CANCER DETECTION USING COAGULATION THERAPY WITH COAXIAL ANTENNA

Arpana kumarai[1],Mohammed ali[1],Sakuntala mahapatra[1], Ankita singh[1],Lipsa kanhara[1],Millee panigrahi[1]
[1]National MEMS design centre, Dept of Electronics and Telecommunication engg, TAT,Bhubaneswar-751021.

.

Introduction:Nearly seven lakh Indians die of cancer every year, while over 10 lakh are newly diagnosed with some form of the disease. Microwave coagulation therapy (MCT) has been used as an alternative to resection, and its efficiency has been evaluated in tissue microwave irradiation from a dipole antenna causes water molecules in the dielectric substance to vibrate dramatically at a frequency of 2.45GHz.

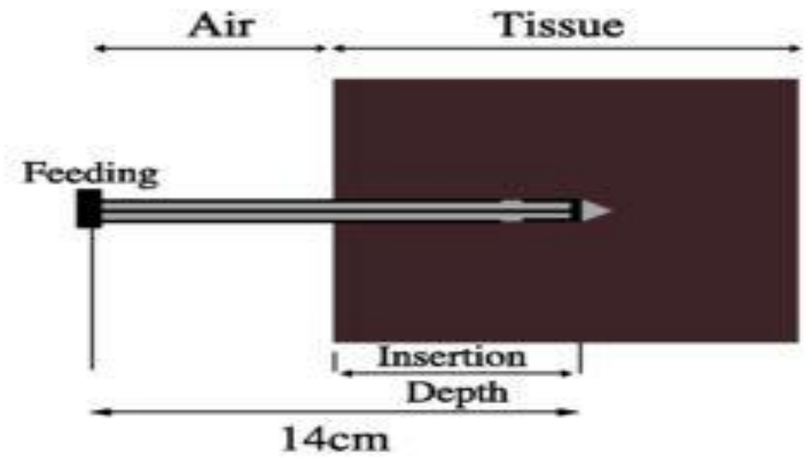

Figure 1. coaxial antenna inserted in tissue

Computational method:An electromagnetic wave propagating in coaxial cable is characterized by transverse electromagnetic fields (TEM). The bio-heat equation describes the stationary heat transfer problem as;

$$\nabla.(-k\nabla T) = \rho_b C_b \omega_{b(T_b - T)} + Q_{met} + Q_{ext}$$

This model neglects the heat source from metabolism.

Results:

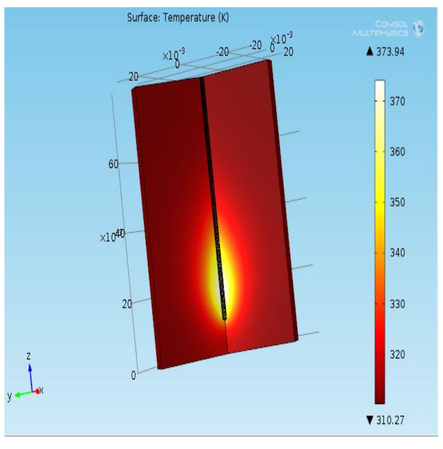

Figure 2. Surface Temperature in the Liver Tissue.

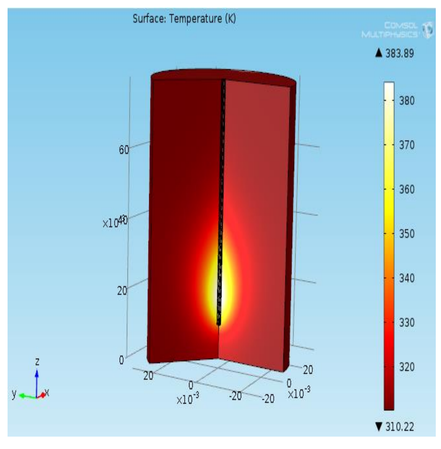

Figure 3. Surface Temperature in the pancreas Tissue.

