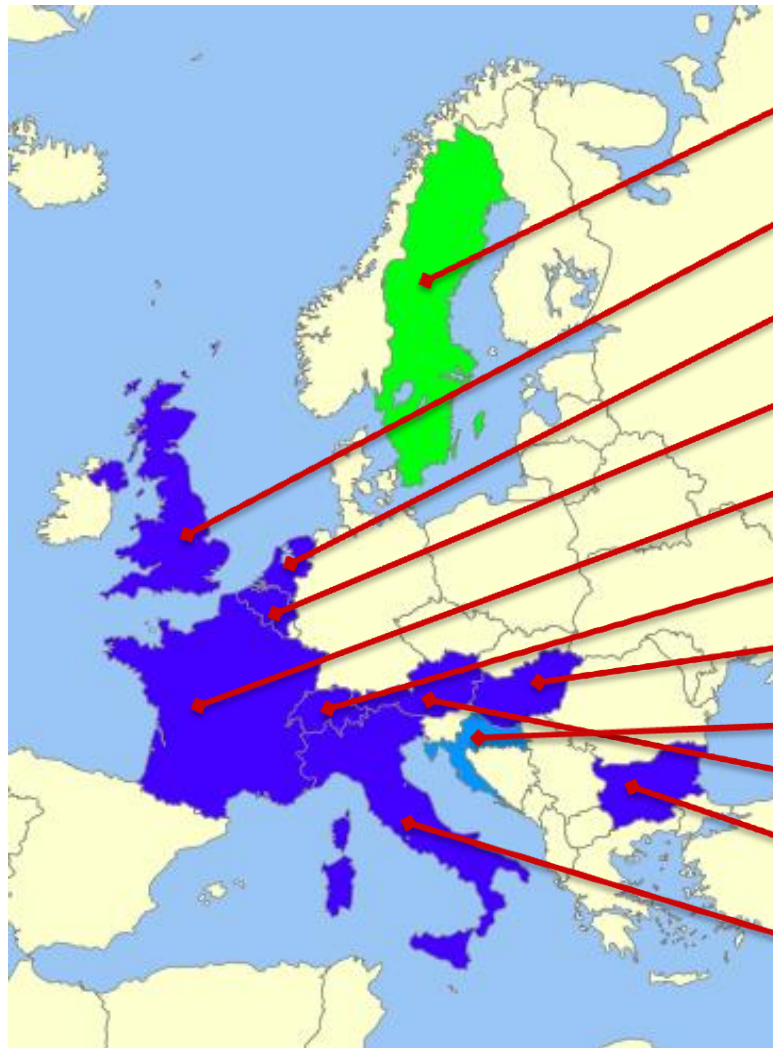




**European network for innovative uses of EMFs in
biomedical applications
EMF-MED**

**Workshop “Immune response modulation”
Rome 15 May 2015**

9 (+2) member states in the group



Sweden ☺

United Kingdom

Netherlands

Belgium

France

Switzerland

Hungary

Croatia

Austria

Romania

Italy

Aim of the workshop

The identification of a common overbridging WM-GOAL:

Focus is on beneficial effects related to the modulation of the immune response in order to:

- 1) provide a better understanding of underlying physical and biological modes of action and thus
- 2) to contribute to the development of targeted and innovative EMF-based medical treatment.

Aim of the workshop

- Collecting relevant own data (flash presentations)
- Collecting relevant data from the literature
- How are these data connected?
- Can we generate a hypothesis for the mode of action?
 - WM proposal: ELF-EMF modulates oxidative response(s) dose (flux density and time) dependently
- How can these results used in medical applications?

Aim of the workshop

Possible objectives (from the WM proposal)

- Which is the primary interaction site between applied EMF and the animal cell?
- Which are the exposure characteristics that allow such an interaction?
- Can exposure affect expression of cell characteristics and activities that promote tissue healing and regeneration?
- Are cellular effects of such magnitude and character that they promote healing or improvement of disease conditions?

