

# Supplementary submission on 5G consultation

By Katherine Smith

## Additional background information on non ionising radiation health issues

Based on the MBIE report (dated April 20) on submissions on the Telecommunications (New Regulatory Framework) Amendment Bill there appears to be an assumption on the part of some staff working for the Ministry of Business, Innovation and Employment that New Zealanders are protected from adverse effects from exposure to non ionising radiation by the current National Environmental Standard for Telecommunications Facilities (NESTF) and NZS 2772.1:999.

Unfortunately, this assumption is incorrect.

***NZS2772.1:999 is designed to protect only against a very limited range of adverse effects; i.e. thermal injury and shocks.***

Radiofrequency radiation (RFR) in the microwave range is classified as a possible carcinogen by IARC and research has shown that levels of RFR in the microwave range that are much lower than those allowed under NZS 2772.1:999 can have harmful biological effects. (Many of these studies can easily be accessed on the website [www.bioinitiative.org](http://www.bioinitiative.org).)

Despite the fact that emissions levels under NZS 2772.1:999 are associated with a variety of health problems, the NZ Ministry of Health is doing next to nothing to gather data about New Zealanders' exposures (beyond checking the emissions levels around some cell sites).

Nor does New Zealand have any system monitor the effects on the health of our population from the proliferation of wireless devices and to take appropriate steps to remedy this.

For example, under the Health Act 1956 there is a system by which NZ physicians are required to report suspected cases of certain infectious diseases, such as a salmonella outbreak. This reporting system assists with control of illness. (For example in the case of salmonella by helping to identify the source and either removing contaminated products from the marketplace and/or providing public education campaigns such as those promoting safe food handling and storage.)

There is no such obligation for physicians to report cases of disease or medical events suspected to be caused by exposure to RFR in the microwave range.

New Zealand has a cancer registry but this registry collects data about the age, ethnicity and type of cancer of people who are diagnosed with this disease, not the cause or suspected cause of the malignancy.

The NZ Ministry of Health does have a committee known as the "Interagency Committee on the Health Effects of Non-Ionising Fields" that reports to the Director General of Health and (according to its terms of reference) also supplies meeting notes "to the Chief Executives of the Ministry for the Environment and the Ministry for Economic Development." It is supposed to report to the "joint Ministers" if there is "reasonable suspicion of health hazards".

The composition of this committee includes representatives of the telecommunications industry and the electricity industry. (The telecommunications industry is a major contributor to the public burden of RFR in the microwave range from the plethora of cell sites it operates around NZ. In the

electricity industry, many companies are unnecessarily adding to people's RFR exposure by installing wireless so-called "smart" or "advanced" meters even though there are safer (non wireless) alternative meters on the market in NZ.)

*I do not believe it is appropriate to have representatives of these industries on a government committee that is supposed to assess the **health effects** of electromagnetic radiation.*

By all means, the government could ask for technical advice (for example, to get advice about what levels of radiofrequency radiation (RFR) in the microwave range are needed for the operation of different devices) from people who have these industry backgrounds but people in these industries should not be part of a committee that is charged with assessing **health** effects.

The key reason for this is that a large part of telecommunications' companies business is now dependent on their being legally allowed to operate infrastructure (i.e. cellular phone towers) that produces large quantities of radiofrequency radiation in the microwave range to facilitate its customers to use devices that utilise this electromagnetic radiation (for example, cellular phones).

Telecommunications companies can easily be seen to have a vested interest in either suppressing or downplaying the significance of research that shows that exposure to this form of electromagnetic radiation has been linked to adverse health effects in some people.

In fact, as this recent investigative article shows, this is exactly what has been happening overseas.

<https://www.thenation.com/article/how-big-wireless-made-us-think-that-cell-phones-are-safe-a-special-investigation/>

Similarly, consultants to the telecommunications and electricity industries can be seen to have a vested interest in the financial welfare of the companies for which they provide consultancy services.

