

Alzheimer's Mouse Study —Do We Smell a Rat?



February 16, 2010

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Alzheimer's Mouse Study—Do We Smell a Rat?

I. Introduction

Recently the news media created an international sensation out of a single research study from University of South Florida showing positive changes in mice exposed to 'cell phone' radiofrequency radiation (Gary Arendash et al, *Journal of Alzheimer's Disease*, Vol 19, page 191-210, 2010). The authors of the study reported that when these mice were exposed for 2 hours a day to a generator that produced 'cell phone' radiofrequency radiation, over a 7-to-9 month period, an unexpected change occurred. Mice that had Alzheimer's-like symptoms improved and mice bred to develop an Alzheimer's-like syndrome (with an increase in beta-amyloid plaque in the brain) did not develop it.

The mice bred to have Alzheimer's-like syndrome performed in a memory test as well as aged mice without dementia.

These results are *exciting news* for people with Alzheimer's who may now be wondering if there may be therapeutic benefits for humans from exposure to electromagnetic fields.

But it's actually *bad news* for anyone who listened to subsequent news reports about the study based on the Press Release from the University of South Florida or the *Journal of Alzheimer's Disease* web posting, which suggested cell phones may protect against Alzheimer's Disease. *Many experts agree that the comments made in the Press Release, as well as newspaper coverage widely generated from it, are exaggerated and misleading.*

One expert in electromagnetic fields, Alasdair Philips, B.Sc.(Eng), DAgE, of Powerwatch in the U.K. (<http://www.powerwatch.org.uk>), says, "*I think the university PR and the Alzheimer's Disease journal PR and the researchers comments are unforgivably wrong in almost every respect in describing the exposure as being similar to cell phone use*".

Here is what you need to know:

II. The radiation exposure the mice received in the Alzheimer's study was not the equivalent of 'cell phone' radiation

a) **The generator used to create the radiation in this study was a different type of exposure than the exposure one gets from cell phones and they are *not comparable*, despite many statements in the sponsoring university's Press Release claiming the exposure was similar to that of a 'cell phone'.** One researcher who has investigated this says the researchers used an HP DSG D4000A generator with a high frequency carrier wave of 918 MHz "*but nowhere can be found the pulse rate used. And it is just the modulation of these low frequency pulse rates (with a lot of other signals in it) that do have the impact on people*".

See the generator specifications at: http://www.testwall.com/datasheets/HP_ESG_DSERIES.pdf

While we understand some HP generators can generate a modulated signal, no modulation was **mentioned** in this study according to the exposure protocol.

The only aspect of the study's EMF exposure that is comparable to cell phone exposure is the carrier frequency. But cell phones use complex modulation signals, too, that contain the 'information' of our conversations, text messages, photos, downloads, etc., in addition to parametric information between the cell tower and the cell phone. Cell phones use a range of complex signaling characteristics, including pulsed digital waves that are significantly different from simple carrier waves.

Besides the exposure in this study being neither pulsed nor modulated like cell phone signals, the researchers were measuring *far field exposure* not a *near field exposure* (i.e. in close proximity to the head of the mouse). Different effects occur in the far field from the near field, so on this basis alone, the exposure in this study cannot be compared to a cell phone exposure. A monopole antenna generating the radiation was in the center of the group of mouse cages, which is more comparable to a whole body exposure from a cell tower than to a cell phone placed directly against the head.

A U.K. biologist, Andrew Goldsworthy, Ph.D., retired lecturer in biology from the Imperial College in London, says the exposure in the Alzheimer's study was not comparable to a cell phone exposure:

“The first point I should make is that they used radiation at 918MHz (similar to a GSM mobile phone in this respect) but it was neither pulsed nor modulated, so it cannot be regarded in any way as being equivalent to real mobile phone or Wi-Fi radiation.”

Indeed, in the original research paper there is no mention of any pulsing or modulation in the EMF Exposure protocol used (Page 93). Also, in Figure 11 B (page 208) there is an unexplained heading saying 'Unmodulated'. "In the absence of anything to the contrary", Dr. Goldsworthy says, "we can only take them at their word."

Dr. Goldsworthy explains unmodulated radiation is *less biologically active*.

“The non-thermal effects of unmodulated radio frequency radiation are normally much weaker than modulated radiation and could even produce the opposite effect (this is called radiation hormesis, which has been studied mostly in relation to ionizing radiation, but it probably also applies to non-ionizing radiation).”

Hormesis is a process seen with numerous toxic exposures, where the body initially is jump started, if you will, into repair mode, and for a period there are *net positive effects*. With chronic exposures, ultimately, there are negative effects. Goldsworthy explains:

“It is argued that living cells and organisms perceive the damaging effects of the radiation and put themselves into “repair mode”. This includes boosting enzymes needed for cellular growth and regeneration and also triggering inflammation to increase the blood supply to the affected region. Provided these measures are successful, there may be no observable adverse effects. However, some of these mechanisms are generic and may also affect other illnesses, so that very weak radiation may have net beneficial effects, even on systems that are not directly affected by it. This may be what we are seeing here; mild inflammation of the brain would increase its blood supply and could stave off the degeneration normally associated with Alzheimer's disease.”

Dr. Goldsworthy and other scientists in this field well know that modulated waves, such as those used by mobile phones, can impact cell membranes and cause biological disruptions of many kinds.

