

Chronic Fatigue Syndrome and Sleep Disruption: Evidence that both powerfrequency and radiofrequency magnetic fields may be a co-factor to investigate in treatments.

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Power Frequency magnetic fields

In 1994, Australian Democrat Senator Robert Bell (Tasmania) tabled a report in the Australian Senate that examined the evidence that the then current National and international exposure standards for human exposure to electromagnetic fields were insufficient to provide an assurance of safety. Part of this report examined the condition of Chronic Fatigue Syndrome and suggested that prolonged exposure to 50 Hz power frequency fields may be one of the causative factors in the condition.¹

This hypothesis was later strengthened with a number of patient case studies compiled with the assistance of several doctors connected with the Australasian College of Nutritional and Environmental Medicine (ACNEM) in January 1998. These case studies indicated that prolonged exposure to environmental level powerline frequency electromagnetic fields apparently were impairing immune system function resulting in CFS symptoms and insomnia.²

In February 1999 a Victorian Workers Compensation Case from 1991-1992 was obtained by this writer from the office manager at *Ross House*, located at 247-251 Flinders Lane, Melbourne. This case examined a number of workplace illness diagnosed as Chronic Fatigue Syndrome. The Workcare investigation found that excessive office building electromagnetic fields from a large electrical substation directly below the office building where the women worked was the common factor in all the symptoms reported by the women. The report also examined the work done to mitigate the EMFs in the area.³ Some of the symptoms reported were:

Chronic tiredness/fatigue; Insomnia: waking around 3 am with an inability to go back to sleep; Stress Inability to concentrate; Fluctuating hormone levels; Anaemia; facial rash, depression, severe premenstrual tension; a feeling of listlessness; light headedness ;"a permanent severe case of jet lag"

Transmission lines and PID

In 1991, as a result of public protests, media attention and a number of court cases over possible health hazards from the twin 400 kV transmission lines built in close proximity to the French village of Coutiches, near Lille, the national power supplier, Electricite de France agreed to fund a regular medical check-up of a number

¹ Maisch D., Non-ionizing Electromagnetic Fields and Human Health: Are current standards safe?, *Senate Hansard*, October 1994.

² Maisch, D., A number of case histories that indicate prolonged exposure to environmental level powerline frequency electromagnetic fields can impair immune system function.

<https://www.emfacts.com/download/CaseHistoriesEMFacts.pdf>

³ Workcare compensation case, Melbourne Victoria, 1991-1992. Workplace Chronic Fatigue Syndrome (CFS) symptoms attributed to exposure to electromagnetic fields (EMF) due to close proximity to an electrical substation, https://www.emfacts.com/download/The_Ross_House_Electrical_Substation.pdf

residents who lived close to the lines. A total of 117 residents were involved in the medical tests. They were to have a check-up and blood analysis done every six months. The initial findings, presented at the Assemblée Nationale in 1994, reported the following symptoms being found in the group:

general tiredness, (chronic fatigue)
headaches
insomnia - especially in children. It was noted that the children's insomnia would disappear when the power (and magnetic fields) was lower than usual and return when the power got back to full level. The children often could not sleep at all and often were sent to relatives' homes, where they could sleep normally.
hypernervosity
hypotension
iron deficiency (later identified as pseudo iron deficiency – see below)
2 cases of severe anxiety / depression
1 bone marrow cancer death in 1992
nausea and dizziness

Similar symptoms were also found in a 2008 survey by the French organization Criirem. Taking a group of people living near two transmission lines and a control group living further away, they found that sleep disturbance, memory problems, headaches, irritability and depression were significantly more frequent amongst those living close to the lines.⁴

In 1994-95 while working in a hospital in Lille, France, Dr. Eric Hachulla and colleagues noticed a number of patients who had come in for a blood analysis which turned out to have very unusual parameter, unknown in the medical literature. In addition all had addresses in one area – Coutiches, and they lived close to the controversial 400 kV transmission lines. A small-scale study was arranged consisting of 31 men, 34 women and 26 children, all living less than 200 metres from the lines. For the control group they used people who were recent blood donors at the Lille blood transfusion centre. The results found that most of the people living close to the lines with magnetic field exposures of 2.0 milliGauss (0.2 uT) or more, had a blood condition characterized by low iron levels, but no symptoms of anemia and no decrease of ferritin, which normally is associated with iron deficiency. Hachulla called this “pseudo iron deficiency” and felt that the findings were quite robust and that this enabled an objective, measureable bio-chemical effect clearly shown in people living near transmission lines. It was found that the abnormal blood parameters would return to normal levels when people moved away from the lines but that this took several months. The same effect (PID and EMF exposure) was seen in people living in another town, Bolezeele near similar transmission lines.