At the links below you will be able to access a brief critique of a report on smart meter emissions that was written by Martin Gledhill who is named as a member of the Interagency Committee on the Health Effects of Non-Ionising Fields in the Committee's 2015 report. Martin Gledhill also provides consultancy services to the telecommunications and electricity industry.

<http://www.stopsmartmeters.org.nz/government-and-electricity-industry-positions/is-the-wel-smart-box-a-health-hazard/>

<http://www.stopsmartmeters.org.nz/wp-content/uploads/2014/06/RF-fields-from-a-WEL-Networks-Smart-Meter-with-comments-by-PW.pdf>

Despite being a consultant to these industries, which in my opinion is a conflict of interest, Martin Gledhill appears to be a key member of the Interagency Committee on the Health Effects of Non-ionising Fields. In fact he is one of two people listed by name in the Committee's 2015 report as being members of the committee. This suggests to me that he plays a prominent role in the committee.

You can see from the critique of Martin Gledhill's report on a test of the emissions of a smart meter that he chose to present the emissions data as a percentage of the NZ Standard (NZS 2772.1:1999) rather than notating the graphs with the actual emissions data. By presenting the data as a percentage of NZS 2772.1:1999, anyone who is not familiar with the RFR levels allowed under the national standard would be likely to perceive the smart meter emissions as a non-problem.

While Martin Gledhill's report would likely have been commissioned by WEL Networks to show that the smart meter emissions comply with NZS 2772.1:1999 (and the smart meter emissions do comply with this standard) the Ministry of Health has this document on a page of its website. In fact, the Ministry of Health is using the document as evidence of the safety of smart meters.

(<https://www.health.govt.nz/your-health/healthy-living/environmental-health/household-items-and-electronics/smart-meters>)

I might add that NZS 2772.1:1999 was written with substantial telecommunications industry input (see: <http://www.stopsmartmeters.org.nz/latest-news/new-zealands-emr-regulations-sufficient-protect-public-health/>) however the Ministry of Health's page cited above makes no mention of this fact.

Unfortunately, biologically, the levels of radiofrequency radiation in the microwave range that are produced by the smart meter are not trivial. A laboratory study has shown that RFR in the microwave range can potentially cause DNA damage at levels of 60,000 microwatts per square metre, lower than the peak emissions for the smart meter. (At 923 MHz range for the smart meter being tested the allowable limit under NZS 2772.1:1999 is approximately 4.6 million microwatts per square metre.)

The limit allowed under NZS 2772.1:1999 compares unfavourably with the ceiling of 1000 microwatts per square metre proposed by the independent coalition of international scientists who co-authored the BioInitiative Report after examining the scientific evidence on the biological effects on non ionising radiation, including RFR in the microwave range. (See: [www.bioinitiative.org](http://www.bioinitiative.org).)

***To put these figures into a broader historic perspective, the estimated background radiation for RFR in the microwave range prior to the industrial age was 0.000001 microwatts per square metre.***

Modern exposures to RFR in the microwave range are unprecedented and on that basis it is not surprising that a significant minority of people (those who may eventually be diagnosed as suffering from electrohypersensitivity) experience symptoms with exposure to the RFR produced by common devices such as cellular and cordless phones, wi-fi routers and cellular phone infrastructure.

***Allowing personnel from the telecommunications and electricity industries (or people doing consultancy work for these companies) to play major roles in a committee that it supposed to provide health advice about the risks of electromagnetic radiation is, in my opinion, at the very least a perceived conflict of interest given that people who work in or for these industries can be seen to have a vested interest in downplaying or suppressing research that raise questions about the safety of non ionising radiation.***

I do not think that New Zealanders' health is being well-served by the quality of advice that is being provided to the Inspector General of Health (and the relevant government ministries) by the Interagency Committee on the Health Effects of Non-Ionising Fields.

