World Academy of Science, Engineering and Technology
International Journal of Biotechnology and Bioengineering
Vol:9, No:09, 2015

Screening Post-Menopausal Women for Osteoporosis by Complex Impedance Measurements of the Dominant Arm

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Abstract : Cole-Cole parameters of 40 post-menopausal women are compared with their DEXA bone mineral density measurements. Impedance characteristics of four extremities are compared; left and right extremities are statistically same, but lower extremities are statistically different than upper ones due to their different fat content. The correlation of Cole-Cole impedance parameters to bone mineral density (BMD) is observed to be higher for a dominant arm. With the post menopausal population, ANOVA tests of the dominant arm characteristic frequency, as a predictor for DEXA classified osteopenic and osteoporotic population around the lumbar spine, is statistically very significant. When used for total lumbar spine osteoporosis diagnosis, the area under the Receiver Operating Curve of the characteristic frequency is 0.875, suggesting that the Cole-Cole plot characteristic frequency could be a useful diagnostic parameter when integrated into standard screening methods for osteoporosis. Moreover, the characteristic frequency can be directly measured by monitoring frequency driven the angular behavior of the dominant arm without performing any complex calculation.

Keywords : bioimpedance spectroscopy, bone mineral density, osteoporosis, characteristic frequency, receiver operating curve
Conference Title : ICBBBE 2015 : International Conference on Biotechnology, Bioengineering and Bioprocess Engineering
Conference Location : Rome, Italy
Conference Dates : September 17-18, 2015