



# American Academy of Environmental Medicine

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## Wireless Radiofrequency Radiation in Schools

Founded in 1965 as a non-profit medical association, the American Academy of Environmental Medicine (AAEM) is an international organization of physicians and scientists interested in the complex relationships between the environment and health. For forty years the Academy has trained Physicians to treat the most difficult, complex patients who are often left behind by our medical system, because their illness, rather than stemming from traditionally understood factors, is related to underlying environmental causes, including (bio)chemical or radiation exposures. AAEM physicians, and physicians world-wide, are treating patients who report adverse, debilitating health effects associated with exposure to radiofrequency energy (RF).

The AAEM strongly supports the use of wired Internet connections, and encourages avoidance of radiofrequency such as from WiFi, cellular and mobile phones and towers, and "smart meters."

The peer reviewed, scientific literature demonstrates the correlation between RF exposure and neurological, cardiac, and pulmonary disease as well as reproductive and developmental disorders, immune dysfunction, cancer and other health conditions. The evidence is irrefutable. Despite this research, claims have been made that studies correlating emissions from WiFi, phones, smart meters, etc. with adverse health effects do not exist.

In May 2011 the World Health Organization elevated exposure to wireless radiation, including WiFi, into the Class 2b list of Carcinogens; recent research strengthens the level of evidence regarding carcinogenicity.

There is consistent, emerging science that shows people, especially children who are more vulnerable due to developing brains and thinner skulls, are being affected by the increasing exposure to wireless radiation. In September 2010, the Journal of the American Society for Reproductive Medicine-Fertility and Sterility, reported that only four hours of exposure to a standard laptop using WiFi caused DNA damage to human sperm.

In December 2012 the American Academy of Pediatrics, representing 60,000 pediatricians, wrote to Congress requesting that it update the safety levels of microwave radiation exposure especially for children and pregnant women.

With WiFi in public facilities as well as schools, children would be exposed to WiFi for unprecedented periods of time, for their entire childhood. Some of these signals will be much more powerful than would be received at home, due to the need for the signals to go through thick walls and to serve many computers

simultaneously. Signals in institutions are dozens of times more powerful than café and restaurant systems.

To install WiFi in schools plus public spaces risks a widespread public health hazard that the medical system is not yet prepared to address. Statistics show that you can expect to see an immediate reaction in 3% and delayed effects in 30% of citizens of all ages.

It is better to exercise caution and substitute with a safe alternate such as a wired connection. While more research is being conducted, children must be protected. Wired technology is not only safer, it also stronger and more secure.

While the debate ensues about the dangers of RF, it is the doctors who must deal with the after effects. Until we can determine why some get sick and others do not, and some are debilitated for indeterminate amounts of time, we implore you to not take the risk, particularly with the health of so many children with whose safety you have been entrusted. Avoidance will always be the best policy. It should be reflected by minimizing RF exposures in public spaces.

Respectfully,

The Board of Directors of the American Academy of Environmental Medicine

# 10 Elements of an Electromagnetically Clean and Conscious School

1. Use hard-wired cable or fiber optic communications networks, replacing over-the-air Wi-Fi transmissions.
2. Install workstations with Ethernet connections available throughout the school for laptop Internet access.
3. Teach students and school personnel to disable Wi-Fi functionality on laptops and personal devices and remove wireless “smart boards.”
4. Institute a “No Cell Phone” policy on campus, including personal hotspot devices.
5. Hard-wire computer peripherals such as mice, keyboards, speakers, monitors and other accessories.
6. Hard-wire printers and disable Wi-Fi function.
7. Disallow iPads or other tablets for students unless they accommodate an Ethernet connection and provide the ability to disable the wireless.
8. Train school personnel to be alert for signs of chronic electro-sensitivity symptoms such as headaches, dizziness, fatigue, irritability, heart irregularities and concentration problems.
9. Educate parents about the advisability of hard-wiring computers and Internet connections and limiting mobile phone use in the home.
10. Assess via *antennasearch.com* and with a radio frequency (RF) meter any external RF radiation sources, such as from antennas or towers, within a mile of the school.





## FACT SHEET

### Wireless Radiation Exposure in Schools

#### What is wireless radiation?

- Non-ionizing radio-frequency (RF) radiation, also known as microwave or wireless radiation, is one form of man-made electromagnetic radiation. Current technologies use RF radiation to send and receive data wirelessly. Common RF radiation sources are radio and television transmissions, cell towers and antennas, cell phones, cordless phones, baby monitors, wireless computer networks (WLAN), smart utility meters and all other wireless devices.

