



## **Answers to Commonly Asked Questions Children and Wireless Radiation**

### **Q: Is wireless technology safe?**

A: Wi-Fi and all radiofrequency radiation has been on the World Health Organization's Class 2B List of Possible Human Carcinogens for more than three years (since May 2011) based on research showing increased brain cancer in heavy users (30 minutes per day) with over 10 years of use. Lead and DDT are also included on this list. Recent research suggests that cancer is only the "tip of the iceberg" and low level wireless microwave radiation is now associated with a host of other concerning biological effects.

### **Q: What is known about safety for children?**

A: Children are not little adults. Children's skulls are thinner and certain tissues of a child's head, including the bone marrow and the eye, absorb significantly more energy than those in an adult head. It is scientifically accepted that children are more vulnerable to the biological effects of microwave exposure than adults due their rapidly developing body systems. Stem cells are more active in children and stem cells are known to be more affected by microwave radiation.

There are no studies showing that microwave radiation exposure in children is safe and no studies showing that continuous exposure from cell phones, cell towers, cordless phones, Wi-Fi routers, baby monitors, etc. is safe.

### **Q: Is cell phone radiation the same as Wi-Fi radiation?**

A: Commonly used cell phone and Wi-Fi signal frequencies are all classified as radiofrequency radiation. Dr. Robert Baan, a member of the International Agency for the Research on Cancer, has stated that the Class 2B Carcinogen status "holds for all types of radiation within the radiofrequency part of the electromagnetic spectrum, including the radiation emitted by base-station antennas, radio/TV towers, radar and Wi- Fi."

### **Q: Are children at increased risk ?**

A: Due to their unique vulnerabilities children are thought to be at increased risk. Current research provides evidence. For example, Dr. Lennart Hardell and his research team at Orebro University in Sweden showed that children who start using a mobile phone in early years have an increased risk for developing a glioma by the time they are in their 20's. Experimental studies are showing significant neurological changes from exposure to microwave radiation levels that meet our FCC guidelines. Environmental exposures at critical periods can have profound effects on fetal and childhood development.

**Q: Don't organizations such as the WHO, FDA, National Cancer Institute and the EPA say Wi-Fi is safe?**

A: Representatives from these agencies do NOT declare that wireless is safe. They say there is inconclusive evidence and that "more research" is needed. Top scientists within the US National Cancer Institute (NCI), FDA and the Surgeon General insist upon undeniable proof of harm before taking any action.

Take, as an example, how the WHO classified outdoor air pollution as a Class 1 Carcinogen in September 2013 citing research indicating that in 2010 3.2 million deaths worldwide resulted from air pollution. When asked why it had taken so long to reach this conclusion, IARC director Dr. Christopher Wild said, "Often we're looking at two, three or four decades once an exposure is introduced before there is sufficient impact on the burden of cancer in the population to be able to study this type of question." Similar to many other carcinogens, undeniable proof may not be available for decades.

The EPA states, "More research is needed to clarify the question of safety." No medical organization that we know of has stated this radiation is safe.

**Q: Hasn't our government set safety standards based on a scientific review of the evidence?**

A: The EPA and the FDA have never done a comprehensive scientific review of this radiation to set standards that protect human health. Current exposure standards were developed decades ago for radar military personnel at a time when wireless technology was not widespread as it is today.

Currently, the FCC is the agency that ensures compliance with radiofrequency exposure standards in this country. However, the FCC is not a medical nor science agency. Current standards have not been reviewed for over 18 years in the United States. Many experts in the field are calling the current standards outdated and inadequate to protect human health.

**Q: I heard that the overwhelming majority of studies that have been published in scientific journals around the world show that wireless microwave radiation is *not* a health risk. Please explain this.**

A: Actually the evidence for risk has increased. Since 2011, several new, major epidemiologic studies have been published that provide further evidence long-term mobile phone use is associated with increased risk of glioma (a type of malignant brain tumor) and acoustic neuroma (a nonmalignant tumor of the nerve that connects the ear to the brain). Moreover, the risks increase with the amount and duration of mobile phone use and are stronger on the side of the head where the mobile phone was predominantly used. If you set aside the industry-funded studies, the overwhelming weight of the evidence shows there is a significant problem. In addition to research on cancer, there are over 1000 peer reviewed, published papers showing harmful biological effects from microwave radiation exposure.