“Umbrella” activity for many WMs

Mode of action:

- Different endpoints with modest effects
- Modulation of free radical homeostasis
- Results from medical processes (wound and bone healing, etc.)
- Systematic and concerted studies
- to be filled in

Development of targeted (E)MF application:

- WG1
- WG2
- WG3

Framework:

Purpose of the COST Action

”this Action will focus on beneficial effects, aiming for breakthrough results, new discoveries and innovative biomedical technologies. The Action will provide a better understanding of underlying physical and biological interaction mechanisms, related to both cancer and non-cancer applications, filling the gaps in the present state of knowledge. Ultimately, the Action will aim to contribute to development and optimization of innovative EMF-based medical devices and procedures, which will be safer, more efficient and less invasive.”

Framework:

What we want to accomplish?

Generation of

- Knowledge (EMF and immune responses what is already known and used for possible applications)
- Research proposal(s) (H2020 Health; based on existing trials)
- Review article
- Cooperations
- ?

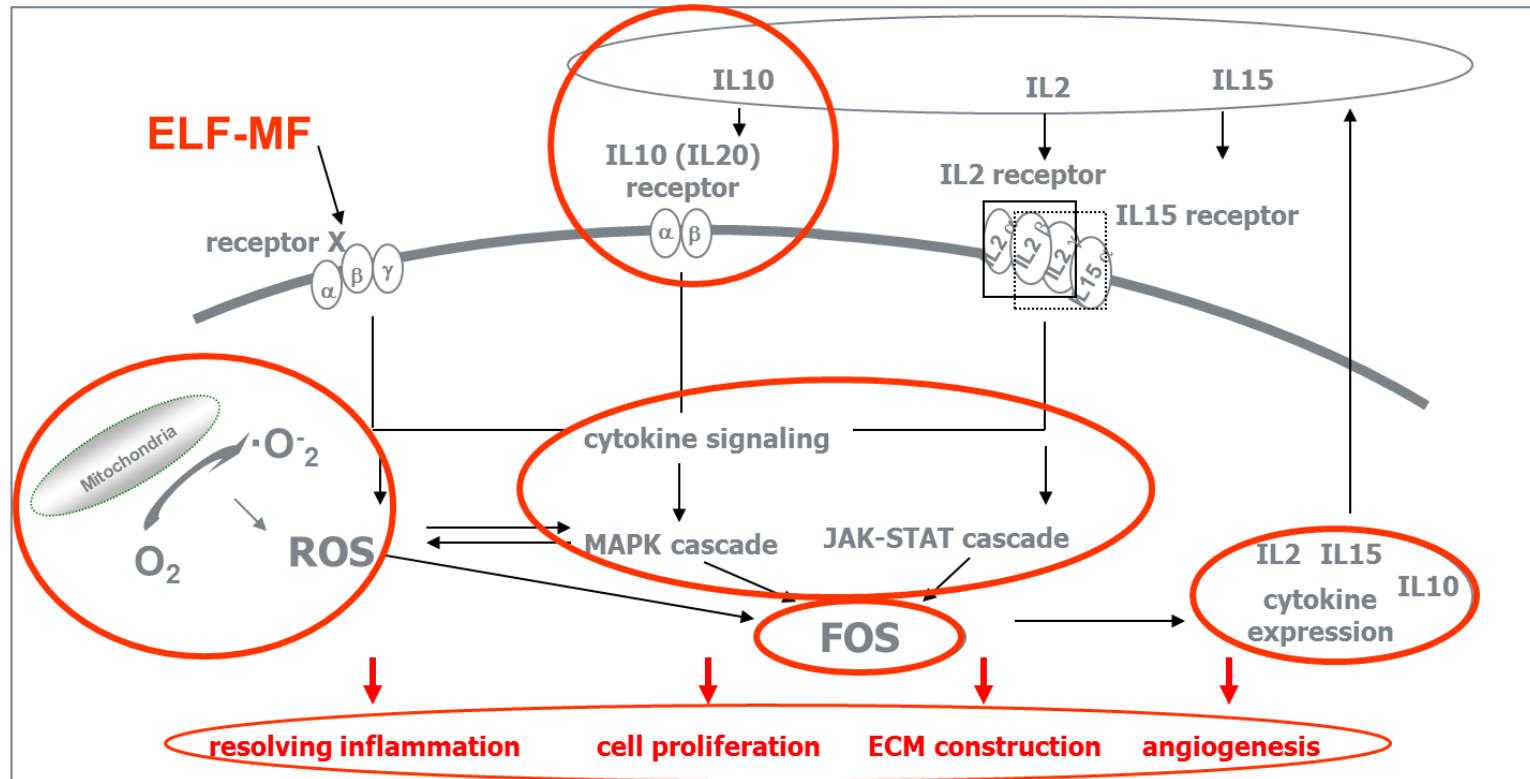
Framework:

Proposed research activities

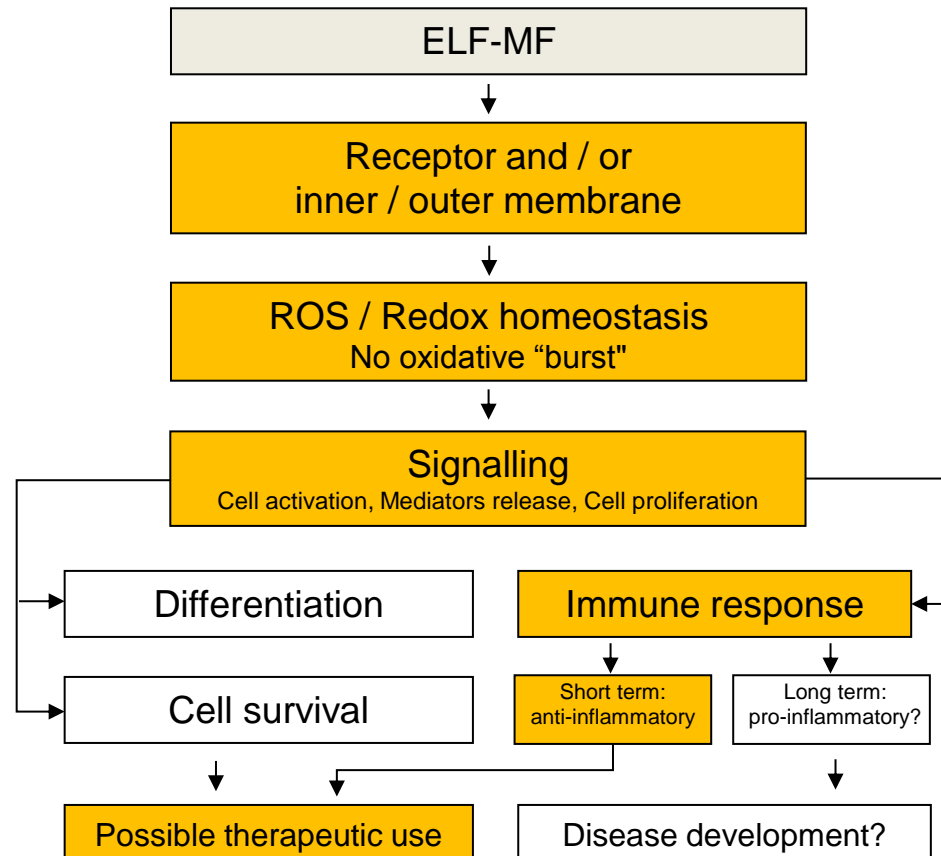
(from the WM proposal)

- Identification of the interface between cells and EMF
- Evaluation of the relevance of the influenced physiological effects
- Identification of exposure conditions for cell activity modulation
- Development of a targeted exposure setup for the activation of immune system

