

Response to information provided by Councillor to Mendip Planning Board 16/3/22

Response from: Dr Erica Mallery-Blythe

Regarding information provided by: Councillor XXX (text in red)

Mendip planning board - 6pm March 16th 2022

Link <https://teams.microsoft.com/#/broadcastPlaybackScreen>

<https://www.mendip.gov.uk/article/9893/Planning-Board-Wednesday-16-March-2022> 1 hour 08 mins

I offer the following corrections to the highly misleading statement provided by councillor XXX. This councillor reassured you that it is impossible for non-ionising radiation to cause oxidative stress, but it was clear from his testimony that he does not fully understand the term 'oxidative stress' or its biological significance:

Transcript provided by XXX:

"I've got a number of points I could make about this but perhaps the most useful and important is speaking as a physics teacher. We have heard the proposed mechanism for harm to human beings is oxidative stress. Oxidative stress means an imbalance of oxidising radicals in the body, too many basically. To create an oxidising radical by radiation requires ionisation. That is what it is. You remove an electron from something and you produce a positively charged oxidising radical. To do that requires enough energy to be able to remove that electron and send it away free somewhere and leave this oxidising radical.

Since the beginning of the 20th century, we have understood the nature of radiation, it can be considered particle or waves. For a particle to have enough energy it means considered as a wave, it must have sufficient frequency, sufficient energy. Ionising Radiation means all radiation that has high enough frequency, enough energy to do this damage to molecules. That is the top end of ultraviolet ν into x-rays and cosmic rays that is ionising radiation, everything above that range the radiation we are talking about here is in the radio range. The individual particles have about a millionth of the energy required to do that.

It is not ionising radiation"

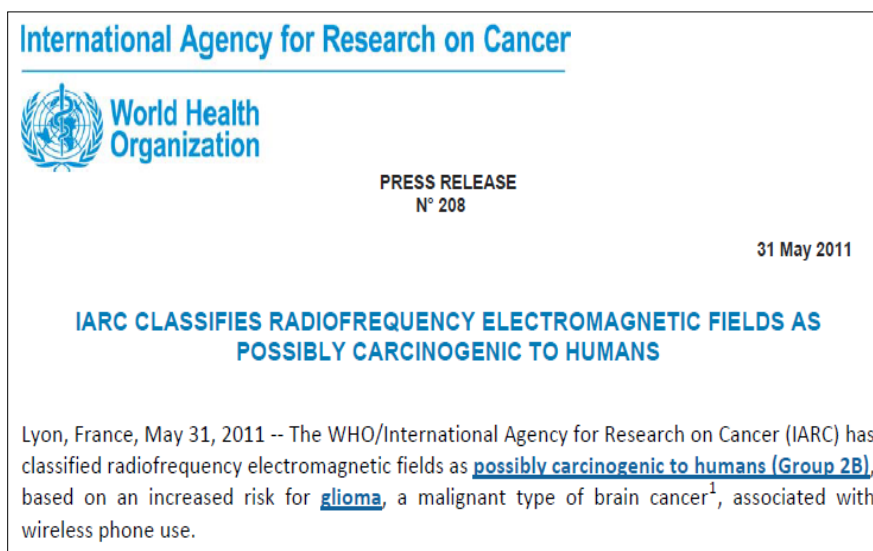
"That is the reason why radio waves do not cause cancer, why 4g doesn't cause cancer, why the Mendip transmitter does not cause cancer, why radar doesn't cause cancer.

It heats us up, that is all that it can do because that is the only way we can absorb that radiation. It just jiggles things a bit faster."

XXX has made clear here that he believes that the only way cancer can be caused is via ionisation as caused by ionising radiation such as eg. X-rays. The quickest, simplest way to convey the fallaciousness of this statement is to remind you that most known carcinogens do not cause cancer via this specific pathway. You are all aware for example that asbestos, smoking and ultraviolet light (UVA and UVA) are all currently classified as Group 1 Known Human Carcinogens. None of these, however, are 'ionising radiation'. More specifically, his assertion to you that oxidative stress can only be caused by ionisation in this way, is invalidated by literally thousands of peer-reviewed scientific publications. When you are encouraged (by the NHS for example), to ensure a diet rich in 'antioxidants', it is not because they are expecting you to be receiving a large dose of X-rays on a regular basis, it is because many, many different environmental and ingested exposures can increase levels of oxidative stress. Increasing levels of free radicals (oxidative stress) in biological tissues is associated with accelerated aging, cellular degeneration, cancer and multiple diverse disease processes. It is the mechanism considered to induce cancerous changes in cells for present Group 1 Known Human Carcinogens¹ including, but certainly not limited to ionising radiation.

