tachycardia (rapid heart rate) and alters the sympathetic and parasympathetic nervous system in a way similar to a "fight-or-flight" stress response.<sup>24</sup>

In May 2015, the International Electromagnetic Field Scientist Appeal was presented to the Secretary-General

of the United Nations, the Director-General of the WHO, the Executive Director of the United Nations Environment Programme and UN Member Nations. As of October 2016, the appeal has been signed by 223 scientists from 41 nations who have all had papers published in peer-reviewed journals on the biological or health effects of non-ionising radiation (EMF).<sup>25</sup>

With over 30 years' experience in conducting EMF research, Dr Martin Blank, the spokesperson for the Appeal, states in a video: "Cellphones, tablets, Wi-Fi... are damaging the living cells in our bodies and killing many of us prematurely... It's particularly frightening that radiation from our telecommunication and powerline technology is damaging the DNA in our cells. It is clear to many biologists that this can account for the rising cancer rates... [T]he time to deal with the harmful biological and health effects is long overdue."<sup>26</sup>

According to published, peer-reviewed research, the effects of low-intensity EMF include: increased cancer risk, cellular stress, free radical formation, increased permeability of the BBB and genetic damage. Other potential effects include learning and memory deficits, neurological/neurotransmitter disorders, reproductive effects and negative impacts on general wellbeing. Moreover, there is "growing evidence of harmful effects



Telecommunications tower in London

to both plant and animal life".<sup>27</sup>

We did not evolve in artificial EMF. In his book *Overpowered*, Dr Blank states that numerous studies have found that EMF damages and causes mutations in DNA. He notes that DNA mutations are believed to be the initiating steps in the development of cancers, and it is the association of cancers with exposure to EMF that has led calls for revising safety standards.<sup>28</sup> Dr Blank says that all EMF is bioactive.<sup>29</sup> He also notes that public health scientist Dr George Carlo found the presence of micronuclei (DNA fragments) in the blood, indicating that radiation from mobile phones caused irreparable DNA damage in cells.<sup>30</sup> (The relationship between micronuclei and cancer is so strong that physicians around the world test for the presence of micronuclei in the circulation to identify patients likely to develop cancer.)

### The EMF Mechanism of Action

Without a "mechanism", it is difficult for the scientific community to accept that an agent can harm. Ionising radiation, asbestos and tobacco smoke are already classified as a Group 1 carcinogens. It took decades for scientists to understand how these agents cause cancer and to discover what is called the "mechanism of action".

Ionising radiation has a direct mechanism of action, whereas the non-ionising radiation (EMF) mechanism of action is indirect. Dr Havas states: "Ionizing radiation such as x-rays and gamma rays are known to cause cancer by detaching the negative ion—the electron—at the heart of human cell structure. Non-ionizing radiation, such as microwaves, [does] not detach electrons." She continues: "One critical aspect of non-ionizing radiation has been overlooked. Ionizing radiation increases free radicals in the body *directly*. Non-ionizing radiation increases free radicals in the body *indirectly*, by interfering with repair mechanisms that neutralize free radicals. Free radicals are carcinogenic. Therefore by interfering with the body's ability to repair free radical damage, microwave radiation is also carcinogenic."<sup>31, 32</sup>

Dr Blank explains that ionising radiation vibrates at a very high frequency with a tremendous amount of energy. When ionising radiation comes into contact with an atom, it can knock an electron free from its orbit around the nucleus and the atom becomes a positively charged ion. (The electron can then attach to another stable atom, resulting in a negatively charged ion.) In this way, ionising radiation causes neutral atoms to become charged ions. Ionising radiation causes chemical reactions that in turn cause damage to biological systems (such as the molecules in the body). The risks of ionising radiation are recognised due to this power to alter the electric charge of atoms and create ions.<sup>33</sup>

According to Dr Blank: "The damage to DNA caused by EMF exposure is believed to be one of the mechanisms by which EMF exposure leads to negative health effects."<sup>34</sup>