“... modulated radio waves (such as those used by mobile phones), where the strength of the carrier wave rises and falls in time with the modulating waveform, give greater biological effects. This is perhaps because they are more effective in jerking structurally-important calcium ions free from cell membranes, which makes them more inclined to leak. The effects of this can be harmful in many cases (see <http://tinyurl.com/5ru6e6> for a proposed mechanism and some of the consequences).”

Consequently, of great concern with this University of South Florida study is that the authors and the Press Release are saying the EMF exposure to the mice was that of a cell phone, when this appears to not be true. In a recent University of Athens study (Fragopoulou et al., *Journal of Pathophysiology (in press)*) (<http://electromagnetichealth.org/electromagnetic-health-blog/mice-exposed-to-cell-phone-radiation-exhibit-memory-deficits/>), scientists found very different results. Using an actual commercial cell phone, memory deficits were found in the mice, instead.

To be fair, the kind of radiation used in the Alzheimer's study may well have had beneficial effects, at least temporarily, and that news is worthy of much further research. There is a whole area of interest in the therapeutic use of electromagnetic fields across a range of frequencies, and the Florida researchers might well have stumbled across something in that category.

Unfortunately, misrepresentations of the study's basic design that led to the implication that cell phone exposures might help Alzheimer's patients or even prevent it, raises questions of credibility with further work by these authors, and with PR communications from the University of South Florida.

It is important to keep in mind this is one small, not yet replicated study, and its conclusions appear exaggerated to many EMF experts. Below are some of statements the spokespeople made. You can decide for yourself if the methodology used was misrepresented in their communication.

b) Arendash et al found an increase in temperature though the reported SAR level was way below the level at which one would expect to find heating. SAR stands for Specific Absorption Rate—the measurement used to understand how the body absorbs energy. For reference, the SAR limit in the U.S. for cell phone exposure is 1.6 W/kg and for whole body exposure it is 0.4 W/kg. The exposure the authors described in this study was reported at 0.25 W/kg, below both the FCC limit for human exposure and the level at which increases in body temperature are known to occur. While heating might be able to enhance the body's circulation abilities, and possibly help to dissolve plaque, scientists do not understand how there could have been *any measurable heating effect* at the study's exposures. Therefore, questions include: Was there a problem in the study's SAR calculation? Was the SAR value used actually higher? This study needs replication to determine if heating effects could actually have occur at SAR levels this low using the particular generator in question, at 918 MHz, for the stated duration.

If low SAR levels did indeed create a heating effect (for reasons unknown), this would open up a can of worms for the cell phone industry. The need to have power levels sufficiently high enough to heat living tissues for biological change to occur has long been at the heart of industry's argument that cell phone exposures are safe.

c) Frequencies which would *also* be present with cell phone exposures were *not present in this study*, including electric and magnetic fields, near field exposures, and well as background ambient radiation.

Stan Hartman of Radsafe in Boulder, CO explains,

“Putting aside the vast differences between a mouse and human brain, you’re eliminating the low frequencies and magnetic fields from the phone, and also putting the exposure to a large extent outside the near field of the signal, which would be about 13 inches. Also, did they replicate the power levels of a phone against the head, and their variations, which could be biologically significant? He adds, “You can’t really replicate the effect of a cell phone close to the human brain by putting the antenna of a 918 MHz signal generator a couple feet away from a mouse’s cage (where, for one thing, exposure can vary a lot with the mouse wandering around in the cage) and then seeing what happens to the mouse.”

Alasdair Philips, B.Sc.(Eng), DAgE, of Powerwatch in the U.K. (www.powerwatch.org.uk), consultants in electromagnetic fields for over two decades, says, “This is quite unlike cellular handset exposure which is in the near-field, which is more biologically active. Also, a handset exposes a user’s brain to real low frequency magnetic fields which have separately and repeatedly been shown to increase the likelihood of developing Alzheimer’s disease.” (See Powerwatch’s list of research references re. magnetic fields and Alzheimer’s at: http://www.powerwatch.org.uk/news/20081112_alzheimers_powerlines.asp)

In addition, as Dr. Goldsworthy says, “The entire experiment was **done in a Faraday cage** so that the mice were not exposed to ambient electrosmog. If my guess is right, and it is an hormesis effect of radiation with very low biological activity, then it may not occur in an *already polluted environment or with a regular cell phone.*” He says, “I am afraid granny may have to spend the rest of her days locked in a Faraday Cage with a HP DSG 4000A signal generator!”

So while no one totally doubts the Alzheimer’s study results, and many researchers find the results intriguing and are looking forward to replicating the study, integrity issues were raised when the authors compared the study exposure to cell phone radiation, and, in the opinion of many scientists, thereby publicized misleading information to the media.

