

Easy determination of radiation absorption in brain tissue from mobile phones using finite element method

ABSTRACT

Brain tissue plays a significant role in both cognitive and psychomotor behavior of humans. However, their interaction with radiation emanating from hand held mobile devices is still not fully understood. This research was aimed at investigating radiation absorption in brain tissue. Bovine brain tissues ranging from lesser than 1 year to greater than 10 years of age were bought from a specialty store (Sigma-Aldrich). The tissues were used within 72 h of extraction for ex vivo brain experiments. The brain tissue was stored at 6°C and then 16°C for 24 h in the MRI room to reach thermal equilibrium before any experiments were undertaken. The averages for the dielectric constant were measured from 1 - 4 GHz using open ended coaxial probe (OECF) (85,070E; Agilent Technologies). The results obtained for the dielectric properties were then used as raw data in the numerical computation and simulation of the radiation absorption by the brain tissues for both adolescent and adults bovine brain tissue using finite element method (FEM). The measured dielectric constants varied for the different brain tissue from 54.39 to 39.29. Analysis showed that adolescents tissue absorbed more radiation than adults from mobile phoneradiation which is due to the higher dielectric property of adolescent brain tissue. The results obtained can be applied to human brain tissue since bovine shares the same compositional properties with humans.

Keyword: Bovine brain tissue; Dielectric constant; Mobile phones; Coaxial probe; Finite element method