***I believe it would be irresponsible for Radio Spectrum Management and the MBIE to accept advice from the Ministry of Health to the effect that the allowable emissions levels under NZS 2772.1:1999 and the NESTF assure public safety. The allowable emissions levels under these standards are not designed to protect the public from any effects other than thermal injury or electric shocks.***

## Report of a variety of symptoms in people living close to “state of the art” street lights in the UK

There have been several reports about residents’ concerns of health problems including insomnia, nose bleeds and still births following the introduction of what is described as “state of the art” street lights to a British town.

Here is one such report:

<http://www.dailymail.co.uk/health/article-5409921/Residents-enduring-stillbirths-street-lamps.html>

From the above report and additional reporting at this link:

[https://www.huffingtonpost.co.uk/entry/gateshead-council-streetlights-conspiracy\\_uk\\_5acbb8aae4b09d0a11965df8](https://www.huffingtonpost.co.uk/entry/gateshead-council-streetlights-conspiracy_uk_5acbb8aae4b09d0a11965df8)

the following data is available:

- The frequency used for the lamps is 868 – 870 MHz
- According to the Council the lamps transmit only 80 seconds per week
- The RFR exposure is claimed to be less than 1% of the UK’s allowable exposure limit

With regard to the Council’s claims that the new street lights are not to blame for the residents’ symptoms, similar claims have been made by the electricity industry with respect to the purported safety of wireless so-called “smart” meters.

As the graphic below illustrates, while a reported total transmission time in the region of only seconds per day may sound reassuring to people who are not familiar with the technical capabilities of modern wireless devices, the reality can be quite different.

The source for the graphic is a report by Don Maisch, PHD.

[http://www.emfacts.com/download/New\\_Zealand\\_critique3.pdf](http://www.emfacts.com/download/New_Zealand_critique3.pdf)

If a smart meter is part of a mesh network even if the total transmission time over 24 hours is in the region of 45 seconds, this can subject people in the vicinity to almost 10,000 pulses of RFR within that period, or one pulse every 8 seconds or so if a meter is performing as an average meter within its mesh network. Exposure will be many times higher if it acts as a local “hub”.

(Smart meters, incidentally have been reported to cause insomnia and nosebleeds.)

**Table 1**

Electric System Message Type [a]	Transmission Frequency Per 24-Hour Period: Average [b]	Transmission Frequency Per 24-Hour Period: Maximum (99.9 <sup>th</sup> Percentile) [c]
Meter Read Data	6	6
Network Management	15	30
Time Synch	360	360
Mesh Network Message Management	9,600	190,000
<b>Weighted Average Duty Cycle</b>	<b>45.3 Seconds<sup>d</sup></b>	<b>875.0 Seconds</b>

Table 1 presents scheduled smart meter system messages and their durations. This is only for the 900Mhz smart meter transmitter radio and represents data for all scheduled messages that are required to sustain the mesh network communications.

If the street lights in Gateshead are part of a mesh network (which seems a reasonable assumption given the frequency used) and they are transmitting for a total of 11 seconds over each 24 hour period they may be emitting pulses of RFR in the microwave range every 30 seconds or so. (I am assuming their emissions profile is constant over a 24 hour period, rather than disproportionately biased toward night time activity.)

Moreover when the 868 MHz band is used as part of a “smart city” transmission band each 868 MHz transmitter within the system has a range of about 300 metres. This means that depending upon how close the street lamps are positioned in relation to each other in the town of Gateshead residents may be exposed to emissions from more than one street lamp’s transmitter.

I have taken the time to look over this story because I believe it provides a warning for New Zealand about the potential effects of intensifying public exposure to non ionising radiation such as would occur if 5G is allowed to be introduced here.

What would be the outcome for residents of an urban area in NZ if 5G transmitters were added to street light poles?

Would those who reported new symptoms following the addition of this new non ionising radiation producing infrastructure to their local environment be treated respectfully and the offending device be voluntarily removed by the company that installed it?

Or would people’s concerns be mocked and dismissed and their forced irradiation continue because our lax standards mean that the emission levels are legal?

## ***Additional information about 5G***

Based on the MBIE report (dated April 20) on submissions on the Telecommunications (New Regulatory Framework) Amendment Bill it appears that the MBIE has received advice from the Ministry of Health that the development of a 5G network would not pose a health risk.