It is not possible - ask a physicist.”

It is possible, I'd suggest you ask the numerous experts in physics, biology, medicine and public health at the International Agency for Research on Cancer (IARC) who were commissioned by the WHO to try to make that decision 11 years ago:



In 2011, the World Health Organisation (WHO) via the International Agency for Research on Cancer (IARC) classified RFR as Group 2B ‘Possibly carcinogenic to humans’². Glioblastoma Multiforme (GBM), an associated rapidly progressive fatal brain cancer and acoustic neuroma, satisfy the Hill criteria for causality from RFR exposure based on human epidemiological studies³. Human epidemiological evidence has continued to accumulate since^{4-9,10}. In 2018 the largest animal study so far, published from the highly credible US National Toxicology Program (NTP)^{11,12} declared the evidence for carcinogenesis ‘clear’, putting pressure on IARC to reassess urgently and elevate RFR to Group 1 ‘Known Human Carcinogen’^{13,14}. Furthermore, the large-scale Ramazzini Institute study¹⁵ which used far field radiation designed to emulate base station type radiation was published shortly afterwards and independently confirmed promotion of carcinogenesis in cells of glial derivation. Legal authorities continue to validate the causal link between RFR and tumours.¹⁶ The incidence of these kinds of brain tumours are rising in the UK¹⁷, Netherlands¹⁸, Australia¹⁹ and USA^{20,21}

“Well, put it this way, no scientist can say anything is impossible, however, in the 30 years or so we have been considering the possibility that this kind of radiation might cause damage to human or other issue, nobody has been able to suggest a mechanism by which this radiation could do that.

Nobody.”

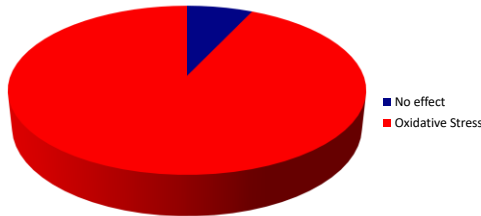
‘Nobody’, in this case is actually hundreds of peer-reviewed scientific authors. The oxidative stress mechanism is a viable, currently accepted mechanism of carcinogenesis for other Group 1 Carcinogens and in the case of non-ionising radiation, hundreds of peer-reviewed scientific papers have now been published demonstrating biological effects occurring in response to a range of frequencies. Specifically, in excess of 90% of publications that investigated for oxidative stress indeed found oxidative stress, both in vitro and vivo (animal studies).²²

Oxidative Stress Review

Yakymenko et al 2015

[Yakymenko et al., 2015, Electromagn Biol Med, Jul 7:3-17.](#)
[Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation.](#)
<https://www.ncbi.nlm.nih.gov/pubmed/26151230>

93 % Studies Demonstrating Oxidative Stress



Dr. Erica Mallery-Blythe 2018

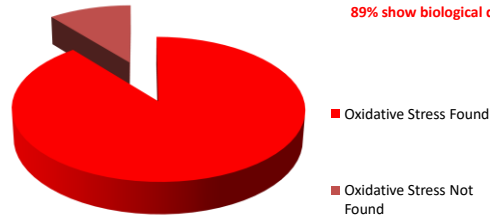
Oxidative Stress Review 2018

[Bandara, P., Carpenter, D.O., 2018, Planetary electromagnetic pollution: it is time to assess its impact. Lancet. Planet. Health 2 \(12\), https://doi.org/10.1016/S2542-5196\(18\)30221-3](#)

