

# Biological Effects From RF Radiation At Low-Intensity Exposure, Based On The Bioinitiative 2012 Report, And The Implications For Smart Meters And Smart Appliances

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## Introduction and Conclusions

The Biological Effects Chart, at the end of this document\*, has been produced using data from a massive new review of the medical research literature on the biological effects of electromagnetic fields. That review is called the BioInitiative 2012 Report.<sup>2</sup> The purpose of the Biological Effects Chart is to show the radiofrequency (RF) exposure levels at which biological effects were found in 67 studies from the RF Color Charts of the BioInitiative 2012 Report, and then to compare those exposure levels to the following:

- (1) Current FCC Maximum Permitted Exposure (MPE) limits that govern Smart Meters and Smart Appliances in the United States
  - (2) New biologically based RF exposure limits proposed in the BioInitiative 2012 Report
  - (3) Calculated RF exposure levels produced by a single Smart Meter at various distances
  - (4) Calculated RF exposure levels produced by a single Smart Appliance at various distances
- This comparison is based on RF exposure levels expressed as the RF power density (RF power per unit area).

This comparison does not address other potentially important factors such as carrier continuity (continuous versus pulsed radiation) and modulation technique (the method used to impress information on the carrier), among others. The purpose is to identify what biological effects arise from exposure to RF power density levels like those produced by Smart Meters and Smart Appliances.

(\* Page 15, at the end of this document)

Smart Meters and Smart Appliances operate in the same frequency ranges as cell phones. Further, Smart Meters have twice the RF power output of the typical cell phone, as shown in the table below, and will be transmitting day and night. Emerging Smart Appliances will likely have about one-fifth the RF power output of the typical cell phone. But a given home may have several Smart Appliances; and they, too, will be transmitting day and night.

Device	RF Power Output
Smart Meter <sup>42</sup>	1.115 watts, which is 1115 milliwatts
Typical leakage from a microwave oven <sup>43</sup>	1 watt which is 1000 milliwatts
Typical cell phone <sup>43</sup>	0.5 watt which is 500 milliwatts
Wireless LAN (802.11a) <sup>43</sup>	0.251 watt which is 251 milliwatts
Wireless LAN (802.11n) <sup>43</sup>	0.250 watt which is 250 milliwatts
Cordless phone <sup>44</sup>	0.230 watt which is 230 milliwatts
Smart Appliance <sup>45</sup>	0.100 watt which is 100 milliwatts
Wireless LAN (802.11 b, g) <sup>43</sup>	0.100 watt which is 100 milliwatts
Typical laptop wireless LAN (Wi-Fi) <sup>43</sup>	0.032 watt which is 32 milliwatts

1. The author holds a Ph.D. in Applied Physics from Harvard University, 1975.

2. BioInitiative Working Group, Cindy Sage and David O. Carpenter, Editors, BioInitiative Report: A Rationale for Biologically-based Public Exposure Standards for Electromagnetic Radiation, December 31, 2012 (<http://www.bioinitiative.org>).

42. The Landis+Gyr FOCUS AXR-SD and the General Electric I-210+c, being installed in Maryland, have FCC-ID OWS-NIC514 which indicates that they send and receive information in two microwave frequency ranges: (1) 902.3 to 926.9 MHz, and (2) 2405.8 to 2480.9 MHz. The RF power output in the first frequency range is 0.968 watts. The RF power output in the second frequency range is 0.147 watt. These values sum to the 1.115 watts shown here, to provide an indication of the total RF power output capability of a Smart Meter. I have used an approximate value of 1 watt for the RF power output of a Smart Meter throughout this document (<http://stopsmartmeters.org/wp-content/uploads/2012/01/OWS-NIC514-FCC-specifications.pdf>).

## Joyce's testimony about symptoms:

In February of 2011, NV Energy installed "Smart Meters" on the homes in my neighborhood. After about a month, both my husband and I started have some symptoms that had not occurred before. I started having some headaches. I never have headaches as a normal part of everyday occurrences, only when I have an occasional illness. I started having ringing in the ears. I went to an audiologist and had my hearing checked and asked about the ringing – nothing was wrong with my hearing and they really didn't know why the ringing in my ears was occurring. I had some heart palpitations, and in Oct. 2010, had tests by a heart specialist. I did check out OK. I also experienced a "tingling" sensation on my face. My husband began having insomnia and headaches. Nothing had changed in our routine or house environment, except the smart meters. We did some research, and found out that these symptoms are attributed to the pulsing radiation of smart meters! I contacted NV Energy, and after two weeks of hounding them, they reinstalled an analog meter on our house. We still had symptoms, and then realized that our neighbor's meter was only 9 feet from our bedroom wall. We talked to our neighbor, and he agreed to have his meter removed. It took 4 calls and 2 months before it was removed. Our symptoms gradually went away, and except for ringing in my ears, the other symptoms have gone. Again, nothing changed in our lives or environment, except the smart meter. As you will see in the data, smart meters are dangerous to people's health!