#### Are there health impacts associated with wireless, or RF radiation?

- Until recently, it was generally accepted that a device using RF radiation only posed a health risk if it generated enough heat to raise the temperature of body tissue – referred to as a thermal effect. In 2016, the results of a multi-year, \$25M study from the National Toxicology Program revealed that RF radiation can cause biological harm at levels far below the actual heating of tissue. This study confirmed the findings of the World Health Organization which classified RF radiation as a possible human carcinogen. Thousands of other peer-reviewed studies from around the world have corroborated these findings.

- Besides cancer, other health impacts associated with exposure to RF radiation include interference with normal brain development in fetuses, damage to reproductive systems, genetic damage, neurological problems and learning deficits, behavioral issues, sleep disruption and electro-hypersensitivity.

- Given our incomplete knowledge of the health effects associated with chronic, low level exposure to RF radiation, the employment of the Precautionary Principle\* seems entirely appropriate and necessary for schools, where children spend about half of their waking hours each day.

*“Current FCC standards do not account for the unique vulnerability and use patterns specific to pregnant women and children. It is essential that any new standards for cell phones and other wireless devices be based on protecting the youngest and most vulnerable population to ensure they are safeguarded throughout their lifetimes.”*  
- American Academy of Pediatrics

\* The Precautionary Principle states that “when there is an indication of harm to health or the environment, precautionary measures should be taken, even if some cause and effect relationships are not yet fully established scientifically.” This principle guides governments around the world when considering regulation of products and technologies.

#### Are children more vulnerable to RF radiation?

- Children are always more vulnerable to threats in their environment due to their immature and rapidly developing bodies and their typical behaviors. A growing body of scientific studies confirms this vulnerability. Some key findings include:

Children have more stem cells which are shown to be especially sensitive to RF radiation, and because they are still growing, their cells are dividing more rapidly.

A child’s head shows absorption (or penetration) rates of RF radiation at approximately twice that of an adult.

- Children today will have a longer lifetime exposure and have much of their lives in front of them. A time lag of 10-20 years to develop cancer will impact them more significantly in the prime years of their lives.

- RF radiation has become ubiquitous in young children’s lives, as companies design and manufacture wireless devices that are intended for use by children, even before birth and as newborns.

### **Does the use of wireless devices in schools create high levels of RF radiation?**

- Schools may employ commercial routers to accommodate the large number of users in a classroom. These routers can be more powerful than home models and close proximity to the router can greatly increase exposure.
- Typical WLAN or WiFi installations in schools generate constant, pulsed RF radiation even when no wireless devices are being used. Teachers and students add to (or amplify) this when they are downloading and uploading information.
- The level of RF radiation at tables of 6 or 8 children when they are all using the internet can easily exceed levels deemed safe by experts.
- Radiation can be blocked or reflected by metal objects and then absorbed or reflected by people in the room. This causes "hot" and "cold" spots in the classroom, making it impossible to get an accurate exposure reading in a classroom with multiple users.

### **What are other countries doing to protect children from wireless radiation in schools?**

**2007** - Bavarian parliament (Germany) recommends the use of wired networks in all Bavarian schools due to health concerns and had each single school informed about this recommendation by the state secretary.

**2011** - The Council of Europe recommends WiFi be banned from schools. The Council of Europe has 47 member states and is highly influential in policymaking. Scientific Panel concludes that standards for WiFi and other wireless devices are "entirely inadequate" and "strongly recommends that schools do not install wireless internet connections that create pervasive and prolonged EMF exposures for children."

**2015** - The Israeli government bans WiFi in kindergartens and restricts hours of use in schools. "Israel is a world leader in research on the health effects of non-ionizing radiation," said Linda Birnbaum, Director of the US National Institute of Environmental Health Sciences. "If some of the studies turn out to be harbingers of things to come, we may have major health consequences from the nearly ubiquitous presence of wireless equipment."

### **Are there other reasons or cost effective options for providing wired internet access to school children?**

- Wired connections are more protective of children's privacy and more secure than wireless because they are more difficult to "hack."
- Wired connections are faster than wireless if high-speed gigabit Ethernet connections are used.
- Newer technologies already exist and more are in development for hardwiring classrooms at a comparable or even reduced cost compared to wireless installations.

