



Action BM0704: Emerging EMF Technologies and Health Risk Management

WG4 focus meetings Paris Nov. 4th, 2009

1- Focus on High Throughput Screening techniques

Attendance:

- Head : Dariusz Leszczynski, Finland
- Contributors:
 - David DePomerai, UK
 - Dirk Koczan, Germany
 - Dieter Stoll, Germany
 - Helmut Franke, Germany
- Coordinator: Isabelle Lagroye, France
- Apologies : Juan Pablo Albar, Spain

- **Summary**

This focus on HTST began in 2008. All papers dealing with EMF and Proteomics, gene arrays and transcriptomics have been reviewed and tables with detailed description of exposure conditions and protocols are being prepared in a large report (about 100 pages). The final version of this report should be available by the end of December 2009. The group's members indicate that the reviews already available (Vanderstraeten and Verschaeve, 2008; McNamee and Chauhan, 2009) are less detailed. The group proposed to provide two reports:

- (i) a detailed report to be printed by STUK (Finland) with the funding from COST (Belgium), as determined after the meeting by e-mail exchanges between Leszczynski and A. McKinlay (BM0704 action Chairman).
- (ii) a shorter opinion in a specialised journal, as Bioelectromagnetics.

It is also decided that the WG4 will send a abstract to the Bordeaux meeting in May 2010. Ideally, a 30 min talk + 30 min discussion should be requested.



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2- Focus on MRI Occupational Exposure

This was the Kick-off meeting for this focus within the WG4. The members are :

- Head , MRI worker: Penny Gowland, United Kingdom
- Contributors:
 - Occupational exposure: Jolanta Karpowicz, Poland
 - Dosimetry: Niels Kuster, Switzerland
 - Standards for exposure limits: Eric Van Rongen, The Netherlands
 - Biological: experimental studies: Kjell Hansson Mild, Sweden
 - Biological experimental studies: XXXX?
 - Policy: Steve Keevil, United Kingdom
 - Biological: human/epi studies: Maila Hietanen, Finland
- Coordinator: Isabelle Lagroye, France

Attendance:

All members except M. Hietanen (Fi) and J. Karpowicz (Po) who apologized

Also in attendance:

Jukka Juutilainen, Finland
Vitas Anderson, Australia

Summary

- Introduction

Our aim is to discuss and make recommendations to the EU on issues related to occupational exposure of MRI workers to EMF. We aim to write a report by February, to allow us to decide whether we need to arrange a workshop on a particular topic by May. Given the time scale, it is unlikely that our report can feed into FP7 or the revision of the EU directive; we will take a longer view.

ICNIRP and EU have limited their discussion around EMF to acute effects because of the paucity of data on chronic effects. In recent years, the EU directive has driven workers in the field to concentrate on characterizing acute effects. However chronic effects are what worry staff and the general public and it is likely that the potential for chronic effects do enter into the decisions around guidelines even if this is not stated directly. There is now a need to focus on both chronic and acute effects. This document is not the minutes of our meeting but simply aims to draw together threads from our discussion and possibly to form the basis for a report (or reports). In the text below are identified areas where we could collate/review data within the time scale of the COST action, that could probably be published in scientific journals. Areas not identified in this way may ultimately be more valuable, but require real resources. The following topics came out of our discussions.



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Review of biology

There is a need for a review of the biology following the SCENHIR review, which was completed in July 2009. This should probably not occur before next July.

It would be interesting to particularly focus on co-exposures. These may not be a real issue for occupational exposure but might provide hypotheses to be tested in future studies.

Outcome: a publishable review

Frequency dependency

At present ELF guidelines extrapolate from sparse data at few frequencies. We should identify the frequency ranges at which data are and are not available and effects to be targeted in any studies across the range of ELF.

Outcome: a publishable review

Epidemiology

There was considerable discussion about planning an epidemiology study. Importantly it was suggested that markers of disease (micronuclei formation [Simi, Mutation Research 645 (2008) 39–43], hormonal or immunological markers) should be used as outcomes rather than disease itself. This would probably improve the power of the study, and also potentially make it more hypotheses led.

This could be complemented by experimental studies, maybe in experimental 'high exposure' systems.

It was also suggested that volunteers for repeated fMRI studies should be used as a target group. Their exposure patterns are very different to occupational exposures but they could be considered to be a 'test' group and they are a group who it would be easy to find controls for.

The need to estimate exposure was discussed but it was stated that approximate exposure would be adequate for epidemiological studies.

Outcome: list of appropriate markers, survey of how many people across EU receive 10 or more MRI scans in a year.

Adverse incidents

It was suggested that we should collate adverse incident reports across Europe and also to actively work to maximize the rate of reporting of any incident related to MRI exposure (adverse or otherwise) at least in a limited number of sites, to get an quantitative measure of the rate of any response to the MRI environment.

Outcome: suggested design of questionnaire for sites.

