AUVA REPORT:

Nonthermal Effects Confirmed; Exposure Limits Challenged; Precaution Demanded.

Edition July 21, 2009

Austrian AUVA Insurance Company Presents Research Report and DVD on Health Risks from Cell Phone Radiation

All across Europe the debate on exposure limits has flared up; insurance companies do not insure cell phone providers because of the incalculable health risks. The **Austrian Social Insurance for Occupational Risks AUVA** (Allgemeine Unfallversicherungsanstalt) commissioned the **Vienna Medical University** to carry out its own research projects, focusing on **effects of cell phone radiation on the brain, immune system, and proteins**. The title itself ***Investigation of Nonthermal Effects of Electromagnetic Radiation in the Cell Phone Frequency Range (ATHEM)*** indicates that: AUVA runs in direct opposition to the representatives of the "thermal paradigm," radiation protection agencies of the various governments as well as the ICNIRP (International Commission on Non-ionizing Radiation Protection), all of which deny there are effects that are not caused by heating (nonthermal effects). Ultimately, the results of the report confirm long-known health risks associated with cell phone technologies. With several quotes from the AUVA report, the results are summarized below.

1. The Significance of the AUVA Report

"The launch and widespread use of cell phones has introduced a new type of exposure. **Never before did large groups of the population hold an RF transmitter to their head.** Issues about health risks have made the headlines because the evaluation of current scientific data leave many questions unanswered. To this day, the conclusions of risk assessments concerning the effects after low-level exposures to RF/EMF radiation **(possible nonthermal effects)** are, at times, rather contradictory (editor's note: RF/EMF=radiofrequency radiation / electromagnetic fields). (...)

The research project ATHEM, therefore, has been aimed at studying the **burning issue** of potential interactions between RF/EMF and biology. (p. 7) (...) The significance of the experimental investigations also lies in the fact that the demonstrated effects, which do not necessarily have disease relevance (e.g. EEG changes), should not even have occurred, according to the strictly thermal interaction mechanism that would have been covered by current exposure guidelines." (p. 8)

2. Main Results

The AUVA studies have verified that:
Electromagnetic fields from cell phone radiation have an impact on the

- **Central Nervous System (brain)**
- **Immune System**
- **Protein Syntheses** [2]

"Beyond that, the significance of the results also lies in the fact that the effects should not even have occurred when assuming exclusively thermal effects, which current exposure guidelines are based on. **Thus, these effects are further evidence for the existence of nonthermal effects."** (p. 168, see also p. 62)

In plain English: Exposure guidelines, therefore, are generally called into question because they are based on thermal effects only.

Current exposure guidelines do not consider the biological processes which already respond to electromagnetic field levels below the critical heating threshold. As a result, the guidelines do not provide protection.
The AUVA Report is a slap in the face for the German Radiation Protection Commission and the ICNIRP, which in the interests of industry deny the existence of nonthermal effects and stick to the thermal paradigm [3]. **The ATHEM report by the AUVA confirms: Cell phone radiation has adverse impacts on health.**

Prof. Wilhelm Mosgöller (image), coordinator: **"We have observed that cells are subjected to stress [1] when exposed to this type of radiation for hours."** (DVD)
"The radiation-induced effects observed, however, were not always dosage-dependent as would be expected from thermal effects. Some cells showed an even stronger response when the 5-minute exposure was followed by a 10-minute break (intermittent exposure). This would also support a nonthermal effect mechanism. The project results, therefore, serve as a further confirmation of the existence of so-called nonthermal effects." (p.169)

Meaning and Significance of the Results

"The results are meaningful for several reasons. Measured against international research activities, the results provide an **up-to-date contribution to the international scientific debate**. The cell investigations, for example, are **groundbreaking** insofar as **they could solve existing inconsistencies in scientific reports** and describe cell responses to RF/EMF exposures in much more detail than previously possible." (p. 167)

3. Impacts on the Brain

During the investigations of healthy human subjects, effects of GSM-900 and UMTS fields were studied under double-blind conditions whereby exposure levels were below current exposure guidelines at all times.

