Field 6th / Glaser

REPRINTED FROM
SOCIETY FOR NEUROSCIENCE
THIRD ANNUAL MEETING
NOVEMBER 7-10, 1973
PRINTED IN THE U.S.A.

FIRING PATTERN CHANGES INDUCED BY LOW INTENSITY MICROWAVE RADIATION OF ISOLATED NEURONS FROM APLYSIA CALIFORNICA.

H. Wachtel, W. Joines,* R. Seaman* and C. Walker,* Duke University, Durham, North Carolina 27706.

Current standards for safe exposure to microwave radiation (MWR) are based on the belief that only MWR levels which cause tissue heating are of concern; however, some recent studies suggest the possibility of neural effects at much lower levels. In order to explore such effects, we have exposed isolated ganglia from Aplysia Californica to precisely controlled MW fields. In addition to the usual advantages they offer as prototypical neuronal systems, these ganglia are also ideal from the standpoint of MW dosimetry and thermal measurement. Since these ganglia are far smaller than the wavelength of even our shortest MW's, they cause little or no distortion of the MW field, which allows us to mount the ganglion within a strip line and measure the absorbed power (P_a) along with the temperature. For relatively low level MWR (P_a from 10 to 50 milliwatts/cc) and MW frequencies of 1.5 and 2.45 GHz (the latter being the commercial MW oven frequency), the most pronounced effects were seen on the firing rhythm of pacemaker neurons. The bursting neurons (L_2-L_6) were found to be particularly sensitive to the MWR, which often caused a marked decrease in the interburst interval or even a conversion of the bursting pattern to a steady firing mode. For these values of P_a the temperature was seen to increase somewhat (1 or 2°C), but the changes in neuronal firing pattern induced by MWR could not be mimicked by convectively heating the ganglion to the same, or even higher, temperatures. (Supported by contracts FDA 73-35 and NIEHS 72-2094.)

Duke University, Durham, North Carolina 27706

Presented at New York Academy of Sciences
Conference on the Biological Effects of
Non-ionizing Radiation
February 12-15, 1974