Little Bodies Out of Sync?

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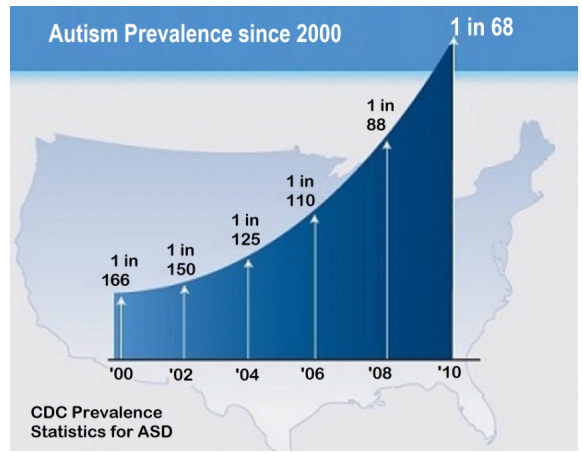
Why Electromagnetic Fields and Wireless Radiofrequency Radiation Exposures Matter for People with Autism Spectrum Conditions



According to Autism Speaks autismspeaks.org the prevalence of Autism increased dramatically from 1 in 5000 (1875) to 1 in 68 (2010) as seen in statistics published by the U.S. Centers for Disease Control and Prevention (CDC).

Ask any parent-to-be about their top concerns for a new baby or for their young children and they will often say autism. Parents of a child (or children) with an autism spectrum condition (ASC) can tell you about its impact on a family's emotional well-being as well as the financial challenge to provide for basic education, treatment, and healthcare.

The prevalence of ASCs has grown so fast that the numbers dwarf any other disease or developmental disability in children. Autism now affects about 1 in 50 children, and costs an average lifetime cost of more than $3 million per child. The situation is getting more severe every year.

We know that genetics alone cannot be responsible, given the staggering rise in prevalence. Multiple environmental factors may act together—it's not just wireless—that can muck up delicate developmental patterns in early childhood.

In 1975, before widespread use of cellphones and exposures to wireless technologies, autism was a comparatively rare health issue. Since then, the nurturing environments that direct the growth and development of humans from fetuses to young children have massively changed. The explosive growth of wireless technologies in the last few decades represents one of the most staggering alterations of the built environment that has ever occurred. And, there is compelling evidence that this alteration are negatively affecting human health.

According to the BioInitiative 2012 Report, exposures in everyday life from electromagnetic fields (EMF) and wireless radiofrequency radiation (RFR) may be contributing to autism. The World Health Organization's International Agency for Research on Cancer classified radiofrequency radiation in 2011 as a Possible Human Carcinogen (Group 2B) which applies to all RFR exposures. So, it is already known to be an environmental toxin of consequence to human health, which justifies taking EMF and RFR seriously as a possible health risk.

Many of the behavioural and biological characteristics seen in autism are similar or identical to those produced by typical daily exposures to cell and cordless phone radiation, cell towers, baby monitors, wireless tablets, Wi-Fi, and other sources of pulsed electromagnetic radiation. EMF/RFR exposures appear to contribute to chronically disrupted homeostasis consistent with many key symptoms of autism.

Lead author of BioInitiative 2012, Martha Herbert, PhD, MD of Harvard Medical School and a paediatric neurologist with Massachusetts General Hospital, says, "such exposures can have a disorganizing effect on the ability to learn and remember, and can be destabilizing to immune and metabolic function."

Evidence for Effects on Autism Spectrum Conditions

ASC prevalence continues to rise, now affecting up to 1 in 50 children in the US, and averaging one per cent globally, according to the latest Centers for Disease Control report. More American children will be diagnosed with ASCs this year than with AIDS, diabetes, and cancer combined. ASCs cost the US $137 billion a year and, having become a huge healthcare burden and global threat, have been categorized by the CDC as a national public health crisis.

Several thousand scientific studies over four decades point to serious biological effects and health harm from EMF and RFR. These studies report genotoxicity, single- and double-strand DNA damage, chromatin condensation, loss of DNA repair capacity in human stem cells, reduction in free-radical scavengers (particularly melatonin), abnormal gene transcription, neurotoxicity, carcinogenicity, damage to sperm morphology and function, effects on behaviour, and effects on brain development in the fetus of human mothers that use cellphones during pregnancy. Cellphone exposure has been linked to altered fetal brain development and ADHD-like behaviour in the offspring of pregnant mice.

Many disrupted physiological processes and impaired behaviours in people with ASCs closely resemble those related to biological and health effects of EMF/RFR exposure. At the cellular and molecular levels many studies of people with ASCs have identified oxidative stress and evidence of free-radical damage. Lipid peroxidation of cell membranes, altered brain wave activity, and consequent sleep, behaviour and immune dysfunction may occur. Mitochondria may function poorly, and immune system disturbances of various kinds are common. Changes in brain and autonomic nervous system electrophysiology can be measured and seizures are far more common in ASCs than in the population at large. Sleep disruption and high levels of stress are close to universal in ASCs.