He compares our DNA to what electrical engineers refer to as a "fractal antenna" that receives or transmits electromagnetic radiation, which is why DNA is very sensitive to EMF radiation—notably more sensitive to EMF than are any other large molecules (such as proteins) in the body. Dr Blank explains that electrons in DNA conduct electricity and the DNA is coiled within the nucleus. Our DNA contains different coils of varying sizes that respond to many different frequencies on the EMF spectrum, which accounts for why our DNA responds to such a wide range of frequencies and why DNA is reactive across the entire electromagnetic spectrum.<sup>35</sup>

In a 2010 presentation, Dr Blank states: "[C]ells react to EMF as potentially harmful, and that is the message that we get from cells, so there's no question about it."<sup>36</sup>

Reporting on Dr Blank's presentation, Joseph Mercola, MD, notes: "Research has clearly shown that radiation within the non-ionizing range can cause single- and/or double-DNA-strand breaks, which cells respond to by creating stress proteins... The reason why the DNA molecule can be made to break apart even though the radiation is non-ionizing is because of the electrical conductivity inside the DNA molecule, i.e., the electrons present in the DNA bases can be made to move. And EMFs have been shown to cause electron transfer in the DNA. So, the idea that non-ionizing radiation cannot create a biological effect has been shown to be completely inaccurate."<sup>37</sup>

Dr Blank explains in his talk that the DNA which "controls the response to EMF" has now been identified. This section is known as the "EMF domain". By changing that part of the DNA, the EMF response can be effectively eliminated. The particular stress protein involved is Hsp70.<sup>38</sup>

## Our DNA contains different coils of varying sizes that respond to many different frequencies on the EMF spectrum.

In 2013, Dr Martin Pall, Professor Emeritus of Biochemistry and Basic Medical Sciences at Washington State University, was given a Global Medical Discovery award. Through a review of the scientific literature and his own meta-analysis, Dr Pall demonstrated that one of the primary non-thermal effects is the activation of voltage-gated calcium channels (VGCCs) in the plasma membrane of cells. When EMF activates these channels, large amounts of intracellular calcium ( $\text{Ca}^{2+}$ ) are produced. This excess calcium within the cells produces a chain of chemical reactions leading to the production of free radicals and oxidative stress. The free radicals then culminate in DNA damage. In short, the excess calcium directly increases nitric oxide (NO) within cells.



EMF radiation damages the DNA in our cells.

This increased NO can interact with superoxide to create peroxynitrite. It has been found that when peroxynitrite breaks down, it creates free radicals and oxidative stress within cells. These free radicals together with oxidative stress from peroxynitrite are thought to be the main culprits in causing disease and DNA damage.<sup>39</sup>

Oxidative stress has been reported around 800 times, so it is well documented that it is produced. In simple terms, free radicals can lead to DNA damage in the cells and can cause cancer. Too much calcium in the cells results in oxidative stress and inflammatory overload. Calcium is a very important signalling molecule in cells, and normally its levels are kept very low.

### EMF, Alzheimer's, Autism and Mental Health

In *The BioInitiative 2012 Report*, Drs Zoreh Davanipour and Eugene Sobel state: "There is now evidence that (i) high levels of peripheral amyloid beta are a risk factor for AD [Alzheimer's disease] and (ii) medium-to-high ELF MF [extra-low-frequency magnetic field] exposure can increase peripheral amyloid beta protein."<sup>40</sup> They also write: "There is considerable *in vitro* and animal evidence that melatonin protects against AD. Therefore it is certainly possible that low levels of melatonin production are associated with an increase in the risk of AD."<sup>41</sup>

There is strong evidence that long-term exposure to EMF is associated with a decrease in melatonin production. Dr Pall says that we know that diseases such as amyotrophic lateral sclerosis (ALS), Parkinson's and Alzheimer's are also caused by excess calcium in the cells. He notes that with the breakdown of the BBB, the number one concern is the impact on the neurons in the brain. He says there are many reports of people in their 30s and 40s developing dementia.<sup>42</sup>