*We fully support and promote access to the internet in all schools. We join with medical doctors, medical researchers, toxicologists, United States and International Public Health Agencies who advise caution and risk reduction around wireless radiation in places where pregnant women and children live, learn and play and strongly suggest hardwired internet connectivity.*



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# Wi-Fi in Schools: Experimenting With the Next Generation

## *Commercial wireless systems expose children to nation's highest radiation levels*

BY CONAN MILNER, EPOCH TIMES

February 28, 2019

The internet has unleashed human knowledge. Never before has it been so easy to learn so much. Of course, it has also drowned us in distraction and created a breeding ground for trolls and misinformation, but if the internet is redeemed by anything, it is its liberation of education. When it comes to accessing this ocean of information, we have two basic choices: wired or Wi-Fi. The vast majority of schools have embraced the wireless revolution. It's easy to see why. Compared to wired internet, wireless is simpler, cheaper, and faster for schools to install.

Today, students are trading notebooks and textbooks for laptops, cellphones, iPads, and all manner of "smart" devices connected to a potent wireless infrastructure that lets them be used virtually anywhere on school grounds.

But that wireless web comes with a devastating downside. Doctors and scientists say that the students and teachers who attend these schools are risking their health.

### **Radiation Dangers**

Dr. Martin Pall, Professor Emeritus of biochemistry and basic medical sciences at Washington State University made a grave case about the dangers involved in his paper, "Wi-Fi is An Important Threat to Human Health," published in the July 2018 issue of Environmental Research.

"The placement of Wi-Fi into schools around the country may well be a high-level threat to the health of our children as well being a threat to teachers and any very sensitive fetuses teachers may be carrying, as well," Pall writes.

Since Wi-Fi is found everywhere from private homes to public spaces, Pall's alarming claim seems hard to fathom. And yet his evidence is compelling: 23 controlled scientific studies demonstrating numerous adverse effects to Wi-Fi radiation exposure. And that's just the tip of the iceberg—there are dozens more studies on Wi-Fi harms which were not included in the paper.

Wireless radiation has become commonplace despite well-documented evidence of its harm, with thousands of studies going back several decades demonstrating health problems associated with exposure. Some of the strongest evidence came last year from the final report of a \$30 million, 19-year study funded by the U.S. Food and Drug Administration. It was conducted by the National Toxicology Program (NTP)—the federal agency tasked with testing toxins—and was designed to be the final word on whether wireless radiation was harmful. It showed clear evidence of cancer and DNA damage linked to cellphone use.

### **Concentrated Risk**

Schools are particularly worrisome, experts say, because they are where the most intense concentration of wireless radiation is found today. The Wi-Fi systems schools have adopted are much more comprehensive than your average home or coffee shop Wi-Fi. These commercial grade systems use several routers or "access points" throughout the classroom, often in the ceiling above

students' heads. Now, add in all the radiation spewing from all the wireless devices operated by each student, and you'll find that kids are spending up to seven hours per day in a thick soup of electro-smog.

Even worse, the people we place in this remarkably concentrated field of wireless radiation are more vulnerable to it. Compared to adults, children are smaller and have smaller and thinner skulls so the radiation penetrates more easily and gets to larger parts of the brain. Also problematic, children's immune and nervous systems are still developing. Plus, kids' cells divide at a faster rate, which increases the risk for mutations that can lead to cancer.

According to Pall, these factors make children more susceptible to the disease processes that wireless radiation has been consistently shown to cause: oxidative stress (which can lead to cancer and non-cancerous conditions, as well as DNA damage), sperm and testicular damage, neuropsychiatric effects, cell death, changes to the endocrine system, and calcium overload.

### **Evidence of Illness**

These disease processes aren't merely theoretical. Epidemiological studies conducted by Dr. Lennart Hardell, an oncologist at Orebro University Hospital in Sweden, showed that children exposed to this radiation are more likely to develop cancer and develop it quicker.

Other doctors and scientists say exposure is likely a significant contributing factor to the rising rates of other childhood diseases. Dr. Hugh Taylor, a professor and chair of obstetrics, gynecology, and reproductive sciences at Yale University, has shown that fetal exposure to wireless radiation affects neuro-development and behavior and can lead to Attention Deficit and Hyperactivity Disorder (ADHD)—a condition that has doubled in the past 10 years.

Harvard Medical School professor and a pediatric neurologist at Massachusetts General Hospital, Dr. Martha Herbert, makes a compelling argument that the rise in autism spectrum disorders may also be related to our rise in wireless radiation exposure.

Herbert's 60-page report from 2012 doesn't provide evidence of cause, but it does reveal several similarities between symptoms known to occur with wireless radiation and biological manifestations in autism, such as cellular stress, tissue damage, protein misfolding, and injury of membranes.

Herbert describes autism, not as a condition of a broken brain, but of a brain that has a hard time regulating itself. And she believes that if such a brain is caught in a cloud of wireless radiation, it is confronted with a disruptive factor, making it even harder for behavior and biology to come into balance.

