

TECHNICAL EQUIPMENT FOR RESEARCH OF THERMAL EFFECTS OF EM FIELD

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Research of interactions between EM Field and biological systems is of growing interests elsewhere. In present time five research institutions in the Czech Republic run research projects focused on studies of interactions between EM field and biological systems. Three of these projects (1 in Germany and 2 here in Czech Republic – one of them in cooperation with Italy) are basic research for simulation of the microwave hyperthermia treatment. Other two projects (both in Czech Republic) are focused on simulation of the case of exposition by mobile phone.

Good results of EM field expositions in biological experiments can be obtained by simple but efficient waveguide applicator. Waveguide offer a very big advantage – in approximately of fifty percents of its aperture the irradiated electromagnetic field is very near to a plane wave, which is basic assumption for good homogeneity of the heating and optimal treatment penetration. Aperture of this waveguide is 4.8 x 2.4 cm and it is excited at frequency 2.45 GHz. Effective heating is in the middle of the real aperture (2.4 x 2.4 cm). Waveguide is filled by teflon to reduce its cut-off frequency. In these experiments we work mostly with power between 10 and 20 W.



Fig.1. Waveguide applicator for biological experiments.

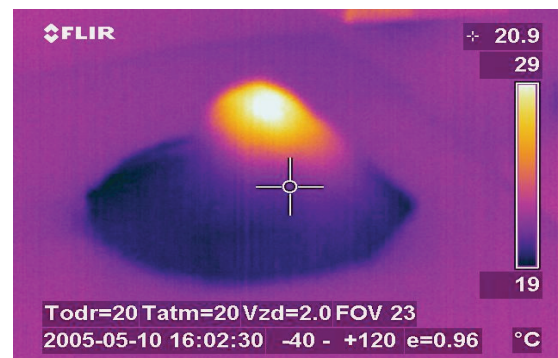


Fig.2. Temperature distribution obtained by measurements by IR camera on surface of a model of mouse.

Another applicator we have developed is created by two inductive loops tuned to resonance by capacitive elements. Coupling between coaxial feeder and resonant loops could be adjusted to optimum by microwave network analyser. The position of the loops is fixed by perspex holder. There is a special cylindrical space for experimental animal in lower part of this holder.

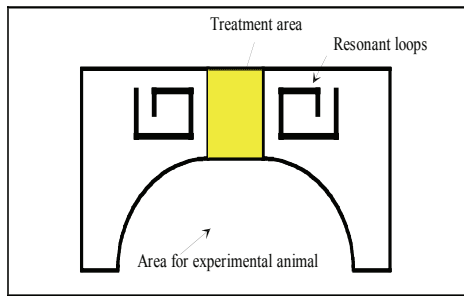


Fig. 3. Arrangement of discussed microwave hyperthermia applicator.

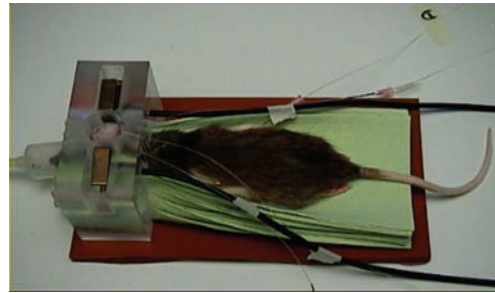


Fig. 4. Photograph of the discussed applicator.

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