Workshop

"SUBTLE THERMAL EFFECTS OF RF-FIELDS *IN VITRO* AND *IN VIVO*"

Program

Organized by

COST 281

FORSCHUNGSGEMEINSCHAFT FUNK E.V.

STATE MINISTRY OF ENVIRONMENT AND TRANSPORT, BADEN-WÜRTTEMBERG

AIM OF THE WORKSHOP

The question whether there exist "non-thermal" effects of weak RF-fields still remains controversial. There are a number of publications claiming to have found "non-thermal" effects in experiments with cells, as well as with animals or human volunteers. These authors call an effect "non-thermal", if irradiation intensity in the experiment is so low that changes in temperature are unlikely to occur physically or if no significant change in temperature has been measured in the body or in the experimental vessel during exposure. But how accurate could temperature be controlled in fact during experiments? At best, the accuracy of measurements is given as ±0.1 K. In some cases, the assumption of temperature constants during irradiation is based on calculations. Only to a limited extent those calculations can take into account the dielectric inhomogenity and processes of heat transport on a microscopic level.

What do we know today about thermoreceptors and their physiological interactions in cells, humans and animals? What does "non significant temperature change" in this context really mean? Specialized thermoreceptors in some animals respond to temperature elevations of some hundredths or some thousandths of a degree. Over the past years a number of detailed investigations provided new insight into the molecular mechanisms of thermosensation. Thermosensitive molecules were found not only in specialized nerve cells but also in a large variety of different cells, including keratinocytes of the skin. There are thermosensitive "riboswitches" in cytoplasm, controlling RNA-activities, and therefore specific processes of protein expression. Thermosensitive transport proteins in membranes are able to induce various cellular signal pathways. Interestingly, the mechanism of thermosensation of these proteins consists in "melting" of specialized helical components, occurring only inside a narrow temperature window of several degrees, typical for each of these protein.

Such data induced a number of new insights and rises new questions. What does "molecular temperature" mean? What are the ways of information processing starting from a thermosensitive molecule up to the hypothalamus? What kinds of physiological reactions are triggered on this pathway by possibly small and local changes of the temperature? How does this correspond with temperature elevations in the skin, the ear, and the brain while using a mobile phone? Are there differences in the response to CW fields as compared to pulsed fields? Shouldn't the problem of "microdosimetry" be discussed again by taking into account all those new findings?

The aim of this workshop is to bring together specialists of the fields mentioned and to focus the attention of RF-EMF-researchers to the mentioned new subjects. Biological,

physiological and health significance of the reported "subtle thermal effects" will be reviewed in the workshop.

PROGRAM AND TOPICS OF THE WORKSHOP

1. Thermoregulation: molecular and physiological aspects

(Thermoreception by specific transport proteins; molecular aspects of HSP-expression and phospholipid-adaptation; thermoreceptors in animals; peripheral thermoreceptors and neuronal aspects of thermoregulation in humans.)

2. Subtle thermal effects of in-vitro experiments with RF-fields

(Summary of MMF/FGF mechanism program findings; Feasibility and limitations of temperature measurement in *in-vitro* experiments and micro-dosimetric calculations; "temperature" in dimensions of biomacromolecules: what does this mean? dielectric heterogeneity and possible differences in heat generation on cellular level)

3. Possibility of generation of subtle thermal effects in RF-experiments with animals and human volunteers

(Heat generation by RF-fields and metabolic energy dissipation in animals and humans; Temperature-versus SAR-profiles in human head during use of a mobile phone.)

4. General discussion:

(Are effects of low-level RF-exposure in cells, animals, and humans in fact subtle-thermal? Are there differences in the stationary temperature profile or in the time course of temperature variation between continuous and pulsed fields? Are there dose-parameters which reflect biological effects better than SAR? What is the health significance of the reported "subtle thermal effects" based on the current scientific knowledge?)

CHARACTER OF THE WORKSHOP

The workshop foresees presentations of invited speakers representing research groups that played a significant role in research performed in the corresponding fields. Additionally, a limited number of presentations will be selected from submitted abstracts by a scientific committee. An especial aim of the workshop is to bring together specialists working purely on molecular processes of thermoreception and thermoregulation with those doing RF-EMF research. The workshop will provide enough time for discussion. A report from the workshop summarizing results of presentations and discussions will be prepared and published.