As for a possible mechanism on how the magnetic field exposure was causing the biological effect, Hachulla concluded the following:

⁴ Associated Press, “The high voltage power lines are a “problem for health”, acknowledges NKM”. Mar. 21, 2008. <https://www.emfacts.com/2008/03/871-french-admission-that-powerlines-are-a-problem-for-health/>

We speculate that EMFs may modify iron metabolism in populations subjected to 0.2 microTeslas (2 mG) or more, with a high bone marrow incorporation of the iron (that would explain the low iron level) and a rapid utilization for the metabolism of haemoglobin, sometimes with non-incorporation of (^{59}Fe) in the liver.⁵

In early February 2002 a copy of the Hachulla paper and transcripts of conversations with Eric Hachulla were given to Analytical Reference Laboratories Pty. Ltd, Melbourne Australia and a quote was received from them on February 25, 2005 for testing for PID at \$29.90 per sample (in batches of 50). The laboratory said that it was a relatively simple test to conduct.⁶

Implications:

- PID may be an easily verifiable biological marker for ELF magnetic field exposure down to a prolonged 2 mG exposure, a level found in many living and working environments.
- The symptoms of PID are similar to the symptoms reported by people with CFS, and insomnia.

To date, no effort has been made to replicate, or follow up on, the original research made by Hachulla et al.

The Australian CFS investigation

In December 1998, a paper was published in the Journal of the Australasian College of Nutritional and Environmental Medicine (JACNEM) which examined the possibility that impaired immune function, associated with CFS may, in some instances, be linked to chronic low-level exposure to extremely low frequency (ELF) electromagnetic fields (EMFs). The authors concluded that, although the link between ELF EMFs and cellular dysfunction were far from proven, sufficient evidence existed to suggest a causal link, which should be included in treatment options.⁷

Following the above paper, the authors were successful in receiving funding to conduct a pilot study, the findings of which were published in the *ACNEM Journal* in April 2002. This study examined the power frequency magnetic field exposures of a group of 49 patients who were being treated by medical practitioners for the condition of CFS. None of the 47 participants had any identification with electrosensitivity and none felt that EMF was a possible factor with their illness. Using a 0.2 uT benchmark, the researchers identified 14 of the 49 subjects with prolonged home exposures over 0.2 uT (2 mG). After excluding three from analysis

⁵ Hachulla E., *et al*, Pseudo-iron deficiency in a French population living near high-voltage transmission lines: a dilemma for clinicians, *European Journal of Internal Medicine*, vol. 11, no. 6, 2000, pp. 351-352. https://www.emfacts.com/download/pid_france.pdf

⁶ Maisch, D., Report on: Pseudo-iron deficiency in a French population living near high-voltage transmission lines: a dilemma for clinicians, March 2001, https://www.emfacts.com/download/pid_france.pdf

⁷ Maisch D, Podd J, Rapley B, Roland A. Chronic Fatigue Syndrome (CFS) - Is prolonged exposure to environmental level powerline frequency electromagnetic fields a co-factor to consider in treatment?, *ACNEM Journal*, Vol. 17 No. 2, Dec. 1998. https://www.emfacts.com/download/cfs_emfs.pdf

for failing to meet the study criteria, 11 were left with an average exposure level of 07.1 uT. (Group A: 7.1 mG) Which was way above the benchmark level.

34 of the 49 subjects had a group EMF exposure of 0.067 uT. (Group B: 0.6 mG). This gave an exposed subject group "A" of 11 individuals and a 'non-exposed' control group "B" of 34 individuals.

Action was taken to reduce group A exposures to under 0.2 uT. As Group B's exposures were very low no action was undertaken for group B.

Both groups were followed for six months for their overall health status.

