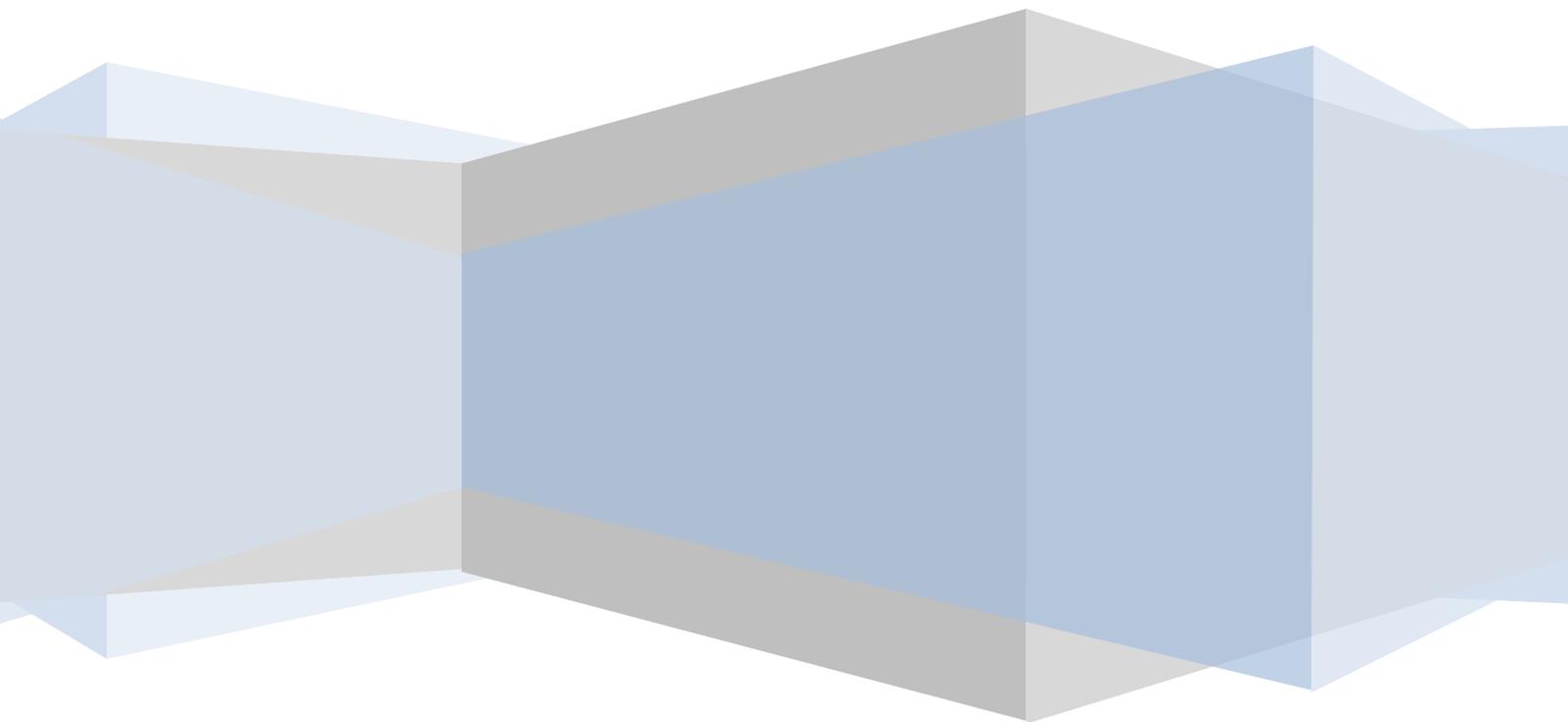


# JOINING THE DOTS

**An overview of adverse public health trends  
since 1998**

*A correlation of research into Electromagnetic  
Radiation that  
shows harm resulting from exposure to wireless  
technology, with the exponential rise in illnesses  
since 1998.*

**Sarah Benson**



## Introduction

*This report aims to not only be a correlation of scientific and public health data, but also to highlight a truthful process, as much as possible a truthful, objective and accurate way of looking at what is presented to us by science and epidemiology..*

The purpose of this paper is to highlight the links between scientific research into the adverse health effects of electromagnetic radiation and what was predicted as a result of this research – the abstract and the actual. All effects must have a cause – this is a fundamental tenet of the physical universe. To deny this is to be unscientific and lacking the faculty that underpins all scientific and intelligent discourse.

My secondary purpose is to honour and exonerate the late Neil Cherry, much of whose work is quoted here. Dr Neil Cherry (Lincoln University, NZ), worked in tandem with other scientists such as Dr Stan Barnett (CSIRO), Dr Peter French, head of microbiology at St Vincent's Hospital in Sydney, Australia, Dr John Holt, cancer specialist in Perth, Australia, Dr Bruce Hocking, Melbourne, the late Dr Ross Adey, USA, Professor Ted Litovitz, Catholic University of the US, and many others shortly before wireless radiation became as widespread as it is today. Their work was largely predictive, as the only real research they could use as a base was the Russian Embassy results from the 60s. Dr Cherry in particular did a meta-analysis of all that had been done to that point and drew what have proved to be startling accurate predictions for public health.

Whilst increases in diseases and illnesses have been steady for about four decades – **statistics are now indicating that since the last 15 years we are seeing, worldwide, a** marked increase in cancers, cardiac illness, obesity, diabetes, asthma, allergies in children, short term memory problems and sleeplessness, to name but a few. The medical fraternity is particularly concerned by the growing incidence of unexplained cancers; two Australian neurosurgeons in 2009 admitted that there is an epidemic of brain tumours - one that includes children. In fact the word 'epidemic' is repeatedly used to describe the global health collapse.

There are many potential causes of illness – genetic and hereditary factors, as well as environmental pollutants such as chemicals. Nevertheless *the only completely new pollutant in the past 10 – 15 years that coincides with the sudden spike in adverse health trends is electromagnetic radiation (EMR).*

With millions of antennas and satellites continually irradiating the global population for the past 15 years, these are in the spotlight as a clear source, being the only new pollutant affecting populations globally.

Since this report was begun, there has been a growing awareness of the problems, and some effort to address them. Frank Clegg, **former President of Microsoft Canada, is now an advocate for wireless radiation safety**, leading an organisation called Canadians for safe Technology.<sup>1</sup>

The human body has its own sensitive electrical system – one that is easily affected by the artificial radiation which penetrates our bodies daily. "The human body", says Dr. G. J. Hyland of the University of Warwick, UK, "is an electrochemical instrument of

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<sup>1</sup> <http://www.c4st.org/>

exquisite sensitivity,” noting that, like a radio, it can be interfered with by incoming radiation.

New Zealand physicist Dr Neil Cherry began his work as an electromagnetic radiation (EMR) meta-analyst when he was asked by a residential group contesting the siting of a mobile phone tower if he would be their expert witness. He consequently studied over 600 researchers worldwide, and was shocked to discover that EMR caused DNA breakages, chromosome aberrations, increased oncogene activity in cells, altered brain activity, altered blood pressure and increased brain cancer at very low levels – much lower than those allowed by the Australian standard. He also found that EMR impacts on the pineal gland, thus resulting in a reduction of melatonin - a vital regulator of many of the body’s biochemical and hormonal systems and functions and a major scavenger of damaging free radicals.<sup>2</sup>

Dr Cherry went on to make numerous media appearances, travelling to many countries around the world, speaking to scientists, individuals and communities about the potential dangers to health from EMR; the only scientist to have done this so comprehensively and consistently. He also took time to discuss his findings with industry and government authorities, tirelessly explaining that biological effects were being found both in the laboratory and in populations that were well below the government’s exposure standard. He did this until he died in 2003.

In 1997 Dr Cherry was invited to address the Australian Senate. Immediately after this address, the then telecommunications Minister, Richard Alston, who had attended, returned to the Senate and accused Dr Cherry of being a snake oil merchant and a charlatan.

However, since that day it has become evident that every single health failure that Cherry predicted has eventuated. His findings have been replicated many times since, and have proved to be prophetic: cancer, leukaemia, cardiac disease, diabetes, sleep disturbances, dementia, weight gain or loss, weakened immune system, asthma, allergies, arthritis, nausea, memory and concentration problems, neurological conditions, and depression – all on a sharp rise. The conditions and diseases he warned of are either endemic or increasing; but unfortunately health authorities appear not to be making the connection between these and EMR.

Dr Cherry also found that microwaves can render the blood brain barrier permeable, thus allowing damaging chemicals, viruses and bacteria into the brain which can cause illnesses such as dementia and brain tumours.

**Over 40 studies [show] that cell phone frequencies [mirror] the biological and epidemiological studies for EMR over the past four decades. This includes...increased brain cancer. I predict a significant increase in brain tumours in younger groups than normal from the use of mobiles.<sup>3</sup>**

**Dr Neil Cherry.**

Recently, Dr Cherry’s work has been confirmed by a group of 14 scientists and public health and policy experts who in August 2007 published a 650 page assessment and

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<sup>2</sup> Cherry, N., 2000: *Evidence that Electromagnetic Radiation is Genotoxic: The Implications for the Epidemiology of Cancer, Cardiac, Neurological and Reproductive Effects.*

<sup>3</sup> Cherry, 2000, *Probable Health effects Associated with base Stations in Communities: The Need for Health Surveys*, p.1

review of the science and public health implications of exposure to EMR called **The BioInitiative Report**.<sup>4</sup> This highly comprehensive report has been widely distributed and accepted as being a true and accurate picture of the current state of the science on EMR and health. They found that:

*“Prolonged exposure to radiofrequency and microwave radiation from cell phones, cordless phones, cell towers, WI-FI and other wireless technologies has been linked to interference with short-term memory and concentration, sleep disruption, headache and dizziness, fatigue, immune disruption, skin rashes and changes in cardiac function. However, “These effects can happen with even very small levels of exposure if they occur on a daily basis. Cell phone use is likely to be more harmful in children whose brain and nervous system development can last into late adolescence,” says Cindy Sage of Sage Associates, “The public health implications of billions of people who are exposed makes this a matter of critical concern to policy-makers around the world.”<sup>5</sup>*

They found that the existing public safety limits were inadequate for both low-frequency electromagnetic fields and radiofrequency radiation.

In 2001 an **Australian Senate Committee** handed down a report that had heard from a wide variety of scientists – many of whom voiced their concern for public health at the results of the research being conducted. During the Senate hearings Dr Cherry said:

*“I was very surprised there is so much published evidence in reputable, peer review journals that has not been sighted, summarised or integrated. The more I received the more solid the evidence seemed to be and the more consistent it seemed to be. And so when I heard people saying that the evidence was weak and inconsistent, I decided I should debate this with people and go to conferences and talk to them about it. ... This culminate last year at the conference at the European Parliament where I was asked to look particularly at low level effects and epidemiological studies with those response relationships of low level effects. ... Over 20 studies show that radiofrequency microwave radiation damages the genes, damages the chromosomes, damages the DNA, and therefore indicates genotoxicity. I am also aware that many studies only use small samples – they are epidemiological studies or laboratory samples. They find elevated levels but they are not specifically significant and they are often described as showing no effects. But I have supplied with my evidence a summary of brain tumour studies, and I have characterised them as studies showing elevated effects, studies showing significantly elevated effects and studies showing dose response effects. And that is a classical way, I believe, at looking at the evidence trail and asking: was it elevated, was it significantly elevated and have we found dose response elevation?”<sup>6</sup>*

As far back as 1994 Australia’s CSIRO produced a 150 page literature review - probably the first in the world - on the health effects from EMR.<sup>7</sup> The report’s author,

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<sup>4</sup> BioInitiative Working Group, Cindy Sage and David O. Carpenter, Editors: *BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Fields (ELF and RF)* at [www.bioinitiative.org](http://www.bioinitiative.org), August 31, 2007.

<sup>5</sup> [http://www.bioinitiative.org/press\\_release/index.htm](http://www.bioinitiative.org/press_release/index.htm)

<sup>6</sup> [http://www.aph.gov.au/senate/Committee/ecita\\_ctte/completed\\_inquiries/1999-02/emr/report/c02.htm](http://www.aph.gov.au/senate/Committee/ecita_ctte/completed_inquiries/1999-02/emr/report/c02.htm)

<sup>7</sup> Barnett, S., 1994, *Status of Research on Biological Effects and safety of Electromagnetic Radiation: Telecommunications Frequencies*, CSIRO, Division of Radiophysics.

Dr Stan Barnett, said: "whilst researching the scientific database in preparation for this report it has become evident that subtle changes in cell structure and biochemistry have been frequently reported at exposure levels where gross thermal change could not be attributed as a cause."

The fact that some studies have shown no effects is partly due to the fact that many are undertaken or funded by those with vested interests, and partly due to the nature of what is under investigation; electricity is a highly volatile element that is inaccessible to the senses and thus not like any other element that must be scientifically examined.

### **Health trends**

A group of scientists and doctors in Germany presented evidence at a conference in 2002 showing "a dramatic rise in severe and chronic diseases among our patients exposed to radiofrequency and microwave radiation". These included extreme fluctuations in blood pressure, heart attacks and strokes in increasingly younger people, degenerative brain diseases such as Alzheimer's and epilepsy, leukaemia and brain tumours. They also found a rise in headaches, sleeplessness, tinnitus and other ailments that were able to be correlated with the onset of exposure to communications microwaves (see Appendix C).

In 2007 The Australian Institute of Health and Welfare announced that the five leading causes of non-fatal illness in Australia were diabetes, ischemic heart disease, dementia, asthma, anxiety and depression. As 90 per cent of diabetes cases are related to weight gain this could be included as a sixth.

**I have no doubt in my mind that, at the present time, the greatest polluting element in the earth's environment is the proliferation of electromagnetic fields.**

**Dr Robert O. Becker, Nobel Prize winner, 2000<sup>8</sup>**

Since then other scientists have conducted further studies showing similar results. One, published in August 2007, indicates that mobile phone radiation causes cancer in mice<sup>9</sup>, and yet another in the same year, with scientists at the Weizmann Institute of Science in Israel finding that after only five minutes of exposure to radiation one tenth of the power of a mobile phone, rat and human cell chemicals underwent changes. This study is unique in that it demonstrates for the first time a "detailed molecular mechanism by which electromagnetic radiation from mobile phones induces activation of extracellular-signal-regulated kinase (ERK) cascade and thereby induces transcription and other cellular processes."<sup>10</sup>

In 2005 researchers in China found that relatively low-level RF radiation can lead to DNA breaks<sup>11</sup>, and in 2004 the REFLEX project, which summarised the work of 12 research groups in seven European countries, reported that RF radiation could increase the number of DNA breaks in exposed cells, as well as activate a stress response – the production of heat-shock proteins. The manager of the project, Franz

<sup>8</sup> <http://www.energyfields.org/science/becker.html>

<sup>9</sup> Oberto G, et al, 2007: *Carcinogenicity Study of 217 Hz Pulsed 900 MHz Electromagnetic Fields in Pim1 Transgenic Mice*. *Radiat Res*; 168 (3): 316 - 326

<sup>10</sup> Friedman et al, 2007: *mechanism of fort-term ERK activation by electromagnetic fields at mobile phone frequencies*, *Biochemical Journal*, 405, 559-568, printed in UK.

<sup>11</sup> Lixia S., et al, 2006: *Effects of 1.8 GHz radiofrequency field on DNA damage and expression of heat shock protein 70 in human lens epithelial cells*. Volume 602, Issues 1-2, 1 135-142

Adlkofer, said: "...available scientific evidence of such critical events demonstrates the need for intensifying research – precautionary measures seem to be warranted."<sup>12</sup>  
There are many such studies.

Dr Peter French, of St Vincent's Hospital in Sydney, was able to replicate earlier findings, indicating that mobile phone radiation switched on heat shock proteins:

**In plain English, the point is that it has been demonstrated by several researchers that increasing the amount of heat shock proteins in cells results in the increased potential for developing tumours, increased stimulation of metastasis or spread of cancers, the direct development of cancer, de novo, and the decreased effectiveness of anti-cancer drugs.**

**Dr Peter French, Principal Scientific Officer, Centre for Immunology, St Vincent's Hospital, Sydney<sup>13</sup>**

In the USA Marshall and Wetherall<sup>14</sup> found an exponential increase of autism, ADHD, Chronic Fatigue Syndrome and Alzheimer's since 1984 - the year the first commercial cell phone networks started to spread across the USA. These rates increased even further with the switchover from analog (1G) to digital (2G) in the early 1990s.

