

**REPORT: Short-Term Scientific Mission (STSM) 04573 COST Action BM0704: Preparatory visit for postdoctoral fellowship program for Amanda Johansson hosted by Dr Martin Rösli**

**(Idiopathic environmental intolerance and its management in practice – physical, physiological and psychological aspects: A collaboration between the Department of Public Health and Clinical Medicine, Umeå University, Sweden and with the Institute for Social and Preventive Medicine, Basel University, Switzerland.)**

Visitor: Amanda Johansson, Occupational and Environmental Medicine, Department of Public Health and Clinical Medicine, Umeå University, Sweden

Host: Martin Rösli, Institute for Social and Preventive Medicine, Basel University, Switzerland

Period: 14-25 June 2009

**Summary**

The aim of this STSM was for Amanda Johansson, Department of Public Health and Clinical Medicine, Umeå University, Sweden to visit Dr Martin Rösli at the Institute for Social and Preventive Medicine, Basel University, Switzerland, for the planning and start-off of an intended postdoctoral fellowship, this in turn aiming to expand the Swedish international collaboration in the research areas Idiopathic Environmental Intolerance attributed to electromagnetic fields (IEI-EMF), and health effects of electromagnetic field (EMF) exposure in general. Financial support for a one-year visit has been received from the Swedish Council for Working Life and Social Research (FAS). Several projects were drafted, however a detailed plan remains to be settled.

## **Purpose of the STSM**

The purpose of the STSM was to plan an intended postdoctoral fellowship for Amanda Johansson, Department of Public Health and Clinical Medicine, Umeå University, Sweden hosted by Dr Martin Rösli at the Institute for Social and Preventive Medicine, Basel University, Switzerland. The research areas Idiopathic Environmental Intolerance attributed to electromagnetic fields (IEI-EMF), and health effects of electromagnetic field (EMF) exposure in general have been decreasing in Sweden in recent years, due to retirements, and due to this, an extended international collaboration is necessary to maintain the expertise.

The postdoctoral fellowship is expected to benefit not only single researchers, but also to contribute to an extended general collaboration between the home and the hosting departments, as well as between Swedish and Swiss researchers. An extension of the international collaboration on the topic of IEI-EHS has long since been advocated

## **Report**

- 14-19 June: BioEM 2009, Joint Meeting of The Bioelectromagnetics Society and the European BioElectromagnetics Association in Davos. This annual meeting is the premier international conference in the area of bioelectromagnetics and encompasses biology, engineering, medicine, epidemiology and physics. Research was presented from the hosting department as well as from my home department (own poster see page 4).

- 22-25 June: Visit at the ISPM in Basel. I was introduced to the scope of activities of the research group and presented the research on the topic IEI-EMF of my home department. With this as a starting point, the forms for a postdoctoral fellowship at the ISPM were discussed. Financial support covering one year of activity has been received from the Swedish Council for Working Life and Social Research (FAS). The time frame for the stay at the ISPM is, at present, October 2009 to August 2010.

## **Proposed projects**

Several ideas for one-year research projects were discussed, but the precise form remains to be specified (September 2009).

Perceived sensitivity to environmental factors other than electromagnetic fields in people with IEI-EMF attributed to different EMF sources..

People with IEI-EMF are often bothered also by other environmental factors than EMF, i.e., noise, odors and chemicals. It has been suggested that this is associated with the elevated autonomic and central nervous excitability that has been observed in people with IEI-EMF. However, there are indications that people with complaints attributed to visual display terminals or mobile phones only are not bothered by other environmental factors to the same extent as are people with general electromagnetic hypersensitivity. In this project, a group with perceived electromagnetic hypersensitivity (EHS) and a group with mobile phone (MP)-related symptoms will be compared with respect to perceived sensitivity to, and annoyance from, other environmental factors than electromagnetic fields. The two IEI groups will also be compared with a population based reference group and control group without EMF-related symptoms. People with EHS are hypothesized to report a higher perceived sensitivity to, and annoyance from, environmental factors in general, and to report impaired general health and quality of life compared with people with MP-related symptoms. People with MP-related symptoms are hypothesized to differ less from the general population in

these aspects than people with EHS. Of interest is further to what extent the results will be different if the comparison groups are constructed not based on the presence of MP- or generally EMF-related symptoms (symptom-based classification), but on the participants own classification of themselves as "hypersensitive" or "not hypersensitive" (attitude-based classification). Data collection has been performed previously.