While the brains of children with autism may be most vulnerable to microwave radiation, Herbert says every brain is at the mercy of its influence.

"I really am concerned about people's brains," Herbert said. "It's not a joke to have this stuff getting into these three pounds of delicate, gel-crystalline structure in our heads that does this amazing stuff. It wasn't meant for this level of exposure."

### **Electromagnetic Neurology**

Herbert explains that, just like our wireless devices, our brain communicates with electromagnetic signaling. In fact, as our instruments have become more sensitive, scientists have discovered that each cell in our body uses electromagnetic signaling.



Now that we live in a wireless world, where we all walk around in a field of electromagnetic radiation nearly all the time, Herbert believes there is enough scientific support to argue that this influence could be an important contributor to degrading the optimal chemical-electrical function of our bodies—thereby detuning our brains and nervous systems.

Autism was once considered strictly a genetic abnormality. But as knowledge of the condition has grown, researchers have uncovered a more complex landscape, where a host of environmental influences have shown an impact on gene expression.

This means that instead of one smoking gun tied to this fast growing condition (the latest estimate from the Centers for Disease Control is that one in every 40 children has autism, up from one in every 166 in 2005), there are likely many factors. Toxic chemicals, for example, have long been demonstrated to impact fetal brain development.

But Herbert argues that, due to electric nature of our bodies, wireless radiation may create more of a disruption than toxic chemicals.

“When you have a toxicant exposure, it can affect the brain, but it has to go through metabolic pathways that can influence the electromagnetics in order to do that,” Herbert said. “But when you have electromagnetic radiation, it’s a straight shot. It’s the same language, so it can be more instantaneous.”

### **Sick in Schools**

Dafna Tachover is a former telecommunications officer turned lawyer who advocates for people harmed by wireless radiation. Her Supreme Court lawsuit in Israel led to the first limits on Wi-Fi in schools worldwide. Tachover showed evidence of 200 sick children from the Wi-Fi in just six schools.

Now in the United States, Tachover says she is contacted by several parents every week with children who have become sick from their school’s wireless system. She says the most common symptoms include headaches, increased sensitivity to noise, nose bleeds, concentration and memory problems, nausea, exhaustion, and hyperactivity.

“Unfortunately, these harms are not potential but existing, and at an epidemic scale,” Tachover said.

The acute or chronic illness that results from wireless radiation is known as electromagnetic sensitivity. It’s the same illness the U.S. Navy dubbed “microwave sickness” when soldiers who had been working with technologies such as radar for extended periods of time displayed the same symptoms. The illness is named for the microwave frequencies that powers wireless technology. Those who contract microwave sickness can’t be in the presence of wireless radiation without painful and sometimes debilitating symptoms.

One child Tachover is working with is a 13-year-old girl from Oregon whose desk was directly under the classroom’s Wi-Fi router. After she developed microwave sickness, her parents enrolled her in a private Waldorf school, because they’re one of few schools that don’t use Wi-Fi.

In some cases, parents are forced to homeschool their children because they can’t get access to schools without Wi-Fi. In other cases, sick kids are forced to make do.

Tachover said one parent had two sons who developed microwave sickness. This mother urged her sons’ school to accommodate by hard wiring the classroom internet and even offered to pay for the



accommodation, but the school refused. As a result, her children can only attend school for a few hours per week.

“When in the Wi-Fi environment they experience headaches, concentration problems, skin rashes and hyperactivity,” Tachover said.

### **Risk to Teachers**

Microwave sickness can impact teachers who work in Wi-Fi too. Laurie Brown, a teacher in the Los Angeles Unified School District (LAUSD), says she knew nothing about the health impacts from wireless until her school installed a commercial grade Wi-Fi system in April of 2015. Today, she says the damage caused by this technology is impossible for her to ignore.

“We had Wi-Fi before, but the upgraded system now had two access points in every single classroom, adding a total of 190 access points to the school, including additional boosters to prevent any loss of connectivity,” Brown said. “All of this was for Common Core testing, and 21st-century teaching.”

During Common Core testing, each of Brown’s students used a wireless laptop (Chromebook) to access this new system. After just two hours in this new high tech environment, Brown started feeling several symptoms: tingling and burning in her skin, breathing problems, and a rising heart rate. Her ankles started itching and her nasal passages started to swell.

Symptoms grew worse and soon Brown could barely make it through the day. Before the new Wi-Fi system, Brown was rarely sick and had saved close to 800 hours of time off for illness. But after the installation of the new equipment, she was sick all the time. By the end of the school year, Brown was out at least two days every week.

“I just started to feel horrible,” she said. “I would go home from school feeling so lousy. I was never a headachy person, and I was getting all these headaches that were so strange.”