Disruption of calcium metabolism is known to occur; calcium metabolism being absolutely critical in maintaining many metabolic processes. EMF/RFR exposure can cause calcium leakage in the cells, by disrupting voltage-gated calcium ion channels, and may interfere with vesicle transport of molecules into cells. Elevated intracellular calcium in ASCs can be associated with genetic mutations but more often may be downstream of inflammation or chemical exposures. All of these phenomena have been documented to result from or be modulated by EMF/RFR exposure. EMF/RFR exposure also makes chemical toxins more damaging, adding another layer of 'allostatic load' or body-burden on healthy functioning of living tissues.

We know that cellphone radiation can cause pathological leakage of the blood-brain barrier. This allows toxins to cross this critical protective barrier and to damage neurons. It also is linked to memory, learning, and behaviour problems in children and pathological changes can be seen directly in the hippocampus (the memory and learning center of the brain). But, what other blood-barriers can EMF/RFR impair? It raises the question whether EMF/RFR may contribute to the widely observed condition of impaired gut metabolism in ASCs (chronic constipation, diarrhoea, and inflammatory bowel disease). Chronic inflammation of the gut wall by passage of immune cells through it can lead to severe GI problems. Pain caused by GI issues can prompt behavioural changes such as increased self-soothing (rocking, head banging, etc.) or outbursts of aggression, or self-injury. And, what does this infer for the placenta-blood barrier? What if EMF/RFR also causes pathological leakage of the placenta and exposes the fetus to toxins in the mother's blood?

EMF/RFR can cause deficiencies of antioxidants such as glutathione, leading to a build-up of excess glutamate, which can lead to neurological hyperactivity and possibly overload conditions of the nervous system and sensory processing. Problems with sensory integration, sleep, seizures, speech, language, and other brain-based issues increase stress, and make adapting and learning more difficult. According to Dr. Herbert in *The Autism Revolution*, too much glutamate equals non-stop electrical signals—like a cartoon character with a finger stuck in an electrical socket getting shocked over and over. Your glutathione supply runs low, and you are so overwhelmed by non-stop neurological activity that it's hard to interact, keep track, or calm yourself.

One new study reports that the brains of autistic children generate more information at rest—a 42 per cent increase on average. This offers a scientific explanation for the most typical characteristic of autism—withdrawal into one's own inner world. The excess production of information may explain a child's detachment from their environment.

Reducing or removing EMF and wireless RFR stressors from the environment is a reasonable—no, a vital—precautionary action given the overall weight of evidence for a link to ASCs. Canada's Safety Code 6 and the Federal Communications Commission thermal safety limits do not address low-intensity (non-thermal) effects, and thus legalize massive exposures and the rollout of hazardous wireless technologies without regard for children who are more sensitive than adults to environmental toxins. Public safety limits must be rethought in terms of fetal, neonatal, and childhood neurological and electrophysiological development. Children are more vulnerable than adults to environmental toxins, and can be affected in utero as well as during the rapid growth of early childhood. Brain and nervous system development in young children appear to be particularly sensitive. The evidence is more than sufficient to warrant new public exposure standards benchmarked to low-intensity (non-thermal) exposure levels causing biological disruption.

In the meantime, it is possible to detoxify the environments of fathers-to-be, pregnant women, and young children by eliminating obvious sources of EMF and wireless radiofrequency radiation. Given the evidence for health risks and the possible links to autism spectrum conditions, these are reasonable things you can do.

LIMIT EXPOSURES TO WIRELESS	DO THIS INSTEAD
• No cell phone in pants pocket on the belt (men)	• On the desk or away from body (protect sperm quality and motility)
• Moms, no cell phone use in pregnancy	• Moms, use corded phones
• No wireless laptops	• Wired computers and laptops*
• No iPads at school, no wireless	• Wired classrooms for internet
• No wireless routers in the house	• Cable modem instead (wired)**
• No cell phones, particularly iPhones	• Corded landline phones
• No cordless phones	• Corded landline phones
• No baby monitors or wireless surveillance monitoring.	• Use your ears and eyes.
• No compact fluorescent bulbs	• Use regular incandescent bulbs

* Or at least unplug the Wi-FI when not in use during the day, and overnight when sleeping.

** Be sure to get a non-wireless router as your firewall – most routers are default wireless whether you use wireless it or not. And, you will not be able to tell if it s transmitting wirelessly unless you do measurements.

Cindy Sage is the co-owner of Sage Associates—an internationally known environmental sciences consulting firm in Santa Barbara, CA. Sage's specialty area of practice is the science and public health effects of electromagnetic fields and radiofrequency radiation (non-ionizing radiation). She is the co-editor and principal author of the BioInitiative Reports (2007 and 2012) and a founder of the international BioInitiative Working Group. Dr. Herbert is an expert on autism and has studied physiological abnormalities in autism and environmental influences on neurodevelopmental disorders, and brain development and function.