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Wireless health issues for children and young people with learning disabilities and special health needs.

Invited Article by Cindy Sage, MA for the National Association for the Dually Diagnosed (NADD)

NADD Environmental Health Project: Since exposure to toxic agents in the environment can cause developmental, neurological, and mental health problems, the National Association for the Dually Diagnosed (NADD) advances awareness of the exposure of toxic agents in the environment. NADD has established an Environmental Health Project under the direction of Edward Seliger, Project Coordinator at eseliger@thenadd.org, and is sponsored by The John Merck Fund.

CHILDREN AND WIRELESS EXPOSURE IN THE SCHOOL ENVIRONMENT

Educators and parents need to understand more about the possible risks of placing children with learning disabilities and special needs in wireless environments. A growing body of scientific evidence suggests that chronic, low-level exposure to radiofrequency (RF) from cell phones, cordless phones, cell towers and wireless connections to the internet may be harmful, particularly to children. [1,2,3,4,5,6,7] We need to understand more about the potential risks of exposures, and what sources need to be assessed before we allow the proliferation of wireless radiofrequency sources in schools.

Chronic exposure to even very low levels of radiofrequency/microwave exposure (the typical wireless environment) can lead to impaired concentration, attention and memory; retarded learning, fatigue, and adverse changes in behavior and sleep patterns. [1.4] Changes in brainwave activity are reported from even short duration exposures to cell phone radiofrequency radiation, and are associated with sleep disruption (changes in sleep architecture, particularly REM sleep). [1.4]

To place wireless technologies in environments that are intended to provide for those with learning disabilities is counter-productive for learning, and potentially harmful to health for both students and teachers.

Massively increased RF exposure has no precedent in human history. [1,2,3,4] These exposures simply did not exist 100 years ago. Our use of microwave frequencies for



wireless communication means that we have no track record for the consequences, but there is substantial and worrisome evidence of health risks, particularly for children. [4]

Cell phones, cordless phones, wireless internet, WI-FI, wireless routers for computers, and school-based interactive wireless learning devices are among the sources of exposure that worry researchers. The use of cell and cordless telephones, and wireless devices like personal digital assistants (PDAs including the iPhone, BlackBerry and Treo units among others) can lead to excessively high exposures that have been associated with increased risk of malignant brain tumors (glioma) and acoustic neuroma (a benign tumor of the auditory nerve in the brain). [4,5,6,7]

Even if children are not actively using cell and cordless phones, they may be getting 'second-hand radiation' from the use of these devices by others in close proximity. The zone of elevated radiofrequency/microwave radiation may extend up to five feet from the user. Using a cell phone inside a car causes re-radiation of the signal, and can reach well into the back seat where children may be riding.

In classrooms, wireless computer access is becoming more prevalent. Rather than have computers linked to cable modem (CAT 5 cable) that involves no radiofrequency exposure for children, wireless internet relies on radiofrequency signals that are transmitted from one or more wireless access antennas that transmit to each computer. And, each computer has a built-in antenna that transmits back, exposing the child to both the computer source and the wireless access point source. If computers are close together, or children are huddled around one computer they may get a significant amount of exposure this way. Radiofrequency exposures in a classroom where 20 students are working on wireless computers can, in one hour, produce the exposure equivalent to speaking on a cell phone for 20 minutes. No one would recommend this for any child, yet wireless classrooms may create such high-intensity environments.

Another growing source of exposure comes from 'wireless interactive learning systems'. For example, the May 2008 issue of NEAToday Magazine (from the National Education Association) carries advertisements for 'interactive whiteboards' or interactive response systems from the SMARTer Kids Foundation. These provide a wireless connection between students and teachers, allowing teachers to quiz and poll students at any time and receive their responses instantaneously. The exposures to wireless are classroom-wide. Cumulative exposures can be substantial over time.

Why create learning environments that may impede learning? Especially when good alternatives (i.e., wired internet connections for computers) are available?



Why don't we hear more about this issue? What about existing standards that are supposed to protect the public?

Compliance isn't the same as safety. When asked about possible health effects of these wireless technologies, most companies simply say "we comply with all applicable federal regulations". What they don't say is that these public safety limits are obsolete when it comes to chronic exposures. They were designed for very short, acute exposures only. They were not designed to protect children, but for a prototype six-foot man. Children are in fact more susceptible to most environmental toxins, since they are growing fast (more cell division means more change in DNA, thus the chance for mutations and health effects.).

Most international agencies regulate RF based on concern for thermal injury (burning or heating of tissue). These limits ignore the harm that comes from day-in day-out exposures at very low levels, like with exposures to cell towers, wireless internet and WI-FI. There are no safety limits that protect us against wireless radiation effects that involve chronic exposure to very low-intensity radiofrequency radiation.

For example, for the 800-900 MHz range (cell phones) the standard is about 580 microwatts/cm² (for 862 MHz). There are dozens of studies showing that the human body (and other mammals) can detect and react to the "signal" at levels more than a thousand times lower. The range of concern for health effects is 0.01 to 1 or 5 microwatts/cm², or far below the limits based on thermal standards. Existing thermal-based standards do not address chronic, low-intensity exposures that affect biological processes in the body.