In February 2007 Swedish scientists announced in the *European Journal of Cancer Prevention* that they had observed a connection between the health of the population and population density, suggesting that the two factors having the strongest correlation with decreased health quality were the estimated average power output from mobile phones...and the reported coverage from the global system for mobile communication base stations in each country."<sup>15</sup>

This was confirmed by the German company ECOLOG's report which was commissioned by telecommunications company T-Mobil in 2000. The results of this research - leaked to British group HESE in 2006 - found that cancer, DNA damage, chromosome aberrations, changes to enzymes, changes in the brain, interruption of cell cycle and cellular communication, debilitation of the immune system and changes to the central nervous system were caused by exposure to EMR.

Around a dozen studies in 2006 and 2007 demonstrated similar results, including one that found the signal from a mobile phone affecting genes and neurons in both 'on' and 'off' modes,<sup>16</sup> while another found "some evidence of nervous system structural damage after the EMR exposure".<sup>17</sup>

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<sup>12</sup> Diem, E., et al, 2005: *Non-thermal DNA breakage by mobile-phone radiation (1800 MHz) in human fibroblasts and in transformed GFSH-R17 rat granulosa cells in vitro*, 2004.

<sup>13</sup> The Parliament of the Commonwealth of Australia, 2001: *Inquiry into Electromagnetic Radiation, Report of the Senate*,

<sup>14</sup> Marshall 2001, Weatherall 2007.

<sup>15</sup> Hallberg, O., 2007: *Adverse health indicators correlating with sparsely populated areas in Sweden*; *European Journal of Cancer Prevention*. 16(1):71-76.

<sup>16</sup> Zhao, TY et al, 2007: *Studying gene expression profile of rat neuron exposed to 1800 MHz radiofrequency electromagnetic fields with cDNA micro assay*. *Toxicology*, 235 (3): 167 - 175

<sup>17</sup> Orendacova, J., et al 2007: *Neurobiological effects of microwave exposure: a review focused on morphological findings in experimental animals*; *Arch Ital Biol*, 145(1):1-12.

**Is it really wise and safe to subject ourselves to whole-body irradiation, all around the clock and wherever we are, with the same mobile radiation which laboratory studies have shown to cause serious injuries and effects?**

**Olle Johansson, Ph.D. Neuroscientist, Karolinska Institute, Stockholm, Sweden<sup>18</sup>**

In April 2009 the European Parliament announced that mobile phone antennas, masts and other EMR emitting devices should be set within a specific distance from schools and health institutions. Based on a report adopted by the European Parliament, the recommendations were that whilst there were many benefits of wireless technology there were “Continuing uncertainties about possible health risks”.

A scientific paradigm change is urgently needed. In his book **The Structure of Scientific Revolutions** (1962), Thomas Kuhn discusses the nature of science, scientific research and methodology and paradigms, how conceptual changes come about, and what prevents them. In the introduction<sup>19</sup> he says:

*“The most obvious examples of scientific revolutions are those famous episodes in scientific development that have often been labeled revolutions before.... Copernicus, Newton, Lavoisier and Einstein. More clearly than most other episodes...these display what all scientific revolutions are about. Each of them necessitated the community’s rejection of one time-honoured scientific theory in favour of another incompatible with it...each transformed the scientific imagination in ways that we shall ultimately need to describe as a transformation of the world within which the scientific work was done. Such changes, together with the controversies that almost always accompany them, are the defining characteristics of scientific revolutions.”*

However,

*“The invention of other new theories regularly, and appropriately, evokes the same response from some of the specialists on whose area of special competence they impinge. For these men the new theory implies a change in the rules governing the prior practice of normal science. Inevitably, therefore, it reflects upon much scientific work they have already successfully completed. That is why a new theory, however specialist range of application, is seldom or never just an increment to what is already known. Its assimilation requires the reconstruction of prior theory...an intrinsically revolutionary process that is seldom completed by a single man and never overnight”.*

”Normal science, for example, often suppresses fundamental novelties because they are necessarily subversive of its basic commitments.”

## **Freiburger Appeal**

(Signed by 58 doctors and medical specialists in 2002 - see Appendix C)

“Out of great concern for the health of our fellow human beings do we - as established physicians of all fields, especially that of environmental medicine - turn to the medical establishment and those in public health and political domains, as well as to the public.

We have observed, in recent years, a dramatic rise in severe and chronic diseases among our patients, especially:

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<sup>18</sup> <http://www.energyfields.org/>

<sup>19</sup> Kuhn, Thomas S., *The Structure of Scientific Revolutions*. Chicago: The University of Chicago Press, 1962.

- Learning, concentration, and behavioural disorders (e.g. attention deficit disorder, ADD)
- Extreme fluctuations in blood pressure, ever harder to influence with medications
- Heart rhythm disorders
- Heart attacks and strokes among an increasingly younger population
- Brain-degenerative diseases (e.g. Alzheimer's) and epilepsy
- Cancerous afflictions: leukaemia, brain tumours
- Headaches, migraines
- Chronic exhaustion
- Inner agitation
- Sleeplessness, daytime sleepiness
- Tinnitus
- Susceptibility to infection
- Nervous and connective tissue pains, for which the usual causes do not explain even the most conspicuous symptoms.

Since the living environment and lifestyles of our patients are familiar to us, we can see, especially after carefully-directed inquiry, a clear temporal and spatial correlation between the appearance of disease and exposure to pulsed high -frequency microwave radiation”.

# 1 *Cancer*

By 2006 there were an estimated 106,000 new cases of cancer diagnosed in Australia, a 34 per cent increase over the past decade. The Australian Institute of Health and Welfare (AIHW) said in June 2008 that the number of cancers being diagnosed each year is growing faster than the overall population.

And in September 2007 David Whiteman, senior research fellow at the Queensland Institute of Medical Research announced that a rapid rise in oesophagus cancer is linked to obesity. It's a real increase in cancer which you just don't see in epidemiological lifetimes," he said. "It's unprecedented to see a cancer come up so quickly".

## ***Mobile Phone Tower Cancer Clusters***

In 2002 Tory leader in the UK, Iain Duncan Smith, called for an urgent government probe into the link between mobile phone masts and cancer after it emerged that people living in five of the seven homes surrounding a building in Woodford with 16 masts on its roof have contracted cancer.

The incidence of leukaemia near these masts is also far higher than would be expected normally, according to statistics. There was a significant decline in the incidence of all cancers the further residents lived away from the masts.

**It is clear from my reading of the scientific literature and from experiments which I have conducted, that there is the strong possibility that biological effects may be induced by long term exposure to low levels of microwaves and radiofrequency fields.**

**Dr Peter French, Australian Senate Inquiry, 2001.**

Also in the UK Dr John Walker from Sutton-Coldfield compiled three cancer cluster studies around mobile phone towers from Devon, Lincolnshire, Staffordshire and the West Midlands. He was convinced they showed a potential link between the angle of the beam of radiation emitted from the masts' antennae and illnesses discovered in local populations.<sup>20</sup> Dr Sutton first noticed a high number of specific cancers in the early 1990s. Out of 18 houses in one street ten people were diagnosed with one form of cancer. He said the odds of three such clusters occurring were one in a billion. The epidemiological figures show that, within 1.4 miles of the Sutton-Coldfield mast, the number of adult leukaemia cases was nearly double what would normally be expected.

In April 2007 The Sunday Times reported that seven clusters of cancer and plus serious illnesses had been discovered around mobile phone towers in the UK.

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<sup>20</sup> <http://www.timesonline.co.uk/tol/news/uk/article1687491.ece>

In 2003 Telecom company Orange suspended operations at a school phone mast site in Paris after eight cases of cancer were confirmed among children in the district.

Near Cardiff in Wales at least eight residents in the parish of St Georges and St Brides died of cancer over five years, and in every one of the 10 houses on a residential street close to the Sandy Heath transmitter in Bedfordshire, there has been a cancer death.

In 2006 17 people around a mobile phone tower in Norfolk County in the US reported symptoms of microwave sickness – including headaches, fatigue, nausea and dizziness since the installation of the tower. The tower was removed.<sup>21</sup>

**An industry funded study found in 1997 that of the exposed mice, 43% developed cancer, compared to 22% in the control group.<sup>22</sup> This was regarded by biomedical scientists around the world as highly significant.**

**“...it may indicate that in individuals genetically predisposed to certain forms of cancer, the long-term intermittent exposure to RF such as those used by mobile phones may be an important stimulus in the induction of malignancy.”**

**Peter French, Principal Scientific Officer, Centre for Immunology, St Vincent’s Hospital, Sydney, 2001<sup>23</sup>**

In the UK in 1999, analysis conducted for The Sunday Times by Professor Gordon Stewart, one of Britain’s leading epidemiologists, showed there may be a significant increase in the risk of cancers, including leukaemia, associated with mobile phone masts. The study revealed an increased incidence of cancer within up to 7km of masts. Subsequent inquiries unearthed clusters in London, Bedfordshire, south Wales and the Midlands. People in one area near the mast were found to be 33 per cent more likely to suffer from cancer. Studies of the sites show high incidences of cancer, brain hemorrhages and high blood pressure within a radius of 400 yards of mobile phone towers.

In Warwickshire, a cluster of 31 cancers were found around a single street, and a quarter of the 30 staff at a special school within sight of a 90ft high mast had developed tumours since 2000, while another quarter suffered significant health problems.

The tower was pulled down by the mobile phone company after the presentation of the evidence by local protesters. While rejecting any links to ill-health, the company admitted the decision was “clearly rare and unusual”.

- A health survey carried out in Spain in 2004 around two GSM mobile phone towers showed “statistically significant positive exposure-response associations between the E-field and fatigue, irritability, headaches, nausea, loss of appetite, sleeping disorder, depressive tendency, feeling of discomfort, difficulty in concentration, loss of memory, visual disorder, dizziness and cardiovascular problems.”<sup>24</sup> According to the Mast Sanity group in the UK, 47 cancer clusters have been reported around schools in Spain.

<sup>21</sup> EMR Australia; newsletter.

<sup>22</sup> Repacholi, M., 1997, *Lymphomas in Eμ-Pim1 transgenic mice exposed to pulsed 900 MHz electromagnetic fields*, *Radiat Res* 1997; 147 (5): 631 – 640.

<sup>23</sup> EMR Inquiry: Chapter 2, p. 83, 2001, Op cit.

<sup>24</sup> Oberfeld, et al, 2004: *The Microwave Syndrome: Further Aspects of a Spanish Study*

**A study instigated by the President of the Federal Agency for Radiation Protection in Germany from 1999 until 2004 found that after five years operation of the mobile phone tower, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the tower compared to the residents outside the area<sup>25</sup>.**

- Two studies carried out in 2004 around transmitters in Israel found a threefold increase of cancers within a 400 m radius of transmitters, and for breast cancer a tenfold increase was found. As a result, two lawsuits were filed for 33 people who lived close to phone towers who consequently contracted cancer and leukaemia in that year.<sup>26</sup>
- In 2006 an Egyptian study found that “Inhabitants living near mobile phone base stations are at risk of developing neuropsychiatric problems and changes in the performance of neurobehavioral functions – either by facilitation or inhibition”.<sup>27</sup>
- In France researchers found that people living within 300m of a base station suffered from tiredness, headaches, sleep disruption, and within 100m irritability, depression, loss of memory, dizziness, and loss of libido.<sup>28</sup>

In 2005 the Nobel Prize winning Irish Doctors Association listed 70 research papers showing the dangers from low level microwaves. Dr. Santini listed 20 similar studies, the EM Radiation Research Trust listed 9 studies, Dr. Blackwell listed 6 similar studies in his report, and finally, four international universities completed the Spanish Study which verified all of the known illnesses.

**Public health surveys of people living in the vicinity of cell site (mobile phone) base stations should be being carried out now, and continue progressively over the next two decades. This is because effects such as ...cardiac disruption, sleep disturbance, reduced immune system competence, cancers and leukaemia are probable<sup>29</sup>**

**Dr Neil Cherry”, 2001.**

- A study published in 2007 by Mina Ha of Dankook University in South Korea found that “children living within 2km of an AM transmitter had more than twice

<sup>25</sup> Eger, H., et al, 2004: *The influences of being physically near a cell phone transmission mast on the incidence of cancer*: Umwelt Medizin Gesellschaft, 2004.

<sup>26</sup> Wolf and Wolf, 2004: *Increased Incidence of Cancer near a Cell Phone Transmitter Station*, International Journal of Cancer Prevention, Vol 1, No 2.

<sup>27</sup> Abdel-Rassoul, G., et al 2006: *Neurobehavioral effects among inhabitants around mobile base stations*, NeuroToxicology, doi:10.1016/j.neuro.012.

<sup>28</sup> Santini, R., et al, 2002: *Study of the health of people living in the vicinity of mobile phone base stations: Influences of distance and sex*, Pathol Biol 50: 369-73.

<sup>29</sup> Cherry, N., 2001, *Probable Health effects Associated with base Stations in Communities: The Need for Health Surveys.*, p. 2.

the risk of developing leukaemia, compared to those living more than 20km away.”<sup>30</sup>

- Communities living near the Vatican radio transmitter north of Rome have reported high rates of cancer – with twice the usual rate of childhood leukaemia within six kilometres of the radio station. The incidence of both decreased with distance from the antennas.<sup>31</sup>
- In 2000 Australian Dr Bruce Hocking presented the findings of a health study done on residents within a 4km zone surrounding Sydney TV towers. He found that children living within this radius had a 60 per cent higher incidence of leukaemia than children who lived further from the towers - with a far greater risk of dying from the disease. Dr Hocking also found a slightly increased rate of adult cancer in the study area than beyond it.<sup>32</sup>

**When you turn on the body's defence mechanism against disease, which the non-ionising radiation does, and you keep turning it on every day, you down-regulate it and it no longer turns on.  
Professor Ted Litovitz, 1999<sup>33</sup>, Catholic University of America, 1999.**

In October 2007 a cancer cluster of 10 people was discovered on the top floor of a hospital in Israel, and also one in Mt Kuringai in Sydney, Australia, also in 2007.

Yurekli AI, et al, 2006. *GSM base station electromagnetic radiation and oxidative stress in rats.*, Tubitak-Uekae, EMC TEMPEST Test Centre, Gebze-Kocaeli, Turkey.

Kwee, S., et al, 1998: *Changes in cell proliferation due to environmental non-ionizing radiation* Bioelectrochem Bioenerg; 44 (2): 251 – 255

### **Brain cancer**

Professor Jillian Birch of Manchester University said in 2001 that cancers such as brain tumours and leukaemia are on a sharp rise in children.

In 2008 another Swedish study by Leif Salford found that mobile-phone exposure caused brain damage in lab rats. They found damage to neurons in rat brains exposed to radiation from mobile phones, saying radiation from GSM mobile phones, which are prevalent around the world, was associated with leakage in the blood-brain barrier.<sup>34</sup>

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<sup>30</sup> Ha, M., et al' 2007: *Radio-Frequency Radiation Exposure from AM Radio Transmitters and Childhood Leukaemia and Brain Cancer*, American Journal of Epidemiology.

<sup>31</sup> Micheleozzi, P., et al, 2002; American Journal of Epidemiology 155(12):1096-103.

<sup>32</sup> Hocking, B., et al 1996: *Cancer incidence and mortality and proximity to TV towers.*, Medical Journal of Australia.

<sup>33</sup> <http://www.feb.se/Bridlewood/NEWS1999.HTM>

<sup>34</sup> Salford, L., *Cognitive impairment in rats after long-term exposure to GSM-900 mobile phone radiation.* Bioelectromagnetics 2008; 29(3):219-32.

The number of brain tumour cases in the US and Europe has increased by up to 40% in 20 years to 2003, according to data released at a medical conference in Italy in 2003.<sup>35</sup> The incidence rate for brain tumours is increasing among people of all ages, but males between 20 and 40 years old are the most affected, according to Dr. Alba Brandes, an oncologist at the Azienda-Ospedale in Padua. "The latest epidemiological studies indicate that white collar workers--intellectuals and professionals--are among the most affected," he said. "The reason is still unknown, though environmental causes such as cellular phones, computers and exposure to electromagnetic fields cannot be ruled out".

- In Qatar, a developing country, scientists found a slight rise in brain tumours between 2004 and 2005<sup>36</sup>.
- In Melbourne in 2006 seven people at the Royal Melbourne Institute of Technology (RMIT) developed brain tumours two floors underneath transmitting antennas. They had been working there for ten years.
- In 2006 Hardell also found that "for all studied phone types an increased risk for brain tumours, mainly acoustic neuroma and malignant brain tumours."<sup>37</sup>
- In 2007 the Swiss Federal Agency for Environment issued a report that said: "it has to be generally regarded as possible that intensive long-term use of mobile telephones could to an increased risk of brain tumours."<sup>38</sup>
- Also in 2007 officials in Belgium and Germany called for a ban on mobile phone use by children under 16, due to the ongoing evidence of harm. Some doctors in Vienna are displaying warning notices in their surgeries.<sup>39</sup>

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<sup>35</sup> Oncolink Cancer News, 2003: *Brain tumour incidence on the rise in U.S. and Europe*.