III. Prior Research Studies Showing Harmful Impacts of Radiation on the Brain Were *Omitted* from the Discussion

There is much research showing deleterious effects on the brain and cognitive function from microwave radiation, ranging from neuron death to Blood Brain Barrier permeability (just as there are studies showing improved performance). Permeability can allow proteins to pass through into the brain that do not belong there, such as albumin. It can also allow heavy metals

and other toxic substances into the brain. ***It is worth sharing some of the existing scientific literature so readers are not left with the impression cell phone radiation may be something good for the brain, as the University of South Florida Press Release has suggested.***

Alzheimer's expert Scott Mendelson, MD, PhD author of *Beyond Alzheimer's: How to Avoid the Modern Epidemic of Alzheimer's*, said recently in his Huffington Post blog:

“A number of studies using mice and rats have found that cell phone radiation harms rather than improves learning and cognitive function. Many, though not all, studies have found that in both rats and mice chronic exposure to cell phone radiation causes deficits in learning and memory in spatial tasks. There is also compelling evidence that cell phones may damage brain tissue. An interesting and often replicated study by Dr. Jacob Eberhardt, published in 2008 in the journal Electromagnetic Biology and Medicine, found that in laboratory rats, two-hour daily exposure to cell phone radiation over a period of a few weeks led to disruptions in the brains protective Blood Brain Barrier as well as a significant increase in the number of dead and damaged neurons in brain tissue. Another recent study, performed by Dr. Dusan Sokolovic published in the Journal of Radiation Research showed that chronic exposure to cell phone radiation causes significant damage through oxidative stress in brain tissue.

“To the best of my knowledge, there is only one study of the effects of chronic cell phone radiation on human cognitive function. A study performed in 2009 by Dr. Roy Luria at Ben Gurion University of the Negev, in Beer Sheva, Israel, and published in the journal Bioelectromagnetics, found that relatively brief exposure to cell phones radiation caused deficits in working through spatial memory problems in normal human subjects.”

In addition, Dr. Mendelson referenced studies of the effects of cell phones on the risks of Alzheimer's in humans by Dr. Orjan Hallberg (*“Alzheimers mortality---why does it increase so fast in sparsely populated areas?”*, Hallberg O, Johansson O, *Europ Biol Bioelectromag* 2005; 1:225-246). He says, ***“The conclusion of this paper was that in the Swedish countryside between 1997 and 2001, a dramatic increase in the rates of Alzheimer's Disease was in statistically significant correlation with the increase in use of cell phones in these areas. This is only a correlation, and there could certainly be other explanations for this apparent relationship. Nonetheless, these findings do not seem to suggest that Alzheimer's Disease was prevented by cell phone use in those areas.”***

Audio Interview with Scott Mendelson, MD, PhD

<http://electromagnetichealth.org/electromagnetic-health-blog/alzheimers-mouse-study-do-we-smell-a-rat/>

A recent study of mice exposed to cell phone radiation at the University of Athens (Fragopoulou et al., *Journal of Pathophysiology (in press)*) found deficits in consolidation and/or retrieval of the learned spatial information after a 2-hour dose of pulsed GSM 900MHz radiation from a commercially available mobile phone (actual mobile phone exposure not exposure via a generator). You can watch videos of the difficulty the mice had in the Morris Water Maze in this study after being exposed to the cell phone radiation. (Ever felt like this yourself after cell phone or Wi-Fi exposure?)

<http://electromagnetichealth.org/electromagnetic-health-blog/mice-exposed-to-cell-phone-radiation-exhibit-memory-deficits/>

See also the paper by Narayanan et al, 2010, “*Effect of radio-frequency electromagnetic radiation (RF-EMR) on passive avoidance behavior and hippocampal morphology in Wistar rats*”. This study, done in India, showed passive avoidance behavior was significantly affected and there were marked morphological changes in the hippocampus of mobile phone-exposed rats in comparison to the control rats.

IV. Have the Study’s Authors and Publicists Fairly Presented the Alzheimer’s Mouse Study?

Being conservative by nature, scientists are usually reluctant to take strong stands on the implications of their research. So it was stunning to read the statements by the authors of this study in the Press Release issued, such as the comments on the applicability of this research to humans with Alzheimer’s disease and also the talk of the ‘*benefits*’ of cell phone use in general.

Let’s look at exactly what was said (*highlights are mine*):

The University of South Florida’s Press Release began with the following extraordinarily misleading statement: **“The millions of people who spend hours every day on a cell phone, may have a new excuse for yakking.”** <http://hscweb3.hsc.usf.edu/health/now/?p=9618>

Here is a link to the web posting of the Press Release by the *Journal of Alzheimer’s Disease* (containing the same content as the University of South Florida Press Release), and below are some excerpts from it. *Note the repeated emphasis that exposures in this study were ‘cell phone exposures’.*

Press Release: <http://www.j-alz.com/press/2010/2010010e6.html>

Comments by the Study’s Authors in the Press Release:

“It surprised us to find that *cell phone exposure*, begun in early adulthood, protects the memory of mice otherwise destined to develop Alzheimer’s symptoms,” said lead author Gary Arendash, Ph.D., Research Professor at the Florida ADRC. “It was even more astonishing that the electromagnetic waves generated *by cell phones* actually reversed memory impairment in old Alzheimer’s mice.”

It was astonishing to read this. We have recently learned that Dr. Arendash is not an expert in RF and relied on others for technical help ‘in electromagnetic field design and implementation’ in this study, including a former employee of Ericsson who is acknowledged for his assistance in the study, though not named as an investigator.

“Since we selected electromagnetic parameters that were *identical to human cell phone use* and tested mice in a task closely analogous to a human memory test, we believe our findings *could have considerable relevance to humans*,” Arendash said.