Who is looking at this issue? What are they saying?

The UK Health Protection Agency advises children to limit their use of mobiles. The UK Government's advisor Prof. Lawrie Challis who heads the committee on mobile phone safety research called for limits on WI-FI use (wireless computer use) for children, citing that health problems are likely to be more serious in children. Children who use Wi-Fi enabled laptops should only do so if they are kept a safe distance (however, no safe distance is known). Using a wireless laptop in the lap is comparable to the RF from a mobile phone, because the antenna is contained within the computer against the lap.

The British Medical Association Board of Science and Education recommends limits on children's cell phone use, and the accompanying leaflet from the Department of Health recommends children under 16 not use mobile phones at all. Other countries that have either adopted or recommended bans or limitations on cell phone use for children include



Russia, Italy and Germany.

The Russian National Committee on Non-Ionizing Radiation Protection (RNCNIRP) advises that children to the age of 18 and pregnant women not use wireless devices because of potential risks to health.

The German Government [Bundesregierung] recommended in 2007 that “the use of WLAN in the workplace or at home should be avoided, if possible. In order to reduce personal radiation exposure, it is better to remain with conventional cable-connected networks.”

French courts are requiring that some cell towers near schools be dismantled (2009) and new antenna sites be banned. The French Green Party has adopted a national platform urging adoption of strict new limits on wireless exposures (in line with the BioInitiative Report). Some schools and libraries in Paris announced the removal of wireless WLAN systems in 2007 due to health complaints from staff workers, and the French National Library campus opted out of wireless in 2008. The French government released a warning in January 2008 concerning mobile phone health effects, particularly on children. The government is not acknowledging a link between mobile phone use and cancer but recommends reducing exposures given the evidence (precaution principle).

The Austrian Medical Association is pressing for a ban on WI-FI in schools. Dr Gerd Oberfeld, Salzburg's head of Environmental Health and Medicine, has describes WI-FI as "dangerous" to sensitive people.

The World Health Organization Report on Children and Health (2002) indicates that prudent avoidance for children would restrict any new exposures to radiofrequency radiation. The WHO had expected to complete its five-year study on radiofrequency radiation completed by 2005 or 2006, but it is still unpublished. Serious questions remain unanswered about potential health effects, particularly to children. [9]

The US National Institutes of Health - National Toxicology Program is now studying RF as a potential carcinogen because of concerns based on the existing but incomplete scientific evidence.

The Los Angeles Unified School District has adopted a policy that prohibits cell sites on LAUSD property, and requires that new schools avoid siting near an existing cell site.



The BioInitiative Report (2007) raises serious concern about the safety of existing public limits that regulate how much electromagnetic field (EMF) exposure is allowable from power lines, cell phones, cordless phones and many other sources of exposure in daily life (www.bioinitiative.org). [4] It was prepared by an international working group of scientists, researchers and public health policy experts. The Report documents the scientific evidence that power line EMF exposure is responsible for hundreds of new cases of childhood leukemia every year in the United States and around the world. It also documents brain tumor risks and other health risks from exposure to wireless technologies, including cell and cordless phones. Risks to children are discussed, since children are usually more sensitive to environmental toxins. The report provides detailed scientific information on health impacts when people are exposed to electromagnetic radiation hundreds or even thousands of times below limits currently established by the Federal Communications Commission (US FCC) and International Commission for Non-Ionizing Radiation Protection in Europe (ICNIRP). [4]

The authors reviewed more than 2000 scientific studies and reviews, and concluded that the existing public safety limits are inadequate to protect public health. From a public health policy standpoint, new public safety limits, and limits on further deployment of risky technologies are warranted based on the total weigh of evidence. The Report recommends new public safety limits, in some cases, thousands of times lower than present safety standards to address the evidence that chronic exposure to low-intensity levels of EMF can be harmful to health and well-being. [1.4] Children should be protected against years of low-level wireless exposures due to health concerns that are now emerging. Since there are good options such as wired cable modem, and traditional corded phones there is no need for wireless in homes and schools.

In Conclusion

Experts recommend that schools avoid installing wireless LAN computer systems and other wireless computer hookups. Those with learning disabilities may be even more susceptible to the adverse effects of wireless on memory, learning, cognition, concentration, attention and other fundamental skills that are essential for a supportive learning environment. Further, children should not use cell or cordless phones, except in emergencies. Children should use a corded phone instead. Children should not be exposed to the second-hand radiation from anyone elses' cell phone either. A four to five-foot radius is required for most cell phones to avoid elevated wireless exposure.



Contact: Cindy Sage, MA, Co-editor of the BioInitiative Report at info@bioinitiative.org or at sagecindy@gmail.com, Santa Barbara, CA 93108 USA

For a complete list of studies, see www.bioinitiative.org and Radiofrequency and Microwave Exposure in the San Francisco Medicine, March 2001 by Cindy Sage, Sage Associates, published by the San Francisco Medical Society.

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