The symptoms I described above are similar to the symptoms described in appendix 1 – **Symptoms of Radio Wave Sickness** from "**A basic Summary of the Neurological Effects of Radiofrequency Sickness**," [www.electricalpollution.com/documents/Neurologicalsum.doc](http://www.electricalpollution.com/documents/Neurologicalsum.doc) and "**No place to Hide**," April 2001 <http://www.ecopolitan.com/health-services/emfprotection/148-symptoms-radio-wave-sickness> and original reference to **RADIO WAVE SICKNESS** by Arthur Firstenberg [http://www.cellphonetaskforce.org/?page\\_id=32](http://www.cellphonetaskforce.org/?page_id=32)

### Appendix 1- Symptoms of Radio Wave Sickness (excerpted from *No Place To Hide* April 2001):

- **Neurological:** headaches, dizziness, nausea, difficulty concentrating, memory loss, irritability, depression, anxiety, insomnia, fatigue, weakness, tremors, muscle spasms, numbness, tingling, altered reflexes, muscle and joint pain, leg/foot pain, "Flu-like" symptoms, fever. More severe reactions can include seizures, paralysis, psychosis and stroke.
  - **Cardiac:** palpitations, arrhythmias, pain or pressure in the chest, low or high blood pressure, slow or fast heart rate, shortness of breath.
  - **Respiratory:** sinusitis, bronchitis, pneumonia, asthma.
  - **Dermatological:** skin rash, itching, burning, facial flushing.
  - **Ophthalmologic:** pain or burning in the eyes, pressure in/behind the eyes, deteriorating vision, floaters, cataracts.
- Others:** digestive problems; abdominal pain; enlarged thyroid, testicular/ovarian pain; dryness of lips, tongue, mouth, eyes; great thirst; dehydration; nosebleeds; internal bleeding; altered sugar metabolism; immune abnormalities; redistribution of metals within the body; hair loss; pain in the teeth; deteriorating fillings; impaired sense of smell; ringing in the ears.

### **RADIO WAVE SICKNESS** by Arthur Firstenberg [http://www.cellphonetaskforce.org/?page\\_id=32](http://www.cellphonetaskforce.org/?page_id=32) **Symptoms**

Insomnia, headaches, dizziness, nausea, memory loss, difficulty concentrating, irritability, respiratory illness (bronchitis, sinusitis, pneumonia), flu-like illness, asthma, fatigue, weakness, pressure or pain in the chest, increase in blood pressure, altered pulse rate (usually slowed), pressure behind the eyes, other eye problems, swollen throat, dry lips or mouth, dehydration, sweating, fever, shortness of breath, muscle spasms, tremors, pain in the legs or the soles of the feet, testicular or pelvic pain, joint pain, pains that move around the body, nosebleeds, internal bleeding, hair loss, digestive problems, skin rash, ringing in the ears, impaired sense of smell, pain in the teeth (especially with metallic fillings)

I also mentioned in the text above that our neighbor's smart meter was only 9 feet from the common wall to our bedroom. This is a common occurrence happening wherever smart meters that use RF to transmit consumption data (no matter what brand) are being installed across the country. This situation is also addressed by Ronald M. Powell Ph.D<sup>1</sup> in his "Biological Effects From RF Radiation..." article. On page 13 in a section titled "A Single Smart Meter on a Neighbor's Home Can Produce RF Power Density Levels Shown to Cause Biological Effects." Here is a direct quote from that section:

"For some locations in a given home, the distance to a neighbor's Smart Meter may be less than the distance to the resident's own Smart Meter. Thus, a neighbor's Smart Meter may be the principal source of radiation for some locations in the given home. The Biological Effects Chart shows that a single Smart Meter can produce RF power densities found to cause biological effects even at distances greater than 20 meters, and certainly up to 100 meters. And the number of neighbors within that range can be large. A given single-family home in a residential community may have one to eight nearest neighbors, and even more next nearest neighbors, all within 100 meters (328 feet) of a given home, and each with a Smart Meter."