“Our study provides evidence that *long-term cell phone use is not harmful to brain*,” Dr. Cao

said. “To the contrary, the electromagnetic waves emitted by cell phones could actually improve normal memory and be an effective therapy against memory impairment.”

This last statement by Dr. Cao, saying that long-term cell phone use is not harmful to the brain, ignoring all the evidence that cell phones can be very harmful to the brain, would indicate, at best, a substantial ignorance of the scientific literature.

As we have explained above, it was not a cell phone that was used in this study. There were vast differences from a cell phone, including being a far field not near field exposure, not including the magnetic fields of a phone, and, according to the protocol as described, not being modulated. Thus, to repeatedly state it was ‘cell phone exposure’ or say ‘we selected electromagnetic parameters that were identical to human cell phone use’ is very disturbing. To say, as Dr. Arendash has stated, ‘we believe our findings could have considerable relevance to humans’ seems egregious to many scientists who have reviewed the study.

The research study itself stated, “Care should be taken in extrapolating our results to cell phone use and EMF exposure in humans,” but in the PR, this message was omitted, and instead emphasized that the study relates to human cell phone use. Thus, hundreds of thousands of news postings subsequently misled the public into thinking they could prevent Alzheimer’s with long-term use of cell phones.

What is one to make of this? What do we do when a medical journal and a university disseminate such misleading information to the media? Maybe there has been an important discovery here for Alzheimer’s reversal in mice, but equating the exposure conditions to cell phone exposure seems to have served only the interest of the cell phone industry at the expense of public health.

Other Statements in the Press Release That Raise Eyebrows:

Here are some other excerpts from the Press Release further calling into question the possible motives of this study:

Questionable Statement:

“Previous human studies of electromagnetic waves from cell phones involved only brief exposures given to normal humans. While some studies reported small improvements in attention or memory (not enough to impact daily life), others reported no memory effects from short-term exposure.”

Please note this statement about earlier studies leaves out something very important: *studies that have shown memory and cognitive impairment from cell phone radiation!* There is no good excuse for this kind of oversight. The researchers evidently chose not to refer to the existence of studies showing memory deficits but to only mention those that had a beneficial or a neutral effect.

In a conversation recently with Lukas Margaritis, Ph.D., head of the Department of Cell Biology and Biophysics at University of Athens, one of the largest bioelectromagnetics labs in the world, he stated (referring to rat studies):

“All that have published so far have shown an (negative) effect on memory.”

Listen to interview with Dr. Margaritis and A.F. Fragopoulou of University of Athens
<http://snipr.com/ubg19>

Here is another **Questionable Statement** from the Press Release that raises eyebrows:

“The USF researchers began investigating the effects of cell phone use on Alzheimer’s disease several years ago, after several observational studies in humans linked a possible increased risk of Alzheimer’s with “low-frequency” electromagnetic exposure -- like the energy waves generated by power and telephone lines. However, cell phones emit “high-frequency” electromagnetic waves, which are very different because they can have beneficial effects on brain cell function, such as increasing brain cell activity, Arendash said.”

The way this is written could lead readers to think that since radiofrequency (RF) and Extremely Low Frequency (ELF) magnetic fields don’t fall into the same part of the electromagnetic spectrum, they don’t have the same kind of biological effects. As Henry Lai, Ph.D. pointed out in a presentation in San Francisco in 2008, *the biological effects of both ELF and RF have in fact been shown in research to be quite similar.*

According to Dr. Lai, biological effects that ELF and RF exposures have in common include:

- Genetic effects
- Cancer
- Cellular/molecular effects
- Electrophysiological effects
- Behavioral effects
- Nervous System effects
- Blood Brain Barrier effects
- Calcium effects
- Cardiovascular effects
- Warm sensations
- Hormonal effects
- Immunological effects
- Metabolic rate/effects
- Reproduction/growth effects
- Subjective symptoms

- Stress

And in fact, the *original* RAPID (Research and Public Information Dissemination) report by NIEHS showed that both tailors and dressmakers (ELF exposure) and ham radio operators (high frequency exposure) have a higher incidence of Alzheimer's disease.

It is unclear why in the first place the University of South Florida Press Release would include a discussion of magnetic fields in the context of an Alzheimer's study involving mice exposed to radiofrequency, *unless of course it served a purpose*. One purpose here may be to make people think RF radiation from cell phones is not as bad as ELF magnetic fields for those who have heard about deleterious effects from power lines or the earlier Alzheimer's studies. The truth is, however, *both* kinds of electromagnetic fields (RF and ELF-magnetic fields) have been shown to have negative biological effects as well as beneficial effects in different circumstances.

V. Cell Phone and Brain Tumor Discussion in a Press Release on Alzheimer's Disease in Mice?

The authors of the Alzheimer's study Press Release seem to have also gone out of their way to bring up the topic of cell phones and brain tumors. Here is what they said:

“There has been recent controversy about whether electromagnetic waves from cell phones cause brain cancer. Some researchers argue that the risk of glioma (40 percent of all brain tumors) doubles after 10 or more years of cell phone use. However, others argue that since the overall lifetime risk of developing a brain tumor of any type is less than 1 percent, any doubling of this risk would still be very low. Groups such as the World Health Organization, the American Cancer Society, and the National Institutes of Health, have all concluded that scientific evidence to date does not support any adverse health effects associated with the use of cell phones. Consistent with the view of these organizations, the researchers found no autopsy evidence of abnormal growth in brains of the Alzheimer's mice following many months of exposure to cell phone-level electromagnetic waves. They also found all major peripheral organs, such as the liver and lungs, to be normal.”

