Abstracts

In Situ Permittivity of Canine Brain: Regional Variations and Postmortem Changes

E.C. Burdette, P.G. Friederich, R.L. Seaman and L.E. Larsen. "In Situ Permittivity of Canine Brain: Regional Variations and Postmortem Changes." 1986 Transactions on Microwave Theory and Techniques 34.1 (Jan. 1986 [T-MTT]): 38-50.

A new probe-based measurements system was used to study dielectric properties of brain in situ, under conditions of induced physiological and pathological changes. Comparative measurements were made as function of time for 30 min prior to euthanasia and for 90-min post-mortem on the pia, the dura (both normal and anoxic), and in grey and white matter. All measurements were performed at 2450 MHz using a probe of diameter comparable to a 16-gauge hypodermic needle. Both conductivity and dielectric constant gradually decrease with time following CaCl/sub 2/ or KCI injection; however, following CaCl/sub 2/ induced cardiac arrest, values increased transiently upon injection, with subsequent decrease similar to KCI euthanasia. This indicates that the CaCl/sub 2/ injection causes a stronger and more abrupt change in blood flow to the brain, as expected from the different mechanisms by which the K/sup +/ and Ca/sup 2+/ ions cause cardiovascular arrest. Values of dielectric properties in homogenized brain--containing all tissue types--lay within the range of values recorded for different tissue types. Lower values for deeper tissue (white matter) reflect the reduced blood flow in comparison to that of the cortex (grey matter) and possible tissue differences. These regional differences are significant in determining absorption patterns for microwave exposure of the head.

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