**Q: What is the problem with current exposure standards?**

A: There are several reasons that current FCC standards are considered inadequate:

- The guidelines were based on preventing thermal effects, i.e. heating. Yet thousands of peer-reviewed, published studies report non-thermal effects indicating biological changes from exposure to non-thermal radiation levels.
- The guidelines do not account for the cumulative effects of constant exposure to multiple sources all day and all night. FCC guidelines considered 30 minutes of exposure.
- The outdated guidelines do not consider research showing “hotspots” can develop in live brains.
- The guidelines were based on an adult male body’s absorption of radiation. Children’s smaller bodies and brains were not considered in the metrics.
- The guidelines consider average exposures, not peak exposures. Research suggests our biology is affected by the erratic nature of the signal and that our cells respond to these short intense bursts of radiation even if the average over time seems low.
- The guidelines do not consider the cumulative effects of radiation coming from multiple sources. Consider a child who has a cell tower at school, a bring your own device all day at school, Wi-Fi routers at home and school and who sits among 30 children’s devices in a class all day long. What is this child’s total exposure?

According to the EPA, “The FCC’s current exposure guidelines are thermally based and do not apply to chronic, non thermal exposure situations.” Wireless device use and Wi-Fi router radiation in the classroom is chronic, non-thermal radiation for the 1080 hours a child is in school each year.

**Q: Are scientists and medical organizations concerned about how the inadequate standards might impact public health?**

A: Yes. The American Academy of Pediatrics has called on the FCC to “Protect children’s health and wellbeing,” stating that “Children are not little adults and are disproportionately impacted by all environmental exposures, including cell phone radiation. Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children.”

In 2014, researchers and scientists from around the world made a Declaration that Canadian Guidelines (which are similar to US guidelines) are inadequate to protect citizens. This comes after dozens of such declarations over the years. Please see our briefing book for details on each of these declarations.

In February of 2014, the US Department of the Interior accused the US Federal government of employing outdated wireless radiation standards stating, “the electromagnetic radiation standards used by the Federal Communications Commission (FCC) continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today.”

**Q: How are these exposure limits made?**

The limits set for manufacturers use a plastic, liquid filled, computer model based on a 220-pound mannequin. Most of the population, including children, the fetus and women, are not represented by this model. Significant research is making the point that such models do not adequately represent how the radiation penetrates young brains. In addition research suggests that living brains can develop hot spots from the radiation. The plastic mannequin model does not account for such vulnerabilities and cannot measure this hot spot issue because the liquid is of a uniform thickness unlike real brains comprised of different densities of tissues.

**Q: How are wireless devices tested?**

A: The FCC regulates that tablets and laptops are tested while placed at 20 cm away from the body. That is about 8 inches.

**Q: Wouldn't companies be required to warn us about these radiation issues?**

A: Every major manufacturer of wireless devices in the world issues warnings to keep their devices away from direct contact with the body. However, these fine print warnings are buried in the fine print of manuals and most parents and children are not aware the warnings exist.

**Blackberry** warns to keep their phones an inch away from any part of your body whenever turned on, "including the abdomen of pregnant women and the lower abdomen of teenagers."

**Samsung 3G**

"Usage precautions during 3G connection : Keep safe distance from pregnant women's stomach or from lower stomach of teenagers. Body worn operation: Important safety information regarding radiofrequency radiation (RF) exposure. To ensure compliance with RF exposure guidelines the Notebook PC must be used with a minimum of 20.8 cm antenna separation from the body."

**iPad:** "... to be sure that human exposure to RF energy does not exceed the FCC, IC, and European Union guidelines, always follow these instructions and precautions: Orient the device in portrait mode with the Home button at the bottom of the display, or in landscape mode with the cellular antenna (located under the black edge at the top of the device) away from your body or other objects..."

**Q: So if my children use the wireless laptop at the manufacturer's recommended 20 cm distance on a table will they be safe?**

A: The 20 cm measurement only pertains to thermal heating risks. It is questionable whether this exposure standard even adequately protects children from these thermal effects (as previously mentioned). Furthermore, there is no scientifically documented known safe level nor scientifically recommended distance to protect children from non-thermal effects.

Exposure is cumulative. Low doses add up, and it is unknown what the total cumulative exposures of children in a classroom with 30 operating devices are, much less a school with

dozens of classrooms with routers and personal devices in use. There is no government agency, federal or municipal, that currently has the mandate, ability or resources to measure the cumulative effects of wireless radiation from multiple sources at home, work or school with Wi-Fi, cell phones, tablets, home cordless phones.

Even when a tablet is on a table, a child is absorbing radiation from the device. When it comes to safety considerations, using cords or cables for ethernet connectivity with Wi-Fi features turned off completely eliminates the risk from this microwave exposure.