#### Comparison between IEI-EMF in Sweden and Switzerland

As the prevalence as well as the characteristics of IEI-EMF are said to vary between countries, it would be of interest to compare populations of different origin. Such a comparison could probably be carried out with data from the mentioned questionnaire study and data from the Swiss QUALIFEX study. Relevant variables would be e.g., prevalence of EMF-non-related symptoms, self related health status, quality of life, annoyance from noise and air pollution and possibly job stress. However, there are substantial differences between the study populations, which may limit the comparability of the data. Another alternative is to use data from a recently published Swedish environmental health study with study population size and recruitment methods more similar to those of the QUALIFEX study. This would be carried out in collaboration with Dr Lena Hillert from the Karolinska Institute, Stockholm.

If the two studies are not comparable, the QUALIFEX study in itself is rather extensive, and could be used for analysis from other points of view than that of EMF, e.g., that of annoyance from other environmental factors (noise, air pollution).

#### Environmental medicine counseling in daily medical practice

The project is still running and will not be finished in the given time frame. However, participation as an observer would be most valuable, as Sweden has no similar initiative. The choice of treatment strategies for IEI patients is limited, and only few of those available have been evaluated. During the STSM I had the opportunity to visit a meeting in this project, which confirmed the impression that information on the course of this project would be of interest for possible development of Swedish strategies for treatment and counseling. The contact with the EMF research group at Umeå University might possibly also be useful to the project as such, as the senior researchers in this group have many years of experience with exposure assessment and management in homes and workplaces.

#### Association between amyotrophic lateral sclerosis and frequent electric shock

Previous investigations have indicated an association between electric work and the development of amyotrophic lateral sclerosis (ALS). No biological mechanism has been established, but it has been suggested that the risk may arise from exposure to electric shocks. One occupational category in which exposure to electric shock is assumed to be frequent is farmers, and it would consequently be of interest to investigate the prevalence of ALS in this category.



# Subtypes of Idiopathic Environmental Intolerance with Attribution to Electromagnetic Fields – Differences in Symptom Picture and Psychological Aspects

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## INTRODUCTION

Idiopathic environmental intolerance with attribution to electromagnetic fields (EMF), that is, symptoms reported in association with EMF exposure, has been reported at least since the 70s. The symptoms may be attributed to single EMF sources (generally visual display terminals or mobile phones) or to electrical equipment in general.

Previous research and clinical observations suggest differences between these groups associated with other factors than symptom attribution.

## AIM

Assessment of symptom picture together with anxiety, depression, somatization, exhaustion, and stress in persons with symptoms attributed to mobile phone (MP) use and persons with general electromagnetic hypersensitivity (EHS).

## REFERENCE

Johansson A., Nordin S., Heiden M., Sandström M. *Symptoms, Personality Traits, and Stress in People with Mobile Phone-Related Symptoms and Electromagnetic Hypersensitivity*. (Submitted to Journal of Psychosomatic Research, 2009).

## MATERIALS AND METHODS

Forty-five persons with mobile phone-related symptoms (MP group) and 71 persons with EHS (EHS group) were compared with a population-based sample (n=106) and a control sample (n=63), consisting of those in the population-based sample not reporting EMF-related symptoms.

## QUESTIONNAIRES

- EMF-related symptoms
- Overall psychological distress (SCL-90)
- Personality traits (KSP)
- State and trait anxiety (STAI)
- Depression (BDI)
- Exhaustion (SMBQ)
- Perceived stress (PSS)

## RESULTS

Both groups reported more symptoms, of both types, than the reference samples. The MP group reported a high prevalence of somatosensory symptoms, whereas the EHS group reported neurosomatic as well as somatosensory symptoms. The EHS group reported more symptoms of both types than the MP group.

