

Elektromagnetische Felder, oxidativer Stress und Gesundheit

Cornel Wick, Winterthur Die Dauerbelastung mit elektromagnetischen Feldern, wie sie zum Beispiel der Mobilfunk verursacht, stresst die Körperzellen. Das begünstigt langfristig die Entstehung vieler «Zivilisationskrankheiten».

Referenzen

- [1] Yakymenko I et al. Oxidative mechanisms of biological activity of low-intensity radiofrequency radiation, *Electromagnetic Biology and Medicine*, 2015;35:2, 186–202.
[doi: 10.3109/15368378.2015.1043557](https://doi.org/10.3109/15368378.2015.1043557)
- [2] Boscolo P et al. Effects of electromagnetic fields produced by radiotelevision broadcasting stations on the immune system of women. *Science of the Total Environment* 2001;273(1–3):1–10.
- [3] Okano H. Effects of static magnetic fields in biology: role of free radicals. *Frontiers in Bioscience* 2008;13, 6106–6125.
- [4] Atasoy HI, Gunal MY, Atasoy P, Elgun S, Bugdayci G. Immunohistopathologic demonstration of deleterious effects on growing rat testes of radiofrequency waves emitted from conventional Wi-Fi devices. *Journal of pediatric urology* 2013;9(2):223-9.
- [5] Rosado MM, Simkó M, Mattsson M-O and Pioli C. Immune-Modulating Perspectives for Low Frequency Electromagnetic Fields in Innate Immunity. *Front. Public Health* 2018;6:85.
[doi: 10.3389/fpubh.2018.00085](https://doi.org/10.3389/fpubh.2018.00085)
- [6] Szmigielski S. Reaction of the immune system to low-level RF/MW exposures. *Science of the Total Environment*. 2013;454–455:393–400. [doi: 10.1016/j.scitotenv.2013.03.034](https://doi.org/10.1016/j.scitotenv.2013.03.034).
- [7] Aydin B., Akar A. Effects of a 900-MHz Electromagnetic Field on Oxidative Stress Parameters in Rat Lymphoid Organs, Polymorphonuclear Leukocytes and Plasma. *Arch Med Res* 2011 May;42(4):261–7. [doi: 10.1016/j.arcmed.2011.06.001](https://doi.org/10.1016/j.arcmed.2011.06.001)
- [8] Hecht K. Ist die Unterscheidung ionisierend/nicht-ionisierend noch gerechtfertigt? Vortrag am Internationalen Symposium «Biologische Wirkungen des Mobilfunks», Mainz 2019.
<https://kompetenzinitiative.com/mainz-2019/> (zuletzt besucht am 04.05.2020)
- [9] Pall ML. Explaining «Unexplained Illnesses». Informa Healthcare Verlag.
- [10] Zuo, L.; Prather, E.R.; Stetskiv, M.; Garrison, D.E.; Meade, J.R.; Peace, T.I.; Zhou, T. Inflammaging and Oxidative Stress in Human Diseases: From Molecular Mechanisms to Novel Treatments. *Int. J. Mol. Sci.* 2019, 20, 4472. doi.org/10.3390/ijms20184472