<sup>36</sup> Salahaldin and Bener, 2006: *International Tinnitus Journal*, 12(2):145-8.

<sup>37</sup> Hardell, L., et al; 2006: *Tumour risk associated with use of cellular telephones or cordless desktop telephones*. *World Journal of Surg Oncology*, 11. doi: 10.1186/1477-7819-4-74.

<sup>38</sup> Swiss Agency for the Environment, Forests and Landscapes, 2005: *Electrosmog in the Environment*.

<sup>39</sup> EMR and Health: 2006 Vol 2, No 1 & 2.

- In January 2007 the *International Journal of Cancer* published a study that found a higher incidence of brain tumours on the same side of the head the phone was used after ten or more years of exposure,<sup>40</sup> and in 2007 a meta-analysis by Swedish researcher Hardell published on the *Occupational Health and Environmental Medicine* website also found that the long term risk of such tumours was two-and-a-half times higher than would normally be expected.<sup>41</sup>
- In Finland researchers showed that using a mobile phone decreased blood flow in the brain.<sup>42</sup>
- An Italian study found that mobile phones temporarily excite the neurons in the part of the brain closest to the phone.<sup>43</sup>
- In September 2008 a new study by Lennart Hardell from the University Hospital in Orebro in Sweden found that mobile use increases cancer risk in children. It reports that “children who use mobile phones are five times more likely to develop brain tumours than those who don’t. Professor Hardell recommends the implementation of the precautionary principle.
- At a forum in November 2008 run by the Australian Centre for RF Bioeffects Research, Professor Bruce Armstrong, head of Public Health at Sydney University concluded that the results in so far from the Interphone study would indicate that the Precautionary Principle should be implemented in the case of children and mobile phones.

**Over 40 studies [show] that cell phone frequencies [mirror] the biological and epidemiological studies for EMR over the past four decades. This includes...increased brain cancer. I predict a significant increase in brain tumours in younger groups than normal from the use of mobiles.**

**Dr Neil Cherry<sup>44</sup>**

<sup>40</sup> Lahkola et al, 2005: *Mobile phone use and risk of acoustic neuroma: results of the Interphone case-control study in five North European countries*, British Journal of Cancer, 93 (7): 842 - 848

<sup>41</sup> Hardell, L., et al, 2007: *Long-term use of cellular phones and brain tumours - increased risk associated with use for > 10 years*, Occupational Environ Med. Published Online First: doi:10.1136/oem.2006.029751.

<sup>42</sup> Aalto, S et al: 2006. J Cereb Blood Flow Metab,

<sup>43</sup> Rossinin, P., et al: 2006, Annals of Neurology,

<sup>44</sup> Cherry, N., 2000: *Evidence that Electromagnetic Radiation is Genotoxic: The Implications for the Epidemiology of Cancer, Cardiac, Neurological and Reproductive Effects.*

In 2009 two neurosurgeons in Australia, Dr Charlie Teo in Sydney and Dr Vini Khurana in Canberra, publicly stated that they are finding a brain tumour epidemic, and that young children are also presenting with brain cancer. They both attribute the epidemic to mobile phone use. Dr Teo replied to a direct question on this on ABC TV: “Personally, I think there probably is. There’s an association, and the association is quite compelling...we know that EMR – electromagnetic radiation – is going to take at least 10 years to create brain tumours and probably longer, 15 to 20 years. So if you pull out studies that have followed patients for more than 10 years it becomes really, really compelling, that link.”

In April 2009 the Office of National Statistics in Britain announced that brain tumours were the leading cause of childhood deaths in Britain, and that more money was needed for brain tumour research. This coincided with the launch of Brain Tumour Research - a coalition of 14 charities which believe that “research is woefully under funded. Kevin O’Neill, a consultant neurosurgeon at Imperial College London, said: “Brain tumours are on the increase....in my unit we have seen the number of cases nearly double in the past year.”<sup>45</sup>

On October 19, 2012, an Italian court ruled that a man’s brain tumour was the result of his heavy use of a mobile phone over a 12-year period, the first case of successful litigation.<sup>46</sup>

Likewise, in March 2013 an Israeli man successfully sued his phone company after contracting cancer in one of his ears. The lawsuit included a medical opinion linking mobile use and his tumour.

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<sup>45</sup> Davies, Caroline: The Guardian: *child cancer deaths led by brain tumours*, 26 April 2009.

<sup>46</sup> Thomson Reuters, 2011.

**Symptoms of reduced immune system competence, cardiac problems, especially of the arrhythmic type and cancers, especially brain tumour and leukaemia are probable.<sup>47</sup>**

**Dr Neil Cherry, 2000.**

The **Interphone project** is a multi-national series of epidemiological studies testing whether using mobile phones increases the risk of various cancers in the head and neck. The project comprises national studies from 13 different countries, which are coordinated by the International Agency for Research on Cancer (IARC), an agency of the World Health Organisation (WHO). It found that “people who use mobile phones for more than ten years have nearly 40 per cent chance of developing brain tumours on the side of the head against which they hold their phones”. The German team reported a 2.2-fold increase in the incidence of glioma tumours amongst those who had used a mobile phone for at least ten years. 48 teams from Denmark, Sweden and the UK have already reported their results, which some observers interpret as indicating a long term risk. This study has become extremely controversial, with scientists from the 13 countries involved feuding as to how to interpret the results. It is generally regarded that the results will embarrass the IARC.

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<sup>47</sup> Ibid.

<sup>48</sup> Microwave News, January 2006.

## **Breast cancer**

According to the Australian Bureau of statistics, breast cancer was the most commonly diagnosed new cancer in women in 2001, with prostate cancer in men the most common.<sup>49</sup>

The Australian Institute of Health and Welfare Cancer Monitoring Unit said that the number of women diagnosed with breast cancer has more than doubled in the past 20 years - increasing from 5,318 women in 1983 to 12,027 women in 2002.<sup>50</sup>

In America, the Federal Centre for Disease Control in the US has said that cancer is the leading cause of premature loss of life among American women - and that breast cancer was the leader in that category.

According to the Breast Cancer Fund's "State of the Evidence" report, approximately half of all breast cancers are caused by environmental factors, including radiation.<sup>51</sup>

This is directly connected to the role of melatonin in the body, which has been shown to have anti-cancer properties. For example, adding melatonin to cancer cells in a laboratory dish will cause them to stop growing. Placing the same dish in an electromagnetic field will cause the cells to start growing again. Research has also shown that night shift work may increase the risk of breast cancer by lowering melatonin levels. At least three studies suggest a link between night-shift work and increased risk of breast cancer.

**...Over 20 studies show that both through reducing melatonin and through enhancing free radical activity, EMR is genotoxic, damaging the DNA and chromosomes, causing cells to mutate thus causing cancer in exposed populations.**

**Dr Neil Cherry<sup>52</sup>, 2001**

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<sup>49</sup> Australian Bureau of Statistics: *Cancer in Australia: A Snapshot, 2004-05*

<sup>50</sup> Media Release, Australian Institute for Health and Welfare May 2006.

<sup>51</sup> Breast Cancer Fund & Breast Cancer Action, San Francisco, 2006: *State of the Evidence, What is the connection between the environment and breast cancer*, 4<sup>th</sup> edition

<sup>52</sup> Senate Inquiry 2001: Op cit. Ch. 2, 2.44.

In Brisbane, Queensland, from 1995 until 2008 17 women working night shift for ABC TV in the same room contracted breast cancer.

In July 2007 a Sydney hospital announced it was investigating a possible cancer cluster after five female staff members were diagnosed with breast cancer within six years. Management at Concord Hospital in Sydney's west revealed it launched a preliminary investigation into cancer patterns among staff. Five female workers were diagnosed with the disease between 2001 and 2006. A drop in melatonin levels has been specifically connected with increases in breast cancer<sup>53</sup>

**“There is sufficient evidence to classify a causal relationship between EMR and breast cancer, with melatonin reduction as the biological mechanism.”**

**Dr Neil Cherry<sup>54</sup>, 2001.**

In 2003 Norwegian researchers reported an increased risk of breast cancer among female telegraph operators exposed to RF/EMF. Premenopausal women showed an increased risk of oestrogen-receptor-negative tumours. Premenopausal women appear to be at higher risk than postmenopausal women.

Another Norwegian study also showed a 60 percent increase in breast cancer risk in women of all ages living near high voltage power lines.<sup>55</sup>

Cleary, S., et al, 1990, *Glioma Proliferation Modulated in Vitro by Isothermal Radiofrequency Radiation Exposure*, *Radiation Research*, Vol. 121, No. 1 (Jan., 1990), pp. 38-45

### **Oesophageal Cancer**

Oesophageal cancer in men has risen by 50 per cent since 1983. At that time, only 9 in every 100,000 men were diagnosed with oesophageal cancer, but now 14 in every 100,000 are diagnosed. It is less common in women.

### **Bowel Cancer**

A study done by the Royal Melbourne Hospital announced in June 2010 that the cost in treating the huge increase in bowel cancer would cost the government \$1 billion in 2011, compared to the \$235 million spent in 2001. [incomplete]

### **Male Breast Cancer**

Although breast cancer is rare in men, a number of studies point to a connection between EMR exposure and male breast cancer. A recent literature review on male breast cancer also identifies exposure to EMR as a risk factor.<sup>56</sup>

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<sup>53</sup> Blask, D., 2005, *Melatonin-Depleted Blood from Premenopausal Women Exposed to Light at Night Stimulates Growth of Human Breast Cancer Xenografts in Nude Rats*, *Cancer Research* 65, 11174-11184.

<sup>54</sup> Ibid

<sup>55</sup> Breast Cancer Fund, Op cit 2006.

<sup>56</sup> Ravandi-Kashani F, Hayes T.G, 1998: *Male breast cancer: a review of the literature*. Elsevier: Volume 34, Number 9, pp. 1341-

In 2001 three cases of male breast cancer showed up in the same office. A law suit was filed – the attorney arguing that the cancers were caused, at least in part, by an electrical substation that was next to the basement office where the men worked. He said that the odds of this happening were a trillion to one.

**There is a large and coherent body of evidence of biological mechanisms that support the conclusion of a plausible, logical and causal relationship between EMR exposure and cancer, cardiac, neurological and reproductive health effects.**

**Dr Neil Cherry, 1999.**

Another recent phenomenon is the appearance of male breasts. It was reported in July 2007 that breast reduction operations on men have risen, by 22 per cent rise over the past 12 months.

Pollan M, et al, *Breast cancer, occupation, and exposure to electromagnetic fields among Swedish men.* Am J Ind Med 2001, 39 (3): 276-85

Demers, et al 1991, *Occupational Exposure to Electromagnetic Fields and Breast Cancer in Men,* American Journal of Epidemiology Vol. 134, No. 4: 340-347

**Further, there is accumulating epidemiological evidence indicating an increased brain tumour risk from long term use of mobile phones, the first RF EMF that has started to be comprehensively studied.**

**The Benevento Resolution, 2002<sup>57</sup>**

Many researchers have also found that mobile phone users reported symptoms of burning or a dull ache in temporal, occipital or auricular areas, headache, concentration problems, discomfort, memory loss, burning skin, tingling and tightness.<sup>58 59 60</sup>

In January 2009 France began to introduce legislation to prohibit the sale of mobile phones to children. Finland has also taken action, with the Finnish Radiation and Nuclear safety Authority recommending their use restricted among children

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<sup>57</sup> The Benevento Resolution – see Appendix A.

<sup>58</sup> Mild, et al, 1998, *Mobile phone use and subjective symptoms. Comparison of symptoms experienced by users of analogue and digital mobile phones.*, Occup Med (Lond) 51(1):25-35, 2001

<sup>59</sup> Hocking, B., 1998, *Preliminary report: symptoms associated with mobile phone use*, Occup Med (Lond);48(6):357-360

<sup>60</sup> Chia et al, 2000, *Prevalence of Headache among Hand-Held Cellular Telephone Users in Singapore: A Community Study*, Environmental Health Perspectives Volume 108, Number 11.

## Prostate and Testicular Cancer

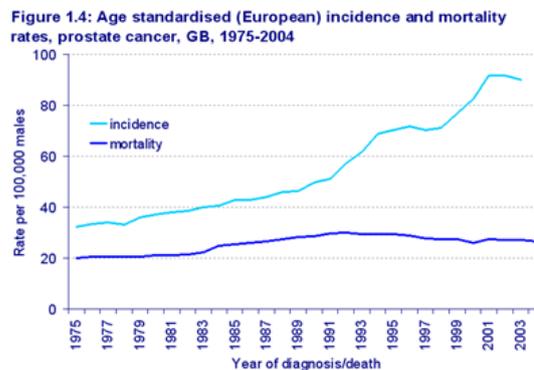
In 2003 prostate cancer was named by the AIHW as one of the most common cancers in Australia.

An Australian Institute for health and Welfare report shows that rates of prostate cancer have risen 42% in the past five years, pushing up the number of prostate cancer cases by 50% to an estimated 18,700 in 2006.<sup>61</sup>

**There is a large and coherent body of evidence of biological mechanisms that support the conclusion of a plausible, logical and causal relationship between EMR exposure and cancer, cardiac, neurological and reproductive health effects.**

**Dr Neil Cherry<sup>62</sup>, 2000.**

Figures from Europe show a dramatic rise in the incidence of prostate cancer from 1993 to 1999. (See diagram).



Also showing effects:

Dasdag, S, Ketani, MA, Akdag, Z, Ersay, AR, Sar, i I, Demirtas ,OC, Celik, MS, 1999: *Whole-body microwave exposure emitted by cellular phones and testicular function of rats*. Urol Res 27(3):219-223.

<sup>61</sup> Australian Prostate Cancer Website: [http://www.prostatehealth.org.au/newsitem.html?notice\\_id=497](http://www.prostatehealth.org.au/newsitem.html?notice_id=497).

<sup>62</sup> Cherry: 2000, Op cit.

## 2 *Autism*

**M**ore children than ever before are being diagnosed with autism spectrum disorders (ASDs), in fact in the last two decades, autism prevalence, as reported in the scientific literature, has increased by more than 600%.

A few decades ago autism struck 1 in 10,000 children, according to Kerry Crofton, PhD.

As the number of children with autism in the America continues to rise, a report released on March 29<sup>th</sup>, 2012, by the Centre for Disease Control and Prevention shows that 1 in 88 American children has some form of autism spectrum disorder. That's a 78% increase compared to a decade ago, according to the report.

This marks a 23% increase since the last report in 2009. And, a 78% increase since the first report in 2007. Some of the increase is due to the way children are identified, diagnosed and served in their local communities, although exactly how much is due to these factors is unknown.

Then in 2013 new National Interview Survey (national telephone surveys conducted by the CDC in America) shows that, between 2007 and 2011 – 2012, the prevalence of parent-reported autistic children between 6- to 17-years-old increased from 1.16 percent in 2007 to 2 percent – or, from 1 in 88 to 1 in 50.

In 2009 the journal *Scientific American* wrote that California's sevenfold increase in autism cannot be explained by changes in doctor's diagnoses, but is likely to be due to environmental causes.<sup>63</sup>

"It's time to start looking for the environmental culprits responsible for the remarkable increase in the rate of autism in California," said Irva Hertz-Picciotto, an epidemiology professor at University of California, Davis, who led the study.<sup>64</sup>

The scientists who authored the new study advocate a shift in autism research to focus on potential factors in the environment that babies and fetuses are exposed to, including pesticides, viruses and chemicals in household products.

