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From: Julia Ogonovsky

**Working Document of the Section for Transport, Energy, Infrastructure and the Information Society on Electromagnetic Hypersensitivity TEN/559**  
- High risk Electrohypersensitivity Group – People with Metal Implants

Sirs

I would like to draw your attention to a sector of the population at increased risk of Electrohypersensitivity (EHS); this group consists of people with metal implants: replacement limbs, joint replacements (hip, knee, shoulder, ankle) and surgical metal-ware such as discs, plates, rods, screws. This also includes people with dental amalgam. A significant number of people is represented. For example, one type of hip prosthesis – Metal-on-Metal – has been implanted in approximately 1.5 million people worldwide.<sup>1</sup>

The member countries of the European Union follow electromagnetic field exposure guidelines published by the International Committee of Non-Ionising Protection (ICNIRP). The “functions of the Commission are to investigate the hazards that may be associated with the different forms of NIR [*Non Ionising Radiation*] develop international guidelines on NIR exposure limits and deal with all aspects of NIR protection.”<sup>2</sup> However, people with metal implants are not covered by their 1998 guidelines:

*Compliance with the present guidelines may not necessarily preclude interference with or effects on medical devices such as metallic prostheses ... Advice on avoiding these problems is beyond the scope of the present document but is available elsewhere.”<sup>2</sup>*

The reference to ‘elsewhere’ is to an earlier document published by ICNIRP’s predecessor.<sup>3</sup> Section 11.5 ‘Interference with medical devices and safety equipment’ states: “A separate concern relates to electromagnetic interference with implantable medical devices and, most prominently, cardiac pacemakers.” It then goes onto address cardiac pacemakers *only*.

It is important to note that the above ICNIRP 1998 guidelines<sup>2</sup> are based only on ‘short-term, immediate health effects’ and so it would be reasonable to assume that long-term, chronic exposure may cause greater, cumulative risk relative to the frequency/interference level in people with metal implants.

In 2010, ICNIRP revisited the low-frequency part of their 1998 guidelines and, in the case of metal implants, repeated their earlier statement verbatim but added: “Advice on avoiding these problems is beyond the scope of the present document but is available elsewhere.”<sup>4</sup> The reference this time was to an International Electrotechnical Commission (IEC) standard<sup>5</sup> to be applied to all electro-medical devices, appropriate for cardiac pacemakers (also

considered outside the scope of the ICNIRP document) but not seemingly to metal prostheses.

So which international body publishes advice on safe emf exposure limits for people with metal implants?

The Institute of Electrical and Electronic Engineers (IEEE) <sup>6</sup> states:

*Medical devices / metallic implants may involve special health and safety problems when the individual using them is exposed to electric/magnetic fields. This standard does not necessarily provide protection against interference with such devices or hardware. The recipient and provider of these devices should be aware of the potential for hazards and precautions that may be necessary with such devices.*”

The recipient is unlikely to be warned of any hazards because the provider – the person implanting the device - is completely unaware of the problem. Metal-ware manufacturers must be legally responsible for informing a recipient of the “potential hazards”.

I was diagnosed with “Intolerance of Electromagnetic Fields Syndrome” some time after my metal hip resurfacing operation. I contacted my hip manufacturer (who shall remain anonymous for legal reasons) to ask what conductivity testing they had carried out on the prosthesis. They failed to provide any evidence of any kind as regards conductivity testing or the effects from any form of electromagnetic fields.

It is important to understand what happens when metal reacts to electromagnetic fields within the human body. The IEEE explains that:

*Metallic hardware implanted in the body can enhance induced electric fields either by providing a magnetic loop, or, a high conductivity region that can locally enhance the possibility of electrical stimulation in localised regions near the implant.”(Reilly & Diamant B78) <sup>6</sup>*

The conductive nature of a metal is an important factor in determining its suitability as an implant. In ‘The electrochemical behaviour of metallic implant materials as an indicator of their biocompatibility’ <sup>7</sup> a comparison of different corrosion-resistance metals and alloys was made, measuring their current densities. The conclusion was that some metals (gold had the highest current density) had a greater current density than others and that “biocompatibility is not only determined by corrosion products, but also by exchange currents and reaction products of redox processes involving tissues compounds.” This was published in 1987 and predates the accelerated roll-out of wireless / microwave / radiofrequency technology but is useful in demonstrating simplistically that different metals react differently to electromagnetic fields and may have an aerial effect ie. attract more electromagnetic fields into the body so interfering with the body’s own finely tuned electromagnetics. It should also be noted that one of the three “physical quantities used to specify the basic restrictions on exposure to EMF” <sup>2</sup> by ICNIRP is “current density”; the others being SAR (the heating effect) and power density. ICNIRP state that “Protection against adverse health effects requires that these basic restrictions are not exceeded.” <sup>2</sup>

