Osteoporotic fractures are one of the major worldwide problems in terms of mortality, disability and healthcare costs. The key to reduce the occurrence of fragility fractures would be an earlier osteoporosis diagnosis through population mass screenings. The currently accepted “gold standard” method for osteoporosis diagnosis is represented by the evaluation of bone mineral density (BMD) of spine and femur through dual-energy X-ray absorptiometry (DXA). However, because of high costs and issues related to X-ray employment, DXA cannot be used for screening purposes. We investigated the possible clinical feasibility and accuracy of an innovative ultrasound (US) method for diagnosis of osteoporosis of the spine. A total of 303 recruited female patients (aged 65–80 y, body mass index (BMI) < 25 kg/m²) underwent two different diagnostic investigations: a conventional spinal DXA and abdominal echographic scanning of the lumbar spine, performed with the ECHOS echographic device (Echolight s.r.l., Lecce, Italy), configured for the acquisition of both echographic images and unfiltered radiofrequency signals. US images and radiofrequency signals were analyzed via a new fully automatic algorithm that performed a series of spectral and statistical analyses, providing a novel diagnostic parameter called “Osteoporosis Score” (O.S.). If dual X-ray absorptiometry is assumed to be the gold standard reference, the accuracy of O.S.-based diagnoses was 83.8%, with Cohen’s $k = 0.752$ ($p < 0.0001$). Significant correlations were also found between US-O.S. and DXA-BMD values in single age intervals: $r = 0.76$ in 65-70 y, $r = 0.72$ in 70-75 y, $r = 0.75$ in 75-80 y ($p<0.001$ for all). The diagnostic agreement between O.S. and DXA resulted to be very good, although it was slightly inferior to recently published data on O.S. measurements in younger patients [1]: this can be at least partially attributed to degenerative changes in the lumbar spine region, which may affect the accuracy of DXA scan.

### Results

For 83.8% of the patients US diagnosis was the same of the corresponding DXA one ($k = 0.752$, $p<0.0001$). Significant correlations (see Figures below) were also found between O.S. and BMD values in single age intervals: $r = 0.76$ in 65-70 y, $r = 0.72$ in 70-75 y, $r = 0.75$ in 75-80 y ($p<0.001$ for all). The diagnostic agreement between O.S. and DXA resulted to be very good, although it was slightly inferior to recently published data on O.S. measurements in younger patients [1]: this can be at least partially attributed to degenerative changes in the lumbar spine region, which may affect the accuracy of DXA scan.