

Session 5: HIGH FREQUENCY EM FIELD EFFECTS

BIOPHYSICAL ACTION OF MICROWAVES

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Theoretical and experimental investigations of biological action of radioemissions show that it is rather varied and defined by intensity, duration, wavelength range, modulation-time characteristics and other parameters of an active electromagnetic field (EMF). Electrical, magnetic and other properties of irradiated objects and systems as well as conditions of influence are also of great importance [1,2,3]. The effects of action of radiofrequency electromagnetic radiation (EMR) essentially depend on EMF frequency characteristics and in many respects they are formed by primary and subsequent biophysical and biochemical ways and mechanisms. Therefore the study of the biophysical action of EMF and EMR is highly necessary for proper understanding and practical use of the medicobiological and ecological action of radioemissions and it is also necessary for the solution of problems of electromagnetic safety.

Microwaves - the EMF and EMR of decimetre, centimetre and millimetre of waves ranges affect all living systems. Investigators have studied, and now they use in practice, the «thermal» effect of microwaves which is observed under the action of electromagnetic fields of comparatively large intensity (10 mW / cm² and more). The basic mechanism of the thermal effect is the temperature increase of the irradiated object due to a considerable amount of heat emitted. Microwave heating has a substantial advantage as compared to ordinary heating methods: it may be done rapidly, in measured doses, in the exact spot required and distributed almost uniformly over the whole volume.

Along with the thermal effect, microwaves possess an expressed energetic and ergo-informative action which may be decisive under certain conditions. It is called «specific» and is not directly connected with the temperature increase of the irradiated object. Specific influence of microwaves is determined by more delicate and precise biophysical ways and mechanisms of interaction of EMF and EMR with bio-objects and it is connected with corresponding formation processes of energetic, physico-chemical and conformational states of biomacromolecules and molecular systems in the acting electromagnetic field.