Here the Alzheimer's disease study Press Release attempts to discredit science showing a connection between cell phone use and brain tumors (Why is this in a Press Release about an Alzheimer's study, anyway?)

A report was issued in August called **“Cellphones and Brain Tumors: 15 Reasons for Concern, Science, Spin and the Truth Behind Interphone.”** It received media coverage around the world and showed clear evidence for a link between cell phones and many kinds of tumors. <http://www.radiationresearch.org/pdfs/15reasons.asp>

In addition, the above statement says there is a less than 1% lifetime risk of developing a brain tumor of any type, which Lloyd Morgan, B.Sc., an expert in brain tumor science, says is incorrect. He says, “At best, this is true only for malignant brain tumors. The great majority of brain tumors are non-malignant.”

Raising the subject of cell phones and brain tumors in the Press Release about the Alzheimer's study is more evidence there probably is a bigger public relations agenda going on here, as we also saw from the discussion of magnetic fields.

Industry funded research, going back to the 1990s, overseen by a formal U.S. government Interagency Working Group surveillance program, including representatives from all non-military government health agencies, the Cellular Telephone and Internet Association (CTIA), and directed by Dr. George Carlo, showed a statistically significant risk of brain cancer. And all of the Interphone studies released to date in many countries around the world (also to a large extent industry funded) have also shown an increased risk of brain tumors after 10 or more years of use. Here is a quote from Dr. Carlo about the Interagency Working Group project in the '90s. The project included representatives from the FCC, EPA, NIH, OSHA, etc. who evidently all knew about the results:

“We identified a statistically significant doubling in the risk of neuroepithelial brain tumors among those using cell phones 500 minutes per month, and a statistically significant dose-response for acoustic neuromas when those using cell phones for more than 6 years were included. Today, people use cell phones in the thousands of minutes per month range, many times the usage that produced the increased brain cancer risk in our original study.”

Lennart Hardell, MD's team in Sweden found significantly increased risk of brain tumors from 10 or more years of cell phone or cordless phone use; for every 100 hours of cell phone use, the risk of brain cancer increases by 5%; for every year of cell phone use, the risk of brain cancer increases by 11%; after 10 or more years of digital cell phone use, there was a 280% increased risk of brain cancer; for digital cell phone users who were teenagers or younger when they first started using a cell phone, there was a 420% increased risk of brain cancer.”

The point is there is a significant increased risk of brain tumors from cell phone use—not that the total cases are low, to which the Alzheimer's study Press Release draws our attention. The way the sentences are linked could have the effect of making people not be concerned about the brain tumor risk since the incidence is, currently, in their estimation, low.

The latency period for brain tumors from cell phone radiation exposure is thought to be several decades, and the fact that we are seeing statistically significant risk of brain tumors after only 10 years of use is of very great concern. According to Lloyd Morgan, B.Sc., only 10% of long-term smokers get lung-cancer. He says, “With 4 billion cell phone users today, if the risk of brain tumors from cellphone use is like the risk of lung cancer in smokers, there could be 400 million cell phone induced brain tumors.”

VI. Examining Industry Statements

Many EMF experts are also highly troubled by the following statement in the Press Release: ***“Groups such as the World Health Organization, the American Cancer Society, and the National Institutes of Health, have all concluded that scientific evidence to date does not support any adverse health effects associated with the use of cell phones.”***

A similar statement was made last fall by John Walls, vice president of public affairs for the CTIA, which represents cell phone makers in the U.S., in response to the report *Cellphones and*

Brain Tumors: 15 Reasons for Concern issued in August. He said, "peer-reviewed scientific evidence has overwhelmingly indicated that wireless devices do not pose a public health risk."

As was pointed out by *Citizens for Health* at that time in a discussion called 'Industry Spin' found at <http://www.citizens.org/?tag=electromagnetic-health>, *Citizens for Health's* Chairman, Jim Turner, Esq., said:

"In fact the authorities that CTIA relies on to say "wireless devices do not pose a public health risk" carefully hedge their statements and dodge the real issues raised by the "Cellphones and Brain Tumors" report: long term effects, especially in children. Every one of the expert agencies hedges its comments by indicating that they can make no statements about long term effects or effects in children since they have not been studied. Note that none of them states what CTIA attributes to them — that we know that cell phones pose no risk."

The truth is that what a lot of these organizations are basing their statements of safety on is the **false premise** that if the exposure conditions do not result in elevated temperature in living tissue there can be no biological effect. Because of this reason, guidelines around the world for EMF exposures are at least a thousand times more lenient than they would be if the disruptive 'non-thermal' biological effects were acknowledged. *The result is that agencies like those above have something on which to base their assurances of 'no harm'.* Since it has been in the best interest of affected industries, including the military, to not acknowledge there are biological effects that are noted far below current exposure guidelines, this view has prevailed for a very long time.