It was found that 55% of the more highly exposed subjects (Group A) reported a definite improvement in their symptoms. These were the subjects who had been given advice and assistance on how to reduce their EMF exposure. Group B received no such advice and only 14% reported a definite improvement in health six months after initial contact.

An unexpected finding in the CFS study was a significant 64% improvement in sleep quality in Group A with only 12 % reporting an improvement in Group B. Interestingly 4 subjects in Group A (36%) reported an end to tinnitus at night where their previous magnetic field exposure was at night (such as sleeping next to a meter box). This was not seen in Group B.^{8,9}

Radiofrequency (RF) field exposures

Study on Health Effects of the Shortwave Transmitter Station of Schwarzenburg, Berne, Switzerland (Major Report)

Background:

A short wave transmitter was installed at Schwarzenburg, near Berne, Switzerland, in 1939. Another antenna was added in 1954 with three 150 kW outputs (6.1-21.8Mhz). and a 250 kW antenna was added in 1971. Since the Seventies, health complaints have been reported by the population in the surroundings of the transmitter, and the effects have been associated with its activity. On the 2nd March 1990, a petition seeking a scientific evaluation of the health damage allegedly cause by the transmitter was handed by a group of inhabitants to the Swiss Federal Department of Traffic and Energy (SFDTE). In October 1990, the Head of SFDTE commissioned a study. It was carried out by 15 doctors and scientists, primarily from the University of Berne, but also from 4 other agencies. Their report was published in August 1995 and found significant changes in various indicators which increased with proximity to the mast (Zone A in the study) and which were significantly worse in elderly people. Symptoms included nervousity, inner restlessness, difficulty in falling asleep, difficulty in

⁸ Maisch, D., Rapley, R., Podd, J., Changes in Health Status in a Group of CFS and CF Patients Following Removal of Excessive 50 Hz Magnetic Field Exposure, *Journal of Australian College of Nutritional & Environmental Medicine* Vol. 21 No. 1; April 2002: pages 15-19

http://www.emfacts.com/download/cfs_changes.pdf

⁹ Reducing the Level of 50 Hz Magnetic Fields Lessens Symptoms of Chronic Fatigue and Improves Sleep.(Poster presentation), Podd J, Maisch D, 2nd International Workshop On Biological Effects of Electromagnetic Fields, Rhodes, Greece, 7-11 October 2002.

<https://www.emfacts.com/download/Reducing50.pdf>

maintaining sleep, general weakness and tiredness and joint pains, Sleep difficulty was especially disturbing as this can lead on to increasing fatigue and reduced feelings of well-being. Observed nocturnal sleep changes occurred in association with increased nocturnal RF exposure levels. The study interim conclusion was as follows:

"Insomnias and joint pains, especially in the elderly, were more frequently reported in Zone A than in Zones B and C. They showed a dose-response relationship with the logistic regression and they were not related to a health-worry personality. Further studies are of need to establish a biophysical mechanism.... "Our results indicate a higher frequency of disorders of a neurovegetative nature among residents up to about 1000 m from the transmitter, and are highly suggestive of a direct effect of the radio shortwave transmitter on sleep quality. The other complaints appear to be mediated by the sleep disorder."¹⁰

Advanced Metering Infrastructure (AMI) also called smart meters

As an essential part of its energy policy, in 2007 the Council of Australian Governments (COAG) in the *National Reform Agenda* recommended the gradual replacement of analogue electricity meters with advanced metering meters (smart meters) which have built-in wireless interconnectivity to connect to a new smart electricity grid.

On December 1, 2017, the Australian Energy Market Commission's (AEMC) final rule determination, titled: "Expanding competition in metering and related services" came into force in Tasmania, SA, NSW, the ACT and QLD. The rule states that this is a framework which is designed to, "promote innovation and lead to investment in advanced meters that deliver services valued by consumers at a price they are willing to pay. Improved access to the services enabled by advanced meters will provide consumers with opportunities to better understand and take control of their electricity consumption and the costs associated with their usage decisions."¹¹