Oxidative Stress

216 / 242
Studies significant OS

216:26
89% show biological disruption



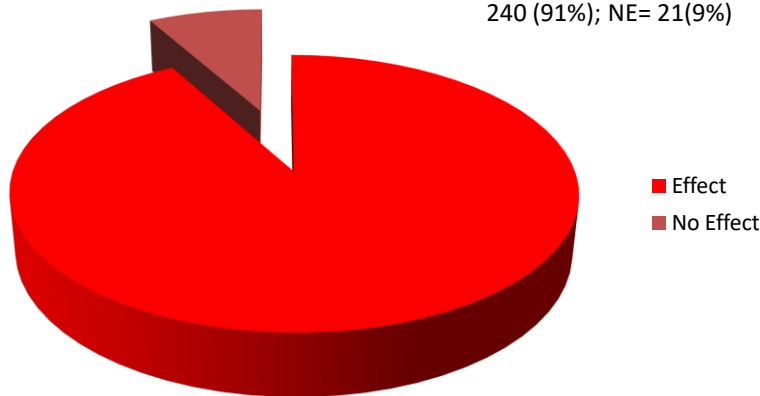
Dr. Erica Mallery-Blythe: BSEM presentation 2018

Bioinitiative 2020 Update Dr. Henry Lai RFR Free Radical (Oxidative)

[BioInitiative Working Group, Sage, C., Carpenter, D., BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation December 31, 2012, as updated in 2014, 2018, 2019 and 2020 www.bioinitiative.org](#)

Oxidative Stress

Of 261 total studies: (E= 240 (91%); NE= 21(9%)



Dr. Erica Mallery-Blythe 2020

As seen from the most recent review above, there are now over 200 publications examining oxidative stress in response to non-ionising radiation and it continues to be seen that in excess of 90% of these papers show positive results²³.

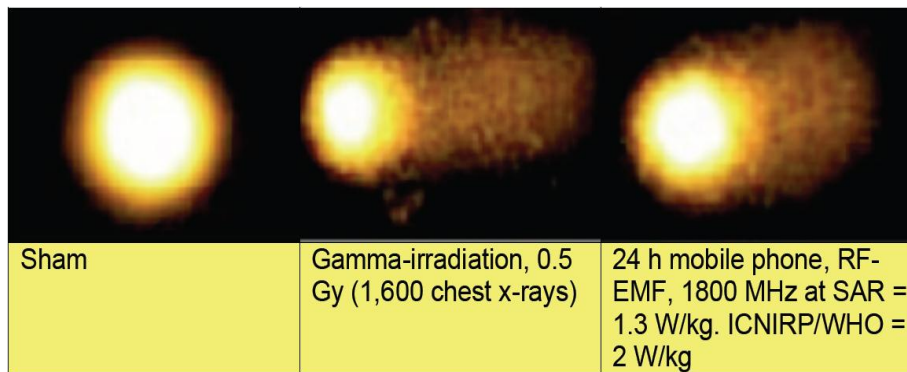
There is no such mechanism by which it could do that. That is the fundamental weakness of this argument about harm.

That people have done experiments and suggested there may be an effect, the effect is always relatively weak whatever they find and then someone else finds none...

In the specific case that this councillor refers to of oxidative stress, 240 groups of authors found the 'effect' and 21 did not. Regarding how 'weak' or strong this damage is, it should be noted that oxidative stress can damage multiple biological systems and is implicated in many diseases of high public health importance (in addition to cancer) such as Alzheimer's, cardiovascular disease and infertility. The effects are cumulative (in a similar way to cigarette smoking) so risk will increase with total cumulative dose and some individuals will be more susceptible than others.

Regarding the seriousness of the potential disease end points, it is important to note that oxidative stress can cause indirect DNA damage (among many other biological damages). Both single and double stranded breaks have been demonstrated in response to the relevant types of radiation at relevant doses. The EU funded multinational ‘Reflex Study’ shown below provides some graphical images of the extent of damages (broken DNA fragments cause the ‘comet’ – like tail and the healthy, un-irradiated DNA is featured on the left). It is important to note that the mobile phone radiation used in this study fell well below the ‘safety’ guidelines currently used here in the UK to protect health. Since XXX has chosen to use Ionising Radiation as the comparator to reassure you that Non-Ionising Radiation is inert, this graphic is particularly relevant. DNA damage as was demonstrated in this study and many more since (including the NTP study as referenced above) increases cancer risk, but there are also many other serious disease end points which are associated and affect both adult and child populations.