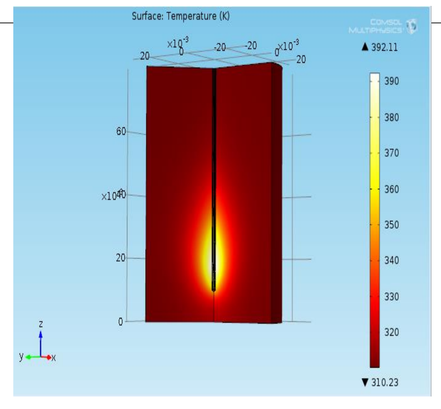

Figure 4. Surface Temperature in the ovarian Tissue

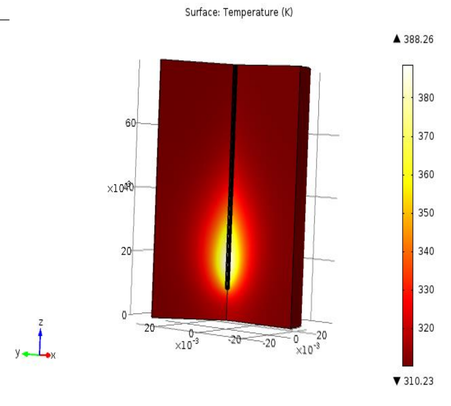

Figure 5. Surface Temperature in the kidney Tissue

Heating power deposited in different tissues is shown below as normalised SAR value:

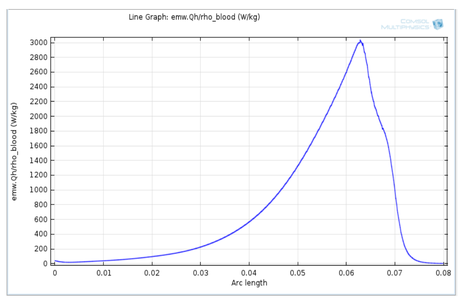

Figure 6. For Liver Tissue.

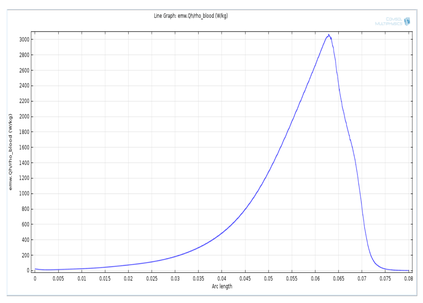

Figure 7. For pancreas Tissue.

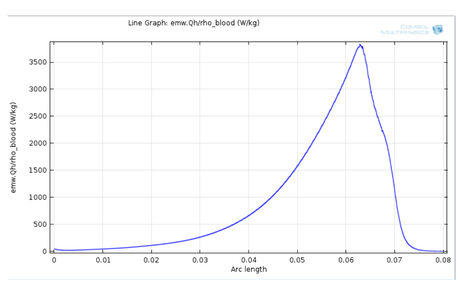

Figure 8. For Ovary Tissue

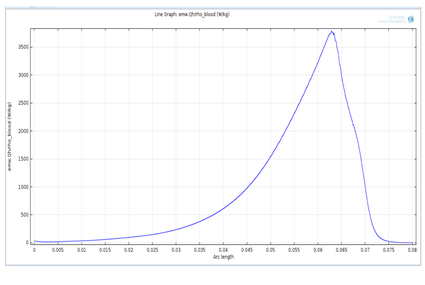

Figure 9. For Kidney Tissue

Conclusions: The temperature is highest near the antenna. A microwave power of 10 W was given as antenna input.IT has been observed that ovary tissue absorbed more power and pancreas tissue absorbed less power than others.IT shows in which type of tissue the given power is mostly utilised and near by area is less affected.

References:

1. Sterzer, F. (2002). Microwave medical devices. IEEE Microwave Magazine, 3(1), 65-70,(2002)
2.Van der Zee J. heating the patient: A promising approach? Annals of Oncology; 13:1173–1184,(2002)