"During and after the actual exposure, certain brain waves (the so-called EEG alpha band, 8-13 Hz) changed. Some of the changes were statistically significant. And some CNS responses to acoustic and optical stimuli (so-called evoked potentials) me-

diated by brain waves remained significantly changed even ca. 30 minutes after the exposure." (p. 62)

Subtle Nonthermal Responses of the Central Nervous System (CNS)

"Some of the exposure effects were comparable with earlier studies and some of them were confirmed. In addition, new important effects were observed that may help clarify the effect mechanism of low-level RF radiation exposures on the central nervous system. The following observations were made:

- In line with previous investigations, changes **in the EEG spectrum** were found, whereby the power increased especially in the alpha band.
- During the experiments, however, EEG changes were also seen in other frequency bands.
- It is important to note here that the increase in the alpha band power already set in during the first five minutes of exposure and
- Remained unchanged for over 50 minutes thereafter (editor's note: after exposure stop). These changes were **more pronounced with UMTS** than with GSM signals.

Since the EEG changes also occurred in higher frequency bands (desynchronized activity), which in the case of **UMTS exposures were even statistically significant**, one can hardly speak of a reduction in central activation. This is also emphasized by the **faster response times** during exposure, which, however, seem to occur **at the expense of the quality of the response** because wrong responses, in particular, were given within shorter time periods." (p. 92)

"The investigation shows that **subtle CNS responses** to exposure to low-level microwave radiation, as generated by cell phone technologies, are possible. However, it is impossible to draw conclusions regarding the health impact or cognitive disturbances from the present results alone.

Without any doubt, the **results represent biological effects that cannot be caused by thermal mechanisms** because the temperature increase is proportional to the specific absorption rate (SAR), and in these experiments the temperature increase was so small that it was balanced out by thermoregulation. Furthermore, since the effects occurred mostly independent of whether the respective side of the head was exposed or not (effects occurred on the exposed as well as non-exposed side), a purely thermal effect mechanism may be excluded." (p. 93)

4. Impacts on Protein Syntheses

Objective

"From a physics point of view, potential nonthermal effects of electromagnetic fields are incapable of directly damaging proteins through radical formation (e.g. from radioactive radiation) because the inherent amount of energy is insufficient. However, hydrogen-oxygen bonds can be made to resonate. This mechanism is utilized for heating water-containing foods with microwaves that, physically speaking, are rather similar. Hydrogen-oxygen bonds contribute significantly to the so-called hydrogen-bond bridges, which are essential for the maintenance of the three-dimensional structure of proteins. Theoretically, it would therefore be possible that the structure and thus the function of proteins

may become impaired by disturbances of their three-dimensional structure through nonthermal effects of electromagnetic fields. Analyzing proteins, therefore, seems to be quite an effective way of studying possible biological effects in cells." (p. 118) [4]

Replication of the Study by the Finnish Radiation and Nuclear Safety Authority

"There is a study by Nylund und Leszczynski (2004) from the Bio-NIR Research Group of STUK (Radiation and Nuclear Safety Authority) in Helsinki, Finland, which compares quite well with our own study. In this Finnish study, the human cell line EA.hy926 was exposed to cell phone radiation, detecting the impact on protein expression… With a sensitive but not quantifiable detection method, silver staining, 38 proteins were found to have changed expression levels. Two of the significantly changed protein levels occurred in cytoskeleton proteins (editor's note: proteins that form the supporting tissue of a cell), **suggesting that cell phone radiation may have a great impact on important intracellular processes."** (p. 118)