Brown knows of at least 10 teachers and staff members who complained of symptoms that they traced to the school’s Wi-Fi. Two retired, one from another school resigned, and at least three (including Brown) filed for workers compensation injuries with the LAUSD. All the claims were initially denied.

Brown is now on disability leave, but she would rather have her old life back. Today, if someone is just using a cellphone near her, Brown’s inflammatory symptoms, as well as other sometimes debilitating symptoms, can quickly return.

“It’s overwhelming and it’s sad because it takes away from the enjoyment of life and your lifestyle,” she said. “I’m someone who is accommodating, likes to please and is easy going. I wasn’t a high maintenance person. It makes me feel uncomfortable in my own skin to feel like I’m inconveniencing others.”

For schools that are willing to make accommodations, lives have been turned around. Appeals through the American with Disabilities Act have made some schools remove the Wi-Fi routers in the classrooms where there are microwave illness sufferers, even extending the router removal to neighboring classrooms when they still exert an influence.

Teacher Sheila Reavill contracted microwave sickness but she convinced her school to hardwire their internet access and connect laptops with an adapter. There is no Wi-Fi or Bluetooth in Reavill’s class, and the children who carry cellphones shut them off when they’re in the room.

"She says she not only she feels better in the classroom, but her students are also calmer and can focus better," Tachover said.

Experts saw dangers in school Wi-Fi upgrades even before they were installed. In 2013, Herbert wrote a warning letter to the LAUSD, citing the thousands of papers that have accumulated over decades which document adverse health and neurological impacts of electromagnetic frequency and radiofrequency radiation (EMF/RFR).

"EMF/RFR from Wi-Fi and cell towers can exert a disorganizing effect on the ability to learn and remember, and can also be destabilizing to immune and metabolic function," Herbert wrote. "This will make it harder for some children to learn, particularly those who are already having problems in the first place."

The letter went viral, but the school district paid it little mind.

"You know who did react? The firefighters," Herbert said. "They had this boondoggle going where they were putting cell towers right behind all the fire stations. So guess what? All the firefighters were getting sick."

### **Pushing for Change**

As more people become aware of the dangers associated with wireless radiation and Wi-Fi in schools, efforts are emerging from teachers unions, parent organizations, and physician groups to address the problem.

One widely proposed solution is for schools to adopt a wired system. This would allow students to have more reliable high-speed internet access but without the microwave radiation. The cost would only be slightly higher than a wireless system.

While installing a wired system would mean a greater cost up front, it could save schools millions in the long run, as well as ensuring the health of the children who attend these schools. Tachover says that most schools are not insured for health effects related to wireless radiation because most insurance companies learned their lesson from tobacco and asbestos and have made an exclusion with regard to wireless.

Some change may come in the form of new laws. In Massachusetts, seven bills have recently taken aim at the issue of wireless technology in a handful of schools.

Deb Mayer runs the Oregon chapter of Parents Across America (PAA). She says her organization has introduced three bills into the state legislature that target children's increasing exposure to wireless radiation.

"We aren't against technology. We're against unsafe use and irresponsible use," Mayer said.

One bill allows Wi-Fi wary parents to choose an alternative for their child. The bill also calls for kids to have recess so they get a chance to move around in the physical world for some part of their day.

The second bill focuses on better public understanding of the biological impact of wireless. It requires public and private schools to distribute information about the potential health risks of wireless network technology to employees, students and parents or guardians. It would also require the state's Health Authority to examine peer-reviewed, independently funded studies on the effects of exposure to microwave radiation in schools and similar environments, particularly exposure that



results from the use of wireless network technologies. It then calls on the Health Authority to create guidelines based on this review.

The bill that Mayer believes has the best chance of passing is one which calls for something wireless manufacturers already do, but writ large. Buried deeply in your cell phone manual are tips about using your device more safely. The bill asks to have these tips more explicit with clear warning labels so that consumers take safety more seriously.

Overall, that's the biggest challenge—getting schools, lawmakers, and the public to treat the issue with the gravity it deserves.

“Getting people to believe that what we say is real and true is really a heavy lift because they don't want to think there is a downside to their devices,” Mayer said. “And they especially don't want to think that giving devices to their kids is a bad thing to do.”

Herbert says another reason why people may be resistant to see this problem is that all this wireless radiation may be affecting our judgment.

“Your judgment is intrinsically off when your brain function is altered in some way. You could be missing things—missing distinctions, or being disorganized in ways you don't realize until you come out of it. Maybe you never come out of it,” Herbert said. “Just something to contemplate as we try and look at our increasing exposure to electromagnetic waves.”