



RESEARCH ARTICLE

Multi-frequency Measurement of Electrical Bioimpedance of Bone to assess Bone Mineral Density

Mrs. S. Mythili¹, Dr. G. Athisha²

¹Associate Professor, Dept of ECE PSNA College of Engineering & Technology, Dindigul, India

²Professor, Dept of ECE, PSNA College of Engineering & Technology, Dindigul, India

¹ smbme@psnacet.edu.in; ² hodece@psnacet.edu.in

Abstract— The design and implementation of an instrument capable of simultaneously measuring bioimpedance at three different frequencies at a reasonable cost required a novel approach to assess the bone quality. A microampere-level sinusoidal excitation current generator operating at frequencies from 100 Hz to 5 MHz are multiplexed to external electrodes on a leg bone, while impedance signals from pair of electrodes are processed within the instrument. 16-bit A/D converters digitize the analog signal, followed by detection using an original method of non-uniform synchronous under sampling. Instrumentation control, data acquisition and display software were developed in the LabView 7.1 VI environment. This is useful for model development, planning of experiments and for training. The instrument will also be used to assess osteoporosis.

Key Terms: - Bioimpedance; multi frequency measurement; BMD

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