In 2006 the Victorian Government mandated the roll out of smart meters throughout the state and in late 2009 the rollout began, predominantly with a mesh network. Soon, newspaper articles started to appear in the Melbourne papers about people who were claiming that ever since a smart meter was installed on their home, they were having health problems, primarily insomnia and tinnitus, especially when the meter was located close to the person's bedroom. In reply to these claims, the proponents of the rollout pointed out that the smart meter's transmissions for power consumption were very brief, only 4-6 times a day, and therefore not capable of causing any health effects whatsoever. However, although the above was correct for measuring power usage, there can be thousands of other brief transmissions not related to electricity usage and these were not being mentioned in the reports and fact sheets extolling the many benefits of switching over to smart metering. The frequent nature of these transmissions was highlighted in a document from Pacific Gas and Electric Co. (USA) where, for a smart meter network running over a 24-hour

¹⁰ Altpeter, E.S., Krebs, Th., Pfluger, D.H., von Kanel, J., Blattmann, R., et al., 1995: "Study of health effects of Shortwave Transmitter Station of Schwarzenburg, Berne, Switzerland". University of Berne, Institute for Social and Preventative Medicine, August 1995. Also see: Cherry N., "Swiss shortwave transmitter study sounds warning" https://www.emfacts.com/download/Forum_2.pdf pp23-26

¹¹ AEMC, "Expanding competition in metering and related services" <https://www.aemc.gov.au/rulechanges/expanding-competition-in-metering-and-related-serv>

period, up to 190,000 transmission pulses can occur.¹²

In order to verify if this was the case with the smart meters being rolled out throughout Victoria, detailed measurements were then undertaken of a typical Melbourne home that had a smart meter recently installed. It was found that there are many brief but very frequent RF transmissions.¹³ This contrasts with what occurs with an analogue electricity meter, which has no RF transmissions. The characteristics of the smart meter emissions therefore appear to be creating a new and unique human exposure situation where no research has yet been done on the possible impacts on health with prolonged close proximity exposure.

A 92-case study report by Melbourne medical practitioner Dr. Federica Lamech was published in the Nov/Dec 2014 issue of the US clinical journal *Alternative Therapies in Health and Medicine*. The journal is a PubMed-listed, peer-reviewed publication. The Lamech paper, is titled "Self-Reporting of Symptom Development From Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series." The paper reveals that the most commonly reported symptoms from exposure to wireless smart meters were, in this order: insomnia, headaches, tinnitus, fatigue, cognitive disturbances, dysesthesias (abnormal sensation), and dizziness. The case series also revealed that the effects of these symptoms on people's lives were significant.¹⁴

As part of an investigation into these reported symptoms, this writer conducted a number of interviews with people who claimed they were being affected by recently installed smart meters. Paramount in symptoms reported was insomnia.¹⁵ (Appendix A)

The irrelevance of the official Guidelines

Claims that the above-mentioned RF exposures are below the official guidelines and therefore are 'safe' are disingenuous as this situation lies outside the parameters set in the guidelines recommended by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) for exposure to radio-frequency fields. In relation to radio-frequency exposure, ARPANSA follows the limits set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) which are only designed to provide protection (from excessive tissue heating for RF) from acute radio-frequency exposures and not against other biological effects not related to tissue heating.¹⁶

¹² Pacific Gas and Electric Co. http://emfsafetynetwork.org/wp-content/uploads/2011/11/PGERFDataOptoutalternatives_11-1-11-3pm.pdf

¹³ Maisch D., Comments on the CONSULTATION PAPER, National Electricity Amendment (Demand Management Incentive Scheme) Rule 2015

¹⁴ Lamech F., 'Self-Reporting of Symptom Development From Exposure to Radiofrequency Fields of Wireless Smart Meters in Victoria, Australia: A Case Series', *Alternative Therapies in Health and Medicine*, Nov. 2014.

¹⁵ Maisch D., Ten case histories of people in Melbourne who are suffering health problems after a smart meter was installed near their bedroom (or in one case their workstation). Sept 11, 2013, https://www.emfacts.com/download/SM_case_studies.pdf

¹⁶ Maisch D., *A case study on ICNIRP harmonization and the Australian RF exposure standard*, Chapter 5 in *The Procrustean Approach*, 2010, <https://ro.uow.edu.au/theses/3148/>

Conclusion

Considering the evidence examined in this report, for medical practitioners who deal with cases of Chronic Fatigue Syndrome and intractable sleep disorders, an investigation of patient's night-time exposure to both power-frequency magnetic fields and radio-frequency fields is warranted. Failure to do so, based on false assurances of safety coming from organisations such as ARPANSA and ICNIRP should itself be considered a potential risk to public health in Australia.