More research needs to be done on the effect of emfs on metal implants. Bio-electromagnetic experts, electrical and electronic / biomedical engineers, toxicologists, orthopaedic specialists need to work collaboratively on this. The recently published EU Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) opinion on ‘The Safety of Metal-on-Metal joint replacements with a particular focus on hip implants’ summarises:

*“Metal-on-Metal (MoM) hip arthroplasty leads to a release of metal products (eg particles and ions) which can in addition form metallo-organic compounds in the body. These products can be deposited in draining lymph nodes and internal organs and may result in local and systemic adverse health effects.”*<sup>8</sup>

These effects are not limited to metal-on-metal hips:

*Local and systemic adverse effects may also occur with other types of metallic implants (eg. Plates, screws).”*<sup>8</sup>

Curiously, the cause of the movement of these ions is not even considered as attributable to electromagnetic fields. [see <sup>16</sup>] No external experts in this area appear to have been included on the review panel.

However, as the metal ions are transported to multiple sites it is possible to see that each site becomes an area of possible “electrical stimulation” rather than just the implant home site.

Magnetic fields at extra low frequency can also cause direct stimulation – of the peripheral nerves and muscle tissue. Peripheral nerve effects include “flickering visual sensations known as magnetic phosphenes”.<sup>2</sup> Stimulation of muscle tissue results in muscle twitching – a repeated involuntary movement of the same muscle(s) in rhythm with the magnetic field flow.

Pulsed microwaves also induce effects in the head. One widely-recognised effect is ‘the microwave auditory effect’ or ‘microwave hearing.’ Allen Frey discovered

*“that microwaves of 300 to 3000 megahertz could be "heard" by people, even if they were deaf, if pulsed at a certain rate. Appearing to be originating just in back of the head, the sound boomed, clicked, hissed or buzzed, depending upon the frequency. Later research has shown that the perception of the waves takes place just in front of the ears. The microwaves cause pressure waves in the brain tissue, and this phenomenon vibrates the sound receptors in the inner ear through the bone structure. Some microwaves are capable of directly stimulating the nerve cells of the auditory pathways. This has been confirmed with experiments with rats, in which the sound registers 120 decibels, which is equal to the volume of a nearby jet during takeoff.”*<sup>9</sup>

This disturbing microwave effect is now being exploited by companies. In 2008, a report was published in *The New Scientist* on a device called ‘MEDUSA’<sup>10</sup> (Mob Excess Deterrent Using Silent Audio) aimed at “military or crowd control applications but may have other uses.” The MEDUSA involves a

*“microwave auditory effect ‘loud’ enough to cause discomfort or even incapacitation... normal audio safety limits do not apply since the sound does not enter through the eardrums...”The repel effect is a combination of loudness and the irritation factor... You can’t block it out.””<sup>10</sup>*

Even ICNIRP<sup>2</sup> states that “Repeated or prolonged exposure to microwave auditory effects may be stressful and potentially harmful.” Advice issued through the UK’s Higher Education Funding Councils (HEFCE) specifically on health and safety risks from wi-fi networks<sup>11</sup> recommended anyone affected by the microwave auditory effect move away from the source. This, of course, now is virtually impossible to do.

It is important to note that this induced ‘noise’ is distinct from tinnitus (in which tiny internal hairs in the ear instead of filtering out background noise filter it in) in that microwave hearing induces ‘brain fog’ or incapacitation during exposure to the microwaves.

It is not possible to know from ICNIRP how much more intense an effect ‘microwave hearing’ would have on people with metal implants as “coupling of EMF to medical devices worn by or implanted in, an individual” is “not considered in this document.”<sup>2</sup>

However, it is important to note that the brain is at risk from circulating metal molecules as the brain’s protective barriers - the blood-brain barrier and the blood-cerebrospinal fluid (CSF) barrier while protecting the central nervous system against chemical insults, by different complementary mechanisms fail to protect against toxic metal molecules:

*Toxic metal molecules can either bypass these mechanisms or be sequestered in and therefore potentially deleterious to brain barriers.”<sup>12</sup>*

Many EHS people record feeling uncomfortably hot in the presence of microwave radiation. It is logical to conclude that EHS people with metal implants will be more prone to increased temperature changes – after all you do not put metal in a microwave oven. Modern microwave communication systems (GSM, 3G & 4G, Wi-fi, train signalling systems, radar networks et al) are turning the airways into a global microwave oven.