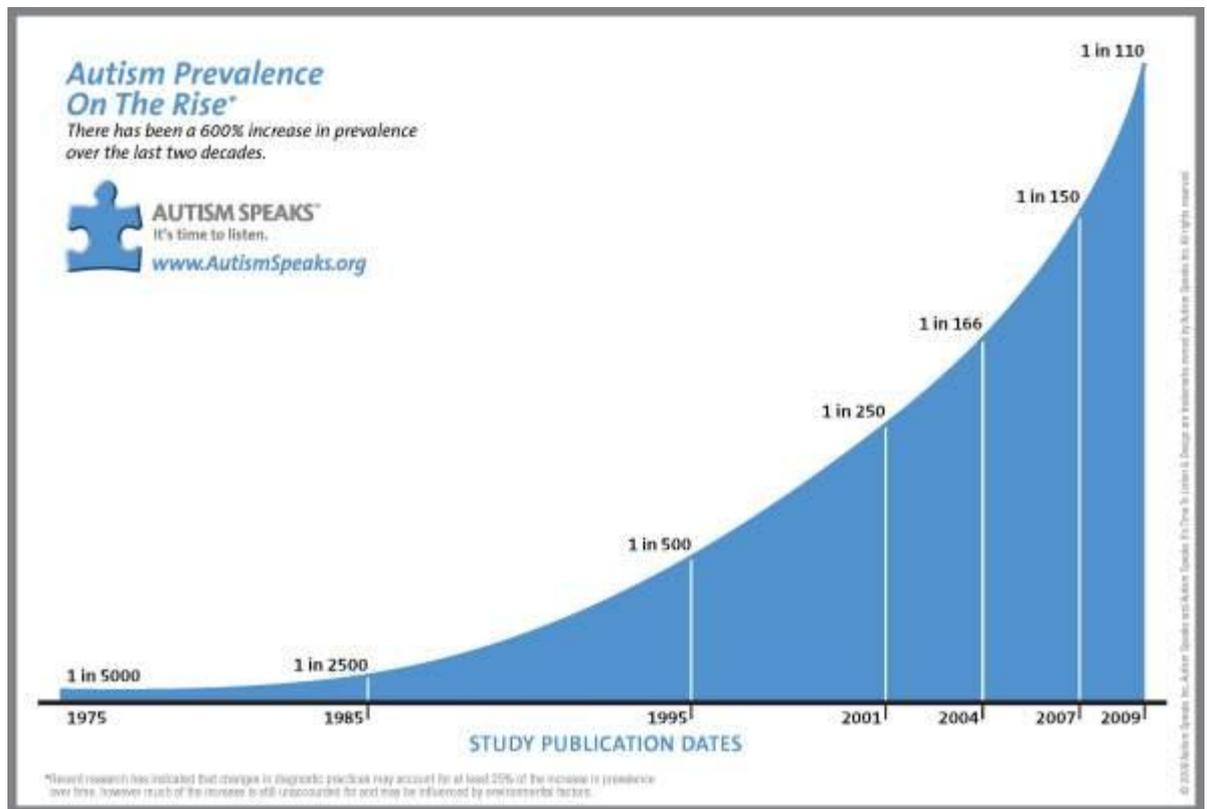
Martha Herbert of the Harvard School of Medicine, one of the world's leading autism experts, wrote to the Los Angeles School board, discouraging the use of

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<sup>63</sup> Marla Cone, *New Study: Autism linked to Environment*, *Scientific American*, January 8, 2009

<sup>64</sup> *Ibid*

Wi-Fi saying that “wireless radiation from Wi-Fi and cell towers can exert a disorganising effect on the ability to learn and remember, and can also be destabilising to immune and metabolic function.”



A report in the New York Times said that the likelihood of a school-aged American child receiving a diagnosis of autism, Asperger syndrome or a related developmental disorder increased 72% in 2011-12 from 2007, according to a phone survey of parents released in March 2013 by the Centre for Disease Control and Protection and the Health Resources and Services Administration.<sup>65</sup>

**Autism Spectrum Disorders are approaching epidemic proportions; there has been a significant increase in diagnoses of autism spectrum disorders, including Asperger’s Syndrome. It makes you wonder if there are other reasons for the increase such as genetics or environment. Given that EMR has been shown to damage DNA, this makes sense.**

**Professor Bruce Tonge, Monash University, Melbourne, Australia, 2010.**

<sup>65</sup> Jan Hoffman, *Parental Study Shows Rise in Autism Spectrum Cases*, March 20, 2013.

# 3

## Diabetes and Obesity

A staggering one billion of the world's population of 6.45 billion is overweight, warned the World Health Organisation in 2005. And rates of overweight and obese people are rising dramatically in poorer countries, not just wealthy nations.<sup>66</sup>

In the US in 1991 no state had obesity rates above 20 per cent. By 2000, 28 states had obesity rates less than 20 per cent, and in 2005 only four states had prevalence rates of less than 20 per cent, according to data collected by America's Centre for Disease Control in 2005.

And in October 2010 the charity Diabetes UK announced that the number of people with diabetes had soared to 150,000 in one year alone, and one in 20 adults in Britain now have diabetes. The Guardian newspaper quoted the charity as saying that these figures were "shocking".<sup>67</sup> They say there is a strong link between diabetes and obesity.

According to a trial by Australia's George Institute for International Health over six years to 2000, diabetes is emerging as one of the greatest threats to the health of populations worldwide. As of 2010, more than 1.7 million Australians are affected by this condition.

**Magda Havas, Environmental Science Professor at Trent University in Canada, found in 2006 that blood sugar levels in diabetes rise and fall in accordance with the electrical environment.<sup>68</sup>**

In Australia a West Australian Health Department survey reported in June 2000 that 793,000 West Australian children aged between five and 15 are estimated to be overweight or obese, putting them at risk of not just heart disease as they get older but also the crippling bone disease arthritis.

In July 2010 it was reported in the Sunday Mail (Melbourne) that the director of international research at the Baker IDI Heart and Diabetes Institute, Professor Paul Zimmet, said that the fact that "children under 10 were being diagnosed with type 2 diabetes highlighted the urgent need for governments to act. We used to teach young doctors that this is a disease only seen in those over 60, but we're now seeing 6 year-olds being diagnosed, and the average age is now between 30 and 35".

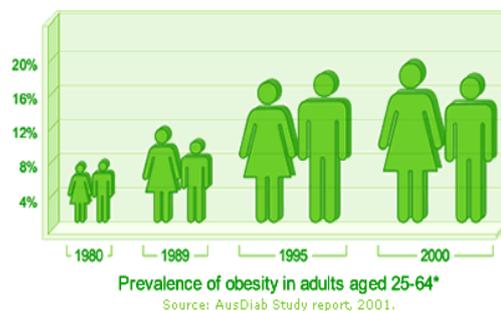
The Auditor General reported in 2007 that these conditions just keep on rising. An estimated 90 per cent of new diabetes cases are attributed to weight gain, which according to the Australian Bureau of Statistics is now 52 per cent of all Australians. Since the 1980s the amount of overweight and obese Australian children has more than doubled. It is estimated that at least 60% of Australians aged 18 years and over

<sup>66</sup> Population Reference Bureau: [www.prb.org/Articles/2005/ObesityCreepingUponLessDevelopedCountries.aspx](http://www.prb.org/Articles/2005/ObesityCreepingUponLessDevelopedCountries.aspx)

<sup>67</sup> The Guardian: *Diabetes and obesity rates soar to 'shocking' rates* 25<sup>th</sup> October, 2010.

<sup>68</sup> Havas, M., 2006, Electromagnetic Hypersensitivity: Biological Effects of Dirty Electricity with Emphasis on Diabetes and Multiple Sclerosis. *Electromagnetic Biology and Medicine*, 25: 259-268.

will be overweight or obese by 2010. Diabetes has risen 77 per cent in Victoria since 2001. The following diagram indicates the sudden rise in obesity from about 1994.



In July 2007 obesity researchers at the Garvan Institute in Sydney reported that a pain-killing chemical produced by the brain may be causing the body to “pile on fat”. Researchers have found that chemicals in the brain are influenced by EMR.

**Dr Russell Reiter’s book (1994) on melatonin lists several illnesses that result from reduced melatonin. The first is arthritis, then diabetes, and cancer... Dr Neil Cherry<sup>69</sup>, 2000.**

- In 2004 a health survey from 1988 to 2000 by the US Heart, Lung and Blood Institute was published in *The Journal of the American Medical Association* said the US was struggling to control the growing rate of childhood obesity, with children and adolescents' blood pressure levels climbing sharply.
- Scientists in 2006 found that dysfunctional mitochondria will interfere with the cellular energy production and can be linked to fatigue - and possibly obesity<sup>70</sup>
- In November 2008 it was reported by the Royal Australian and New Zealand College of Obstetricians and Gynaecologists that there was a huge rise in obese pregnant mothers. “We’re seeing women who are bigger than we’ve ever seen before, and the increase has really been quite dramatic over the last five years,” said ChrisineTippett, President.
- In April 2009 in South Australia it was reported that women’s bra sizes are increasing, with many Australian companies extending cup size to meet growing consumer demand. Triumph (lingerie) have said that 55 per cent of the women’s underwear manufacturer’s sales to retailers were of cups D and larger – a 10 per cent rise from five years ago. The most common size last year was 14C – compared to 12B in 2004.
- “When I launched my first lingerie collection 10 years ago, 10 – 14B used to be our bestsellers by a mile,” said Jupi Corporation’s Bruno Schiavi. Now our bestsellers are 12 – 16C, 16D and 16DD.<sup>71</sup> Melatonin regulates the endocrine system, and thus hormone levels.

<sup>69</sup> Reiter, R.J., 1994: *Melatonin suppression by static and extremely low frequency electromagnetic fields: relationship to the reported increased incidence of cancer*. Reviews on Environmental Health, 10(3-4): 171-86.

<sup>70</sup> Xie et al, 2004; Goldberg G, 2006; Buchachenk et al, 2006.

<sup>71</sup> The Advertiser, April 2009.

- The results of an ABS survey released in May 2009 found that there was a significant increase in the proportion of obese children, from 5.2 per cent in 1995 to 7.8 per cent in 2007 – 8. Whilst poor dietary habits and long hours in front of a computer would be other variables, it is open to speculation why these trends have only been seen in the past 10 to 15 years.

**Researchers in Japan have been able to induce obesity in rats by producing microwave-induced lesions to an area of hypothalamus. They noted a drop in hypothalamic norepinephrine and dopamine and a decrease in adrenal epinephrine – a potential cause of obesity.<sup>72</sup>**

With obesity being linked to the endocrine system it does not take a large leap to see that the hormonal system could also be being interfered with in such a way as to cause the onset of early puberty. A study by the Cincinnati Children's Hospital and published in the journal *Paediatrics* in 2010 found that the number of girls who have developed breast by the age of seven has doubled since 1997. This study found that one in four black girls, and one in ten white girls had developed breasts by the age of seven. This is part of a string of studies indicating that girls in the US are reaching puberty sooner.<sup>73</sup>

Another unexpected change in physiology has been reported by Cryan and Dinan at the Laboratory of Neurogastroenterology, University College, Cork, Ireland. In their abstract "Mind altering microorganisms: the impact of the gut microbiota on brain and behaviour" they say: "Recent years have witnessed the rise of gut microbiota as a major topic of research interest in biology. Studies are revealing how variations and changes in the composition of the gut microbiota influence normal physiology and contribute to diseases ranging from inflammation to **obesity**."<sup>74</sup>

Could electromagnetic radiation be influencing the growth and development of such microorganisms?

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<sup>72</sup> Takahashi, et al 1994: *Obesity and Insulin Resistance in Human Growth Hormone Transgenic Rats*, *Endocrinology* Vol. 139, No. 7 3057-3063

<sup>73</sup> The Guardian, October 2013.

<sup>74</sup> Cryan & Dinan: *Mind-altering microorganisms: the impact of the gut microbiota on brain and behaviour*, *Nat Rev Neurosci*, October 2013.

# 4 Heart Disease, Strokes, and High Blood Pressure

**G**lobally, high blood pressure was one of the top three leading modifiable risk factors of disease in 2005, along with tobacco and alcohol. But new research from The George Institute for International Health<sup>75</sup> has shown that high blood pressure now causes up to 66% of cardiovascular diseases such as heart disease and stroke in the Asia-Pacific Region.

In Australia in 2007, the Baker Heart Research Institute's Professor Simon Stewart sent medical staff into shopping centres around the country to measure the blood pressure of 15,000 people. The preliminary findings were that 42 per cent of Australians now have high blood pressure - up from 35 per cent in 2000.

In the US, almost a third of all adults suffer from high blood pressure - a dramatic rise over the past decade. A recent report in *Hypertension: Journal of the American Heart Association* indicates that some 65 million adults were diagnosed with high blood pressure in 2004, versus 50 million 10 years ago. (New York Times, June 2004).

Also in 2004 a health survey from 1988 to 2000 by the US Heart, Lung and Blood Institute and published in *The Journal of the American Medical Association* mentions the fact that in children and adolescents blood pressure levels are climbing sharply.

A survey done by the British Heart Foundation for the UK's National Health Service in 2002 claimed the number of people living with heart failure has risen by 15 per cent.<sup>76</sup> A mechanism for this was proposed by Professor Russell Reiter, one of the world's leading researchers on melatonin, who summarises its role as being vital for healthy sleep, reducing cholesterol and blood pressure, and therefore the incidence of strokes.<sup>77</sup>

In an attempt to address this problem in March 2009 it was reported at the American College of Cardiology's Congress in Florida that Melbourne researchers have developed a new surgical technique to "zap" the nerves around the kidneys to dramatically reduce high blood pressure. The problem is....a time bomb," associate Professor Markus Schlaich of the Baker IDI Institute.

High blood pressure has routinely been found amongst those living around phone towers in the UK<sup>78</sup>

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<sup>75</sup> George Institute for International Health 2005: *High blood pressure the culprit in 2 out of 3 heart attacks and strokes in the Asia-Pacific.*

<sup>76</sup> Muntner, P., et al: *Trends in Blood Pressure among Children and Adolescents*, Journal, of the American Medical Association, 2004; 291:2107-2113..

<sup>77</sup> Russell and Robinson, 1995: *Melatonin: your body's natural wonder drug*, New York Bantam Books.

<sup>78</sup> Op cit,

In 2012 the Center for Disease Control found that 1 in 3 Americans suffered from High Blood Pressure, and more than half don't have it under control – with most people having seen a doctor at least twice in the previous year, yet their condition remained unchanged. “High Blood Pressure is public health enemy number 2 after tobacco” said Frieden in a teleconference on Tuesday (Sept 2012)<sup>79</sup>

**In 1998 Braune et al found increases blood pressure as a result of exposure to EMR<sup>80</sup> Dr Neil Cherry, 1999.**

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<sup>79</sup> Centre for Disease Control and Protection, 2012.

<sup>80</sup> Braune, S. et al, 1998: *Resting blood pressure increase during exposure to a radiofrequency electromagnetic field.* Lancet 351 (9119):1857-1858.

## 5 Asthma, Allergies and Arthritis

A report published in the *Medical Journal of Australia* in July 2007 claimed that young children are being admitted into hospital with severe food allergies at five times the rate of a decade ago. The report's author, Dr Ray Mullins, who also works as a practitioner in Canberra, noted a 12-fold increase in childhood allergies in the last couple of years.<sup>81</sup> In 2010 Dr Mullins said 15,000 would be born in that year that would develop a potentially fatal food allergy, which, he said, translates to 65,00 children with allergies before they reach school age. "It's a public health problem of epidemic proportions", he said.

In 2001 there had been a 25 per cent rise in asthma in Sydney, with an increase in the death rate by 5 per cent.

A report by the Australian Institute of Health and Welfare in 2005 found that asthma is the most common chronic disease among children up to the age of 14.<sup>82</sup>

The National Jewish Medical and Research Centre in Denver reported that after reunification, West Germans were found to be far more allergic than their eastern counterparts, even though industrial pollution was so much higher. Many researchers and scientists were - and still are - puzzled by this fact, but what they failed to examine is the fact that East Germany had much stricter regulations regarding ambient radiation levels than West Germany. Since East Germany adopted West Germany's standards, allergies in former East Germany have since reached par with the levels of former West Germany.

**In 1997 Dr Peter French, discovered that the production of histamine – the chemical responsible for allergic reactions and which is involved in bronchial spasm - is nearly doubled after exposure to mobile phone frequencies. He predicted that this could result in an increase in illnesses such as asthma and allergies in the years to come.<sup>83</sup>**

Extremely Low-Frequency electromagnetic fields (ELFs) such as those from powerlines, domestic wiring and electrical appliances have also been shown to increase the number of mast cells in the body that are implicated in asthma.<sup>84</sup>

**Dr. John Holt ... pointed out that mobile phone frequencies double the amount of histamines and thus cause asthma and allergies.<sup>85</sup>**

<sup>81</sup> Mullins, 2007: *Paediatric food allergy trends in a community-based specialist allergy practice, 1995–2006*, Medical Journal of Australia.

<sup>82</sup> Australian Institute for Health and Welfare: *Selected Chronic Disease among Australia's Children*, 2005

<sup>83</sup> French, P., et al (1997): *Electromagnetic Radiation at 835 MHz changes the morphology and inhibits proliferation of a human astrocytoma cell line.*

<sup>84</sup> Rajkovic et al, 2003: *Histological and stereological analysis of cutaneous mast cells in rats exposed to 50 Hz EMF*, 6<sup>th</sup> International Congress of the European Bioelectromagnetics Association (EBEA), Budapest, Hungary, November 13-15, (abstract).