**Q: Is the Wi-Fi technology being used in schools the same as what is being used in most homes today?**

A: No. Wi-Fi systems in school districts are usually much higher strength because they are designed to operate hundreds of computers simultaneously, unlike home based consumer systems that only operate a handful of computers.

**Q: Should we be concerned about using Wi-Fi at home as well as at school?**

A: A child working on a wireless device in a home will be absorbing the radiation from the device. We recommend using cords or cables for non-wireless connections whenever possible. Cell phones can be lifesaving tools and critical technology when we are traveling. However, our homes, like schools, are an example of a space where we can easily prefer non-wireless internet connections as we have specific locations where we use our computers.

**Q: Wireless is everywhere. Are there really actions that will make a difference?**

A: Children spend most of their time at home sleeping and at school learning. By making simple changes such as using cords and cables for computers and keeping devices on Airplane mode, a child's daily exposure will be significantly reduced. Since exposure is cumulative and children will have a lifetime to be exposed, such reduction actions will make a tremendous difference.

**Q: What are the everyday sources of microwave radiation in our home?**

A: Each electronic product that can wirelessly send voice, images, or data to another product or network emits microwave radiation. In addition to cell phones, here are some examples of devices that emit microwave radiation: tablets, laptops, digital baby monitors, cordless phones, printers, iPod Touch, wireless tv service, signal boosters, portable internet sticks, projectors, wireless gaming consoles, cordless keyboards, cordless speakers, "smart" watches, wifi or bluetooth fitness wristbands, and even your cordless computer mouse is a strong emitter. If a device can "sync" with your phone without a cord, then the device is wireless. Wireless radiation can be an emission from any size of communication device, computer, appliance, monitor, sensor, wearable, etc. Also, most microwave ovens, even when brand new, do leak microwave radiation out into rooms of the home when the oven is operating.

**Q: I am not ready to give up my wifi, is there anything I can do?**

A: You can significantly reduce your exposure by simply turning the wireless off (power off) when not in use, just as you would any appliance. Be sure to turn your router, cell phones, gaming consoles and all wireless devices off at bedtime. In addition, consider where the wifi router (and any other wifi source) is located and be sure that it is not near bedrooms or living spaces where any person (or pet) spends a large amount of time. Walls don't block wireless radiation.

You also can contact your internet provider, who can at no charge usually instantly remotely turn down the signal strength. Often the internet provider can explain how you can control that signal strength yourself online. Some routers are set to pump out radiation strong enough to reach 100 meters in all directions, but this is usually not necessary in our homes. If you talk to your neighbors about turning their signal strength down and more often off, this is a win-win as it will reduce your exposures to their wifi radiation emissions and of course also reduce their exposures.

**Q: Wi-Fi router radiation levels are so low. How is this any different than the electromagnetic radiation that has been around since the Earth began?**

A: Our society has never before been exposed to levels even remotely close to the current levels of microwave radiation in our workplaces, homes and schools today. Wi-Fi emits levels of radiofrequency microwave radiation millions of times higher than what our parents and grandparents ever experienced. Wireless routers in classrooms are like bringing mini cell towers into classrooms.

**Q: Considering the number of people using wireless devices, shouldn't we be seeing an increase in brain tumor incidence, and we are not?**

A: Recent research is showing that, internationally, brain cancer registries are showing a rise. The incidence of the worst brain cancer, glioblastoma, has increased in the United States and Denmark (Morgan et al, 2014). An Australian study has shown an overall significant increase in primary malignant brain tumors from 2000 to 2008, particularly since 2004. Another recent study (Zada et al, 2012) shows an increase in brain tumors in three major cancer registries in the United States. The increase seen is in the frontal and temporal lobes, which are the two regions closest to where a cell phone is typically held.

There is a long latency period for brain tumors – from 5 to as long as 50 years. Since cell phones have only been widely used in the US for two decades, the full increase in cancer rates is still unknown. Rates of autism, ADHD, diabetes, food allergies and immune diseases are skyrocketing, and it is understood that this increase cannot be due to genetics alone as the genome does not change in two decades. Environmental factors are increasingly thought to be behind this sharp rise. Like air pollution and chemical exposures, electromagnetic fields have been shown to increase stress on biological systems and impact the developing brain. Some research is pointing to a synergistic effect between toxic exposures such as lead and electromagnetic fields.

The Environmental Health Trust supports the use of technology in classrooms and applauds the creative use of digital resources. The use of technology and access to the internet does not require the constant exposure of children to microwave radiation. Cords and cables as wireline (non-wireless) connections are the safest option for internet access.