- [11] Calabrese EJ and Baldwin LA. Hormesis: The Dose-Response Revolution. *Annu. Rev. Pharmacol. Toxicol.* 2003;43:1, 175–197. doi.org/10.1146/annurev.pharmtox.43.100901.140223
- [12] Yun J., Finkel T. Methormesis. *Cell Metab.* 2014 May 6; 19(5): 757–766.
[doi: 10.1016/j.cmet.2014.01.011](https://doi.org/10.1016/j.cmet.2014.01.011)
- [13] Friebe R. Hormesis: das Prinzip der Widerstandskraft. Wie Stress und Gift und stärker macht. Hanser Verlag 2016.
- [14] Ristow, M. Unraveling the Truth About Antioxidants: Mitohormesis explains ROS-induced health benefits. *Nat Med* 2014;20, 709–711. doi.org/10.1038/nm.3624
- [15] Davis DR. Declining Fruit and Vegetable Nutrient Composition: What is the Evidence?, *HortScience horts*, 2009;44(1), 15–19 [doi: 10.21273/HORTSCI.44.1.15](https://doi.org/10.21273/HORTSCI.44.1.15)
- [16] Tulchinsky, T.H. Micronutrient Deficiency Conditions: Global Health Issues. *Public Health Rev* 32, 2010;243–255. doi.org/10.1007/BF03391600
- [17] Myers S, Zanobetti A, Kloog I. et al. Increasing CO₂ threatens human nutrition. *Nature* 2014;510, 139–142. doi.org/10.1038/nature13179
- [18] Schmidt, Lang, Thews. *Physiologie des Menschen*. Springer Verlag 2005, 29. Auflage.
- [19] Liu Z, et al. Role of ROS and Nutritional Antioxidants in Human Diseases. *Front. Physiol.* 2018;9:477. [doi: 10.3389/fphys.2018.00477](https://doi.org/10.3389/fphys.2018.00477)
- [20] Kovacic P, Pozos RS. Cell signaling (mechanism and reproductive toxicity): redox chains, radicals, electrons, relays, conduit, electrochemistry, and other medical implications. *Birth Defects Res C Embryo Today* 2006;78(4):333–344. [doi: 10.1002/bdrc.20083](https://doi.org/10.1002/bdrc.20083)
- [21] Arbeitsgruppe Mobilfunk und Strahlung. 18. November 2019.
<https://www.news.admin.ch/news/message/attachments/59384.pdf>
- [22] Filippini et al. Environmental and Occupational Risk Factors of Amyotrophic Lateral Sclerosis: A Population-Based Case-Control Study. *Int. J. Environ. Res. Public Health*, 2020;17(8), 2882.
[doi: 10.3390/ijerph17082882](https://doi.org/10.3390/ijerph17082882)
- [23] Reipa V, Atha DH. 2018. Nanomaterials and Oxidative Stress. *Challenges* 2009;9(1):17.
- [24] Woźniak E, Sicińska P, Michałowicz J, et al. The mechanism of DNA damage induced by Roundup 360 PLUS, glyphosate and AMPA in human peripheral blood mononuclear cells – genotoxic risk assesment. *Food Chem Toxicol.* 2018;120:510–522. [doi: 10.1016/j.fct.2018.07.035](https://doi.org/10.1016/j.fct.2018.07.035)
- [25] Turkmen, R., Birdane, Y.O., Demirel, H.H. et al. Antioxidant and cytoprotective effects of N-acetylcysteine against subchronic oral glyphosate-based herbicide-induced oxidative stress in rats. *Environ Sci Pollut Res* 2019;26, 11427–11437. doi.org/10.1007/s11356-019-04585-5
- [26] Mao, Q., Manservisi, F., Panzacchi, S. et al. The Ramazzini Institute 13-week pilot study on glyphosate and Roundup administered at human-equivalent dose to Sprague Dawley rats: effects on the microbiome. *Environ Health* 2018;17, 50. doi.org/10.1186/s12940-018-0394-x
- [27] Defarge N, Spiroux de Vendôme J, Séralini GE. Toxicity of formulants and heavy metals in glyphosate-based herbicides and other pesticides. *Toxicology Reports*, 2018;Volume 5, Pages 156–163. doi.org/10.1016/j.toxrep.2017.12.025
- [28] Madden EF. The role of combined metal interactions in metal carcinogenesis: a review. *Rev Environ Health* 2003;18(2):91–109. [doi: 10.1515/reveh.2003.18.2.91](https://doi.org/10.1515/reveh.2003.18.2.91)