Results of Protein Changes Caused by Cell Phone Radiation Replicated

"In the experiments with proteome analysis, some of the same cells (connective tissue cells and lymphocytes) were used that had already been used in previous studies on DNA damage. [5]
The assumption that there are sensitive and insensitive cells could be confirmed. In connective tissue cells, radiation-induced effects could be shown, which did not occur as clearly in lymphocytes. In contrast to previous studies, we not only investigated the amount of proteins in a cell but also the activity of protein formation (synthesis) during exposure. **For the first time, it was shown that cell phone radiation exposure causes a notable change in protein synthesis profiles.** At a SAR of 2 W/kg, the demonstrated effects are **reproducible** and **statistically highly significant, but they start to show at SAR levels as low as 0.1 W/kg**. The activation of the protein synthesis is measurable ca. 4 hours after the exposure starts. Since the heating of the testing set-up was kept at a constant temperature, which was monitored, and no detectable temperature changes occurred during this time period, this also excludes a thermal effect… The increased rate of synthesis returns to normal levels within 2 hours of when exposure stops. Again, a dynamic which can hardly be explained by "thermal" effects." (p. 168.)

Prof. Christopher Gerner (image)**:** "Only when we started focusing on protein synthesis—in contrast to the amount of proteins—could we demonstrate statistically significant effects of cell phone radiation. The main effect we have seen showed that, in general, the protein synthesis activity of cells increased tremendously. It appears that cells do notice that some proteins lose their function and that this loss of function, therefore, must be compensated for by the synthesis of new proteins."
DVD Commentary: "As a result, cells experience stress."

Studies on the Sustainability of the Observed Effects

"The effects observed from the exposure to cell phone radiation (GSM & UMTS) show a significantly increased protein synthesis activity in exposed cells after eight hours. (...)

The here presented findings demonstrate very clearly that, after a sufficiently long exposure period (8 h) to cell phone radiation (GSM and UMTS), some

cultured cells show biological responses. With eight hours of exposure, the effect occurs reliably in reactive cell types—so long as the cells are provided with a 10-minute break after every 5 minutes of exposure during the entire exposure period; thus the cells will have been exposed to the radiation only for about one third of the time." (p. 136)

Statements about the Effect Mechanism

"Based on the fact of an increased protein synthesis, the following mechanism seems plausible at this time: Due to the radiation exposure, resonance oscillations are excited in oxygen-hydrogen bonds, which, in general, are also responsible for heating with microwaves. With their complex three-dimensional structures, proteins are mainly stabilized, among other things, by so-called hydrogen-bond bridges. Thus resonance (in the widest sense of the term) could destabilize the three-dimensional structure through a weakening of the respective bonds. As a result, temporary denaturation and proteasomal breakdown of proteins may occur, which would explain the observation of a compensatory increase in protein synthesis rates." (p. 137)

Health-Related Consequences

"Possible health risks that may be a consequence of these results cannot be assessed adequately at this point. According to the available findings, it is a temporary effect, which cannot be detected anymore two hours after the exposure stops. However, in cases of diseases and pathophysiological conditions, it seems certainly conceivable that symptoms may worsen through the increased protein synthesis as it was observed during cell phone radiation exposures. Various neurodegenerative disorders are triggered, among other things, because nerve cells show a relatively high rate of protein synthesis, which the protein transport and distribution systems of the cell cannot handle anymore. The observed cell degenerations in neurodegenerative disorders are, for the most part, attributed to this mechanism. Under these circumstances, a further increase in the rates of protein synthesis in sensitive nerve cells may seem detrimental to human health." (p.137)

Clear, Reproducible Biological Effects and Clarification of Previous Contradictory Findings

"With the application of highly sensitive testing methods, it was possible to find clearly reproducible biological effects of cell phone radiation in cultured cells. **A groundbreaking finding of this project is that cell phone radiation exposure leads to an increased formation of new proteins (e.g. stress proteins as a sign of cell stress, etc.) in reactive cells.**