"The problem of exposure from the neighbors' Smart Meters becomes more serious as the distances between adjacent homes, and thus the distances between adjacent Smart Meters, get smaller. So, generally speaking, residents of townhouses will receive more radiation from their neighbors' Smart Meters than residents of single-family homes. And residents of apartments will receive even more radiation from their neighbors' Smart Meters, depending on the location of the Smart Meters in the apartment buildings." [end quote]

Mr. Powell clearly makes the point that even if one individual removes the smart meter from his own home, his neighbor's smart meter negates any relief he might have promulgated by this preventative measure, which is why we are currently paying for our neighbor to opt out of his smart meter so the RF effects of his will not beam into our bedroom.

There are two other aspects of our situation that seem unsolvable except to maintain our and our neighbor's analog meter into perpetuity. The power density output per Mr. Powell's report put our neighbor's smart meter at approximately 15 mW/m<sup>2</sup> (fig.1 pg 9) because my neighbor's smart meter is 9 feet or 3 meters from our bedroom. Even if it were only 10 mW/m<sup>2</sup> that would be 0.001 mW/cm<sup>2</sup>, which is below the current FCC standard of .6 mW/cm<sup>2</sup>, but unfortunately the FCC standards do not take cumulative exposures into account, and are most certainly not current considering they suggest that you actually have to heat cells or tissue to do any harm. If smart meters were a one time exposure and or even intermittent exposure that would be one thing, but permanently installed smart meters especially those installed on a neighbors house similar to ours, are not intermittent, but continuous every 15 seconds or less, 24/7.

Secondly, in conjunction with cumulative exposure to RF produced from smart meters, chronic exposures can result in adverse health affects per conclusions reached in the **2012 BIOINITIATIVE** report. <http://www.bioinitiative.org/conclusions/> On page 1 of the report under a section titled BIOEFFECTS WITH CHRONIC EXPOSURES CAN REASONABLY BE PRESUMED TO RESULT IN ADVERSE HEALTH EFFECTS we read this:

"Many of these bioeffects can reasonably be presumed to result in adverse health effects if the exposures are prolonged or chronic. This is because they interfere with normal body processes (disrupt homeostasis), prevent the body from healing damaged DNA, produce immune system imbalances, metabolic disruption and lower resilience to disease across multiple pathways. Essential body processes can eventually be disabled by incessant external stresses (from system-wide electrophysiological interference) and lead to pervasive impairment of metabolic and reproductive functions." [end quote]

This concern is further corroborated by Dr. Powell's report on page 11 under a section titled "A Single Smart Meter Can Produce RF Power Density Levels Shown to Cause Biological Effects." Here are Dr. Powell's comments:

"The Biological Effects Chart enables a comparison between the RF power densities produced by a Smart Meter, at various distances from that Smart Meter, and the RF power densities that triggered biological effects in the 67 studies.

The power density at 1 meter (3 feet) from a Smart Meter is higher than the power density that triggered biological effects in 50 of the 67 studies.

The power density at 5 meters (16 feet) from a Smart Meter is higher than the power density that triggered biological effects in 26 of the 67 studies.

The power density at 20 meters (66 feet) from a Smart Meter is higher than the power density that triggered biological effects in 14 of the 67 studies." [end quote]

Based on our distance of 3 meters, (9feet) our neighbor's smart meter would have triggered biological effects in more than 26 out of the 67 studies that were conducted in the 2012 BIOINITIATIVE report. My health symptoms referred to above seem to corroborate those facts in both reports.

Recently I did a study on the future effects of cell phone towers and smart meters with the accompanying smart appliances that the appliance industry wants to implement in the very near future. There now over 70 Cell Tower structures and 196-registered antenna locations located within a 4 mi. radius of our home per <http://antennasearch.com/sitestart.asp> The closest cell tower is less than .61 mi from our home.

This is how many smart meters are in our neighborhood in addition to the cell towers and antennas, all of which are major producers of RF (radiation frequency). There are approximately 15 houses per city block and in a 4-mile radius there are roughly 17 blocks. That works out to over 12,400 smart meters within a 4 mi radius of our house. When HAN (Home Area Network) are forcibly installed like smart meters were and a home contains 15-20 chipped appliances that will add another 217,000 RF emitting devices to our neighborhood.

That is an intolerable number and needs to be stopped.