

Investigation of 900 MHz Electromagnetic Radiation for Effects on Permeability of the Blood Brain Barrier

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Statement of Objective: A study was conducted to examine blood brain barrier (BBB) integrity in animals exposed to GSM RF signals. Significant features include use of an exposure system comparable to that employed in an earlier French study (Dr. Aubineau) with associated detailed dosimetry, multiple exposure levels along with positive controls, and a blind experimental design.

Methodology: Exposure rockets were constructed modeling those used in the French study. Each animal, exposed or sham exposed, were acclimated to the rockets over a 3 day period, after which they were exposed or sham exposed to 1.0 or 4.0 W/kg (brain SAR) for two hours using loop antennas similar to the French study. The antennas were calibrated with documented performance values by IT'IS (Zurich, Switzerland). Agreement with data from the original antenna was outstanding for the antennas fabricated for this study. Male Sprague Dawley rats were cannulated in the ascending aortic vessel for introducing fluorescently labeled dextran into the brain immediately prior to exposure. The fluorescent dextran (MW of 70 kdal. and 10 kdal.) is labeled with Oregon Green dye with an absorbance/emission maxima at 496/524 nm respectively.

Analysis: Immediately following exposure, animals were euthanized and brains were perfused with ice cold 4% formaldehyde in phosphate buffered saline. Subsequent to in situ perfusion, brains were removed into 4% PBS at 5 degrees C for 24 hours, followed by 48–72 hours in cold 30% sucrose (in PBS). Brains were then quick frozen using liquid nitrogen and kept at -80 degrees C until preparations for histological analyses. To insure the blind nature of the study, preparation of histological samples and fluorescent analyses of brain tissues were performed by Dr. Nissi Varki and Dr. Kelly Doran (University of California, San Diego)

Results: Six animals were used per exposure condition with analyses ongoing. Preliminary results indicate that fluorescence is limited to the vessel walls with no appreciable extravasation into surrounding brain tissue in animals exposed as well as sham exposed to the GSM signal. No differences have been observed in animals exposed to either the 4 or 1 W/kg levels of exposure.