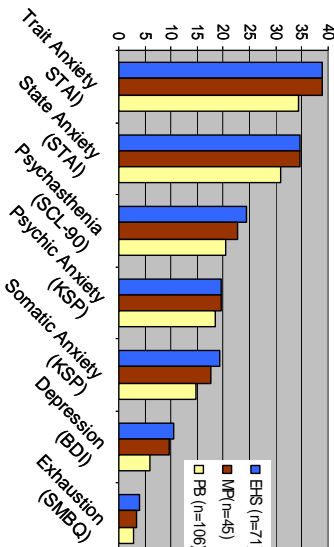
The MP group reported significantly increased levels of exhaustion and depression but not of anxiety, somatization, and perceived stress compared with the population-based group. The EHS group reported significantly increased levels of all conditions except for perceived stress.

There was a general tendency of the EHS group to higher levels than the MP group of the assessed psychological aspects, except for perceived stress, which was reported to a higher extent by the MP group.

Percentage of participants reporting various symptoms (experienced at least once a week) among subjects with mobile phone-related symptoms (MP) or general electromagnetic hypersensitivity (EHS), and population-based (PB) and control (C) groups.

Symptoms	EMF-related symptoms				EMF-related symptoms			
	MP	EHS	PB	C	MP	EHS	PB	C
Dizziness	18	42 <sup>1,3,5</sup>	13	11	27 <sup>1,4</sup>	75 <sup>1,3,5</sup>	7	0
General discomfort	29	77 <sup>1,3,5</sup>	11	10	73 <sup>1,4</sup>	82 <sup>3,5</sup>	9	0
Difficulties concentrating	36	68 <sup>1,5</sup>	18	13	42 <sup>1,4</sup>	81 <sup>1,3,5</sup>	10	0
Memory/lapses	31	49 <sup>1,5</sup>	12	10	22 <sup>1,4</sup>	61 <sup>1,3,5</sup>	3	0
Fatigue	33	75 <sup>1,3,5</sup>	27	21	36 <sup>1,4</sup>	80 <sup>1,5</sup>	11	0
Headache	22	51 <sup>1,5</sup>	21	16	56 <sup>1,4</sup>	73 <sup>1,5</sup>	19	0
Visual disturbances	47 <sup>1,4</sup>	41 <sup>1,5</sup>	4	0	66 <sup>1,4</sup>	67 <sup>1,5</sup>	12	0
Visuals behind/round ear	42 <sup>1,4</sup>	39 <sup>1,5</sup>	5	0	64 <sup>1,4</sup>	67 <sup>1,5</sup>	19	0
Visuals on ear	35 <sup>1,4</sup>	62 <sup>1,5</sup>	12	6	64 <sup>1,4</sup>	90 <sup>1,5</sup>	20	0
Burning skin	18	54 <sup>1,3,5</sup>	3	2	51 <sup>1,4</sup>	79 <sup>1,5</sup>	4	0
Tringling/lightness	33	73 <sup>1,3,5</sup>	30	21	20 <sup>1,4</sup>	65 <sup>1,3,5</sup>	4	0
Sleeping disorders	24	41 <sup>1,5</sup>	11	11	20 <sup>1,4</sup>	49 <sup>1,3,5</sup>	2	0
Tinnitus	24	41 <sup>1,5</sup>	11	11	20 <sup>1,4</sup>	49 <sup>1,3,5</sup>	2	0
Numbness	13	34 <sup>1,5</sup>	10	9	22 <sup>1,4</sup>	59 <sup>1,3,5</sup>	2	0
Mean (SD) number of symptoms	4.0 (3.0) <sup>1,2,4</sup>	7.4 (3.8) <sup>1,3,5</sup>	1.9 (2.4)	1.3 (2.0)	6.3 (3.0) <sup>1,2,4</sup>	9.7 (3.3) <sup>1,3,5</sup>	1.2 (2.1)	0 (0)

<sup>1</sup>. Significant difference MP/EHS; <sup>2</sup>. Significant difference MP/PB; <sup>3</sup>. Significant difference EHS/PB; <sup>4</sup>. Significant difference MP/C; <sup>5</sup>. Significant difference EHS/C. Adjustment for multiple tests (Bonferroni).



## CONCLUSION

The findings support the hypothesis of a difference between people with symptoms related to a single EMF source (mobile phones) and people with general EHS with respect to symptom picture and psychological aspects. The differences may be pronounced enough to be important for the outcome of medical treatment and remedial activities. The differences should also be considered when performing research, both in the selection of subjects and in the interpretation of study results.