I therefore thought I should provide Radio Spectrum NZ with some additional information about millimetre wave frequencies.

### **Use of millimetre wave frequencies in weapons systems**

As you may possibly be already aware, millimetre wave frequencies have been exploited by the United States military as part of a “non lethal” weapons system known as “Active Denial”.

Colloquially known as the “pain ray” because of the intense burning pain experienced by people within range of the beam, this weapon uses millimetre waves (95 GHz).

The system has been tested on volunteers under controlled conditions in which there was a 15 second non exposure period between blasts of the weapon.

<https://www.telegraph.co.uk/news/science/7900117/The-Active-Denial-System-the-weapon-thats-a-hot-topic.html>

One reporter who volunteered to experience what it was like to be hit by the weapon noted that his skin continued to tingle for “several minutes” after he had quickly “scurried” out of the way of the beam.

<https://www.telegraph.co.uk/news/worldnews/1569733/How-I-was-zapped-by-a-heat-wave-gun.html>

Another report by a journalist who volunteered to be exposed to this weapon may be read at the link below:

<https://www.wired.com/2012/03/pain-ray-shot/>

Another reporter who volunteered for a test later wrote an article about an attempted cover-up by the US military of a test in which one of the volunteers required hospital treatment for burns.

<https://www.wired.com/2008/10/pain-ray-accide/>

A report from 2008 warned that a millimetre wave weapons system “Shows 'Potential for Death'”.

Quoting from the article:

“Dr. Altmann describes the Active Denial beam in some detail, noting that it will not be completely uniform; anyone unlucky enough to be caught in the center will experience more heating than someone at the edge. And perhaps more significant is his thorough analysis of the heating it produces – and the cumulative effect if the target does not have the chance to cool down between exposures. In U.S. military tests, a fifteen-second delay between exposures was strictly observed; this may not happen when the ADS is used for real.

*“As a consequence, the ADS provides the technical possibility to produce burns of second and third degree. Because the beam of diameter 2 m and above is wider than human size, such burns would occur over considerable parts of the body, up to 50% of its surface. Second- and third-degree burns covering more than 20% of the body surface are potentially life-threatening – due to toxic tissue-decay products and increased sensitivity to infection – and require intensive care in a specialized unit. Without a technical device that reliably prevents re-triggering on the same target subject, the ADS has a potential to produce permanent injury or death.”* [Original emphasis]

<https://www.wired.com/2008/10/army-ordering-p/>

## **Animal test data on the effects of exposure to millimetre waves**

### **1) A paper showing eye damage from millimetre wave exposure**

Research published in 1994 (“Experimental studies on the influence of millimeter radiation on light transmission through the lens” *Klin Oczna*. 1994 Aug-Sep; 96(8-9):257-9) showed that rats exposed to millimetre wave radiation for only 56 days developed changes in the lens of their eyes. The wave length used was 5.6 mm (53 GHz). The power output was 10 milliwatts/cm<sup>2</sup> (100,000,000 microwatts/m<sup>2</sup>)

The rats’ exposure in this study is higher than the applicable time averaged standard in NZ (NZS 2772.1:1999) which would allow for a maximum (time averaged) exposure of up to 1 W/cm<sup>2</sup> (10 million microwatts per square metre) for the general public for 53 GHz. (It is lower than the peak public exposure limit of 10 billion microwatts per square metre.)

The authors, Prost M, Olchowik G, Hautz W, Gaweda R, conclude the abstract for their study by stating that “radiation in millimetre range can induce changes in the lens, predisposing to cataract development.”

The abstract for the study may be accessed via <https://www.ncbi.nlm.nih.gov/pubmed/7897988>

### **Comments**

While the level in the study was higher than what is allowed under NZS 2772.1:1999 for the public for time averaged exposure, this study raises concern because a short exposure time (*less than two months*) caused damage to the lenses of the rats’ eyes.

