

MEASURED COMPLEX PERMITTIVITY OF FAT TISSUE USING FREE SPACE METHOD

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ABSTRACT This paper introduces a unique focused beam free space technique for the measurement of the complex permittivity of a kidney fat tissue. The free space system is used to illuminate different spots on the tissue sample and the transmission and reflection coefficients of the measured sample are obtained at room temperature. The effective complex permittivity of the fat tissue is computed by averaging. The experimental set up is described and the procedure followed to obtain an effective permittivity data is outlined. The free space measurement are carried out at Ku band in the frequency range from 12 to 18 GHz and then compared with previous reported measurements from literature. A curve fitting routine is implemented based on the least square method to search for the most appropriate values of Cole-Cole fitting model parameters. The results obtained in the current study indicate that there are local variations in the dielectric properties for the same measured sample. These data can be used to interpret the large variability in experimentally measured values of the permittivity for the same tissue type and it can help to reduce further discrepancies in the literature.

KEYWORDS Fat Tissues, Free Space Measurement, Effective Complex Permittivity

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