<sup>85</sup> FEB - The Swedish Association for the Electrosensitive <http://www.feb.se/ARTICLES/TheGoldenGoose.html>

## **Arthritis**

More children are suffering from arthritis than ever before. Unpublished data released in June, 2007 from a study conducted jointly by the American College of Rheumatology and the American Academy of Paediatrics for the Centre for Disease Control and Prevention states that nearly 300,000 children in the United States have arthritis. The Bloorview MacMillan Children's Centre in Toronto states that this number is "probably an underestimate", since it only takes into account those children who have actually been diagnosed with arthritis.

An Australian study confirms that the rate of childhood arthritis is four to six times higher than rates typically quoted

Data released in the *Medical Journal of Australia* showed that there was a jump of 46 per cent of arthritis cases between 1990 and 1995. "There is a clear indication of a dramatic growth in the prevalence of arthritis in people aged 24 and over", said Dr Kenneth Muirden of the Arthritis Foundation of Australia.

***Multiple observations of melatonin reduction in EMR-exposed populations mean that EMR exposure increases the incidence of arthritis, diabetes, cancer, reproductive, neurological and cardiac disease and or death, as identified by Reiter and Robinson.***

**Dr Neil Cherry<sup>86</sup>, 2000.**

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<sup>86</sup> Cherry, N., 2000, *EMR Reduces Melatonin in Animals and People*

# 6 Alzheimer's Disease

Someone develops Alzheimer's every 72 seconds, according to America's 2007 Alzheimer's Association report. The Alzheimer's Association reported that in 2007 there were more than 5 million people in the United States living with Alzheimer's disease - a 10 percent increase from the previous nationwide estimate of 4.5 million. In September 2010 it was reported in the International Herald Tribune that a report commissioned by Alzheimer's Disease International that the global cost of dementia is likely to exceed \$604 billion. They also estimate that as of 2010 35 million people have dementia worldwide, and that at the current rate of growth this will double every 20 years with 66 million by 2030 and 115 million by 2050. Professor Martin Prince: "...it is massive social issue".

15 years ago Alzheimer's disease was considered a rare condition. What has happened in the interim?

The American Diabetes Association also warned in an address to the Association's 67th Annual Scientific Sessions, held June 2007 in Chicago, that today's mushrooming diabetes epidemic will become tomorrow's Alzheimer's epidemic – there is a direct link between these illnesses.

In the UK, experts from the Alzheimer's Society have predicted this year that rising rates of obesity will lead to dramatic increases in the number of people with Alzheimer's disease. Obesity, smoking, high blood pressure and cholesterol all increase the risk of dementia because they lead to damage of the blood vessels in the brain, which in turn leads to the death of brain cells.<sup>87</sup>

**Melatonin plays a vital free radical scavenging role in the brain where, because it is high in iron, has a high production rate of hydroxyl radicals (OH). Free radical damage is now known to play a formative role in most brain disorders, including Alzheimer's disease, Multiple Sclerosis and Parkinson's disease<sup>88</sup>.**

**Dr Neil Cherry, 2000.**

In June 2007 neurologist Sudha Seshadri of Boston University found that diabetes speeds — and may even cause — Alzheimer's disease. The central problem in diabetes is the body's inability to regulate blood sugar through the hormone insulin.<sup>89</sup>

Exposure to EMR has also been shown to affect an abnormal drop in the levels of the neurotransmitter acetylcholine.<sup>90</sup> A drop in the levels of this neurotransmitter has been linked to a number of neurological and neuromuscular disorders - including Alzheimer's disease.

<sup>87</sup> BBC News: <http://news.bbc.co.uk/1/hi/health/6249174.stm>

<sup>88</sup> Cherry, N., 2000, *Evidence that Electromagnetic Radiation is Genotoxic: The implications for the epidemiology of cancer and cardiac, neurological and reproductive effects*

<sup>89</sup> WebMD: <http://www.cbsnews.com/stories/2007/06/26/health/webmd/main2984847.shtml>

<sup>90</sup> Modak et al 1981, Dutta et al 1992, Omura & Losco 1993, Testylier et al 2002, Gautier et al 2003

Several studies by Salford and his colleagues<sup>91 92</sup> demonstrated the permeability of the blood brain barrier, and in 2003 another study showed that mobile phones damage key brain cells and could trigger the early onset of Alzheimer's disease. They found that radiation from mobile phone handsets damages areas of the brain associated with learning, memory and movement. "We have good reason to believe that what happens in rat's brains also happens in humans", he said.<sup>93</sup>

***EM fields alter the levels of protective proteins.... these protective proteins are related to Alzheimer's and that a reduction in protective proteins means a greater probability of Alzheimer's....there is data out there that appears to relate the incidence of Alzheimer's to exposure to electromagnetic fields. .***

**Professor Ted Litovitz<sup>94</sup>, 2000**

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<sup>91</sup> Persson, B.R.R., Salford, L.G. and Brun, A., 1997: *Blood-brain barrier permeability in rats exposed to electromagnetic fields used in wireless communication*. Wireless Network 3: 455-461.

<sup>92</sup> Ibid

<sup>93</sup> Salford, L., Op cit, 2003.

<sup>94</sup> Senate Inquiry: Op cit 2000, Ch 2, 2.60.

# 7 *Depression, Anxiety, and Suicide*

The number of young people battling depression has doubled in 12 years, according to a report in 2002 from the Joseph Rowntree Foundation in the UK.

Mood disorders such as depression and anxiety can be attributed to a variety of variables such as emotional and psychological issues, drug and alcohol abuse, stress and poor diet - however I mention them in this context as they are also implicated by the research into EMR.

It was reported that in the US by the Anxiety Association of America (ADAA) that more than 40 million suffer from anxiety disorders, with the younger generation being more affected.

It is also worth noting that extreme alcohol consumption amongst the young has risen exponentially in recent years. In October 2010 Alcohol Concern reported that hospital figures show a 32 per cent increase in four years from 2003 to 2007. One teenager was quoted in a report in the Guardian newspaper as saying: "I took overdoses of alcohol and drugs as I was depressed...I drank to make myself feel better."

Likewise, a substantial body of research showing depression as an outcome has also been done on the effects of powerlines, electrical sub-stations, and domestic wiring as well as RF radiation from wireless technology.

A report by the US government shows a sudden sharp rise in youth suicide rate with a similarly sudden 18 per cent rise for suicides from 2003 to 2004 among the under 20s, from 1,737 to 1,985. The rise is largely driven by increases in deaths among older teenagers, and is apparently a reversal of a trend that was showing a steady decline in the 10 years before that.

In June 2009 The Australian Institute of Health and Welfare released a report that said that the rate of children aged 10 to 14 hospitalised for intentional self harm rose from 30 per 100,000 in 1998-99 to 41 per 100,000 in 2006-7. These new figures suggest a growing prevalence of anxiety, depression and other mental issues among young people at an earlier age. One should note that young people are the greater users of wireless technology than older people.

Microwave exposure has been shown to cause a decrease of 5-HT in the blood. 5-HT is a precursor to the production of the brain hormone serotonin. Low levels of serotonin have been linked to anxiety and depression.

Changes in the levels of the brain hormone, dopamine have also been shown to be connected with microwave radiation and other EMF exposure<sup>95</sup> A drop in dopamine levels has also been linked with depression<sup>96</sup>

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<sup>95</sup> Mausset-Bonnefont et al 2004, Sieron et al 2004

<sup>96</sup> Brown & Gershon: 1993.

## Suicide

Britain was shocked in 2012 with a 15 per cent rise in suicides. However, although this is also being blamed on the recession – such things have been lived through in the past without loss of life. In fact, it often made those affected more resourceful and creative.<sup>97</sup>

In 2012 it was reported in the UK that a talented musician from Oxford who was only 36, killed himself due to the pain and extreme discomfort he felt from microwave devices in particular that gave him a “constant zapping” in his head.<sup>98</sup>

In 2012 it was reported in the UK that 3,471 people had taken their lives which was a rise of 15 per cent compared to 2007. This was blamed on the recession and bankruptcy.<sup>99</sup>

Similarly, in Greece in 2012, suicide rates rose by a third. Since 2010, 2,500 people had taken their lives, although the number is believed to be much higher. Once with the lowest suicide rate in Europe, sun-blessed Greece has seen suicide rates skyrocket. Whilst the economic situation has been dire, it is not the first time the Greeks have seen hard times.<sup>100</sup>

The Centres for Disease Control (CDC) also revealed in 2012 that the numbers of attempted suicides among teenagers had increased from 6.3 per cent in 2009 to 7.8 in 2011

New Pentagon data show that US troops were killing themselves at the rate of nearly one a day in 2012, 18% above 2011's corresponding toll. This is eclipsing the US population – a reversal of the situation of previous years. It is interesting to note that an increasing amount of military personnel keep large amounts of wireless devices close to the bodies of soldiers for long periods of time.

**Suicide is a result of deep clinical depression. High voltage powerline exposure is associated with clinical depression, Verkasalo et al (1997), and suicide, Perry et al. Neil Cherry says that: “EMR interacts and interferes with communication systems in our brains, hearts, cell and bodies through neurotransmitters and neurohormones, including the serotonin/melatonin system”).<sup>101</sup>**

A report by SSentif Intelligence said in 2012 that new research shows that the number of cases in England of depression and other forms of mental illness, reporting that some primary care trusts (PCTs) have reported more than a 40% rise in the number of people seeking treatment over the past three years. The sharpest rise involves cases of depression, with the number of affected patients rising 11% nationwide. Almost one

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<sup>97</sup> Rethink Mental Illness 25 May, 2012.

<sup>98</sup> The Sun newspaper, 2013.

<sup>99</sup> Daily Mail online, May 2012.

<sup>100</sup> Alan Hall, Reuters, August 2012.

<sup>101</sup> Evidence given to Australian Senate Inquiry, 2000.

in ten people now suffer from depression, with south-west Essex reporting a 52% increase in the number of registered patients between 2008-9 and 2010-11.<sup>102</sup>

Judy Aldred a spokesperson for the data firm said: “We have to remember that the real numbers are likely to be much higher as many people do not seek GP support for their conditions”.<sup>103</sup>

**Dr Cherry found that melatonin reduction, clinical depression and suicide are all significantly dose-response related to EMR exposure<sup>104</sup>.**

**“Along with sleep disruption and brain tumour, this constitutes a very strong and coherent set of data supporting a causal relationship between ELF to RF/MW exposure, including mobile phone usage, and neurological illness”.**

**2000**

A recent study has found that microorganisms in the gut: “...that show a role for the gut microbial in the regulation of **anxiety**, mood, cognition and pain.”<sup>105</sup>

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<sup>102</sup> SSentif Press Release: The Great Depression: is the UK facing a mental health crisis? October /2012

<sup>103</sup> Ibid

<sup>104</sup> Cherry 2000, *Evidence that Electromagnetic Radiation is Genotoxic: The implications for the epidemiology of cancer and cardiac, neurological and reproductive effects*, p. 32.

<sup>105</sup> Cryan & Dinan, *Mind-altering microorganisms: the behaviour of the gut microbiota on brain and behaviour*. Nat rev Neurosci, Oct, 2013.

# 8

## Sleep Disturbance

There are various causes of sleeplessness – but there is little doubt that this problem is on the rise.

A study conducted around the Schwarzenburg radio and TV tower in Switzerland in the mid 1990s showed that the local population suffered from insomnia and other neurological problems such as nervousness, weakness, tiredness, restlessness and aching limbs<sup>106</sup> whilst the tower was operating, but resumed normal sleeping patterns when it was switched off. Dr Cherry explained that this was due to reduced melatonin levels caused by exposure to the signal.

Symptoms of sleep deprivation range from weight gain to irritability, hallucinations and depression, Professor Russell Foster, of Oxford University, told the Cheltenham Science Festival.

A recent study of 2000 women by Britain's National Sleep Foundation found that 70 per cent of the women experienced regular ongoing sleep problems, with men only 52 per cent. In the US in 2006, 42 million people (one in five) took medication to help them sleep – up 60 per cent since 2000.

In July 2008 The Centre for Community Child Health at the Murdoch Children's Research Institute reported that "thousands of Australian children....aged six and seven have trouble sleeping, and their disturbed slumber has a drastic effect on their health, behaviour and ability to learn..."

Another study reported in 2008 reported that "Sleep deprived teenagers are at greater risk of high blood pressure and future heart attacks – and their mobile phones, computer games and iPods could be to blame".

- In 1996, researchers K. Mann and J. Röschke in Neuropsychobiology, pointed out that REM sleep plays a special physiological role for information processing in the brain.<sup>107</sup> Resting EEG patterns have shown a shortening of REM sleep and a strengthening of alpha waves.
- Hutter et al<sup>108</sup> found that people living near mobile phone towers suffered from headaches, tiredness, sleep disturbance, loss of memory, dizziness, and difficulty in concentrating.

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<sup>106</sup> Swiss Agency report: Op cit.

<sup>108</sup> Hutter, et al; 2000: *Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations.*

**They were sampling melatonin before and after the tower was permanently turned off and they found a significant rise in melatonin after the tower was turned off. They found a dose response increase in sleep disturbance. When the tower was turned off experimentally, the sleep quality improved and melatonin rose in animals. Dr Neil Cherry<sup>109</sup>, 2000**

In Oberlindern in Germany in 2003 a radio tower was closed down due to complaints from the locals, who complained the signal was keeping them awake.<sup>110</sup>

Recent studies from Spain, France and the UK around the mobile phone towers in found that sleep problems were among the symptoms experienced.

Also showing effects:

Fritzer G, J et al, 2007: *Effects of short- and long-term pulsed radiofrequency electromagnetic fields on night sleep and cognitive functions in healthy subjects*, Bioelectromagnetics;28:316-325.

Vecchio, F et al, 2007, *Mobile phones change brain wave patterns*, Eur J Neurosci 25(6):1908-1913

Borbely, A et al, 1999: *Pulsed high-frequency electromagnetic field affects human sleep and sleep electroencephalogram*. Neurosci Lett 275(3):207-210.

**... I have found more than 30 studies showing chromosome damage in people exposed to radiofrequency microwave radiation. This is far more than we have for benzene, which is a carcinogen.**

**Dr Neil Cherry, 2000.**

A few years ago melatonin in tablet form had to be imported from the US – but now in Australia it can be found in every chemist and health food shop. Why? Because information that insomnia is a result of the inhibition of melatonin by EMR is now a part of life

In a report published by the NHS in England in My 2012 it was revealed that stress-related insomnia was on the rise and spending 50 million pounds a year on drugs. Last year Freedom of Information Inquiries found that 15.3 million prescriptions were handed out compared with 14.5 in 2007-8. Last year the NHS spent 49 million pounds on sleeping drugs – up from 43 million three years previously. Dr Andrew McCulloch of the Mental Health Association has said that the most likely explanation in stress-related insomnia due to the economic crunch. However such situations have arisen throughout history with pout any such documented effects.<sup>111</sup>

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<sup>109</sup> Senate Inquiry: Op cit, 2001, Ch.2, 2.87.

<sup>110</sup> mX newspaper, Melbourne 2007.

<sup>111</sup> National Health Service, UK, 2012 & the Mental health Foundation, 2012.

# 9

## Cognition impairment

One of the most worrying developments in recent times is the apparent “dumbing down” of intelligence.

A recent study suggests that since the Victorian era, human beings have lost on average 14 IQ points. Study co-author Dr Jan te Nijenhuis, professor of work and organisational psychology at the University of Amsterdam.....

Dr Gerald Crabtree, a leading geneticist from Stanford University in the US in a paper published in the journal Trends in Genetics, Dr Crabtree says unavoidable changes in our genetic makeup, combined with advances in technology have caused us to become a mutation of our former human selves, and a lot less brighter than our human ancestors. He blames this on processed food and pesticides, all of which are no doubt big contributors.

Additionally, in their recent study on the influence of the impact of gut microbiota on physiology, Cryan & Dinan found that: “Studies in germ-free animals and in animals exposed to pathogenic bacterial infections, probiotic bacteria or antibiotic drugs suggest a role for the gut microbiota in the regulation of anxiety, mood, **cognition** and pain.”<sup>112</sup>

As many adverse conditions and illnesses are due to neurological impairment, as well as DNA damage, Chromosome damage, leakage of the blood brain barrier and interference with the production of Melatonin, it is not surprising that not only is human intelligence is being overwhelmed by this energy, but that other behavioural disorders are also on the rise – such as domestic violence.