Up until now, international research on cell phone radiation has investigated the amount of proteins in different cells—with seemingly contradictory results. Now we can show that there are resistant and sensitive cells, which may explain the previous apparent contradictions. **Interestingly enough, the same cells that showed increased rates of DNA breakage under exposure conditions were also the ones that appeared strongly affected in proteome analyses** (editor's note: detection of all proteins present in a cell). Those cells that did not appear to be reactive in studies on DNA breakage also showed hardly any changes or none at all in protein synthesis. These findings confirm the assumption that there are sensitive and robust cells. Thus the **results are groundbreaking for the interpretation of past—seemingly contradictory—findings and future ones**." (p.137)

Possibility of DNA Breakage under Exposure Conditions

"The observed pattern of a generally increased protein synthesis indicates an exposure-dependent protein inactivation. This would also explain why in metabolically active cells naturally occurring DNA breaks—caused by free radicals—are not sufficiently repaired anymore, resulting in increased DNA breaks in cells that are exposed." (p. 138; editor's note: In addition, electromagnetic exposures provoke the formation of the free radical nitric oxide, resulting in an increased rate of DNA damage.)

DVD Commentary: "This is about breaks in genes and chromosomes, about the damage to the genetic blueprint. And these are the breaks that can also be caused by certain chemicals and the UV portion of sunlight."

Prof. Hugo W. Rüdiger (image): "Chromosomes are much larger units, they contain hundreds or thousands of genes; such a break is a genetic disaster for the cell because it can hardly be reconciled with the survival of the cell. The cell, therefore, tries to make repairs. When doing repairs, the cell indeed survives but at the price of errors, so-called mutations, creeping in. And these mutations are lasting changes, which, in turn, also bear the risk of cancer." (DVD)

Special Importance for Children and Youth

"One of the observations showed that, among the different cells, those respond particularly strongly, which are metabolically active (editor's note: anabolic and catabolic process during metabolism). **This cell property is especially pronounced in growing tissues, that is, in children and youth. Consequently, these population groups would be more susceptible than average to the described effects."** (p.138)

Confirmation of Thermal Effects

"The radiation-induced effects observed, however, were not always dosage-dependent as would be expected from thermal effects. Some cells showed an even stronger response when the 5-minute exposure was followed by a 10-minute break (intermittent exposure). This would also support a nonthermal effect mechanism. **The project results, therefore, serve as a further confirmation of the existence of so-called nonthermal effects.**" (p. 169)

5. Preventive Measures and Cell Phone Use

"Any person, of course, can learn important lessons from these results. The findings of the study show that a cell phone user can minimize the potential risks through a prudent use of this technology." (p.169)

- Selection of a Cell Phone with Speakerphone: Thus the cell phone need not be held against the ear. The radiation level greatly decreases with the increasing distance to the cell phone. With most modern cell phones, it is possible to keep approximately 2 meters distance (and more) between hand and ear and still have a good call quality.

- Selection of a Cell Phone with Low SAR and Low *connect*-Radiation Factor: Prior to any purchase, one can research a cell phone's emission levels at the Internet. In addition to the SAR value in W/kg (specific absorption rate), the so-called *connect*-radiation factor is also of interest. The latter was developed by the *connect* laboratory, which considers radiation fluctuations and peaks during reception and thus also includes the effective power output. If in doubt, users should base their decision more on the *connect*-radiation factor. General information can be found at the web site of the German Federal Agency for Radiation Protection www.bfs.de/elektro/oekolabel.html or the Swiss Federal Office of Public Health www.bag.admin.ch/themen/strahlung/00053/index.html?lang=en, or at the link www.handywerte.de, where the emission properties of numerous cell phones are listed.

- In standby mode, put a cell phone in a separate purse and do not carry it close to your body, especially when in motion (e.g. train or car).

- In the car, use speakerphone function, headset, or Bluetooth. Better yet, use a hands-free kit with external antenna. Using a cell phone inside a car without an external antenna can increase the exposure considerably (in comparison to settings outside a car).

- Do not use a cell phone when reception is poor (in basements or elevators). In such a situation, the cell phone must increase its power output in order to establish or maintain the connection to the base station.