See the recent GQ Magazine article, "**Warning: Your Cell Phone May Be Hazardous to Your Health**" which reviews the history of government, military and industry suppression of the science showing non-thermal effects, dating back to 1975 and the work of Alan Frey.

<http://www.gq.com/cars-gear/gear-and-gadgets/201002/warning-cell-phone-radiation?currentPage=1>

And listen to an interview with the article's author, investigative journalist Chris Ketcham, at <http://electromagnetichealth.org/electromagnetic-health-blog/cell-phones-the-new-cigarettes-gq-thinks-so/>

Note that a report called the BioInitiative Report (www.bioinitiative.org) was released in 2007 contradicting the industry view that there are not effects below current exposure guidelines. The BioInitiative Report reviewed 2,000 studies showing biological effects at *non-thermal exposures*. The argument that there are not biological effects at non-thermal levels of exposure was dead in the water.

So, in the University of South Florida Alzheimer's study, it's not surprising to find biological effects at low power (SAR) levels, but it must be pointed out that the findings of biological effects at low SAR levels *where tissue heating was also found*, does not add up based on current scientific understanding.

It still remains to be seen whether there was any miscalculation of the SAR value, since the unexplained heating occurred, but until that mystery is resolved, for now we have to assume that biological effects did indeed occur at a low SAR value (0.25 W/kg). But note

that this low intensity exposure would not heretofore have been expected to create any biological effects, according to the party line of industry and industry-linked regulatory bodies.

VII. Industry’s Argument that Biological Effects Do Not Exist at SAR Exposures Heretofore Considered ‘Non-Thermal’ Can Thus *No Longer Be Used as a Justification for Lax EMF Exposure Guidelines!*

As has been mentioned, the CTIA and other bodies such as the FDA and FCC have held the position that there are only harmful effects of non-ionizing radiation at power levels capable of *heating*, not acknowledging biological effects at what are considered non-thermal, or low SAR levels of exposure, despite there being thousands of studies showing biological effect at non-thermal SAR levels. (“After the Vioxx scandal, where the FDA had prior knowledge that this drug caused heart attacks, does anyone believe that the FDA protects the public?”, asks one of the scientists.) Going back at least as far as 1975, the government and military has denied and tried to squash science finding biological effects at non-thermal levels of exposure.

Now, with the new Alzheimer’s study, the military as well as the telecommunications industry will have some answering to do. Regulators can now reasonably begin to question anew the adequacy of present exposure guidelines, currently concerned only with thermal effects.

Since it is still not explainable how heating could have occurred at a SAR of 0.25 W/kg in this study, or approximately *16x lower that the level known to create the same degree of heating*, some researchers caution to be skeptical of the unexplained heating effect, and to focus for now on the encouraging biological results for the mice with Alzheimer’s, which deserves further exploration. Some think the heating effect could be a red herring, or possibly ignorance in working with electromagnetic fields. So more understanding is needed.

It is interesting to note that the news of biological effects observed at a low SAR value has been disseminated wrapped in a story leading people to believe they can prevent Alzheimer’s by using a cell phone—deflecting perhaps, in an exciting story, from the true scientific significance of this news. We expect industry will face fallout from this acknowledgement, however, as governments around the world now have a basis to reasonably question ambient microwave radiation exposures, ultimately leading to stricter standards.

Martin Blank, Ph.D. of Columbia University remarked in a recent presentation at Columbia University Law School that current exposure guidelines which only consider the potential for thermal effects are too high by at least a thousand times.

[\(http://electromagnetichealth.org/electromagnetic-health-blog/columbia-university-law-school-wireless-hazards-panel/\)](http://electromagnetichealth.org/electromagnetic-health-blog/columbia-university-law-school-wireless-hazards-panel/)

VIII. EMF Benefit for Alzheimer's Patients or Not?

Scientists say we must proceed slowly and cautiously to attempt to replicate and better understand the University of South Florida Alzheimer's findings. If it turned out there were an unmodulated, background frequency that could help to process plaque away in the brains of Alzheimer's patients, as is suggested by this study, of course that would be wonderful, as long as the exposure did not have other harmful effects. The positive and negative effects, naturally, would need to be weighed against each other.

Harmful effects include the consequences from breach of the Blood Brain Barrier. In the short-term, some scientists say potential enhanced circulation to the brain from Blood Brain Barrier permeability (as reported by Leif Salford, MD and others) might be beneficial for Alzheimer's patients, but the end result might also mean brain tissue exposure to heavy metals and other toxins that could have serious long-term consequences. In addition, other health impacts of this form of radiation must be considered, including increased risk of brain cancer, salivary gland tumors, acoustic neuromas, eye cancers and other neurological disorders.