**Dr Cherry informed the committee that in his view there is now sufficient evidence to show that EMR interacts and interferes with communication systems in our brains, hearts, cells and bodies through neurotransmitters and neurohormones, including the serotonin/melatonin system.**

**Neil Cherry, Senate Inquiry into Electromagnetic Radiation, May 2001.**<sup>113</sup>

This may also explain the sudden rise in domestic violence. The war against DV was meant to have been won, reported the Guardian newspaper in 2012. Citizens Advice of the UK, said that a worrying increase was occurring, with an 11% increase on 2011 figures; 3,300 incidents were reported between October and December 2012.

According to Home Office figures, 1.2 million women in the UK experienced domestic abuse last year, including half a million victims of sexual assault.

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<sup>112</sup> Ibid.

<sup>113</sup> Report of the Senate Environment, Communications, Information Technology and the Arts Reference Committee: Australian Parliament, 2001.

**The World Health Organisation (WHO) has declared recently that Domestic Violence has now reached epidemic proportions.**

A worldwide study showed that study showed that physical or sexual violence is a public health problem affecting more than one-third of women.

At the time of writing, it is Domestic Violence Awareness Week. In the UK, the Borough of Croydon, former borough commander David Musker said domestic violence was at “epidemic” levels – and it has risen since, according to the latest crime statistics. The figures show that 3,095 domestic crimes took place in the 12 months up to August, a rise of 23 per cent rise on the year before. They suggest figures could be higher, due to “Massive under-reporting”.

This spike in violence follows a downturn in DV from 1995 until 2004, according to Justice Department figures in the US.

Another unexpected, but hardly surprising development is the rise in dog violence and dog attacks. There has been "unprecedented rise" in the number of dog attacks and related incidents in Stevenage, according to recently released figures reported by the UK's BBC.

A SHARP rise in cases of postmen being bitten by dogs has been seen across the Luton area in the UK, where there has been an 85 per cent increase in cases of postmen and women being bitten by dogs with a total of 24 being bitten, up from 13 cases reported in the previous year.<sup>114</sup>

In 2013, dog "bites and strikes" caused 6,740 hospital admissions in England - a 6% rise from the previous year, the Health and Social Care Information Centre (HSCIC) said.

They also report that **the number of dog attacks which lead to hospital stays are on the rise**, new figures suggest. The figures also showed the number of hospital admissions as a result of other animal attacks was also on the rise. Bites and strikes from other mammals such as horses, foxes and cats accounted for 2,970 admissions - a 10% increase compared to the previous 12 month period.

“Our statistics also show that hospitals have dealt with more admissions for bites and strikes by mammals compared to last year.”

Associated Press also report that dog bites has risen dramatically in the last few years in Arizona. State Department of Health Services director, Will Humble, asked a team of employees to gather vital statistics on emergency room visits and overnight hospitalizations for people suffering from severe dog bites. The department's report, which was released this week, **found incidents that required hospitalization have more than doubled in the last five years.**

Similar results have been reported in Scotland, South China, Canada, and elsewhere.

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<sup>114</sup> The Luton on Sunday, 2014



# 9

## Memory loss, Concentration

### Mental Health problems, ADHD

It was reported by the Australian Commission on Safety and Quality in Health Care, who received 257 serious incidents in 2006 and 2007 and in October 2008 that “Medical mistakes, such as operating on the wrong body part or even patient, occur every second day in Australia, and the number of incidents is on the rise”.

There is no doubt that most people, whatever their age, are reporting serious defects in the functioning of their short-term memory, and indeed, even long term memory.

Recent studies from Spain, France and the UK around mobile phone towers found that memory and concentration were affected by exposure.

In 2000 Dr. Henry Lai, a research professor in bioengineering at the University of Washington, linked long-term memory loss and diminished navigating skills in rats with the microwaves emitted by mobile phones. "This is the first study that shows that radio frequencies can affect long-term memory functions in rats," Lai said. Previous studies have focused mainly on short-term memory.

Lai placed 100 rats in a large tank of water and taught them to swim to a platform in the middle of the tank. After swimming to the platform six times, the rats were easily able to find their way to it. Next, half of the rats were exposed to microwaves similar to those emitted by mobile phones. All of the exposed rats forgot the way. The unexposed rats, once again, had no problem swimming to the platform.

"Then we took the platform away," Lai said. "The normal rats went to the location, but the irradiated rats, on the other hand, swam around randomly, and did not approach the former location of the platform."<sup>115</sup>

In 2006 researchers in Israel found adverse health effects from a mobile phone base station radiation on cognitive function. They exposed 36 volunteers to the base station, such that both the right or the left side of the brain were exposed. At the same time, subjects performed tests to activate either the left or right side of the brain. They showed that exposure to the left side of the brain slowed responses in three of the four tasks.<sup>116</sup>

In 2006 in China a research team exposed rats to a GSM mobile phone signal for 15 minutes a day for eight days. Results showed that exposure reduced synaptic activity and the numbers of excitatory synapses in the experiment.<sup>117</sup>

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<sup>115</sup> Wang, B.M. and Lai, H., 2000: *Acute exposure to pulsed 2450-MHz microwaves affects water maze learning in the rat*. *Bioelectromagnetics* 21:52-56.

<sup>116</sup> Eliyahu, I. et al, 2006: *Bioelectromagnetics*, 27(2): 119-126.

<sup>117</sup> Xu, S et al.; *Neurosci Lett* Jan 25, 2006.

**Mild et al (1998) show significant dose-response relationships for cell phone usage and headaches, dizziness, memory loss, discomfort, fatigue, and loss of concentration.**

**Dr Neil Cherry<sup>118</sup>, 2000.**

In Greece in 2006 it was shown that phone radiation affects cognitive functions in humans.<sup>119</sup>

### **The Mental Illness Epidemic**

Severe, disabling mental illness has dramatically increased in the United States. Marcia Angell, in her 2011 *New York Review of Books* piece, **summarizes**: “The tally of those who are so disabled by mental disorders that they qualify for Supplemental Security Income (SSI) or Social Security Disability Insurance (SSDI) increased nearly two and a half times between 1987 and 2007—from 1 in 184 Americans to 1 in 76. For children, the rise is even more startling—a thirty-five-fold increase in the same two decades.”<sup>120</sup>

Another study on cerebral blood flow was conducted where it was observed by the researchers that 16 volunteers experienced a short-term decrease in cerebral blood flow<sup>121</sup>

Also showing effects:

Krause et al, 2007: *Effects of pulsed and continuous wave 902 MHz mobile phone exposure on brain oscillatory activity during cognitive processing*, *Bioelectromagnetics*, 2007; 28:296-308.

Huber R et al, 2005, *Exposure to pulse-modulated radio frequency electromagnetic fields affects regional blood flow*. *Eur J Neurosci*; 21:1000-6

**The increase in mental health problems among children may be due to cell phone radiation.**

**Mona Nilsson, 2013<sup>122</sup>**

Dr Hugh Taylor, chief of reproductive endocrinology and infertility for the Yale Medical Group says: “We have shown that behavioural problems in mice resemble ADHD are caused by cell phone exposure in the womb. The rise in behavioural disorders in human children may be in part due to foetal [microwave] radiation exposure.”

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<sup>118</sup> Cherry, N., 2000, *Evidence that Electromagnetic Radiation is Genotoxic: The implications for the epidemiology of cancer and cardiac, neurological and reproductive effects*, p. 33.

<sup>119</sup> Papageorgiou, G., et al 2006: *Neurosci Lett*, Jan 4.

<sup>120</sup> Bruce Levine, *Why the Rise of Mental Illness? Pathologizing Normal, Adverse Drug Effects, and a Peculiar Rebellion*, Mad in America, July 2013.

<sup>121</sup> Wolf, M., et al, 2006: *Do GSM 900MHz signals affect cerebral blood circulation? A near-infrared spectrophotometry study*, *Optics Express*, Vol. 14, Issue 13, pp. 6128-6141

<sup>122</sup> Mona Nilsson, *The increase in mental health problems among children may be due to cell phone radiation*, Jan 2013.

# 10 *Electrosensitivity*

**33** years ago in 1976 US military documents described typical ES symptoms from low (non-thermal) levels of microwave radiation as follows: “Personnel exposed to microwave radiation below thermal levels experience more neurological, cardiovascular and haemodynamic disturbances than do their unexposed counterparts...The most common subjective complaints were headache, fatigue, perspiring, dizziness, menstrual disorders, irritability, agitation, tension, drowsiness, sleeplessness, depression, anxiety, forgetfulness, and a lack of concentration”. (US Defence Intelligence Agency, March 1976)<sup>123</sup>

Whilst this type of effect was not predicted by scientists, it is nevertheless an increasingly reported problem. There is a fine line between what could be termed Electrosensitivity and what is also known as Microwave Sickness.

Electrosensitivity is not like an allergy you are born with - it is a condition that builds over increased time and radiation exposure. As electro-pollution grows and spreads it is becoming more and more difficult for those who suffer this level of sensitivity.

In 2012, the Austrian Medical Association also adopted guidelines for the diagnosis and treatment of illness caused by wireless radiation. Austria's checklist for physicians lists the following symptoms: sleep problems, fatigue, exhaustion, lack of energy, restlessness, heart palpitations, blood pressure problems, muscle and joint pain, headaches, depression, difficulty concentrating, forgetfulness, anxiety, urinary urgency, anomia (difficulty finding words), dizziness, tinnitus and sensations of pressure in the head and the ears, tightness in chest, hyperactivity, irritability, noise sensitivity, burning sensation in the eyes and skin conditions.

A group of people in Europe and the USA reported general and severe symptoms of sleeplessness, headache, fatigue, tinnitus, dizziness, memory deficits, irregular heartbeat, and whole-body skin symptoms.

And in Glastonbury in the UK in November 2008 The Independent newspaper reported that many residents started experiencing a range of health problems such as panic attacks, skin rashes, headaches and dizziness...nausea, sudden sweating and extreme fatigue since Wi-Fi antennas were installed in their area. Many had to move from the area to regain their health.

Dr Andrew Goldsworthy has written a report *Electromagnetic Fields and Health* (2009) that offers a mechanism for this condition. He says that cell membrane leakage that can cause neurological illnesses and cancers can also result in electrosensitivity symptoms. Extremely weak alternating electric fields similar to those produced by Wi-Fi, cell phones, cordless phones and base stations can act on these calcium ions and dislodge them. This weakens the membrane and makes it more inclined to leak. Very little energy is required since the calcium has to be moved only far enough from the

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<sup>123</sup> Electrosensitivity UK Newsletter, March 2009; <http://www.es-uk.info/>.

membrane for an alternative ion (usually potassium) to sneak into its place. Since potassium (with only one positive charge) is less good than calcium (which has two charges) at holding the membrane together, it still leaks.”<sup>124</sup>

One survey has estimated that approximately 10% of electromagnetic hypersensitivity sufferers in Sweden were on sick leave or have taken early retirement or a disability pension, compared to 5% of the general population. For those who report being severely affected, their symptoms can have a significant impact on their quality of life; with sufferers reporting physical, mental and social impairment and psychological distress.

From a recent letter to the author:

*“I feel increasingly barred from doing things because so many of the things that people do are now governed by technology. Its like a bad dream! As if I had suddenly become allergic to life...and yet, to me, it is as if life has been poisoned with a toxin that seeps into everything, and to which I am particularly intolerant. It makes me so lonely that nearly everyone else seems to be able to go along with it [.....] I used to be sociable and out-going, enthusiastic about life – but I seem to be shrinking inwards. The pain I feel continuously is intense and worsening, and I don’t know how to live like this! Even my family don’t understand. [...] Lack of sleep makes it hard to plan, pain makes it hard to think. I sometimes feel I’m going mad – yet I know I’m a sane, intelligent person. I live more and more in my small car whenever I am not doing one of my two jobs. Up there, where there are trees and flowers, birds, hills rocks, grasses and sun I can briefly feel normal. The life comes back into me, like warmth, the pain goes, ideas and inspirations come to me – and with them joy and enthusiasm for life. ‘What was all the fuss about I ask myself?’ Then I go back home, and immediately the pain returns and life drains away....I can’t bear to live like this.”<sup>125</sup>*

The tragic case of Michael Nield who killed himself because of just such a level of suffering from his Electrosensitivity shows the extent of what some people are going through.

The Sun newspaper reported then that” A talented Oxford graduate killed himself because he was tortured by an allergy to mobile phones”, the inquest heard.

“Tragic violinist Michael Nield, 36, had a condition that was so severe he wore a special micro-mesh body suit when he was out of the house and slept with a microfiber tent over his bed to reduce his exposure to [microwaves]. Michael felt a constant zapping in his head, which lessened when he moved, but in the end made life unbearable.

Even though it is hard for those who do not suffer from this condition to understand the level of suffering, the question must be asked: is it moral and right to let this condition exist without addressing the problems at the highest levels?

Housing can be built using far more insulation; protective materials could be manufactured at a mass level and sold inexpensively. W-Fi in the home, schools, hospitals and other public places should be banned, as also cordless phones. In fact,

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<sup>125</sup> Personal correspondence, September 2014.

wherever there is a possibility to reduce microwave radiation in the environment, it should be taken. Indeed, in many countries now small moves are being made.

## 7 Male Infertility

Male fertility has been declining for over 20 years. Whilst variables such as oestrogenic chemicals packaged foods are also a factor here, many studies have indicated that EMR is also a likely cause.

A cancer specialist from West Australia, Dr John Holt, said in 1996 in private correspondence on communications frequencies: "I believe the current level of EMR is responsible [in part] for male infertility round the world".

**Reduced melatonin leads to increased DNA strand breaks and chromosome aberrations. These in turn lead to cancer and reproductive effects.**

**Dr Neil Cherry, Senate Inquiry, 2001**

In October 2010 Conrado Avendano, research Director at the Nascentis Reproductive Medical Centre in Argentina announced that they had found that microwave radiation from a laptop computer connected by Wi-Fi may damage DNA and decrease sperm mobility. According to Avendano damage to sperm happened in only four hours. This study will be published in the journal *Sterility and Fertility*.

- In 1997 Magras & Xenos placed mice at various locations in relation to an RF tower in Greece in order to monitor their fertility over several generations. The 'low' exposure group became infertile after five generations, and the 'high' exposure group after three generations.<sup>126</sup>
- An American study from the Reproductive Centre in Cleveland in 2006 shows that men who used a mobile phone had a 25 per cent lower sperm count than men who never used a mobile. Sperm counts in the US have plummeted 29 per cent, attributed by the study's authors to mobile phone emissions.<sup>127</sup>

<sup>126</sup> Magras and Xenos, 1997: *RF radiation induced changes in the pre-natal development of mice*. *Bioelectromagnetics*, 18(6): 455-

<sup>127</sup> Agarwal, et al 1997: *Effect of cell phone usage on semen analysis in men attending infertility clinic: an observational study*, 2006.

- Dr George Carlo of the US showed that the cumulative DNA damage caused by RF exposure is carried forward to future generations.
- In 2008 a team from Japan found that radiation from a mobile phone on stand-by can affect reproduction. They found that exposed animals had a decrease in sperm concentration and general quality.<sup>128</sup>

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<sup>128</sup> Salma, S et al, Int J Androl, Dec 2 2008.

## Conclusion

**R**esearch into EMR continues to be conducted around the world and is continuing to find adverse health effects on health.

In 2009 a Stockholm study found that 3G mobile phone radiation inhibited DNA repair for up to 72 hours after exposure. This result is a typical finding, but governments and health authorities are slow to act on the evidence that is piling up, both in the laboratory and in populations.

However, the European Environment Agency published a 750-page report in January 2013, called: "Late Lessons from Early Warnings" which contains twenty new case studies, with brain tumour risk also addressed. The report highlights this form of EMR as "possibly carcinogenic", or cancer-causing, by the World Health Organisation's (WHO) International Agency for Research on Cancer (IARC).

During the past 20 years, at least 30 new diseases have emerged, for many of which there is no treatment, cure or vaccine, or the possibility of effective prevention or control. In addition, the uncontrolled and inappropriate use of antibiotics has resulted in increased antimicrobial resistance and is seriously threatening drug control strategies against such common diseases as tuberculosis, malaria, cholera, dysentery and pneumonia.<sup>129</sup>

Medical authorities are trying to reverse the exponential rise in illnesses over the past 15 years with public awareness campaigns. However to look at trying to reverse such trends without addressing all the possible causes is like trying to rid the bathroom floor of water without first searching for the source of the flooding.

Communications frequencies use non-thermal levels of microwave radiation. However well-known scientist and author Robert Becker said in 1985, "...when non-thermal dangers were originally documented in America, military and industrial spokespeople refused to acknowledge them, lying to Congress and the public. Many scientists who naturally wanted to continue working went along with the charade."<sup>130</sup>

Dr. George Carlo, who used to run a multi-million dollar research program for the mobile phone industry before going public regarding the dangers posed by mobiles, uses the analogy of putting a frog in water. If you put a frog in boiling water, it will jump out. However, if you put a frog in cold water and gradually heat the water, you can cook the frog because the frog's body will adjust to the slight changes in temperature and it will not notice it is being cooked. Well, the same thing might be happening to an unsuspecting public.