- No Hour-Long Phone Calls: Internationally published studies and the ATHEM results have shown that, after 2 to 4 hours of exposure, sensitive cells begin responding with changes in the DNA and rate of protein synthesis (…); and after 8 hours, this effect occurs for certain.

- Since the impact on protein synthesis (cell stress) is no longer detectable only 2 hours after the exposure stops, it seems prudent to have breaks without exposure.

6. The Downplaying Continues

In spite of all the reports such as the AUVA report that confirm adverse health effects, the downplaying of exposure limits by the cell phone industry grows ever more irresponsible. The denial of effects continues and exposure limits are carved in stone. Thus, a IZMF press release (PR head office of the German cell phone industry) from July 20, 2009 reads: "Physicians need up-to-date and science-based expert knowledge in order to appropriately treat patients who ascribe their symptoms to the impact of electromagnetic fields from cell phone radiation," says Dr. Matthias Otto from the allegedly charitable Kinderumwelt GmbH. "Current exposure limits are set well below the biological effect threshold and, as a result, also provide sufficient protection for children, pregnant women, and other especially susceptible persons—according to our current state of knowledge."

This claim, however, contradicts the statement of the German Radiation Protection Commission (SSK): "Regarding the potential risks of cell phone radiation on children and youth, no scientific studies are available to date." (SSK, position paper "Cell Phone Radiation and Children," p. 6)

The ICNIRP concedes that exposure limits only protect from "short-term, acute health impacts" caused by "increased temperatures in tissue" (Guidelines, p.

48) and that nonthermal biological effects are not taken into account.

In its response on January 4, 2002 to the parliamentary inquiry submitted by the CDU/CSU (parliamentary bulletin 14/7958), the Federal Government of Germany has explicitly confirmed the lack of a precautionary component: “When the current exposure limits, which form the basis of the siting license, were established, the precautionary principle had not been considered.” (p.18, see also p.14)

At the presentation of the German Mobile Phone Research Programme (2008), German Environment Minister Sigmar Gabriel admitted that there is still a need for research and clarification regarding respective effects in children. The German branch of the Friends of the Earth (Bund für Umwelt und Naturschutz BUND) made a fitting comment on this behavior: “To respond to a ‘need for clarification’ with the continuation of large-scale population testing demonstrates an utter lack of respect for or sense of responsibility towards fundamental rights.” [7]

Cell phone radiation is labeled safe even though 70% of the around 1,500 studies on health-related effects of RF radiation available to date found significant effects.

7. Conclusion

The Austrian Ministry of Health responded promptly to the results of the ATHEM Report with a flyer on “Cell Phone Rules” and an appeal to parents: **“These recommendations are especially important for children. Dear parents, talk with your children about them!”**

This action is a positive step, and ultimately an **admission of the risk which is associated with cell phone technologies.** Stepping away from downplaying the risk is also urgently needed in Germany, Switzerland, and other European countries.

But then the Report also provides other current political initiatives a broader basis for a potential success, for example, the **parliamentary initiative** regarding lower exposure guidelines and efficient precautionary measures that is **spearheaded by the Member of the Swiss National Council Christian van Singer and signed by 55 other members of the National Council** [8]. The ever-growing frontline of citizens, who combine forces in such organizations as Diagnose-Funk or the Competence Initiative e.V. and others, make every effort to contribute to public health solutions with their awareness campaigns across all levels of the population.