In his 2008 paper, independent EMR researcher Dr Stephen J. Genuis of the Faculty of Medicine, University of Alberta, Canada, highlights the following case study. "A 17-year-old boy experiencing a 3-year history of intrusive thoughts relating to religious themes believed he had committed unpardonable sins and was convinced the devil was imminently sending him to hell. As well as



increasing depressive symptoms, the adolescent displayed escalating aggression towards his parents. The nominally religious parents took their son for religious counsel, to no avail. Psychiatric diagnosis included a thought disorder. Psychotropic medication failed to control the symptoms but caused numerous side effects. Human exposure assessment uncovered extremely high gauss measurements ( $\geq 200$  mGauss) at the head of the teen's bed, as electrical entry to the house was immediately adjacent to the bedroom, right beside his bed. As well as changing rooms, all other sources of EMF exposure were minimized. Within 12 weeks, the intrusive thoughts abated considerably, the mood symptomatology declined, the medication was stopped, and the parents indicated that their son was now a friendly, motivated boy. One episode of symptom aggravation subsequently occurred immediately following 4h of online work in a high school computer

**...there are at least 10 different research groups which have argued that EMF has an important role in the autism epidemic.**

laboratory; symptoms subsided within 72h of deliberate EMF avoidance. All adverse symptoms completely cleared within 6 months and wellness was maintained over the next 2 years and at the time of writing.<sup>43</sup>

In regard to the autism epidemic, in 2013 Dr Martha Herbert, a paediatric neurologist at Massachusetts General Hospital, and Cindy Sage, co-editor of the *BioInitiative* reports of 2007 and 2012, outlined a wide range of autism symptoms that match known symptoms of wireless exposure, including genetic damage to sperm, calcium channel mutations and inflammation.<sup>44</sup>

Dr Pall comments that there are at least 10 different research groups which have argued that EMF has an important role in the autism epidemic. He contends that

the autism epidemic is caused by EMF acting via calcium channels and chemicals acting via NMDA receptors.<sup>45</sup>

In his 2016 paper on EMF and neuropsychiatric effects, Dr Pall describes the five criteria that are required to prove a cause-and-effect relationship, and demonstrates that the evidence supports them all.<sup>46</sup>

Dr Pall has solved the puzzle of how EMF influences our biology through non-thermal effects: EMF activates VGCCs. He notes: "The key piece of evidence is that in 26 different studies, the effects of these microwave and lower frequency EMFs were blocked or greatly lowered by calcium channel blockers!... There are close to 1000 studies showing effects of microwave EMFs on calcium fluxes and calcium signaling in cells, effects that can be explained by VGCC activation. An important study (Pilla, 2012<sup>[47]</sup>) showed that the increase in intracellular calcium  $[Ca^{2+}]_i$  seems to be almost instantaneous [and this] argues for a direct effect."<sup>48</sup>

**Continued next issue...**

#### **About the Author:**

Donna Fisher is the author of four books on EMF: *Silent Fields: The Growing Cancer Cluster Story* (2008; reviewed in NEXUS 15/06); *More Silent Fields: Cancer and the Dirty Electricity Plague* (2009; 17/01); *Dirty Electricity and Electromagnetic Radiation* (2011; 18/04); and *Light that Heals: Energy Medicine Today & Beyond* (2014; 22/01). Her article "Dirty Electricity and the Link to Cancer" was published in NEXUS 16/06. Donna is currently assisting women in a workplace breast cancer cluster, and lectures to doctors and health professionals, educators, occupational health and safety officers and union representatives. She can be contacted by email at [donna@donnafisher.net](mailto:donna@donnafisher.net). For more information, visit her website <http://www.donnafisher.net>.

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