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Permeability of the Cochlear Partition Assessed by Electrochemical Potential Changes During Anoxia. T. KONISHI AND A. N. SALT, *Laboratory of Environmental Biophysics, NIEHS, Research Triangle Park, N.C. 27709*

We have previously reported that ionic permeability changes in the endolymph-perilymph barrier are a significant contributing factor to the physiological mechanisms underlying the noise-induced hearing loss. An indirect method of estimating permeability changes is to measure alterations of electro-chemical potentials during anoxia, from which the contribution of passive ion movement can be calculated. This allows differences of permeability of the endolymph-perilymph barrier between normal and noise exposed guinea pigs to be indirectly assessed. The endocochlear potential (EP) and K^+ concentrations of endolymph and perilymph were simultaneously measured in the basal turn of the guinea pig cochlea with a pair of double barreled K^+ selective electrodes.

When anoxia was induced in guinea pigs treated with dihydrostreptomycin or kanamycin, the rate of decline of both EP and chemical potential for K^+ was reduced compared to normal animals. In guinea pigs exposed to broad band noise at 115 dBA for periods ranging from 3 to 17 days, our results indicate that decline of the electrochemical potential is reduced but not to the extent found in guinea pigs treated with ototoxic antibiotics. The K^+ conductance of the endolymph-perilymph barrier calculated from rate of decrease of K^+ concentration of the endolymph and K^+ electrochemical potential difference showed a substantial decrease in noise exposed guinea pigs and ototoxic antibiotic treated guinea pigs, as compared to normal animals.

Part of this report was published in J. Acoust. Soc. Am. 65: S12 (1979).

Exposure of Pregnant Mice to 2.45 GHz Microwave Radiation. D. I. MCREE, *Laboratory of Environmental Biophysics, NIEHS,* AND P. NAWROT, *Environmental Biology Branch, NIEHS, Research Triangle Park, N.C. 27709*

The purpose of this research was to determine the effects of 2.45 GHz microwave radiation on pregnant mice (CD-1 strain) and their developing fetuses. The ages of the mice ranged from 49-55 days and their weights ranged from 27-29 grams at the beginning of the experiment. Separate groups of mice were exposed to 5 mW/cm², 21mW/cm², and 30 mW/cm² incident power density. The specific absorption rates corresponding to each of the exposure power densities were approximately 5.3 mW/g, 22.3 mW/g, and 31.8 mW/g as determined from deep colonic temperature measurements in dead mice. The mice were exposed for 8 hr/day: 4 hr in the morning, 1 hr back in home cages for food and water, 4 hr additional exposure in the afternoon. The 5 mW/cm² exposure group was exposed from day 1 to day 15 of pregnancy. Separate groups of animals were exposed from days 1-6 and days 6-15 for power densities of 21 mW/cm² and 30 mW/cm². Several control groups were used to separate the effects of microwaves and other factors such as elevated temperature and handling. For the 5 mW/cm² exposure group, handled and non-handled control groups were used to determine handling effects. In the 21 mW/cm² and 30mW/cm² groups handled and non-handled control groups were placed in the same environmentally controlled chamber as the exposed groups. In addition, handled and nonhandled elevated temperature control groups were located in a second environmentally controlled chamber. Environmental temperatures were set to simulate the thermal stress produced by microwave exposure. Maternal and fetal response to the different conditions was determined by measuring the following parameters: pregnancy rate, maternal weight gain, number of litters, implantation sites per litter, resorptions, live fetuses per litter, average fetal weight, stunted fetuses, dead fetuses, and malformed fetuses. Visceral and skeletal malformations were determined in all fetuses on day 18 of pregnancy. The results of the experiment show that a significant decrease in pregnancy rate from 86% to 72% was measured due to handling during the early stages of pregnancy (days 1-6). An additional decrease to 65% occurred at exposures to 21 mW/cm² (days 1-6) and to 50% at 30 mW/cm² (days 1-6). A significant decrease in maternal weight gain was measured in all handled groups of animals. No difference was measured between the irradiated handled and temperature handled groups. A significant difference in average fetal weights was measured due to a combination of handling and heating. No significant difference occurred between irradiated handled and temperature handled groups. A significant increase in congenital malformations occurred only at the 30 mW/cm² (6-15 days) exposure. An increase from 1.7% in the temperature handled group to 3.1 percent in the irradiated handled group was measured. Two-thirds of the malformations were cleft plate.

Effects of Microwave Radiation on the Vitality of Isolated Frog Sciatic Nerves. D. I. MCREE, *Laboratory of Environmental Biophysics, NIEHS Research Triangle Park, N.C. 27709* AND H. WACHTEL, *Duke University, Durham, N.C.*

Isolated frog sciatic nerves were exposed in a waveguide system to 2.45 GHz CW microwave radiation at specific absorption rates (SAR's) ranging from 0 mW/g to 100 mW/g. The effect of microwaves on the vitality of the nerves was measured in terms of the ability of the nerves to sustain a high firing rate over prolonged periods without suffering appreciable changes in the characteristics of the compound action potential (CAP). The nerves were stimulated by using twin pulses separated by 5 msec interval at a repetition rate of 50 pulses/sec. For SAR's equal to or greater than 10 mW/g, the exposed nerves were first seen to undergo a prolongation of their refractory period and, while later on in the exposure, severe decreases in the maximal CAP were observed. These effects appear to be microwave-specific, as they were not observed either when the temperature was held constant or when the temperature was increased in the absence of microwaves. The effects also were found to be irreversible as the nerves did not revitalize or increase their activity on terminating the exposure. No significant effects on vitality of the nerves were observed for an SAR of 5 mW/g in this series of the experiments.

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Abstracts

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