

A New Method For Quantitative Ultrasound Measurements At Multiple Skeletal Sites - First Results Of Precision And Fracture Discrimination

Reinhard Barkmann¹, Edvard Kantorovich³, Chaim Singal³, Didier Hans², Harry K Genant², Martin Heller¹, Claus-Christian Glüer¹

¹*Osteoporosediagnostik Kiel, Radiologische Diagnostik Kiel, CAU Kiel, Germany,* ²*Osteoporosis and Arthritis Research Group, Department of Radiology, University of California, San Francisco,* ³*Sunlight Ultrasound Technologies LTD, Rehovot, Israel*

Abstract

We investigated a new multi-site Quantitative Ultrasound device that measures the acoustic velocity in axial transmission mode along the cortex. Using a prototype of the Omnisense (Sunlight Ultrasound Technologies, Rehovot, Israel) we tested the performance of this instrument at 4 sites of the skeleton: radius, ulna, metacarpal and phalanx. Intra-observer (inter-observer) precision errors ranged from 0.2% to 0.3% (0.3% to 0.7%) for triplicate measurements with repositioning. Fracture discrimination was tested by comparing a group of 34 women who had previously suffered a fracture of the hip, spine, ankle, or forearm to a group of 28 healthy women who had not suffered a fracture. Age adjusted standardized odds ratios ranged from 1.6 to 4.5. Except for the ulna the sites showed a significant fracture discrimination ($p < 0.01$). The areas under the ROC-curves were from 0.88 to 0.89 for radius, metacarpal and phalanx. A combination of the results from the three sites showed a significant increase of the ROC area to 0.95 ($p < 0.05$). Our results show promising performance of this new device. The ability to measure a large variety of sites and the potential to combine these measurements are promising with regard to optimizing fracture risk assessment.

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