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<sup>129</sup> TWN Third World Network

<sup>130</sup> Becker, R., *The body electric: Electromagnetism and the Foundation of Life*, 1998, Harper Paperbacks.

**... The early studies show that oscillating signals interfere with the brain very significantly and can change the EEG and can change the calcium ions, and these change reaction times. This is a classical physics approach of resonant absorption. If a system can oscillate and an oscillating signal comes in, it can resonantly be absorbed. It is what an aerial does, it is what a cell phone does, it is what is used in telecommunications ... It has been demonstrated in many laboratories that it actually does occur.**

**Dr Neil Cherry, 2000.**

It has taken 50 years for governments to finally take seriously the reality of global warming. David Suzuki said in the 1970s that we only had 40 years left if development continued at the same pace. He was right - but governments did not act, and now we are paying the price. It has been same with tobacco, with three decades passing before any action was taken. The same story has been seen with asbestos, lead, benzene, thalidomide, and so on.

I believe that we must heed independent scientists on the dangers of non-thermal radiation before populations are further damaged. Groups in the UK and Europe have already suggested lowering the exposure limits by using more fibre optic cabling and by siting antennas away from residential areas and schools. Whilst this would be one solution to making the technology safer, it is also more costly.

In Europe and the US wireless-free zones are now being created, along with materials and buildings as a shield against EMR. A building now exists in Budapest with the sole aim of shielding its occupants from antennas, and in Canada Officials from the Slokan Valley Economic Development Commission are claiming that keeping the valley mobile-free will draw in tourists and new residents<sup>131</sup>

It is extraordinary that telecommunications carriers can still install antennas on rooves of shops, churches, schools and other public buildings without permission from owners, local councils, or those nearby, in spite of regular protests. This technology has been rolled out the world over without prior warning or consultation. There were no regulations for the testing of the emissions in spite of the publicised dangers.

It could also be argued that to be exposed to a pollutant with no possibility of escape is an abuse of human rights.

**The problems are going to increase unless a determined effort is made to only install sites that produce extremely low mean residential exposures - somewhat less than 0.01uW/cm2.**

**Dr Neil Cherry, 2001.**

The human race has evolved against a background of very low level natural radiation - about 8Hz. Artificial EMR is now billions of times higher than when our grandparents lived. This pulsing is in the frequency range of our brain waves and can cause it to alter its function, thus changing human consciousness.

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<sup>131</sup> Blake L., and Morrow, T., 2007: *Electrosmog – What Price Convenience?*  
<http://www.energyfields.org/pdfs/ElectroSmog.pdf>.

If the effects showing up now after only 15 years are anything to go by - and if levels continue to increase as they are bound to do with the further development of wireless technology - what sorts of effects on human beings and animals can we expect in future years? Research is beginning to indicate that there may be no safe threshold for these exposures, as was the case for x-rays...and if that's the case, we are in trouble because non-ionising radiation is everywhere and growing exponentially.

In 2010 the British Trust for Ornithology found that between 1995 and 2008 there was a 20% drop in the kestrel population, and a further fall of 36% between 2008 and 2009.

This trend is part of general loss of biodiversity which is also attributable to climate change. According to the UN Environment programme, the Earth is in the middle of a mass extinction of life. Scientists estimate that 150 – 200 species of plant, insect, bird and mammal become extinct every 24 hours.

This is a mind-boggling situation, and it is even more mind-boggling that so little is being done to find the cause and “switch off the bathroom tap”.

**More evidence has accumulated suggesting that there are adverse health effects from occupational and public exposures to electric, magnetic and electromagnetic fields, or EMF, at current exposure levels. What is needed, but not yet realised, is a comprehensive, independent and transparent examination of the evidence pointing to this emerging, potential public health issue.**

**The Benevento Resolution 2006 (see Appendix B)**

***Sarah Benson** has studied the effects of EMR on human health for 15 years, and was senior researcher in this area to Senator Lyn Allison. Together with Senator Allison she instigated the Australian Federal Inquiry in 1999, which handed down its report in May 2001.*

*She was a member of the Australian Communications Industry Forum committee that devised a Code of Conduct for the siting of mobile phone towers in Australia, contributing notes on the Precautionary Principle to the Appendices.*

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## Appendix A

### **Dr Neil Cherry (1946 - 2003)**

Dr Neil Cherry (1946 -2003) held the position of Associate Professor of Environmental Health at Lincoln University, New Zealand. (Assoc Prof (NZ) = Full Prof (US)). Professor Cherry had listened to these concerns of the community and spent many years and a great deal of his own salary income to travel around the world visiting universities and laboratories to collect the published papers and discuss as much as possible with the original researchers to make sure his evidence and conclusions are closely correct.

It is highly likely that Professor Cherry was the first Environmental Health scientist in the world to research and publish strong evidence that:

- a. Electromagnetic fields and radiation damage DNA and enhance cell death rates and therefore they are a Ubiquitous Universal Genotoxic Carcinogen that enhances the rates of Cancer, Cardiac, Reproductive and Neurological disease and mortality in human populations. Therefore there is no safe threshold level. The only safe exposure level is zero, a position confirmed by dose-response trends in epidemiological studies; and that
- b. Solar and Geomagnetic Activity is a Natural Hazard causing serious human health effects through modulation of extremely small natural electromagnetic radiation ( $0.1\text{pW}/\text{cm}^2$ ), the Schumann Resonance signal, that is detected by the human brains and alters the melatonin output which causes modulation of many human health effects including cancer, cardiac, reproductive and neurological diseases and mortality.

The robust scientific evidence that justifies these claims is available on this web site. <http://www.neilcherry.com/index.php>.

**Dr Neil Cherry** held the position of Associate Professor of Environmental Health at Lincoln University, and had a professional scientific background in physics, biophysics, meteorology, Agricultural and Human Biometeorology, renewable energy, energy efficiency and environmental epidemiology.

Environmental Health involves assessing the health impacts of environmental toxins and proposing solutions based on efficient, smart and safer technology, engineering, planning and strategies that are consistent with the quadruple bottom line. The quadruple bottom line takes into account environmental, social, financial and cultural factors.

Professor Cherry had skills of teaching and research on the climate, health effects of weather on plants, animals and people and the health effects of air pollution and viruses, the academic area of Biology, Biophysics and Environmental Epidemiology. Dr Cherry was also an elected Regional Councillor on Environmental Canterbury, since 1992. From 1995 he had been the Chair of the Regional Planning Committee. Thus he was responsible for developing plans to clean up the environment. He was frequently involved in resource consent hearings for applications seeking to release contaminants to the environment.

Dr Cherry had been very familiar with environmental law and its linkage to scientific evidence. The main New Zealand law applied to the plans and resource consents is

the Resource Management Act (1991) [RMA]. The RMA law requires decisions to avoid, remedy or mitigate any potential or actual adverse effects of activities on the environment. In the RMA the Environment includes people and communities. Effects include cumulative effects and Any potential effects of low probability that have a high potential impact , Section 3, RMA.

Back in 1994 Dr Cherry was invited by a local primary school (Opawa) to present information on the possible health effects of a cell site that was proposed to be installed next to the infant department of the school. He explained to the school meeting that the law contains the precautionary approach of having to deal with potential adverse effects on the environment including people and children. Integrating his knowledge from classical physics involving resonant absorption, showed that the frequency of the mobile phone radiation produced a half wavelength that match the child's size. Therefore children were highly vulnerable for any possible health effects. He therefore recommended that the school declined the offer. The school voted by over 80 percent to reject the offer to install a cell site adjacent to the infant teaching block.

Since this time most of Professor Cherry's research had been focused on the health effects of electromagnetic fields and radiation. In November 1994 he was an expert witness in the first cell site base station appeal in New Zealand assisting the local residents to win the case by the court rejecting the request by BellSouth for a  $200\mu\text{W}/\text{cm}^2$  public exposure standard. The court set the allowable level at  $2\mu\text{W}/\text{cm}^2$ , based on evidence of childhood leukaemia at  $2.4\mu\text{W}/\text{cm}^2$ , the law requiring it to be avoided. Dr Cherry had been surprised to find how much published science there is to show that across the electromagnetic spectrum the ELF fields and RF/MW radiation damage the cellular DNA, alter cellular calcium ions, reduce melatonin, and altar many cellular functions. Radiofrequency and Microwaves, including cell phone radiation, are genotoxic shown by many independent studies published since the first in 1959. Therefore they are carcinogenic. Microwaves also open the Blood Brain Barrier, letting natural and external brain damaging chemicals into the brain and CNS. Dr Cherry also discovered that epidemiological studies of exposed workers and the residents confirm, through classical public health assessment, that electromagnetic fields and radiation are a Ubiquitous Universal Genotoxic Carcinogen, causing increased rates of Cancer, Cardiac, Reproductive and Neurological health effects in exposed human populations, with a safe level of zero exposure.

Dr Cherry's standing and credibility was confirmed on 1 January 2002 by the award of a Royal Honour of Officer of New Zealand Order of Merit (O.N.Z.M.). The citation for his award shows that it is for his services to Science, Education and Community, including his research and teaching work on Environmental Epidemiology and the health effects of electromagnetic radiation.

Dr Cherry's own research, published in the Natural Hazards journal, Cherry (2002), shows that a natural electromagnetic signal, called the Schumann Resonances, generated by a tropical thunderstorms, and radiating around the world in the resonant cavity created between earth's surface and the bottom layer of the ionosphere, is resonantly absorbed, detected and responded to by the brain because of the ELF frequency matching the frequency range of the spectrum of the brain EEG rhythms.

The Schumann Resonance signals provide synchronization of the ELF, daily and annual functions of the brain. The latter two are in support of the normal diurnal and seasonal solar activity. This provides the biophysically plausible mechanism to explain how sunspots on the sun, solar storms and sunspot cycles modulate cancer, cardiac, reproductive and neurological effects through modulating the melatonin/serotonin cycle in human populations. This confirms the importance of and sensitivity of the melatonin protective activity, including being a highly potent antioxidant being with naturally produced (by breathing) oxygen free radicals.

In 2002 Cherry predicted that since electrical workers and physiotherapists are occupationally exposed to electromagnetic fields that are about a million times higher than the Schumann Resonance signal, would have higher rates of cancer, cardiac reproductive and neurological effects. Multiple independent epidemiological studies confirm that this is true. It is also scientifically sensible and proven that placing a cellular telephone next to your head, producing a signal around a billion times stronger than the Schumann Resonance signal, causes serious alterations of brain activity, leading to elevated rates of road accidents, headaches, nausea, dizziness, loss of concentration and memory, DNA damage and enhanced cell death rates, and significant increases in brain cancer rates. All of this is confirmed by many published studies. Biological organs, including the brain, are flexible, variable and adoptive biological organs. For the brain's electromagnetic thinking activity to be coherent and stable enough for intelligence to develop, Dr Cherry had concluded that the ELF synchronization of the brain electromagnetic activity by the Schumann Resonance Signal in a has provided a mechanism that allowed intelligence to develop.

### **Tribute from Senator Lyn Allison, Australian Senate Hansard, June 2003.**

Senator ALLISON (Victoria) - I wish to pay tribute to a New Zealand scientist, environmentalist and regional councillor, Dr Neil Cherry, who died on 24 May this year. Dr Cherry was an Associate Professor of Environmental Health at Lincoln University and had a professional scientific background in physics, biophysics, meteorology, agricultural and human biometeorology, renewable energy, energy efficiency and environmental epidemiology. He was involved in a wide variety of scientific and community projects. He developed international expertise in human biometeorology, air quality and the effects of natural and artificial electromagnetic radiation on people's health. He was frequently called upon to present his findings overseas. He cared passionately for the environment, for science and for public health. Fellow councillors described Dr Cherry as a visionary—a man of tremendous intelligence and courage, including the courage to speak his views even when they were unpopular.

I met Dr Cherry when he visited Melbourne and Canberra—in fact, when he came to the parliament. He spoke publicly on the potentially damaging effects on human health of low-level microwave radiation from mobile phones and mobile phone antennas. His recent work was the review of thousands of papers on cell biology, biochemistry, biophysics, medicine and electromagnetic radiation. He concluded that the published scientific data showed that electromagnetic radiation, or EMR, was capable of causing cell damage and neurological problems.

In 2001 I chaired the Senate inquiry into this area, to which Dr Cherry made a submission, and he appeared before the committee via teleconference. It was an indication of Dr Cherry's effectiveness that he was attacked by the government because he dared to challenge the industry and the government line that said there was no evidence that EMR is not safe. He was actually in the gallery at the time that he was attacked and I think he was taken aback somewhat at the remarks that were made, but he was also accustomed to his critics being short on scientific argument and long on rhetoric. Reading his work, one becomes aware of how little we really understand about electromagnetic radiation and how much further we need to go before the full ramifications of its impact on the human body and brain are understood.

One of Dr Cherry's many findings was that exposure to electromagnetic radiation could result in Alzheimer's disease, or dementia.

A report for Alzheimer's Australia by Access Economics last month says, and I quote: "The dementia epidemic has arrived and it should be made a national health priority".

There are 162,000 people with dementia in Australia, almost 7000 of which are as young as 37. According to this report it is now more common than skin cancer.

Dr Cherry also showed that arthritis was a possible health outcome. The number of rheumatoid arthritis sufferers in Australia is now 500,000 with some of these being children.

Now it may or may not be the case that EMR is implicated in all or even some of these but the findings of Dr Cherry should not be ignored just because they are unpalatable to the telecommunications sector.

Dr Cherry's standing and credibility was confirmed on 1 January 2002 by the award of a Royal Honour of Officer of New Zealand Order of Merit (ONZM.). His award is for his services to Science, Education and Community, including his research and teaching work on Environmental Epidemiology and the health effects of electromagnetic radiation.

Neil was a man of strength, wisdom, compassion and humanity. One colleague describes him as "very straight - straight as a gun barrel."

I offer my sincere condolences to Neil's wife Gae. People like Dr Cherry are rare. He will be sadly missed, both as a scientist and as a human being.

## Appendix B

### Benevento Resolution

The International Commission for Electromagnetic Safety (ICEMS) held an international conference entitled "*The Precautionary EMF Approach: Rationale, Legislation and Implementation*", hosted by the City of Benevento, Italy, on February 22, 23 & 24, 2006. The meeting was dedicated to W. Ross Adey, M.D. (1922-2004). The scientists at the conference endorsed and extended the 2002 Catania Resolution and resolved that:

More evidence has accumulated suggesting that there are adverse health effects from occupational and public exposures to electric, magnetic and electromagnetic fields, or EMF<sup>1</sup>, at current exposure levels. What is needed, but not yet realised, is a comprehensive, independent and transparent examination of the evidence pointing to this emerging, potential public health issue.

Resources for such an assessment are grossly inadequate despite the explosive growth of technologies for wireless communications as well as the huge ongoing investment in power transmission.

There is evidence that present sources of funding bias the analysis and interpretation of research findings towards rejection of evidence of possible public health risks.

Arguments that weak (low intensity) EMF cannot affect biological systems do not represent the current spectrum of scientific opinion.

Based on our review of the science, biological effects can occur from exposures to both extremely low frequency fields (ELF EMF) and radiation frequency fields (RF

EMF). Epidemiological and *in vivo* as well as *in vitro* experimental evidence demonstrates that exposure to some ELF EMF can increase cancer risk in children and induce other health problems in both children and adults. Further, there is accumulating epidemiological evidence indicating an increased brain tumour risk from long term use of mobile phones, the first RF EMF that has started to be comprehensively studied. Epidemiological and laboratory studies that show increased risks for cancers and other diseases from occupational exposures to EMF cannot be ignored. Laboratory studies on cancers and other diseases have reported that hypersensitivity to EMF may be due in part to a genetic predisposition.

We encourage governments to adopt a framework of guidelines for public and occupational EMF exposure that reflect the Precautionary Principle<sup>2</sup> -- as some nations have already done. Precautionary strategies should be based on design and performance standards and may not necessarily define numerical thresholds because such thresholds may erroneously be interpreted as levels below which no adverse effect can occur. These strategies should include:

6.1 Promote alternatives to wireless communication systems, e.g., use of fibre optics and coaxial cables; design cellular phones that meet safer performance specifications, including radiating away from the head; preserve existing land line phone networks; place power lines underground in the vicinity of populated areas, only siting them in residential neighbourhoods as a last resort;

6.2 Inform the population of the potential risks of cell phone and cordless phone use. Advise consumers to limit wireless calls and use a land line for long conversations.

