RADIATION EXPOSURE SYSTEMS FOR *IN VITRO* AND *IN VIVO* EXPERIMENTS

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Two novel microwave (MW) exposure systems are presented: MWES-1 designed for the membrane fluidity (monitored by fluorescence anisotropy of trimethylaminodiphenyl hexatriene labeled receptor cells) measurements under MW exposure (Fig. 1) and MWES-2 designed for the cell culture exploration under an inverted microscope, equipped with a fluorescence device (as well as with a computerized image acquisition), simultaneously with MW irradiation (Fig. 2). The MWES-1 permits 2.45 GHz MW injection simultaneously with the fluorescence anisotropy measurements by using an adjustable coaxial antenna immersed directly into the cuvette with biological sample of a Jobin Yvon JB3D spectrofluormeter. The MWES-2 uses a rectangular waveguide applicator with travelling wave placed between the condenser and the objective of a Zeiss Axiovert 200 inverted microscope. The MWES-2 permits the exploration under microscope, during MW exposure, of the cell shape analysis (using dedicated software for image analysis, Image Pro Plus), cell viability tests (using Lucifer Yellow dye - living cells absorb the dye by endocytosis), drugs uptake (using Acridin Orange and Ethidium Bromide), cell membrane potential measurements by using fluorescent dye, $DisC_3(5)$,3,3'-dipropylthiadicarbocyanine iodide (fluorescence intensity is directly proportional the cell membrane potential). Also, a special designed installation which permits separate, successive and simultaneous irradiation *in vitro* (cell cultures) and *in vivo* (laboratory animals) with 2.45 GHz microwave and 6.23 MeV electron beam irradiation are presented. Some representative experimental results are discussed.

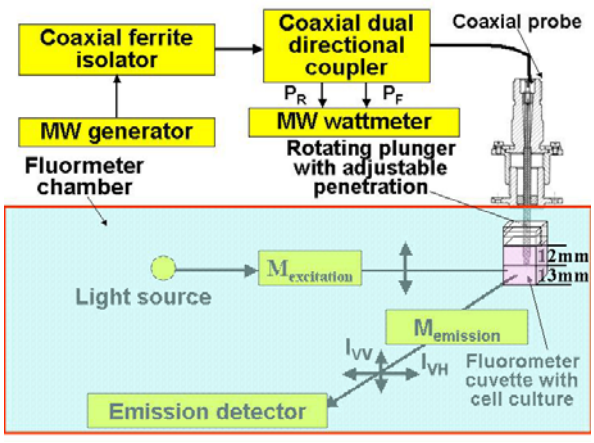

Fig. 1: Schematic drawing of the MWES-1 experimental arrangement

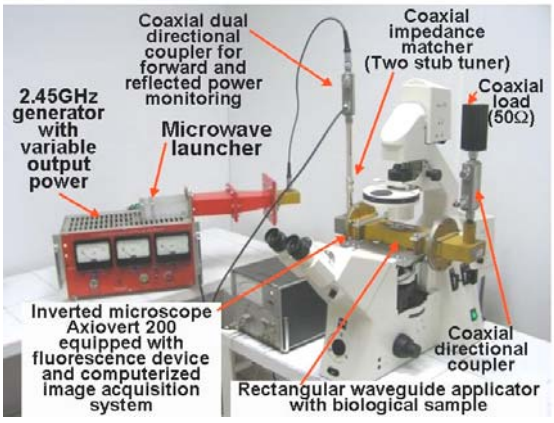

Fig. 2: Photograph of MWES-2 experimental arrangement with 2.45 GHz MW generator and WR284 rectangular waveguide applicator