With the ATHEM Report, the BioInitiative Report, and hundreds of individual scientific studies, there is a wealth of evidence about the health risks associated with this technology, so it is not a question of insufficient evidence anymore. **This is now about the conflict between commercial interests of an industry supported by the government and the protection of public health.** The BUND warns:

“The ubiquitous exposure to this unnatural type of radiation at unprecedented levels of power density harms human health. Short-term and long-term health impairments are preprogrammed and will especially manifest in the next generation if politically responsible actions are not taken immediately.” [9]

Your **diagnose-funk** Editor Team

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References

[1] A comprehensive discussion on the health impact of cell stress can be found in the new brochure: “Zellen im Strahlenstress”, 2009. Oxidative cell stress occurs when antioxidative processes are unable to neutralize an increased level of free radicals (e.g. nitric oxide or hydrogen peroxide), thereby shifting the balance toward oxidation. As a result, cells can become damaged in various ways, e.g. oxidation of unsaturated fatty acids, proteins, and DNA.

[2] Protein Biosynthesis: Synthesis of proteins in an organism; a process, in which individual amino acids are attached via peptide bonds to form a protein (translation). The specific sequence of the amino acids is dictated by the nucleotide sequence of the DNA. The mRNA that is created during the transcription when nucleobases are paired along the DNA strand takes the message of this sequence to the ribosomes, the place of protein biosynthesis.

[3] In the glossary of the emf-portal, the German Federal Government still takes the following view regarding nonthermal effects: “Die Wirkung elektromagnetischer Energie, die nicht auf Erwärmung des Gewebes zurückgeführt werden kann. Bei niederfrequenten elektromagnetischen Feldern unterhalb von 1 MHz können Stimulationseffekte an Nerven, Muskeln, Neuronen und Sinnesrezeptoren auftreten. Oberhalb von 1 MHz konnten bisher nur thermische Wirkungen nachgewiesen werden. [Effects of electromagnetic energy that cannot be ascribed to the heating of tissue. In the case of ELF electromagnetic fields below 1 MHz, stimulatory effects in nerves, muscles, neurons, and sensory receptors can occur. Above 1 MHz, only thermal effects could be demonstrated to date.]“ (22 July 2009)

[4] See also: Zimmer, Guido: Habe Mut, dich deines eigenen Verstandes zu bedienen, in: Bleuel, Heike: Generation Handy...grenzenlos im Netz verführt, 2008. „Zellen im Strahlenstress“, author team Stuttgart West, 2009, chapter 6: EMF frisst Energie

[5] Diem, et al., Mutation Research, 583, 178-183, (2005); REFLEX, European Union Project QLK4-CT-1999-01574, http://www.verum-foundation.de, (2004); Schwarz et al., Int. Arch. Occup. Environ. Health 81:755-767, (2008).

[6] http://www.diagnose-funk.org/gesundheit/bioinitiative/index.html or www.bioinitiative.org

[7] Für zukunftsfähige Funktechnologien. Begründung und Forderungen zur Begrenzung der Gefahren und Risiken durch hochfrequente elektromagnetische Felder. Ed. by BUND Bundesvorstand, 2008

[8] http://www.parlament.ch/d/suche/seiten/geschaefte.aspx?gesch_id=20090438

[9] Für zukunftsfähige Funktechnologien. Begründung und Forderungen zur Begrenzung der Gefahren und Risiken durch hochfrequente elektromagnetische Felder. Ed. by BUND Bundesvorstand, 2008

AUVA Report
“Untersuchung athermischer Wirkungen elektromagnetischer Felder im Mobilfunkbereich”
In German only

http://www.auva.at/mediaDB/555261_R47.pdf

Athermische Wirkungen elektromagnetischer Felder (DVD, 14 Min.)
In German only

Easy-to-understand introduction to the research results of the ATHEM Study and recommendations on how to use cell phones

www.filmservice.at. Filmnummer: 113229
http://www.filmservice.at/katalog/katalog.aspx?SNR=1

Zellen im Strahlenstress.
In German only

Cells under Radiation Stress.
Why Cell Phone Radiation Makes You Sick.
Highlights of international cell phone radiation research.
Author Team Stuttgart-West, 52 pages, color,
20 images and graphs, May 2009.
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From Subtle Fraud to Scientific Crime

About the Contents:

- Political framework
- Current state of research
- Known effect mechanisms of cell impairments
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