Ultrasound velocity through the cortex of phalanges, radius, and tibia in normal and osteoporotic postmenopausal women using a new multisite quantitative ultrasound device


Department of Medical Physics, University of Crete, Faculty of Medicine, Iraklion, Greece

RATIONALE AND OBJECTIVES:
To assess a new multisite quantitative ultrasound (QUS) device (Sunlight Omnisense 7000 S) suitable for the measurement of speed of sound (SOS) in the phalanges, radius, and tibia.

METHODS:
The study group consisted of 270 healthy Caucasian postmenopausal patients (mean age: 60.0 +/- 7.6 years) and 53 Caucasian postmenopausal patients (mean age: 67.2 +/- 7.4 years) with osteoporotic fractures. Measurements of SOS and bone mineral density (BMD) were carried out in all subjects.

RESULTS:
Intraobserver in vivo short-term precision was on average 0.76% for the radius, 0.47% for the tibia, and 1.54% for the phalanges. The interobserver precision ranged from 0.77% to 2.39%. Measurements of SOS at the 3 skeletal sites were significantly correlated (r = 0.28-0.44; P < 0.001). Significant correlations were found between SOS at all sites and BMD (r = 0.21-0.41; P < 0.001). The odds ratio for fracture prediction for SOS was 1.47 for tibia, 1.69 for radius, and 2.69 for phalanx. The corresponding odds ratios for BMD at the lumbar spine, femoral neck, and total hip ranged from 2.08 to 3.26. The area under the receiver operating characteristic curve ranged from 0.611 to 0.741 for SOS measurements and from 0.745 to 0.797 for BMD measurements.

CONCLUSIONS:
The Omnisense multisite QUS device exhibits reproducible performance. Among the QUS variables, the phalangeal SOS provides the best discrimination of fracture patients.