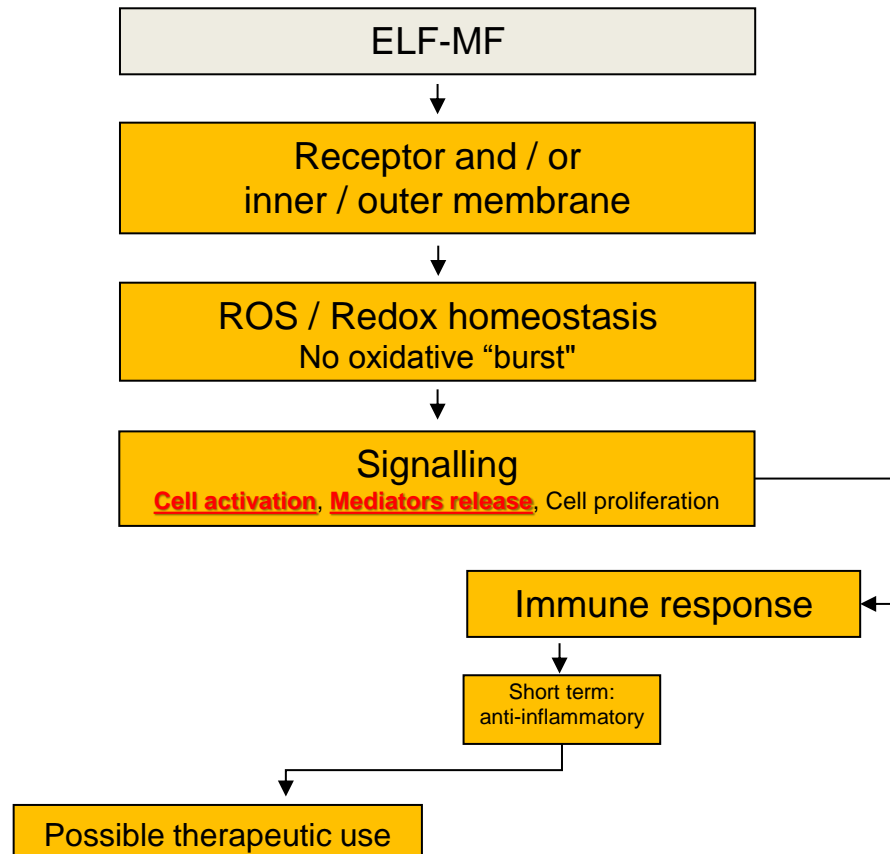
Monocyte / Macrophage activation



Alternative activation pathway



Hypothetical interaction between ELF-MF and living systems. ELF-MF interacts with cellular receptors and/or the inner or outer site of the membrane and activates specific molecular pathways leading to a change of the redox homeostatic capacity of the cell. This can be due to the release of free radicals triggering cell signalling that influences cell activation, release of intermediates, and/or the activation of cell proliferation. Cell signalling can also lead to the activation of differentiation and cell survival, being a helpful effect in therapeutical use. On the other hand, signalling can also trigger the immune response. In a short term perspective, it seems that anti-inflammatory responses are activated, which could be a useful tool for treatment of inflammation. Long term effects however, could trigger pro-inflammatory pathways causing the amplification of or the development of diseases. (Mattsson and Simkó 2012)



Hypothetical interaction between ELF-MF and living systems. ELF-MF interacts with cellular receptors and/or the inner or outer site of the membrane and activates specific molecular pathways leading to a change of the redox homeostatic capacity of the cell. This can be due to the release of free radicals triggering cell signalling that influences cell activation, release of intermediates, and/or the activation of cell proliferation. Cell signalling can also lead to the activation of differentiation and cell survival, being a helpful effect in therapeutical use. On the other hand, signalling can also trigger the immune response. In a short term perspective, it seems that anti-inflammatory responses are activated, which could be a useful tool for treatment of inflammation. Long term effects however, could trigger pro-inflammatory pathways causing the amplification of or the development of diseases. (Mattsson and Simkó 2012)

FOR THE ATTENTION! THANK YOU FOR THE ATTENTION!
FOR THE ATTENTION! THANK YOU FOR THE ATTENTION!

