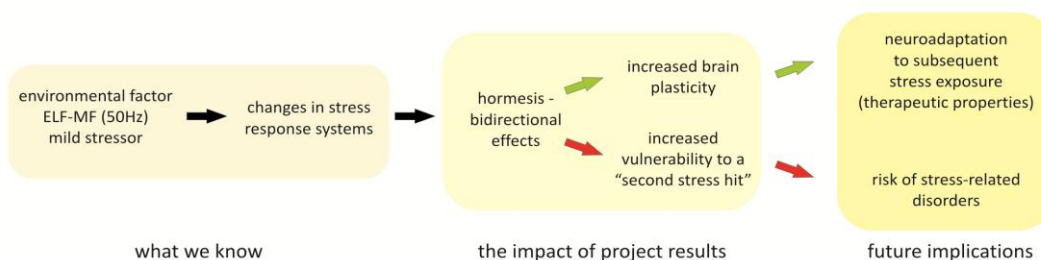


## DESCRIPTION FOR THE GENERAL PUBLIC

The issue of the influence of electromagnetic radiation on human organism aroused public interest for a long time. This involves the use of electromagnetic field for the benefit of human beings but also the capability of evaluation of its negative effects. Ever greater development of industrialisation results in a great increase in the number of sources of electromagnetic fields. The assessment of the effect of electromagnetic fields of frequency about 50 Hz (ELF-MF) on human beings is one of the crucial direction of the study taking into account the universal presence of electroenergetic installations and appliances of different voltage range in the environment we are living in. Magnetic fields of lowest frequency, apart from the more known potentially negative impact on living organisms, elicit also positive effects which more and more often find an application in curing a variety of disease syndromes. Many research studies on the consequences of ELF-MF fields' impact on living organisms have been published in recent years. However, the results obtained often do not correspond with each other or they reach opposite conclusions and therefore do not give explicit answer to the question if ELF-MF exerts a beneficial effect on human organism or a negative one. There is also a lack of theories that could explain the observed phenomena in comprehensive and obvious way. It legitimises the advisability (usefulness) of conducting further investigations in this matter. Therefore, we decided to conduct a research focused on explaining the reasons/mechanisms of ambiguous influences of low frequency electromagnetic field on living organisms (rats in our study). We put forward a hypothesis that **ELF-MF exhibit hormesis, i.e. bidirectional action dependent on the level of ELF-MF magnetic induction (T).**

Hormesis is a process in which a chemical agent or an environmental factor, damaging at higher doses, applied at a low dose induces an adaptive beneficial effect on the cell or organism. As early as in XVI century Swiss physician Paracelsus claimed that it is the dosage (not a substance) that makes everything either a poison or a remedy (*Dosis facit venenum*). In contrary to a pretty common belief (view) that low doses give rise to merely proportionally lower health risk than higher ones, the scientific research shows that organism's defensive forces operate in such a way which allows the beneficial effects of low doses to reveal. Depending on the dose bidirectional effect of a stressor means that the equilibrium disturbed by a low dose gradually triggers a defensive reaction and an organism mobilizes in some excess its defensive forces, preparing itself for the next hazard, while in the case of high doses the homeostasis disturbance is so significant that enabling the above mentioned mechanism is not possible. We assume that the effect of electromagnetic field is not unambiguously negative but the direction and dynamics of changes depend on the level of magnetic induction.

ELF-MF exposure releases stress reaction adequate to the density of the field. We assume that the modification of organism susceptibility to subsequent stressors will be the consequence of the process. Mechanism of this phenomenon can be based on the process of so called cellular hormesis, in other words, the bidirectional activation of intracellular signal pathways: 1) of compensatory nature; which can be the basis of neuroadaptation to further stress factors or 2) leading to disruption of intracellular homeostasis towards the increase of vulnerability to a subsequent damage (scheme).



### Scheme presenting assumptions of the project

It is important to identify hormetic mechanisms of ELF-MF effect as it can be of great importance to set best standards for the protection of the population against harmful ELF-MF doses. The demonstration of hormetic model of electromagnetic field's impact on the organism will mean that first harmful effects of the field appear just after exceeding a certain "dose" of the field, below this level it may have a beneficial influence on the organism. It opens new perspectives of exploitation of electromagnetic field in elaborating new preventive and therapeutic strategies. We assume that the results of the proposed study will concur to the objectification of scientific knowledge on the effects of electromagnetic fields on human health, by extension they will be a crucial issue for international organizations, such as WHO or ICNIRP (International Commission on Non-Ionizing Radiation Protection) in elaboration new standards concerning safety of ELF-MF and risk assessment associated with the exposure to these fields.