6.3 Limit cell phone and cordless phone use by young children and teenagers to the lowest possible level and urgently ban telecom companies from marketing to them.

6.4 Require manufacturers to supply hands-free kits (via speaker phones or ear phones), with each cell phone and cordless phone.

6.5 Protect workers from EMF generating equipment, through access restrictions and EMF shielding of both individuals and physical structures.

6.6 Plan communications antenna and tower locations to minimize human exposure. Register mobile phone base stations with local planning agencies and use computer mapping technology to inform the public on possible exposures. Proposals for city-wide wireless access systems (e.g. Wi-Fi, WIMAX, broadband over cable or power-line or equivalent technologies) should require public review of potential EMF exposure and, if installed, municipalities should ensure this information is available to all and updated on a timely basis.

6.7 Designate wireless-free zones in cities, in public buildings (schools, hospitals, residential areas) and, on public transit, to permit access by persons who are hypersensitive to EMF.

ICEMS<sup>3</sup> is willing to assist authorities in the development of an EMF research agenda. ICEMS encourages the development of clinical and epidemiological protocols for investigations of geographical clusters of persons with reported allergic reactions and other diseases or sensitivities to EMF, and document the effectiveness of preventive interventions. ICEMS encourages scientific collaboration and reviews of research findings.

The Precautionary Principle states when there are indications of possible adverse effects, though they remain uncertain, the risks from doing nothing may be far greater than the risks of taking action to control these exposures. The Precautionary Principle shifts the burden of proof from those suspecting a risk to those who discount it.

We, the undersigned scientists, agree to assist in the promotion of EMF research and the development of strategies to protect public health through the wise application of the precautionary principle.

Signed:

1. Fiorella Belpoggi, European Foundation for Oncology & Environmental Sciences, B. Ramazzini, Bologna, Italy
2. Carl F. Blackman, President, Bioelectromagnetics Society (1990-91), Raleigh, NC, USA
3. Martin Blank, Department of Physiology, Columbia University, New York, USA
4. Natalia Bobkova, Institute of Cell Biophysics, Pushchino, Moscow Region
5. Francesco Boella, National Inst. Prevention & Worker Safety, Venice, Italy
6. Zhaojin Cao, National Institute Environmental Health, Chinese Centre for Disease Control, China
7. Sandro D'Allessandro, Physician, Mayor of Benevento, Italy, (2001-2006)
8. Enrico D'Emilia, National Institute for Prevention and Worker Safety, Monteporzio, Italy
9. Emilio Del Giudice, National Institute for Nuclear Physics, Milan, Italy
10. Antonella De Ninno, Italian National Agency For Energy, Environment & Technology, Frascati, Italy
11. Alvaro A. De Salles, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil
12. Livio Giuliani, East Veneto & South Triol, National Inst. Prevention & Worker Safety, Camerino University
13. Yury Grigoryev, Institute of Biophysics; Chairman, Russian National Committee NIERP
14. Settimo Grimaldi, Inst. Neurobiology & Molecular Medicine, National Research, Rome, Italy
15. Lennart Hardell, Department of Oncology, University Hospital, Orebro, Sweden
16. Magda Havas, Environmental & Resource Studies, Trent University, Ontario, Canada
17. Gerard Hyland, Warwick University, UK; International Inst. Biophysics, Germany; EM Radiation Trust, UK
18. Olle Johansson, Experimental Dermatology Unit, Neuroscience Department, Karolinska Institute, Sweden
19. Michael Kundi, Head, Institute Environmental Health, Medical University of Vienna, Austria
20. Henry C. Lai, Department of Bioengineering, University of Washington, Seattle, USA
21. Mario Ledda, Inst. Neurobiology & Molecular Medicine, National Council for Research, Rome, Italy
22. Yi-Ping Lin, Centre of Health Risk Assessment & Policy, National Taiwan University, Taiwan
23. Antonella Lisi, Inst. Neurobiology & Molecular Medicine, National Research Council, Rome, Italy
24. Fiorenzo Marinelli, Institute of Immunocytology, National Research Council, Bologna, Italy
25. Elihu Richter, Head, Occupational & Environmental Medicine, Hebrew University-Hadassah, Israel
26. Emanuela Rosola, Inst. Neurobiology & Molecular Medicine, National Research Council, Rome, Italy
27. Leif Salford, Chairman, Department of Neurosurgery, Lund University, Sweden
28. Nesrin Seyhan, Head, Department of Biophysics; Director, Gazi NIERP Centre, Ankara, Turkey
29. Morando Soffritti, Scientific Director, European Foundation for Oncology & Environmental Sciences, B. Ramazzini, Bologna, Italy

30. Stanislaw Szmigielski, Military Institute of Hygiene and Epidemiology, Warsaw, Poland
31. Mikhail Zhadin, Institute of Cell Biophysics, Pushchino, Moscow Region.

*Date of Release: September 19, 2006. For more information, contact Elizabeth Kelley, Managing Secretariat, International Commission For Electromagnetic Safety (ICEMS), Montepulciano, Italy. Email: [info@icems.eu](mailto:info@icems.eu).*

## Appendix C

### Salzburg Resolution on Mobile Telecommunication Base Stations International Conference on Cell Tower Siting

1. It is recommended that development rights for the erection and for operation of a base station should be subject to a permission procedure. The protocol should include the following aspects:
  - Information ahead and active involvement of the local public
  - Inspection of alternative locations for the siting
  - Protection of health and wellbeing
  - Considerations on conservation of land- and townscape
  - Computation and measurement of exposure
  - Considerations on existing sources of HF-EMF exposure
  - Inspection and monitoring after installation.
  
1. It is recommended that a national database be set up on a governmental level giving details of all base stations and their emissions.
2. It is recommended for existing and new base stations to exploit all technical possibilities to ensure exposure is as low as achievable (ALATA-principle) and that new base stations are planned to guarantee that the exposure at places where people spend longer periods of time is as low as possible, but within the strict public health guidelines.
3. Presently the assessment of biological effects of exposures from base stations in the low-dose range is difficult but indispensable for protection of public health. There is at present evidence of no threshold for adverse health effects.

Recommendations of specific exposure limits are prone to considerable uncertainties and should be considered preliminary. For the total of all high frequency irradiation a limit value of 100 mW/m<sup>2</sup> (10 µW/cm<sup>2</sup>) is recommended.

For preventive public health protection a preliminary guideline level for the sum total of exposures from all ELF pulse modulated high-frequency facilities such as GSM base stations of 1 mW/m<sup>2</sup> (0.1 µW/cm<sup>2</sup>) is recommended.

Disclaimer: The Resolution represents the personal opinion of the undersigning scientists and public health specialists and is not that of the organisation they are affiliated to.

Dr. Ekkehardt Altpeter	Inst. for Social- and Preventive Medicine, University of Bern	Bern, Switzerland
Dr. Carl Blackman	US Environmental Protection Agency	Research Triangle Park, North Carolina, USA
Dr. Neil Cherry	Lincoln University Christchurch	Christchurch, New Zealand
Prof. Dr. Huai Chiang	Zhejiang University School of Medicine Microwave Lab	Hangzhou, China

Dr. Bill P. Curry	EM SciTek Consulting Co.	Glen Ellyn, Illinois, USA
Prof. Dr. Livio Giuliani <sup>1</sup>	National Institute of Occupational Safety and Prevention (ISPESL)	Rome, Italy
Prof. Dr. Yuri Grigoriev	Centre of Electromagnetic Safety, Institute of Biophysics	Moscow, Russia
Dr. Helene Irvine	Greater Glasgow Health Board, Dept. of Public Health	Glasgow, Scotland, UK
Dr. Christoph König	Federal State of Salzburg, Public Health Dept., Environmental Health	Salzburg, Austria
Prof. Dr. Michael Kundi	University of Vienna, Inst. for Environmental Health	Vienna, Austria
Ronald Macfarlane	Health Promotion and Environmental Protection Office, Toronto Public Health	Toronto, Canada
Dr. Malcolm MacGarvin	modus vivendi, Consultant for the European Environment Agency	Glenlivet, Scotland, UK
Dr. Fiorenzo Marinelli <sup>1</sup>	Ist. di Citomorfologia C.N.R.	Bologna, Italy
Prof. Dr. Wilhelm Mosgöller	University of Vienna, Inst. for Cancer Research	Vienna, Austria
Dr. Gerd Oberfeld	Federal State of Salzburg, Public Health Dept., Environmental Health	Salzburg, Austria
Dr. Colin Ramsay	Scottish Centre for Infection and Environmental Health (SCIEH)	Glasgow, Scotland, UK
MA Cindy Sage	Sage Associates	Santa Barbara, California, USA
Dr. Louis Slesin	Microwave News	New York, USA
Prof. Dr. Stan Szmigielski <sup>1</sup>	Department of Microwave Safety, Military Institute of Hygiene and Epidemiology	Warsaw, Poland

1) This preliminary guideline level of 1 mW/m<sup>2</sup> (0.1 µW/cm<sup>2</sup>) is, by the participants marked with a (1), understood as an operational level for one facility (e.g. a cell tower).

## Appendix D

### Freiburger Appeal 2002

Out of great concern for the health of our fellow human beings do we - as established physicians of all fields, especially that of environmental medicine - turn to the medical establishment and those in public health and political domains, as well as to the public.

We have observed, in recent years, a dramatic rise in severe and chronic diseases among our patients, especially:

- Learning, concentration, and behavioural disorders (e.g. attention deficit disorder, ADD)
- Extreme fluctuations in blood pressure, ever harder to influence with medications
- Heart rhythm disorders
- Heart attacks and strokes among an increasingly younger population
- Brain-degenerative diseases (e.g. Alzheimer's) and epilepsy

- Cancerous afflictions: leukaemia, brain tumours

Moreover, we have observed an ever-increasing occurrence of various disorders, often misdiagnosed in patients as psychosomatic:

- Headaches, migraines
- Chronic exhaustion
- Inner agitation
- Sleeplessness, daytime sleepiness
- Tinnitus
- Susceptibility to infection
- Nervous and connective tissue pains, for which the usual causes do not explain even the most conspicuous symptoms.

Since the living environment and lifestyles of our patients are familiar to us, we can see, especially after carefully-directed inquiry, a clear temporal and spatial correlation between the appearance of disease and exposure to pulsed high -frequency microwave radiation (HFMR), such as:

- Installation of a mobile telephone sending station in the near vicinity
- Intensive mobile telephone use
- Installation of a digital cordless (DECT) telephone at home or in the neighbourhood

We can no longer believe this to be purely coincidence, for:

Too often do we observe a marked concentration of particular illnesses in correspondingly HFMR-polluted areas or apartments;

Too often does a long-term disease or affliction improve or disappear in a relatively short time after reduction or elimination of HFMR pollution in the patient's environment;

Too often are our observations confirmed by on-site measurements of HFMR of unusual intensity.

On the basis of our daily experiences, we hold the current mobile communications technology (introduced in 1992 and since then globally extensive) and cordless digital telephones (DECT standard) to be among the fundamental triggers for this fatal development.

One can no longer evade these pulsed microwaves. They heighten the risk of already-present chemical/physical influences, stress the body's immune system, and can bring the body's still-functioning regulatory mechanisms to a halt. Pregnant women, children, adolescents, elderly and sick people are especially at risk.

Our therapeutic efforts to restore health are becoming increasingly less effective: the unimpeded and continuous penetration of radiation into living and working areas, particularly bedrooms, an essential place for relaxation, regeneration and healing, causes uninterrupted stress and prevents the patient's thorough recovery.

In the face of this disquieting development, we feel obliged to inform the public of our

observations, especially since hearing that the German courts regard any danger from mobile telephone radiation as "purely hypothetical" (see the decisions of the constitutional court in Karlsruhe and the administrative court in Mannheim, Spring 2002).

What we experience in the daily reality of our medical practice is anything but hypothetical! We see the rising number of chronically sick patients also as the result of an irresponsible "safety limits policy", which fails to take the protection of the public from the short- and long-term effects of mobile telephone radiation as its criterion for action. Instead, it submits to the dictates of a technology already long recognised as dangerous. For us, this is the beginning of a very serious development through which the health of many people is being threatened.

We will no longer be made to wait upon further unreal research results - which in our experience are often influenced by the communications industry, while evidential studies go on being ignored. We find it to be of urgent necessity that we act now!

Above all, we are, as doctors, the advocates for our patients. In the interest of all those concerned, whose basic right to life and freedom from bodily harm is currently being put at stake, we appeal to those in the spheres of politics and public health. Please support the following demands with your influence:

New health-friendly communications techniques, given independent risk assessments before their introduction and, as immediate measures and transitional steps:

Stricter safety limits and major reduction of sender output and HFMR pollution on a justifiable scale, especially in areas of sleep and convalescence.

A say on the part of local citizens and communities regarding the placing of antennae (which in a democracy should be taken for granted);

Education of the public, especially of mobile telephone users, regarding the health risks of electromagnetic fields;

Ban on mobile telephone use by small children, and restrictions on use by adolescents;

Ban on mobile telephone use and digital cordless (DECT) telephones in preschools, schools, hospitals, nursing homes, events halls, public buildings and vehicles (as with the ban on smoking);

Mobile telephone and HFMR-free zones (as with auto-free areas);

Revision of DECT standards for cordless telephones with the goal of reducing radiation intensity and limiting actual use time, as well as avoiding the biologically critical HFMR pulsation; and

Industry-independent research, finally with the inclusion of amply available critical research results and our medical observations.

Signed:

Dr. med. Thomas Allgaier General medicine, Environmental medicine, Heitersheim

Dr. med. Christine Aschermann, Neural physician, Psychotherapy, Leutkirch

Dr. med. Waltraud Bar, General medicine, Natural healing, Environmental Medicine, Wiesloch

Dr. med. H. Bernhardt, Pediatrics, Schauenburg

Dr. Karl Braun von Gladiss, General medicine, Holistic medicine, Teufen

Hans Bruggen, Internal medicine, Respiratory medicine, Environmental medicine, Allergics, Deggendorf

Dr. med. Christa-Johanna Bub-Jachens, General medicine, Natural healing, Stiefenhofen

Dr. med. Arndt Dohmen, Internal medicine, Bad Sackingen  
 Barbara Dohmen, General medicine, Environmental medicine, Bad Sackingen  
 Verena Ehret, Doctor, Kotzting  
 Karl-Rainer Fabig, Practical doctor  
 Dr. med. Gerhilde Gabriel, Doctor, Munchen  
 Dr. med. Karl Geck, Psychotherapy, Murg  
 Dr. med. Jan Gerhard, Paediatrics, Child/adolescent psychiatry, Ahrensburg  
 Dr. med. Peter Germann, Doctor, Environmental medicine, Homeopathy, Worms  
 Dr. med. Gertrud Grunenthal, General medicine, Environmental medicine, Bann  
 Dr. med. Michael Gulich, Doctor, Schopfheim  
 Julia Gunter, Psychotherapy, Korbach  
 Dr. med. Wolfgang Haas, Internal medicine, Dreieich  
 Dr. med. Karl Haberstig, General medicine, Psychotherapy, Psychosomatics, Inner-Urberg  
 Prof. Dr. med. Karl Hecht, Specialist in stress-, sleep-, chrono-und space travel medicine, Berlin  
 Dr. med. Bettina Hovels, General medicine, Lorrach  
 Walter Hofmann, Psychotherapy, Singen  
 Dr. med. Rolf Janzen, Paediatrics, Waldshut-Tiengen  
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## Appendix E

### Precautionary principle

The precautionary principle is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action.

The precautionary principle is most often applied in the context of the impact of human actions on the environment and human health, as both involve complex systems where the consequences of actions may be unpredictable.

As applied to environmental policy, the precautionary principle stipulates that for practices such as the release of radiation or toxins, massive deforestation or overpopulation, the burden of proof lies with the advocates. An important element of the precautionary principle is that its most meaningful applications pertain to those that are potentially irreversible, for example where biodiversity may be reduced. With respect to bans on substances like mercury in thermometers, freon in refrigeration, or even carbon dioxide exhaust from automobile engines and power plants, it implies:

"... a willingness to take action in advance of scientific proof [or] evidence of the need for the proposed action on the grounds that further delay will prove ultimately most costly to society and nature, and, in the longer term, selfish and unfair to future generations."

The concept includes ethical responsibilities towards maintaining the integrity of natural systems, and the fallibility of human understanding.

Some environmental commentators take a more stringent interpretation of the precautionary principle, stating that proponents of a new potentially harmful technology must show the new technology is without major harm before the new technology is used. *Wikipedia*