The EU Funded ‘Reflex Study’ Evidence of Damage from EMF DNA Breakage

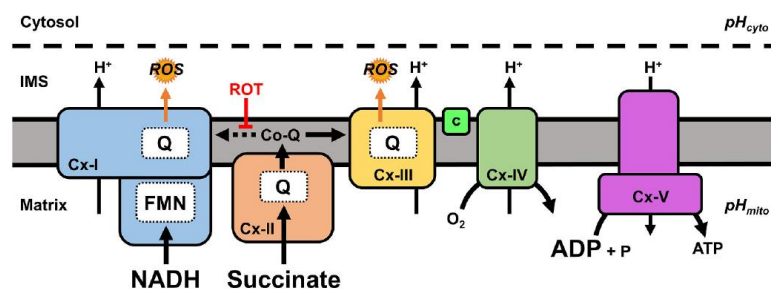


Comet Assay - a typical picture after RF-EMF-exposition of HL60 leukaemia cells, Adlkofer (2004).

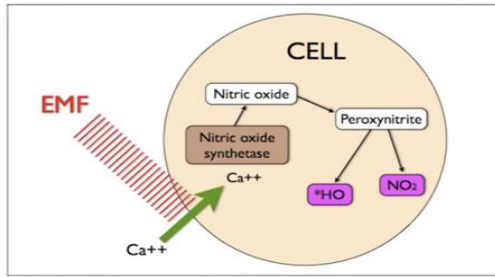
Dr. Erica Mallery-Blythe 2018

... but fundamentally nobody has been able to suggest a mechanism and it always helps if you want to make an argument that this causes this, if you can suggest a way in which it may happen.

Oxidative stress is a proven mechanism. Regarding further detail of the creation of the free radicals, there are also many peer-reviewed publications^{24,25,26} and the diagrams below²⁷ pertain to one of these which involves the irregular gating of voltage gated ion channels in the cell membrane. Radical pair mechanism explanations are also well documented and should be very familiar to XXX as a physicist (also laid out in below diagram).



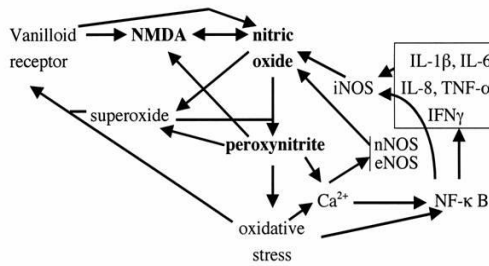
EMF Activation of VGCCs Increases Free Radical Production



Peroxynitrite produces free radicals, including hydroxyl radical and NO₂. This increase in free radicals then leads to inflammation, oxidant stress, and damage to cell structures, including DNA.

The EMF doesn't directly damage the cell. It just deranges cellular metabolism. The free radicals that are produced by this change in metabolism are what causes the damage.

Figure 1



There is no suggested mechanism.

That statement is grossly inaccurate to the tune of hundreds of papers describing oxidative stress as referenced.

I would not ordinarily take the time to counter this kind of verbal statement in this kind of forum, however this councillor delivered his testimony with great confidence and it was clear from the response, that his testimony was considered appropriate, useful and appreciated by the council. His self belief was unfortunately inversely proportional to his factual accuracy, however and it is deeply disturbing that important decisions which concern the health of citizens all over the UK are being made in this way, using inaccurate information from under-informed sources.

It is my understanding that in this case the 'Responsible Body' could be considered to be your Council, if health damages are incurred. I would strongly advise this councillor (especially given his safeguarding role in loco parentis as a teacher and self purported authority on this subject), to reconsider his advice and reassurance.

It was just that the vote ultimately fell in favour of the objectors to the mast proposal, however as councils continue to be pressurised to allow increased radiation emissions, one would hope that decisions will be made on the basis of genuinely expert testimony representing both viewpoints, with time for them to be fully explored and debated. Three minute speeches are not sufficient for councils to appraise such important, novel issues.