It is scientifically accepted that special precautions must be taken with patients with metal implants during MRI scans because of the increased risk of heating. This is because

*Metal implants, even if non-ferromagnetic, may couple with the radiofrequency (RF) electromagnetic field used in magnetic resonance imaging (MRI) and cause a heating hazard.<sup>13</sup>*

A report for the Police Federation of England and Wales<sup>14</sup> on the then proposed new emergency services mobile phone network, TETRA, also acknowledged the heating effect of microwaves as well as the “accumulative factor” which accelerates the heating effect:

*“The accumulative factor puts a very different slant on doses of microwave radiation in particular an accumulative level of radiation can build up very quickly when you receive 400,000,000 waves every second. This is why scientists are concerned ...Warnings are also given to people with metal implants in their bodies. These*

*implants can a)warm up; and b) absorb the microwave radiation and re-emit it at a different wavelength.*”<sup>14</sup>

A warning note was also given in a paper on ‘Metal-framed spectacles and implants and specific absorption rate among adults and children using mobile phones at 900/1800/2100 MHz.’<sup>15</sup> This 2006 paper concluded that “in the case of 2100 MHz with vertical position of the phone for adults and of the 900MHz for children with metallic implants the ANSI/IEEE limits are exceeded.” They also showed that “Our calculation shows a maximum of the cellular SAR in the child head, which in the case of the metallic implant could be as much as 100% higher than in the adult head.”

ICNIRP (1998) exposure guidelines<sup>2</sup> state that

*“Prolonged exposure of animals to levels of microwave radiation that raise the body temperature ultimately lead to failure of these thermoregulatory mechanisms. ...*

*... At levels of absorbed electromagnetic energy that cause body temperature rises in excess of 1-2 degrees C, a large number of physiological effects have been characterized in studies with cellular and animal systems (Michaelson and Elson 1996). These effects include alterations in neural and neuromuscular functions; increased bloodbrain barrier permeability; ocular impairment (lens opacities and corneal abnormalities); stress-associated changes in the immune system; haematological changes; reproductive changes (e.g., reduced sperm production ); teratogenicity; and changes in cell morphology, water and electrolyte content, and membrane functions.”<sup>2</sup>*

ICNIRP go on to say under ‘Guidelines for Limiting EMF Exposure’<sup>2</sup> that they have adopted more stringent exposure conditions to take into account the fact that many “members of the public are unaware of their exposure to EMF” and “cannot reasonably be expected to take precautions to minimise or avoid exposure.” They cite:

*“the potentially higher thermal sensitivity in certain population groups, such as the frail and / or elderly, infants and young children, and people with diseases or taking medications that compromise thermal intolerance.”<sup>2</sup>*

They do not specify people with metal implants who, as members of the public, cannot also be expected to be aware of their emf exposure and the necessity to adopt an avoidance strategy. The exposure limits *must* be stricter to take into account this significant group.

Metal implants can be complex and contain alloys including ironically some used in the production of batteries (charge-holding) such as nickel. Many of these metals are toxic in themselves or in higher quantities (cobalt, chromium, manganese) and are paramagnetic. Through wear (the friction of a metal surface with another surface and / or load-bearing stress wear as in the case of metal hips) metal ions break off, enter the bloodstream, and cause chemical and immune system disruption.

The release of heavy metals may induce heavy metal poisoning. Heavy metal poisoning has also been noted as having the power “to precipitate EHS.”<sup>16</sup> Metal toxicity is being provoked by electromagnetic radiation which is, itself, a carcinogen.

Surgical implants can also lead to ‘Toxicant Induced Loss of Tolerance (TILT)’. This toxic burden in turn “makes patients vulnerable to other sensitivity-related conditions such as fibromyalgia, chronic fatigue syndrome and multiple chemical sensitivity.”<sup>16</sup>

Currently, many EHS sufferers have more than one diagnosis. Since EHS is not yet included in the WHO International Classification of Diseases (and thus not recognised by medical professionals and those paying state disability allowances and paying out on sickness insurance policies) it is quite probable that statistically EHS sufferers are appearing in data listed under other conditions resulting in an underestimate of the current number.

