

# Biological Effects of Mobile Phone Radiation

## Studied in New Ph.D. Thesis

*by Lennart Olofsson (translated from Swedish)*



Henrietta Nittby defended her thesis titled “Effects of Mobile Phone Radiation upon the Mammalian Brain.” The thesis has studied the effects of the electromagnetic radiation from GSM cell phones, to investigate:

1. To what extent albumin leaks into the brain, including days after the exposure.
2. To what extent long-term exposures affect human behavior, memory, nerve damage or accelerated aging.
3. To what extent genes are changed after exposure.

*Henrietta Nittby*

The doctoral dispute took place December 6, 2008 at the Department of Clinical Neurosurgery at the University Hospital in Lund, Sweden. Henrietta is a part of the research group headed by Professor Leif Salford. Her advisors were the three professors Leif Salford, Bengt Widegren and Bertil Persson.

### **Half of the world’s population uses cell phones**

Henrietta Nittby started her doctoral lecture by stating that about half of the world’s population today uses cell phones, which emit electromagnetic radiation in the form of microwaves. The question which must be asked is to what extent live organisms are affected by these radio frequency fields. How does it affect humans and other living organisms being irradiated like never before in the evolution of humanity?

### **Blood-brain barrier**

Cell phones are usually held close to the user’s head. This results in about half the energy emitted by the phone being absorbed by the brain. The mammal brain is normally protected against toxic substances in the blood by the blood-brain barrier, which is made up of cells. This barrier restricts compounds circulating in the blood

from reaching the brain, thus protecting the brain from potentially harmful compounds.

### **Increased leakage of albumin, reduced memory function, genetic changes**

Henrietta Nittby has shown in her research that:

- Rats exposed to GSM 915 MHz cell phone radiation for two hours, at four different intensities, had increased leakage of albumin across the blood-brain barrier seven days after the exposure.
- Rats exposed to GSM cell phone radiation for two hours a week, for 55 weeks, showed decreased memory function.
- Rats briefly exposed to cell phone radiation showed genetic changes in the cerebral cortex and hippocampus of the brain. Not in the individual genes, but in functional groups of genes, most of which are associated with the functioning of cell membranes.

The studied effects are all from low-level exposures to microwave radiation. The effects are in all cases non-thermal. Most remarkable was that the lowest level of irradiation resulted in the largest leakage of albumin.

### **Do these results apply to the human brain?**

To translate from the rat brain to the human brain is not simple and obvious. Differences in shape and size could result in different patterns of absorption of EMF radiation. Even if the brains were anatomically similar between mammal species, different parts of the brain may serve different functions. The discovery of a leaking blood-brain barrier, reduced memory function and genetic changes in rats does therefore not necessarily mean the same response in humans.

If microwave exposures of the human body include a possible risk, then this is a major issue for society. Epidemiological studies will first answer this question in another decade or two. Laboratory experiments are therefore extremely important to quantify the effects of EMF exposures, and to try to understand the underlying mechanisms.

A large number of studies have been conducted around electromagnetic effects on the brain, with an unclear picture. While some studies show a clear effect concerning increased risk of brain cancer, genetic changes, changes in the EEG pattern, changed memory function and changed levels of neurotransmitters, other studies show no significant changes at all.

In this case, it is important to remember that demonstrated effects cannot be ignored, despite some studies showing none. According to the Rio Declaration, the Precautionary Principle applies. Where there is a threat of serious irreversible damages, no lack of full scientific proof should be used to delay effective safeguards to prevent damage.

### **Dr. Henry Lai was opponent**

The opponent was Professor Henry Lai, University of Washington, Seattle, USA. He took a look back in his opening speech and observed that knowledge of the health effects of electromagnetic radiation have been known for quite awhile. Neighbors to powerful radio transmitters have turned out to have higher risk of certain types of cancer. As an example, he mentioned that people in a town in Massachusetts have the highest incidence of breast cancer in the entire USA. The town is right under the strongest FM transmitter on the eastern seaboard of the US.

Regarding cell phones, he reminded us that 80% of the energy emitted by a cell phone hits the body during a call. Most of this energy hits the head. He suggested that cell phone users should hold the phone away from their head. He said that he didn't own a cell phone himself, and probably was the only one present without one.

### **Inconsistent research explained**

Dr. Lai visited the question of why different researchers arrive at different conclusions in the question of cell phone radiation health effects. He referenced a study on the relationship between the scientific findings and who financed the study. Looking through a total of 326 articles on biological effects from cell phone radiation, 181 stated there were effects, while 145 stated there were none. When looking into who paid for the studies, it showed that 72% of the studies financed by the industry showed no health effects. Meanwhile, only 33% of the independently financed studies showed no health effects, while 67% of them showed there were.

A similar article is published in *Microwave News* (vol. XXVI, No. 4, July 2006), where the authors looked at studies on microwave's effect on DNA. The conclusion is that one's trust in a particular study should be influenced by who or whom paid for it.

In his closing statement, Dr. Lai went into the work conducted by Leif Salford and Bertil Persson. The pioneering work of the Salford group on cell phone radiation's effects on the blood-brain barrier has now been confirmed by about thirty studies.

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