¹ Smith MT, Guyton KZ, Gibbons CF, Fritz JM, Portier CJ, Rusyn I, DeMarini DM, Caldwell JC, et al. 2016. Key characteristics of carcinogens as a basis for organizing data on mechanisms of carcinogenesis. *Environ Health Perspect* 124:713-721.

² World Health Organization: International Agency for Research on Cancer (IARC), Press Release No. 208, May 31st 2011. [IARC Classifies Radiofrequency Electromagnetic Fields as Possibly Carcinogenic to Humans](#)

³ Hardell L, Carlberg M, 2016. [Evaluation of Mobile Phone and Cordless Phone Use and Glioma Risk Using the Bradford Hill Viewpoints from 1965 on Association or Causation](#), *BioMed Research International*, Volume 2017, Article ID 9218486 <https://doi.org/10.1155/2017/9218486>

⁴ Bortkiewicz A, Gadzicka E, Szymczak W. Mobile phone use and risk for intracranial tumors and salivary gland tumors - A meta-analysis [published correction appears in *Int J Occup Med Environ Health*. 2017 Jun 19;30(4):685]. *Int J Occup Med Environ Health*. 2017;30(1):27-43. DOI: <https://doi.org/10.13075/ijom.1896.00802>

⁵ Di Donato, I., Federico, A. News on the journal *Neurological Sciences* in 2017. *Neurol Sci* 39, 15–21 (2018). <https://doi.org/10.1007/s10072-017-3241-x>

⁶ Yang M, Guo W, Yang C, et al. Mobile phone use and glioma risk: A systematic review and meta-analysis. *PLoS One*. 2017;12(5):e0175136. Published 2017 May 4. <https://doi.org/10.1371/journal.pone.0175136>

⁷ Cardis E, Armstrong BK, Bowman JD, et al. Risk of brain tumours in relation to estimated RF dose from mobile phones: results from five Interphone countries. *Occupational and Environmental medicine* 2011; 68(9): 631-40. <https://doi.org/10.1136/oemed-2011-100155>