Given how this Alzheimer's research story has been handled, not only by the media but by the study's authors in the study itself, their statements to the press, and in the University of South Florida Press Release, *there may be a lot more beyond replicating the research that we need to get to the bottom of here, too!*

Logical Questions:

- Who are the PR people behind this and by whom are they funded?
- Of the \$380 million in research grants and contracts received by the University of South Florida last year, how much, if any, of these funds came from the telecommunications industry?
- Who funds the Florida Alzheimer's Disease Research Center (ADRC) at the University of South Florida?
- This research was said to have been conducted by researchers at universities in Japan and China, as well as at USF's Florida Alzheimer's Disease Research Center. How much of the research was done in Asia, under whose guidance and *who funds those universities?*
- Who funds investigator, Dr. Cao, the man who said ***“Our study provides evidence that long-term cell phone use is not harmful to brain”***?
- Were the researchers being advised by telecom industry or former telecom industry personnel?
- What was the role of Dr. Huseyin Arslan from the University of South Florida's Department of Electrical Engineering who was 'gratefully acknowledged' in the Alzheimer's study for his technical help? His biography indicates he is a former **Ericsson** employee, has been guest editor and Board Member of the **Wireless Communications and Mobile Computing Journal** and **Technical Program Co-Chair of the IEEE Wireless and Microwave Technology Conference**. Dr. Arslan is currently Faculty

Advisor to the **Wireless Communications & Signal Processing Group at University of South Florida** (<http://wvsp.eng.usf.edu/>).

- What was the role of Prof. Thomas M. Weller, Ph.D., **Director of the Center for Wireless and Microwave Information Systems**, Department of Electrical Engineering at the University of South Florida (<http://rfmicro.eng.usf.edu/index.html>). He was also ‘gratefully acknowledged’ for his technical help.

In the Journal of Alzheimer’s Disease *Disclosure Statement* all investigators declared ‘nothing to disclose’. But given how the news about this study was disseminated so very much supporting the interests of the telecommunications industry, further exploration of all telecom industry relationships with all parties and entities involved, and relationships with former telecom industry executives, is certainly in order.

In this study, two people with connections to the wireless telecommunications industry were technical advisors, but because they were not listed as co-investigators, no conflict of interest statements were necessary.

Jim Turner, Esq., Chairman of *Citizens for Health* (www.citizens.org) and Partner of Swankin & Turner in Washington, D.C. says, “We need to know where all the research that we rely on comes from and who may have been in a position to influence it.” Indeed, citizens need to insist that our laws support disclosure and transparency regarding corporate funding of scientific research, including access to complete corporate funding records at all public universities.

Unfortunately, in the case of this news story about Alzheimer’s and cell phones, the global news media lapped up the story without doing its homework. There are now over 775,000 internet citations when searching on ‘Alzheimer’s and cell phones’, and readers of much of this news coverage have been misinformed. Stories were riddled with misstatements about cell phone radiation preventing and curing Alzheimer’s, *which EMF experts say is not supported by the study*.

Lloyd Morgan, B.Sc. asks, “How is it possible that this study has gotten so much media attention? How is it possible that this study can make so many unsustainable claims about protection of humans from Alzheimer’s disease, when previous studies showing cell phones caused dementia in rats from real world cell phone radiation got little to no media notice?”

I’d suggest news editors carefully consider what happened in this case and make sure it doesn’t happen again.

Conclusion:

As Alzheimer’s expert Scott Mendelson, MD says, “Unless you are using your cell phone to call your doctor for a good check up or to buy a membership in a health club, that phone will NOT protect you from developing Alzheimer’s Disease.”

According to Andrew Goldsworthy, B.Sc., Ph.D., “It is perfectly possible that unmodulated microwaves could mitigate the effects of Alzheimer’s disease, but modulated microwaves are likely to do more harm than good. So now may not be the time to buy granny a mobile phone,

but we should nevertheless look more carefully at the effects of **unmodulated** radiation. It may really help, but we still need to proceed with great caution.”

Lloyd Morgan, B.Sc., lead author of “*Cell Phones and Brain Tumors: 15 Reasons for Concern*,” an expose on the design flaws in the brain tumor science, and a member of the Bioelectromagnetics Society, says: “Even if there were a frequency (ies) that could have the positive effects on amyloid plaque in the brain of Alzheimer’s patients found in this single study, this of course sets up an interesting dilemma: “Would people deliberately expose themselves to years of heavy duty EMF to stave off Alzheimer’s, but simultaneously enhance the risk of negative effects, such as cancer?”

Stan Hartman of Radsafe in Boulder, CO says:

“To conclude from this study that “cell phone exposure, begun in early adulthood, protects the memory of mice otherwise destined to develop Alzheimer’s symptoms” is leap enough (wouldn’t it be better to put an actual phone next to a rat’s head?), but to conclude, as Dr. Cao does, that “long-term cell phone use is not harmful to the [human] brain” and that “the electromagnetic waves emitted by cell phones could actually improve normal [human] memory and be an effective therapy against memory impairment” is getting into Eval Knieval territory.

“Maybe it’s true, but this one study, valuable and intriguing though it is, doesn’t illustrate that.”

Alasdair Philips, B.Sc.(Eng), DAge, of Powerwatch in the U.K. (<http://www.powerwatch.org.uk>), as well as a member of the UK Department of Health Stakeholder Group on ELF EMFs and the U.K. Health Protection Agency’s EMF Discussion Group, says, “It is completely unjustifiable and inexcusable to describe this as in any way resembling human exposure to electromagnetic fields from cell phone use... It is an untruth to state that it did. It is especially unworthy of the University of South Florida (which would have known better) and improper of the *Journal of Alzheimer’s Disease* to repeat it. It can only, in my opinion, be regarded as cell phone industry spin.”