### Recommendations to the Working Party

I would ask the Working Party to acknowledge in their report that

- 1) People with metal implants are a high risk group for electrohypersensitivity; and,
- 2) because of metal poisoning and increased sensitivity for electrohypersensitivity, people with metal implants are also at risk of other sensitivity illnesses such as fibromyalgia, multiple chemical sensitivity and chronic fatigue syndrome; and
- 3) Nos 1 and 2 be communicated in media campaigns to create awareness of EHS especially with the medical profession;
- 4) The ICNIRP exposure guidelines which have excluded this group for more than 20 years now be recognised as unfit for purpose; and
- 5) that the Working Party cite the EU Parliament vote of 2008 that supported the view by 522 votes to 16, that the ICNIRP guidelines were obsolete and out of date;<sup>17</sup> and that
- 6) they call for a new organisation (whose members must be proven to have no direct or indirect links eg funding or influence with the telecom industry) to establish safe exposure guidelines for all that take into account biological effects from emfs at lower levels; and that
- 7) they do all in their power to recommend to the WHO the inclusion of electrohypersensitivity in the International Classification of Diseases so that the medical profession is fully informed of the condition and does not waste valuable financial and time resources investigating single symptoms instead of looking at a multi-systemic, neurological condition.

And to include

- 8) Under **section 2.1.1** of the Working Party document (TEN/559-EESC-2014-05117-00-01-DT-TRA (ES)) other significant symptoms of electrohypersensitivity particularly relevant to sufferers with metal implants such as
- a) Body temperature rises;
  - b) Increased general sensitivity to metal (whether in direct contact or through the coupling effect). Many EHS sufferers cannot sleep on a metal bed or metal mattress because of the increased vibration conducted through them;
  - c) Intense vibration – throughout the body but especially in the head and the area surrounding the implant from electric and magnetic fields; and simultaneously pulsing vibration from radiofrequency/microwave fields;
  - d) Accompanying c) it is important to include the ‘microwave auditory effect’ or ‘microwave hearing’ as discussed earlier, peripheral nerve effects and muscle stimulation as well as
  - e) regularly experienced symptoms of vertigo and nausea.

I would sincerely request that

- 9) **paragraph 2.1.2** of the Working Document (TEN/559-EESC-2014-05117-00-01-DT-TRA (ES)) be amended.

Severely affected EHS sufferers are NEVER free from symptoms because of their system’s overstimulation / overreaction to emf sources of the smallest magnitude. It is a reality now that it is almost impossible to avoid some emf source wherever you are.

The situation is getting worse daily. For example, the UK Government (Dept of Culture, Media & Sport) is managing the ‘Beacon Project’. This project’s aim is to enforce maximum mobile phone signal coverage throughout the U.K. by the end of 2016 making it extremely difficult to find a ‘white’ area with poor or no signal in which to live.

- 10) and, most importantly, that a paragraph is inserted on the long-term effects of electrohypersensitivity. If this is not done then the committee members will have an incomplete picture on which to vote. EHS sufferers are at increased risk of cancer and Alzheimers; the consequences of providing insufficient help will be devastating;
- 11) Documents from Professor Dominique Belpomme pertaining to the risk of Alzheimers have already been forwarded to you directly by Minerva Paloma following your meeting in Spain.

## **References**

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- <sup>5</sup> International Electrotechnical Commission (IEC). Medical electrical equipment –part 1: general requirements for safety; 2: collateral standard: electromagnetic compatibility-requirements and tests. Geneva: IEC 60601-1-2; 2005b.
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<sup>14</sup> Confidential Report on TETRA Strictly for the Police Federation of England and Wales, Trower, B, September 2001. [*TETRA stands for Terrestrial Trunked Radio, formerly known as Trans-European Trunked Radio*]

<sup>15</sup> Metal-framed spectacles and implants and specific absorption rate among adults and children using mobile phones at 00/1800/2100 Mhz, Joo, E, Szasz, A, Szendro, P, Electromagnetic Biol Med, 2006, 25(2):103-12.

<sup>16</sup> Electromagnetic hypersensitivity: Fact or Fiction, Genuis, SJ, Lipp, CT, Science of the Total Environment, Volume 414, 1 January 2012, Pages 103-112

<sup>17</sup> The EU Parliament on September 4, 2008, by 522 votes to 16, confirmed that the 'ICNIRP guidelines were obsolete and out of date.' EU Parliament vote, Mast Action UK – Legal Services (2010) quoted in Declaration of Barrie Trower, in support of a preliminary and permanent injunction enjoining Portland Public Schools' use of WI-FI. US District Court, District of Orego, Portland Division, David Mark Morrison v Portland Public ~Schools pt 47, p15