- ⁸ Momoli F, Siemiatycki J, McBride ML, et al. Probabilistic Multiple-Bias Modeling Applied to the Canadian Data From the Interphone Study of Mobile Phone Use and Risk of Glioma, Meningioma, Acoustic Neuroma, and Parotid Gland Tumors. *Am J Epidemiol.* 2017;186(7):885-893. <https://doi.org/10.1093/aje/kwx157>
- ⁹ Luo J, Li H, Deziel NC, et al. Genetic susceptibility may modify the association between cell phone use and thyroid cancer: A population-based case-control study in Connecticut. *Environmental Research* 2020; 182: 109013. <https://doi.org/10.1016/j.envres.2019.109013>
- ¹⁰ Choi, Y.-J.; Moskowitz, J.M.; Myung, S.-K.; Lee, Y.-R.; Hong, Y.-C. Cellular Phone Use and Risk of Tumors: Systematic Review and Meta-Analysis. *Int. J. Environ. Res. Public Health* 2020, 17, 8079. <https://www.mdpi.com/1660-4601/17/21/8079#cite>
- ¹¹ Wyde, M.E. et al., 2018. National Toxicology Program Technical Report on The Toxicology and Carcinogenesis Studies in Hsd: Sprague Dawley SD Rats Exposed to Whole-Body Radio Frequency Radiation at a Frequency (900 Mhz) and Modulations (GSM And CDMA) Used by Cell Phones, National Institutes of Health Public Health Service U.S. Department of Health and Human Services
- ¹² Melnick, R. L., 2018. Commentary on the utility of the National Toxicology Program study on cell phone radiofrequency radiation data for assessing human health risks despite unfounded criticisms aimed at minimizing the findings of adverse health effects. *Environ Res.* 2019 Jan;168:1-6. doi: 10.1016/j.envres.2018.09.010. Epub 2018 Sep 20. <https://www.ncbi.nlm.nih.gov/pubmed/30243215>
- ¹³ Hardell, L., Carlberg, M., 2019. "Comments on the US National Toxicology Program technical reports on toxicology and carcinogenesis study in rats exposed to whole-body radiofrequency radiation at 900 MHz and in mice exposed to whole-body radiofrequency radiation at 1,900 MHz". *International Journal of Oncology* 54, no. 1 (2019): 111-127. <https://doi.org/10.3892/ijo.2018.4606>
- ¹⁴ Peleg et al., 2018. Radio frequency radiation-related cancer: assessing causation in the occupational/military setting. *Environ Res.* May;163:123-133. doi: 10.1016/j.envres.2018.01.003
- ¹⁵ Falcioni et al., 2018. Report of final results regarding brain and heart tumors in Sprague-Dawley rats exposed from prenatal life until natural death to mobile phone radiofrequency field representative of a 1.8 GHz GSM base station environmental emission. *Environ Res.* 2018 Aug;165:496-503. doi: 10.1016/j.envres.2018.01.037.
- ¹⁶ The Court of Appeal of Turin full judgment, 13 January 2020 (904/2019 of 3.12.2019 , Romeo v. INAIL <https://www.globalresearch.ca/court-appeal-turin-confirms-link-between-head-tumour-mobile-phone-use/5701050>
- ¹⁷ Philips et al., 2018. Brain tumours: rise in Glioblastoma Multiforme incidence in England 1995–2015 suggests an adverse environmental or lifestyle factor. *Journal of Environmental and Public Health* 2018 Apr 21 <https://doi.org/10.1155/2018/7910754>
- ¹⁸ Ho VK, Reijneveld JC, Enting RH, et al. Changing incidence and improved survival of gliomas. *European Journal of Cancer* 2014; 50(13): 2309-18. doi: 10.1002/cam4.1757 DOI: 10.1016/j.ejca.2014.05.019
- ¹⁹ Dobes M, Shadbolt B, Khurana VG, et al. A multicenter study of primary brain tumor incidence in Australia (2000-2008). *Neuro-oncology* 2011; 13(7): 783-90. doi: 10.1093/neuonc/nor052
- ²⁰ Zada G, Bond AE, Wang YP, Giannotta SL, Deapen D. Incidence trends in the anatomic location of primary malignant brain tumors in the United States: 1992-2006. *World Neurosurgery* 2012; 77(3-4): 518-24. DOI:10.1016/j.wneu.2011.05.051
- ²¹ Lehrer S, Green S, Stock RG. Association between number of cell phone contracts and brain tumor incidence in nineteen U.S. States. *Journal of Neuro-Oncology* 2011; 101(3): 505-7. DOI: <https://doi.org/10.1007/s11060-010-0280-z>
- ²² Yakymenko et al., 2015, *Electromagn Biol Med.* Jul 7:1-17. Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation. <https://www.ncbi.nlm.nih.gov/pubmed/26151230>
- ²³ BioInitiative Working Group, Sage, C., Carpenter, D., BioInitiative Report: A Rationale for a Biologically-based Public Exposure Standard for Electromagnetic Radiation December 31, 2012, as updated in 2014, 2018. 2019 and 2020 www.bioinitiative.org
- ²⁴ Lai, H. 2019. Exposure to Static and Extremely-Low Frequency Electromagnetic Fields and Cellular Free Radicals, *Electromagnetic Biology and Medicine*, 38:4, 231-248, DOI: 10.1080/15368378.2019.1656645 <https://doi.org/10.1080/15368378.2019.1656645>
- ²⁵ Panagopoulos D et al., 2000. A Mechanism for Action of Oscillating Electric Fields on Cells. *Biochemical and Biophysical Research Communications* 272, 634–640 (2000) <https://www.sciencedirect.com/science/article/abs/pii/S0006291X00927463>
- ²⁶ Dimitris J. Panagopoulos, Andreas Karabarbounis and Lukas H. Margaritisa, 2002. Mechanism for action of electromagnetic fields on cells. *Biochemical and Biophysical Research Communications* 298 (2002) 95–102 <https://www.researchgate.net/publication/8626458> Mechanism of action of electromagnetic fields on cells
- ²⁷ Pall, M., 2018. Wi-Fi is an important threat to human health. *Environ Res.* Jul;164:405-416. <https://www.ncbi.nlm.nih.gov/pubmed/29573716>