So, when it comes to scientific research with ramifications for industries as large and as powerful as the telecommunications industry, we must certainly dig deep and question scientific methodologies and motives—and remember the old adage, “Don’t believe everything you hear!” Especially when scientists are promoting overly bold conclusions, we have to stop and acknowledge to ourselves if we smell a rat, instead of falling prey to the confusion being created and the cognitive dissonance that ensues.

For more information on *Deceptions in Science* in general, listen to my interview with Professor Magda Havas, Ph.D. on this topic at <http://electromagnetichealth.org/audio-archives-and-more/#havas>. In this interview, Dr. Havas describes ways scientific design, methods, conclusions and interpretation can be manipulated to serve a purpose.

End Note

It may well be that an important discovery has been made about the potential use of non-ionizing electromagnetic fields to treat Alzheimer's. This would not be a great surprise, however. EMF for healing is already used in many medical circles, for example for physical therapy, in hyperthermia, brain stimulation for addictions and beyond, and it also is widely used in the subset of alternative medicine called 'energy medicine'. Many investigators are exploring if infusing the body with electromagnetic energies of various kinds can create lasting transformation of cancer cells.

So, it is not at all implausible that electromagnetic fields of the right frequency, whether radiofrequency, or even ELF-magnetic fields, could also offer healing for Alzheimer's. *What is important, however, is that in exploring the healing potential of electromagnetic modalities we also understand the potential dangers, and then make informed decisions regarding use of these technologies based on the known pluses and minuses.*

One promising new potential treatment for a range of degenerative conditions was described in a study in Rejuvenation Research (Vol 11, Number 6, 2008) by Perez et al called, "*Engineered Repeated Electromagnetic Field Shock Therapy for Cellular Senescence and Age-Related Diseases*". The paper discusses applying beneficial electromagnetic field energy to the human body to stimulate the natural stress response and activate the repair and maintenance systems to delay cellular aging. It is expected that this new 'electromagnetic strategy' may have very exciting implications for human aging and disease, including in conditions such as Alzheimer's.

On the other hand, Dr. Sam Milham, MD has a new paper now in press (*Medical Hypothesis*), suggesting that patients with Lou Gehrig's disease (ALS) may develop it through exposure to electromagnetic fields applied to or induced in the body, such as with various kinds of conventional medical electromagnetic stimulation.

Understand there is no doubt there are *both positive and negative effects from electromagnetic fields*. One does not cancel the other, however. We need to ask questions about any electromagnetic field to which we choose to expose our bodies, whether through medical therapies, telecommunications devices or new utility technologies, and understand the possible benefits and the risks.

Just remember, we are electromagnetic beings. All biological systems in our bodies are regulated by our electrical system, and by its relationship to the natural world. Thus, it is best to live with as few unnatural, man-made electromagnetic fields as possible to create the least disruption to our internal communication systems. To the degree we knowingly expose ourselves to fields that have been shown in research to impact cellular and systemic functioning, we do this at our own peril.

And the blanketing of America in wireless radiation is undoubtedly a high-risk, society-wide biological experiment, in which we should consider minimizing our participation.

Please also understand that we have tremendous ability to *create our own energy* to bring balance and improve biological regulation in the face of these frequencies. Walking generates internal energy and can do much to support our health. Singing, breathing, expressing, connecting—all these things have positive physiological effects. Taking in the energy of the sun is profoundly

healing, as is being in nature. Proactively relaxing our bodies, after wireless radiation exposure, is increasingly important.

While taking these positive, rebalancing steps, please don't for a second think that using an every day cell phone is good for your brain! While it is clear there can be positive effects from electromagnetic radiation in certain circumstances, on balance, the existing scientific literature suggests cell phone use involves very significant risk.

Here's a quote from Paul J. Rosch, MD, Clinical Professor of Medicine and Psychiatry, New York Medical College and Emeritus Member, The Bioelectromagnetics Society, about wireless telecommunications radiation:

“This gigantic experiment on our children and grandchildren could result in massive damage to mind and body with the potential to produce a disaster of unprecedented proportions, unless proper precautions are immediately implemented. At the same time, we must acknowledge that novel electromagnetic therapies have been shown to benefit stress related disorders ranging from anxiety, depression and insomnia, to arthritis, migraine and tension headaches. As demonstrated in Bioelectromagnetic Medicine, they may also be much safer and more effective than drugs, so we need to avoid throwing the baby out with the bathwater.”

Camilla Rees, MBA, is co-author of “Public Health SOS: The Shadow Side of the Wireless Revolution” (<http://snipr.com/ubgpi>), co-author of the white paper “Cell Phones and Brain Tumors: 15 Reasons for Concern”, Founder of www.ElectromagneticHealth.org, Member of the International EMF Alliance and EMF Advisor to Citizens for Health, Mercola.com and FrankLipmanMD.com. She is also an Environmental Consultant, Patient Advocate, Integrative Care Counselor and Radio Host. Donations for EMF Advocacy may be made on a tax-deductible basis. Contact Camilla at info@electromagnetichealth.org if you are able to support EMF education for physicians, government, media and the public, or if you would be interested in sponsoring research in this field.



Much gratitude to the many experts who reviewed the University of South Florida's Alzheimer's mouse study and offered their time and attention to proof read and greatly improve this report, **“Alzheimer's Mouse Study—Do We Smell a Rat?”** Your contribution is greatly appreciated.

