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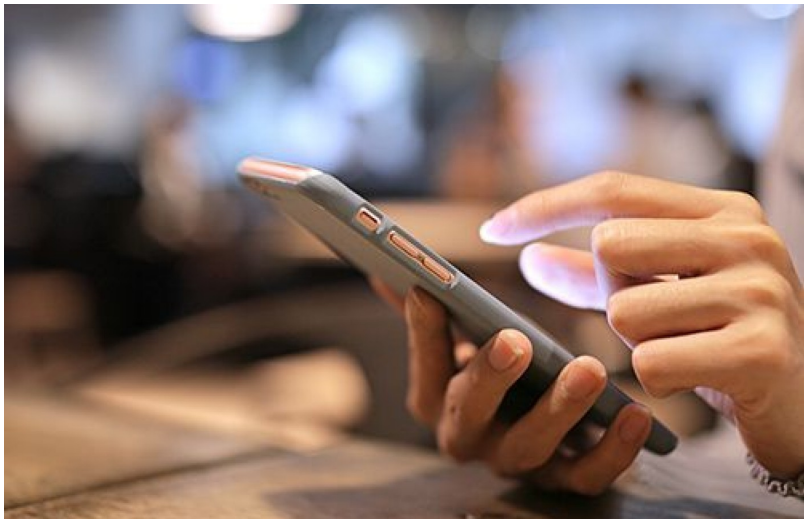

PUBLIC HEALTH

EMF Exposures: Adverse Effects on Patient Health and Outcomes

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Daily exposures to EMFs have grown exponentially in the past several decades with the introduction of wireless technologies such as cellphones, cell towers, 5G and other wireless technologies that use radiofrequency (RF) radiation as the primary method for transmitting data. Developing and implementing safe exposure limits and educating the public on the potential hazards of overexposure may be necessary to avoid unintended overexposures and the ensuing health consequences.

As health care practitioners, we play an important role in the ability to recognize, diagnose and treat unintended overexposures. For example, we have a duty to inform patients of the possible negative impacts of habits, behaviors and environmental exposures which may affect health outcomes. We can also educate patients on appropriate food and water intake, reducing or eliminating exposures to environmental toxins and chemicals, smoking, drug and alcohol use, stress and poor lifestyle habits, in order to help them prevent illness or heal.

Health Issues Linked to EMF Exposure

An often-overlooked environmental toxin is the increased chronic exposure to EMFs. Published research has raised questions about the safety of chronic exposure to EMFs,[1] and has revealed strong correlations to EMF exposures contributing to numerous health issues including:

- Chronic fatigue
- Depression and anxiety
- Autism and ADHD
- Immune dysfunction
- Memory impairment

- Inflammatory neurological diseases
- Sleep pattern dysfunction
- Lowered fertility rates
- Cardiovascular disorders and stroke
- Cancer

Causation Mechanisms

There are several considerations for how overexposure to EMFs may cause damage and induce various illnesses or diseases including oxidative stress, cellular signaling, and underlying genetic predispositions. Studies have indicated that EMF exposure can alter voltage gated calcium channels (VGCCs) and produce undesirable results, affecting neurotransmitters such as glutamate, GABA and acetylcholine, which produce neuropsychiatric effects and lead to anxiety and depression.[2]

VGCCs also play important regulatory roles in endocrine hormone production, cardiovascular function, oxidative stress, nerve impulses, gene expression, muscle contraction, adrenal function and enzyme activity.[3] An abnormal influx of calcium into mast cells can prompt or exacerbate allergic reactions.[4]

It is important to note that short-term activation of VGCCs can produce *positive* healing effects, while long-term or chronic activation has been shown to lead to cell damage and DNA breaks.[5]

Peroxynitrite (ONOO-) is a powerful oxidant and can transverse through cell membranes by anion channels. EMFs create a substantial increase in peroxynitrite activity with long-term or high level exposures, leading to increased reactive oxygen species (ROS) and oxidation, which depletes antioxidants, including glutathione. This can lead to numerous inflammatory conditions, blood-brain barrier and cell damage, and DNA breaks.[6]

Autophagy is a homeostatic process that helps to control inflammation and support healthy immune response. Environmental toxic exposures, including EMFs, along with genetic mutations, can lead to poor autophagy function and increased risk of disease.[7] A deficiency of glutathione caused by EMF exposures can negatively affect the autophagy process.

Acupuncture and Nutritional Therapies to Counter EMF Exposures

The good news is that many natural therapies, such as acupuncture, herbal and nutrition therapy, and lifestyle counseling can help mitigate the long-term damage from EMF exposures.

Studies have shown that acupuncture can regulate the signaling pathways that lead to oxidative stress, excitotoxicity, inflammation; and promotes neuron survival, angiogenesis, neurogenesis and neuroplasticity. A 2017 review article by Luo, et al.,[8] assessed the effects of acupuncture on apoptosis and autophagy, revealing how Du 20, SP 6, ST 36, *Ren* 6, Du 14 and GB 34 consistently proved to reduce oxidative stress and inflammation, and reduce excitotoxicity and neuron death.

Additional studies[9] suggest SP 6 can correct cellular imbalances caused by Ca2+ leakage that leads to oxidative stress and depression. SP 6 reduced depression behavior by alleviating endoplasmic reticulum (ER) stress and oxidative stress in the amygdala.

LV 3 and BL 23 have been shown in studies[10] to lower high levels of ROS and increase glutathione levels. ST 36 reduces ROS production and oxidative/nitrative stress and inflammation.[11]

Elevated oxidation caused by EMFs creates a need for increased levels of antioxidants either by supplementation or food therapy.[12] Additional intake of vitamins A, C and E, selenium, iodine, zinc, CoQ_{10}, glutathione, chlorophyll, B vitamins, vitamins D + K, essential fatty acids, flavonoids found in green or black tea, indoles from cruciferous vegetables, and sulfur compounds from garlic are essential to help guard the body from EMF damage.

Studies show that EMFs cause damage to brain structures (cortex, hippocampus, basal ganglia) and also reduce Purkinje cells, which may lead to several degenerative diseases including autism and Alzheimer's. Administration of EPA / DHA and melatonin showed neuroprotective effects on repeated EMF exposures.[13] In fact, melatonin is a powerful and protective antioxidant, but it is depleted with repeated EMF exposures. Supplementation can restore healthy sleep patterns, and reduce inflammation and cortisol response to stress.

Making Your Practice Safe

At my own practice, I have turned my treatment and consultation room into a Faraday cage by using professional remediation products to block all EMFs from entering the room. Patients must turn all wireless devices to "airplane mode" and turn off all antennas before entering the room. Many patients notice the difference and often comment on how "peaceful" and "good" it feels in the room compared to just a few feet away in the hallway.

A new patient once entered the room, then stopped and said, "Something is different in here." She walked back out into the hallway, stood there for about five seconds and came back into the room. She said, "It feels very good in this room, and not as good in the hallway. What do you have in here?" I explained to her that there are no EMFs in this room and that it is a "healing space" for her whole being.

If EMFs are toxic, and the body becomes sick with chronic toxic exposures, how can we expect our bodies and minds to fully heal if we do not address the daily increase of EMF exposures? Education is the key. The scientific data has been published for many decades, so we have a duty as health care practitioners to read and understand how EMFs affect us at every level. When we are properly informed, we can make better choices for ourselves, and we can pass that knowledge to our patients, families and communities.

Author's Note: One of the best things we can do is to reduce our daily exposure to EMFs in the home and at work. A good step-by-step education resource can be found at https://ehtrust.org. For 10 steps to safe use of technology, click here.

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