Modeling of Radiofrequency Nerve Lesioning in Inhomogeneous Media

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Abstract : Radiofrequency (RF) lesioning of nerves have been commonly used to alleviate chronic pain, where RF current preventing transmission of pain signals through the nerve by heating the nerve causing the pain. There are some factors that affect the temperature distribution and the nerve lesion size, one of these factors is the inhomogeneities in the tissue medium. Our objective is to calculate the temperature distribution and the nerve lesion size in a nonhomogenous medium surrounding the RF electrode. A two 3-D finite element models are used to compare the temperature distribution in the homogeneous and nonhomogeneous medium. Also the effect of temperature-dependent electric conductivity on maximum temperature and lesion size is observed. Results show that the presence of a nonhomogeneous medium around the RF electrode has a valuable effect on the temperature distribution and lesion size. The dependency of electric conductivity on tissue temperature increased lesion size.