

# **DIAGNOSTIC ACCURACY OF A NOVEL ULTRASOUND-BASED METHODOLOGY FOR SPINAL DENSITOMETRY ON A COHORT OF FEMALE PATIENTS (45-65 Y)**

*Francesco Conversano<sup>1</sup>, Maurizio Muratore<sup>2</sup>, Roberto Franchini<sup>1</sup>, Ernesto Casciaro<sup>1</sup>, Fernanda Chiriaco<sup>1</sup>, Maria Daniela Renna<sup>1</sup>, Antonio Greco<sup>1</sup>, Laura Quarta<sup>2</sup>, Eugenio Quarta<sup>2</sup>, Sergio Casciaro<sup>1</sup>.*

<sup>1</sup>*National Research Council, Institute of Clinical Physiology, Lecce, Italy; <sup>2</sup>O.U. of Rheumatology, "Galateo" Hospital, San Cesario di Lecce, ASL-LE, Lecce, Italy.*

**OBJECTIVE:** To test the diagnostic accuracy of a novel ultrasound (US)-based method to perform spinal densitometry without employing X-rays.

**MATERIALS AND METHODS:** A cohort of 345 female patients was recruited according to the following criteria: 45-65 years, BMI ("body mass index") < 25 kg/m<sup>2</sup>, no severe deambulation impairments, medical prescription for a spinal DXA, signed informed consent. All the enrolled patients underwent two examinations: a conventional spinal DXA (Hologic Discovery) and an US scan of lumbar spine. US data were analyzed by a novel algorithm that processed both echographic images and "raw" radiofrequency signals and calculated the same diagnostic parameters provided by DXA (bone mineral density (BMD), T-score, Z-score). Diagnostic accuracy of obtained results was evaluated through a direct comparison with DXA output as a function of patient age.

**RESULTS:** For 88.1% of the patients US diagnosis (osteoporotic, osteopenic, healthy) was the same of the corresponding DXA one. In particular, diagnostic accuracy showed the following behavior as a function of patient age range: accuracy was 95.0% in 45-50 y, 88.9% in 50-55 y, 92.0% in 55-60 y and 78.6% in 60-65 y. Pearson correlation coefficient (*r*) between DXA and US measurements was also evaluated for each diagnostic parameter (BMD, T-score, Z-score) for patients in the same age range: all the obtained values of *r* were within the interval 0.63-0.84 (*p*<0.001) and their trends against age qualitatively reflected the observed diagnostic accuracy profile.

**CONCLUSIONS:** The proposed US approach to spinal bone densitometry showed a very good agreement with DXA diagnoses. This new non-ionizing method has the potential for being extremely useful for early osteoporosis diagnosis through population mass screenings and for therapeutic outcome monitoring.

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