SCHEDULE

(may be subject to on-site changes)

Monday, November 21st

09:00 Welcome by the Organizers

09:05 Introduction to the Workshop by Roland Glaser

"THERMOREGULAION: MOLECULAR & PHYSIOLOGICAL ASPECTS"

Chair: Alexander Lerchl, Rapporteur: Maren Fedrowitz

09:15 Thermoregulatory Mechanisms in Humans
Peter Wust

09:45 Discussion

10:00 Thermal and photomechanic infrared receptors in fire-seeking beetles
Helmut Schmitz

10:30 Discussion

10:45 ***Coffee-Break***

11:15 Temperature Dependence of Ion Channels, Membranes, Cells and CNS Tissue
Wolfgang Hanke

11:45 Discussion

12:00 Thermosensor control in the DnaK chaperone system
Philipp Christen

12:30 Discussion

12:45 ***Lunch***

14:00 Discussion on Thermoregulation

"SUBTLE THERMAL EFFECTS OF IN VITRO *EXPERIMENTS WITH RF-FIELDS"*

Chair: Roland Glaser, Rapporteur: Margarita Simeonova

15:00 Requirements, Dosimetry and Performance Comparison of different Setups, for the Exposure of Cells at 900 and 1800 MHz used in current Studies
Jürg Fröhlich

15:30 Discussion

15:45 Dielectric Properties of Cell Membrane Molescules and their Influence on the Subcellular RF-Field-Distribution
Jan Gimsa

16:15 Discussion

16:30 ***Coffee-Break***

17:00 More Heat than Light: The Difficulty of separating Subtle Effects of Microwaves from Subtle Thermal Artifacts
Kenneth R. Foster

17:30 Discussion

18:00 ***Social Event and Dinner***

Tuesday, November 22nd

Chair: Ken Foster, Rapporteur: Margarita Simeonova

09:00 Microwave SAR at the DNA-scale
Jaques Vanderstraeten

09:30 Discussion

09:45 »Subtle thermal« effects of interaction of non-ionized radiation with DNA crystals: A quantum mechanical approach
A.-Constantinos Cefalas

10:15 Discussion

10:30 ***Coffee-Break***

11:00 Microwave Radiation and Temperature Effects on the Green Flourescent Protein
Anan Copty

11:30 Discussion

11:45 Discussion on Subtle Thermal Effects *in vitro*

12:45 ***Lunch***

"POSSIBILITY OF GENERATION OF SUBTLE THERMAL EFFECTS IN RF-EXPERIMENTS WITH ANIMALS AND HUMAN VOLUNTEERS"

Chair: Peter Wust, Rapporteur: Jochen Buschmann

14:00 Numerical and experimental determination of SAR and temperature distribution for 'in vivo' bio-experiments involving radio frequency exposure
Andreas Bitz

14:30 Discussion

14:45 Increase in skin temperature during mobile phone calls. The effect of RF-exposure and other factors explored in experimental and theoretical studies
Gunnhild Oftedal

15:15 Discussion

15:30 ***Coffee-Break***

16:00 SAR and Temperature Elevations in the Human Head during RF Exposure
Gernot Schmid

16:30 Discussion

16:45 Effects of non-thermal EMF (GSM, UMTS) on hamsters and mice: implications for the definition of »non-thermal«
Alexander Lerchl

17:15 Discussion

18:30 ***Social Event and Dinner***

Wednesday, November 23rd

Chair: Jürgen Kiefer, Rapporteur: Jochen Buschmann

09:00 Introduction to Discussion: Practical Suggestions on the Use of Thermal Thesholds in Animal Studies on Electro-magnetic Fields (EMF)
Jochen Buschmann

09:10 Discussion on (subtle) thermal effects *in vivo*

11:00 ***Coffee-Break***

11:30 General Discussion
(Recommendations for further research?)
Chair: Jürgen Kiefer

13:00 ***Lunch***

ORGANIZING COMMITTEE:

COST281 Steering Committee
Gerd Friedrich (FGF)
Frank Gollnick (FGF)
Lutz Haberland (Universität Rostock)
Anette Kellendonk (FGF)
Uwe Möbius (FGF)

ORGANIZED BY:

FORSCHUNGSGEMEINSCHAFT E.V. **COST 281**

STATE MINISTRY OF ENVIRONMENT AND TRANSPORT, BADEN-WÜRTTEMBERG

VENUE & ACCOMODATION:

Deutsche Telekom AG
Tagungshotel Stuttgart
Universitätsstraße 34
70569 Stuttgart
Phone: +49 800 3304215
Fax +49 711 6863-4898

Arrival in Stuttgart by Car

From all directions:

- From the Stuttgarter Kreuz (interchange) take the A831 in the direction of Stuttgart / Vaihingen and the B14 in the direction of Stuttgart Zentrum as far as the "Universitat" exit
- Note: Please comply with the speed limits on the freeway as speed cameras are in operation before the "Universitat" exit
- Turn left at the first set of lights, then take the second street on the right directly to the Tagunshotel
- There is a short stay parking lot in front of the hotel

Arrival in Stuttgart by Train

From Stuttgart Hauptbahnhof (main station)

- Take the S-Bahn (city train) from platform 101, Line S1 (in direction of Boblingen) OR S2 (in the direction of Oberaichen / Flughafen) OR S3 (in the direction of Vaihingen-Flughafen) as far as the "Universitat" station
- Travel time from Stuttgart main station to "Universitat" station is 10 mins
- Leave the station via the "Universitatszentrum" exit
- The Tagungshotel is 2 minutes walk away, following the signs
- Note when buying your train ticket please give the S-Bahn station "Universitat" in Stuttgart-Vaihingen as your final destination. Your ticket will then include travel on the S-Bahn.

Arrival in Stuttgart by Air

From international airport

- Take the S-Bahn S2 train (in the direction of Schorndorf) OR the S3 (in the direction of Backnang) to the "Universitat" station
- Travel time from the airport to "Universitat" station is 17 mins
- Leave the station via the "Universitatszentrum" exit
- The Tagungshotel is 2 minutes walk away, following the signs

In case of need please contact the following persons:
Lutz Haberland, mobile 0049-160-676 11 98
Uwe Möbius, mobile 0049-170-472 18 74

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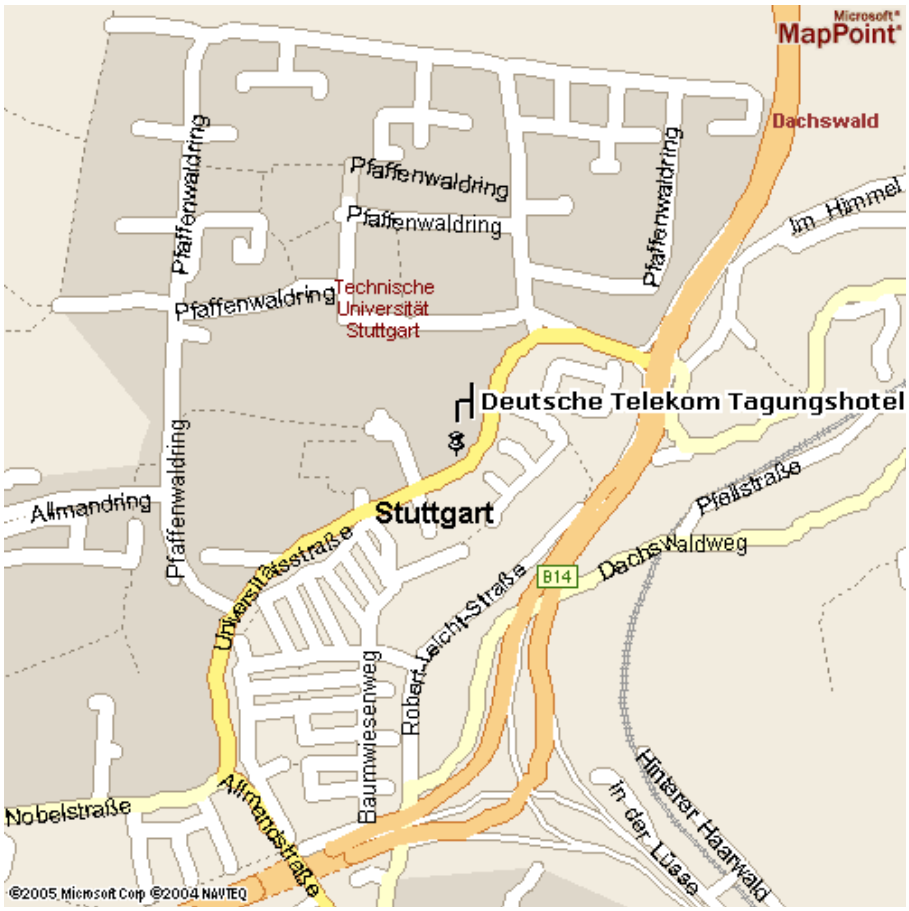

Deutsche Telekom AG
Tagungshotel Stuttgart
Universitätsstraße 34
70569 Stuttgart
Phone: +49 800 3304215
Fax +49 711 6863-4898