Education of staff

A number of organizations are proposing that staff training should be improved. We can propose a syllabus (and provider?) for EU wide MR staff training.

Outcome potentially publishable



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Staff monitoring

Could we also indicate markers of interest for occupational health medicals? (This may require clinical input).

Outcome potentially publishable

Interactions

An attempt could be made to estimate the number of patients and staff who receive simultaneous or consecutive MR and ionizing radiation exposures. This group might allow to study interactions between different agents.

New types of exposures

One should seek to quantify new staff exposures, in terms of the number of staff exposed and the fields and procedures that they are involved in.

Outcome probably publishable.

At the end of the meeting, the group was as followed:

- Head , MRI worker: Penny Gowland, United Kingdom
- Contributors:
 - Occupational exposure: Jolanta Karpowicz, Poland; Kjell Hansson Mild, Sweden
 - Dosimetry: Niels Kuster, Switzerland
 - Standards for exposure limits: Eric Van Rongen, The Netherlands
 - Biological experimental studies: Jukka Juutilainen, Finland
 - Policy: Steve Keevil, United Kingdom
 - Biological: human/epi studies: Maila Hietanen, Finland
- Coordinator, Biological experimental studies: Isabelle Lagroye, France



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3- Focus on Children and EMF

Attendance:

Head: Carmela Marino, Italy

Contributors:

- Jochen Bushmann, Germany

Coordinator: Isabelle Lagroye, France

Apologies:

- Claudio Pioli, Italy
- Zenon Sienkiewicz, UK
- Timo Kumlin, Finland

Also in attendance:

Jukka Juutilainen, Finland

Vitas Anderson, Australia

Niels Kuster, Switzerland

Gunnhild Oftedal, Norway

Lena Hillert, Sweden

Kjell Hansson Mild, Sweden

Eric van Rongen, The Netherlands

Summary

The outcomes of the last meeting in Davos are presented by C. Marino. The focus is on RF field given the aim of the action (EMF-emerging technologies).

Two principal points deserve some considerations as indicated in the Davos meeting: The rationales, which make sense to investigate RF bioeffects on children need to be well- defined.

Children are indeed potentially more sensitive and long time users, and it is the ethical responsibility of our generation that developed these technologies.

A guidelines system should be provided to suggest the appropriate models in terms of:

- Minimum numbers of studies (Ethics, costs, statistical power)
- Good compromise between dosimetric tools and animal models, making sure that animal models represent the worse case.
- Set of studies to help the risk assessment and to address a policy based on the outcome (if it is negative.....risk is acceptable; if positive.....towards mechanism)

In Davos, J. Bushman was invited to propose and write a text to consider in dialectical way the considerations listed above. This text is presented by J. Buschmann and deals



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with research strategy on EMF bioeffects, with a toxicological view. The proposal is to adopt a REACH approach for EMF and to consider and test each RF signal as a different agent. An extensive discussion followed about the pros and cons of such a strategy. It was also stressed that this topic is not specific to the “children and EMF” issue but a much more general approach to be discussed within the WG4 focus on “extrapolation of RF data to new signals”.

One outcome of the focus on Children and EMF is a report that will provide a review of the literature, will monitor research in progress and look for the gaps and the lack in the research. It is proposed to use a similar approach as Wiedemann et al. 2009 paper and update and comment this report. The following tentative list of the topics for the report is suggested:

- dosimetric and exposure assessment aspects (with WG1 and WG2)
- experimental data:
 - cell studies, cell models (i.e. stem cells)
 - animal studies, animal models (i.e. juveniles, foetuses)
 - human (with WG3)
- epidemiology (with WG3)

The report will be coordinated by C. Marino. Main contributors from WG4 are C. Pioli, Z. Sienkiewicz and Timo Kumlin (animal models), M.R. Scarfi and I. Lagroye (cell models). Leaders of the other WG will be asked for contribution, and a list of scientists who volunteer to participate should be given to C. Marino.

J. Juutilainen informs about his interest in joining the group (animal models).

Closing the meeting, C. Marino indicated her willingness to involve the children focus group in the scientific programme of the COST BM0704 Lisbon meeting in 2010 dedicated to children and EMF.

A number of issues were also discussed at the meeting of WG1 and WG2, Nov. 6th, 2009.

Biologists of WG4 asked J. Wiart and N. Kuster to support and to help in reporting about the different set-up available for exposure of pregnant females or juveniles (i.e. in the report) and their characteristics (i.e. restrained or freely moving animals).

On the perspective of toxicology, long experiments with different exposures in terms of frequencies and sources (multi, combined or sequential exposure) will be needed for animal experiments. The physicists mentioned however that less people are active in

The current research in dosimetry deals with the modelling of animals of different species, and at different ages (A. Christ, J. Wiart). Research on dielectric properties of tissues at different age (in vitro and in vivo exp.) is also performed (A. Peyman, HPA, UK) and is very useful for the SAR evaluation in young people.