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<https://www.emfacts.com/papers/>

Appendix A (Interviews - anecdotal)

Case 1

"My symptoms started the night the smart meter was installed (externally on the bedroom wall). Waking with heart palpitations and a racing heart and internal shakiness. A surging feeling that went right through my body now and then. Head pain and a burning pain on the left side of the head. Depleted immune system, leading to flu and cold. I am now getting nausea and maybe 2 -3 hours sleep a night."

Case 2

"Since installation, I wake up with headaches every single morning and go to bed with something very much like vertigo every night. I have had this ever since the smart meter was installed. It is also installed on my front porch which is right outside my bedroom, so I am very close to it."

Case 3

"Since my smart meter was installed, I have experienced shortness of breath, palpitations, and headaches mainly at the back of my head. Could it be because the position of the meter is on the other side of the wall where I sit every night while watching TV? What can I do about it? I have no room to change the position of the couch and my symptoms are getting worse by the day."

Case 4

"I experienced the same issues from my neighbour's two smart meters located three metres from my bedroom. After complaining to Powercor, I found that they must have reconfigured them as they are not communicating as much (confirmed with an EMF meter). My heart palpitations/pain in my chest has gone but I still am waking up with headaches (although they are not as intense as before the meter was reconfigured)."

Case 5

"I have developed ringing in my ears that would go away when I went to work. Now I have had two months off work, the ringing is constant. I have developed a thyroid problem since the smart meter was installed. I wake up aching. The meter is next to my bedroom wall."

Case 6

"Our smart meter was installed about two years ago. Our town in central Victoria was one of the earliest in the roll-out. Since its installation (outside my bedroom window), my health and the general health of my family has gone downhill rapidly...I suffer from severe headaches, memory loss, loss of motor skills. I feel as though I am walking around in a haze. I lie awake until daylight some nights, and others it is 1-2 pm when I wake up. There is also the high-pitched squeal that the smart meter emits constantly."

Case 7

"I came to Australia after a smart meter was fitted two metres below my bedroom window in NZ. I was not informed of the radiation danger. I subsequently experienced severe health problems and was at a loss to explain this. One of my students wrote a report about her own experiences

with smart meters and I had to mark it. I began to put two and two together. The report probably saved me serious health problems.”

Case 8

“A smart meter installed Aug 2012 unbeknownst to homeowner. A highpitched sound started that night, kept him awake. His inspection the next day found the new smart meter in his meter box. Ongoing insomnia, tinnitus and overall deterioration in health since then. Shielding has helped, but ongoing difficulty in sleep and tinnitus continues.”

Case 9

“My son, aged 22, started work in a small graphic design studio in Fitzroy. After only being there a few weeks, he started to become quite unwell. He was getting severe dizziness, headaches, couldn't see straight or concentrate and was getting heart palpitations and extreme kidney pain, so much so that he had to take several days off to recover. On returning to work, the same thing happened again and by lunchtime he had to leave. As it was a Friday, he was able to have the weekend away and started to improve. The next week, his problems recurred yet again and it was then that he discovered that there was a smart meter situated inside a wooden box only about two metres from his head. (Just to rule out any other cause, he underwent medical tests – ECG, blood test and kidney scan – which all came back clear.) Finding that he was only getting worse at work, he felt he had no alternative but to resign. He is now ‘sensitised’ to EMR and gets quite dizzy when exposed to it.”

Case 10

“I’ve been trying to find the answers to the question of the nightmare of noise mostly at night emitting through the walls of my home , it all started when a smart meter was installed on the outside wall of our home in Sebastopol Victoria ...It has taken a tremendous toll on my health as the noise is ongoing. Many people I have spoken to have the same story to tell. We also have a neighbors' smart meter facing our bedroom window.”

For details of the above see the Powerpoint presentation: Advanced Metering Infrastructure or The Smart Electricity Grid, Unintended consequences of smart meter placement
https://www.emfacts.com/download/SM_case_studies.pdf