- [29] Jomova K, Valko M. Advances in metal-induced oxidative stress in human disease. *Toxicology* 2011;10, 283(2–3):65–87. [doi: 10.1016/j.tox.2011.03.001](https://doi.org/10.1016/j.tox.2011.03.001)
- [30] Hässig M, Jud F, Naegeli H, Kupper J, Spiess B. Prevalence of nuclear cataract in Swiss veal calves and its possible association with mobile telephone antenna base stations. *Schweiz Arch Tierheilk.* Band 151, Heft 10, Oktober 2009, 471–478. [doi: 10.1024/0036-7281.151.10.471](https://doi.org/10.1024/0036-7281.151.10.471)
- [31] Shui Y, Holekamp NM, Kramer BC, et al. The Gel State of the Vitreous and Ascorbate-Dependent Oxygen Consumption: Relationship to the Etiology of Nuclear Cataracts. *Arch Ophthalmol.* 2009;127(4):475–482. [doi: 10.1001/archophthalmol.2008.621](https://doi.org/10.1001/archophthalmol.2008.621)
- [32] Deng Y et al. Effects of aluminum and extremely low frequency electromagnetic radiation on oxidative stress and memory in brain of mice. *Biol Trace Elem Res* 2013;156(1–3):243–252. [doi: 10.1007/s12011-013-9847-9](https://doi.org/10.1007/s12011-013-9847-9)
- [33] Amara S, et al. Effects of static magnetic field and cadmium on oxidative stress and DNA damage in rat cortex brain and hippocampus. *Toxicology and Industrial Health* 2011;27(2), 99–106. doi.org/10.1177/0748233710381887
- [34] Virtanen H, Huttunen J, Toropainen A and Lappalainen R. Interaction of mobile phones with superficial passive metallic implants. *Phys. Med. Biol.* 2005;50; 2689-700
- [35] Matikka H (formerly Virtanen) et al. Temperature changes associated with radiofrequency exposure near authentic metallic implants in the head phantom – a near field simulation study with 900, 1800 and 2450 MHz dipole. *Phys. Med. Biol.* 2010;55; 5867.
- [36] Mortazavi S, Vazife-Doost S, Yaghooti M, Mehdizadeh S, Rajaie-Far A. Occupational exposure of dentists to electromagnetic fields produced by magnetostrictive cavitrans alters the serum cortisol level. *J Nat Sc Biol Med* 2012;3:60–4.
- [37] Belpomme D, Irigaray Ph. Electrohypersensitivity as a Newly Identified and Characterized Neurologic Pathological Disorder: How to Diagnose, Treat, and Prevent It. *Int J Mol Sci* 2020 Mar 11;21(6):1915. [doi: 10.3390/ijms21061915](https://doi.org/10.3390/ijms21061915)
- [38] Bediz CS, Baltaci AK, Mogulkoc R, Oztekin E. Zinc supplementation ameliorates electromagnetic field-induced lipid peroxidation in the rat brain. *Tohoku J Exp Med* 2006;208(2):133–140. [doi: 10.1620/tjem.208.133](https://doi.org/10.1620/tjem.208.133)
- [39] Gröber et al. Corona, Influenza und co – Stellenwert von Nährstoffen bei virusbedingten Atemwegserkrankungen. *Zs. F. Orthomol. Med.* 2020 18:6–12.
- [40] Von Essen et al. Vitamin D controls T cell antigen receptor signaling and activation of human T cells. *Nat Immunol.* 2010;11(4):344-9. [doi: 10.1038/ni.1851](https://doi.org/10.1038/ni.1851)
- [41] Shankar A, Prasad A. Zinc and immune function: the biological basis of altered resistance to infection. *Am J Clin Nutr.* 1998;68(2 Suppl): 447S–463S. doi.org/10.1093/ajcn/68.2.447S
- [42] Doukali H et al. Oxidative stress and glutathione S-transferase genetic polymorphisms in medical staff professionally exposed to ionizing radiation. *Int J Radiat Biol* 2017;93(7):697–704. [doi: 10.1080/09553002.2017.1305132](https://doi.org/10.1080/09553002.2017.1305132)
- [43] DaCosta L et al. Nutrigenetics and Modulation of Oxidative Stress. *Ann Nutr Metab* 2012;60(suppl 3):27–36. [doi: 10.1159/000337311](https://doi.org/10.1159/000337311)