***The study certainly suggests that it would be unwise to allow any increase in allowable non ionising radiation levels to facilitate the development of a 5G system.***

***It also begs the question, what could happen to human eyes from lower levels of exposure to millimetre waves over a greater time period?***

I might add that cataracts are already a problem for many people in NZ and that there has been concern for years that our public health system is not keeping up with the need for cataract surgeries (and that many other people with eye diseases that threaten their vision are having long waits for specialist treatment.)

<https://www.healio.com/ophthalmology/news/print/ocular-surgery-news-europe-asia-edition/%7Ba939d562-ed02-4aec-852c-cbc2c545e386%7D/demand-for-cataract-surgery-in-new-zealand-outpaces-resources> (2004)

<http://www.stuff.co.nz/marlborough-express/10176095/Waiting-list-woe-for-cataract-patients> (2014)

<https://www.radionz.co.nz/news/national/316970/eye-patients-losing-vision-in-long-wait-for-specialists> (2016)

<https://www.stuff.co.nz/national/health/90821897/patient-prepared-for-blindness-while-waiting-two-years-for-operation> (2017)

At present, most people affected by cataracts are in their 70s.

Introducing new technology (such as millimetre wave transmitters and 5G compatible smart phones) that may increase the risk of people developing cataracts after a relatively short time would seem to be a poor idea given the overstretched resources of our public health system.

(It would seem to be a particularly unwise given that the technology could conceivably lead to people developing cataracts at a much younger age than normal, given that many working age people use smart phones as part of their jobs. An increase in the burden of cataracts in younger people could be expected to adversely impact productivity, in addition to the worry and frustration it could cause to people who fear they could lose their vision.)

## **2) A paper showing skin damage and death from exposure to millimetre waves**

Research conducted in China (“EEG changes and stress reactions in rat induced by millimeter wave” Sheng Wu Yi Xue Gong Cheng Xue Za Zhi. 2011 Feb;28(1):40-4.) shows concerning effects from exposure to 35 GHz millimetre waves.

The abstract for the study by Xie T<sup>1</sup>, Pei J, Li F, Huang X, Chen S and Qiao D may be accessed via this link:

<https://www.ncbi.nlm.nih.gov/pubmed/21485180>

**The full text of the study reports the following facts:**

A previous study showed that exposure to 35 GHz millimetre waves for just **three seconds** caused the rat’s skin temperature to increase by about **20 degrees Celsius** and caused the rat to show heat-related pain/stress reactions including struggling violently.

The intensity of the millimeter wave radiation to which the rat was exposed was estimated to be 7.5 W/cm<sup>2</sup> (75 billion microwatts per square metre). This is higher than the applicable current standard in NZ (NZS 2772.1:1999) which would allow for a maximum (non time averaged) exposure of up to 1 W/cm<sup>2</sup> (10 billion microwatts per square metre) for the general public for 35 GHz.

The full text also includes the following facts:

Male rats were exposed to 7.5 W/cm<sup>2</sup> of 35 GHz waves which was directed on a shaved area of their back. This area had a radius of 0.75 centimetres. The rats were immobilised and an EEG was used to monitor their brain waves.

***Exposure to this level of millimetre wave radiation resulted in the death of the rats within 10 minutes.***

After irradiation began, the rats struggled continuously for the first 16 or so seconds then struggled intermittently until about the 30 second mark. Thereafter the rats breathed more rapidly than is normal for rats but did not move much until about the six minute mark when they struggled strenuously then entered what was described as a “failure period” and were dead within a few more minutes.

In another experiment to assess the effects of the 35 GHz millimetre waves on skin, the results were as follows:

Randomly divide 21 rats into 7 groups (3 per group):

- Group 1: **0 second** of irradiation (Control group)
- Group 2: **5 seconds** of irradiation
- Group 3: **10 seconds** of irradiation
- Group 4: **15 seconds** of irradiation
- Group 5: **20 seconds** of irradiation
- Group 6: **30 seconds** of irradiation
- Group 7: **50 seconds** of irradiation

The conscious rat was fixed on an irradiation platform, and left standing for a few minutes to get used to the environment.

