

## **Strong Diagnostic Agreement Between a Novel Ultrasound-Based Method for Lumbar Densitometry and Dual-Energy X-Ray Absorptiometry**

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**INTRODUCTION:** Currently, osteoporosis is mainly diagnosed through dual-energy X-ray absorptiometry (DXA). However, DXA cannot be used for early diagnoses through population mass screenings because of issues related to ionizing radiation employment. Aim of this study is to perform a preliminary clinical validation of a new ultrasound (US)-based method for vertebral densitometry.

**METHODS:** A total of 270 women were included in this study according to the following criteria: 45-80 years of age, body mass index (BMI)  $\leq 40$  kg/m<sup>2</sup>, no deambulation impairments, medical prescription for a vertebral DXA, signed informed consent. All the enrolled patients underwent two examinations: a conventional vertebral DXA (Hologic Discovery) and an US scan of lumbar spine. US data were analyzed by a novel algorithm that processed both echographic images and corresponding unfiltered "raw" signals and calculated the same diagnostic parameters provided by DXA (bone mineral density (BMD), T-score, Z-score). Diagnostic accuracy of obtained results was assessed through a direct comparison with DXA output as a function of patient age and BMI.

**RESULTS:** For 87.0% of the patients US diagnosis (osteoporotic, osteopenic, healthy) was the same of the corresponding DXA one. Specifically, diagnostic accuracy was 87.7% for patients with BMI in the range 25-40 kg/m<sup>2</sup> (n = 114) and 86.5% for those with BMI < 25 kg/m<sup>2</sup> (n = 156), with maximum (88.6%) and minimum (78.7%) accuracy in the age range 61-65 yr and 45-50 yr, respectively. All the obtained values of Pearson correlation coefficient (r) between diagnostic parameters provided by DXA and US for patients in the same age and BMI ranges were within the interval 0.72-0.91 (p < 0.001).

**CONCLUSIONS:** We proposed an innovative method for US evaluation of BMD directly on the spine which showed a strong and significant agreement with DXA diagnoses. This technique has the potential to revolutionize the approach to osteoporosis diagnosis.