For all groups, the average power density at the focal spot area was approximately 7.5 W/cm<sup>2</sup> and the irradiation spot was on the rat’s back (from which the fur had previously been removed by shaving).

Six hours after irradiation the rat were anaesthetised so that a skin sample (10 mm × 10 mm) could be taken for further analysis.

#### Key findings:

When irradiated for 5 seconds, the epidermal cells were slightly swollen, and the blood vessels in the dermis expanded.

At 10 seconds irradiation, congestion and inflammation appeared in the dermis.

At 15 seconds, epidermal tissue was partially necrotic, and the hair follicle started to fragment.

At 20 seconds, the epidermal tissue is basically necrotic, and the superficial dermis also swells.

When irradiated for 30 seconds, the entire skin has been severely damaged.

When irradiated for 50 seconds, the skin was completely necrotic and the skin tissue had been scorched/charred.

### **What can we learn from this research?**

Irradiation with high intensity millimetre waves over 10 minutes causes severe pain and prostration followed by death, even when a comparatively small area of the body is exposed to the radiation. (A rat weighing about 250 g would be expected to have a body surface area of approximately 275 cm<sup>2</sup> and the irradiated area was approximately 1.8 cm<sup>2</sup>.)

Irradiation of a shaved rat's skin for as little as 50 seconds completely destroyed the skin in the irradiated area.

***This study provides evidence that it would be extremely foolish to allow any increase to NZ's (already lax) NZS 2772.1:1999 in order to facilitate the development of a 5G system.***

The study raises the questions of ***what would the effects of lower intensity whole body exposure to millimetre wave radiation on a 24/7 basis***, such as would be the case for a person who is living and working in an urban environment where there are millimetre wave transmitters in close proximity.

Some people who have developed electrosensitivity report burning sensations from exposure to source of electromagnetic radiation that penetrate deeper into the body than do millimetre waves.

People who suffer from electrosensitivity (defined in my initial submission) are understandably alarmed at the idea that they could be exposed to millimetre waves that effectively target the skin surface and worry that their (already very unpleasant) existing symptoms could be severely exacerbated.

However it is clear from the tests of millimetre wave based weapons systems and this animal study that millimetre waves of sufficient intensity can evoke pain and, with more than momentary exposure, have the potential to cause mild to severe skin damage in humans or animals which have been exposed to this form of non ionising radiation.

I think it is not too harsh to use the word "torture" to describe the treatment of the rats in the study on which I have reported.

***Given that the effects of lower intensity, chronic irradiation by millimetre wave frequencies on humans (and our pets) are as yet unknown I would hope that Radio Spectrum Management would take a responsible approach and not auction or allow the use of millimetre waves to be used as part of a 5G system.***

If it turns out that constant lower level exposures to millimetre wave frequencies cause skin (or eye) damage that results in chronic pain for people living and working close to millimetre wave emitting small cells, given that neighbours of NESTF compliant transmitting equipment have no legal ability to object to its installation or demand its removal, affected people could have no options other than to move house and/or leave their jobs.

This would impact adversely on productivity.

***New Zealand cannot realistically hope to progress socially or economically if the government institutes policies that damage people's health.***

The facilitation of the proliferation of wireless infrastructure that produce non ionising radiation (such as RFR in the microwave range or millimetre waves) may allow telecommunications companies to make bigger profits.

However, allowing the installation of infrastructure that produces RFR in the microwave range that is associated with increased risk of cancer in both users of some wireless technologies and people living in close proximity to cellular phone transmitters imposes a burden on individuals, families and our already strained public health system which has to foot the bill for treatment costs.

The potential health consequences of a 5G system incorporating millimetre waves are not clear at this time although the wavelengths can be expected to interact with skin and eyes.

***Wired technologies such as the copper phone system and fibre allow for safe, corded phone systems as well as safe, hardwired internet systems. Investing in these systems will allow New Zealanders to enjoy safe internet and phone access while still protecting health and maximising productivity.***