

The Importance of Precision-New Hopes for Monitoring Osteoporosis Treatment by QUS

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The use of quantitative ultrasound (QUS) measurement in the diagnosis of osteoporosis is growing. The role of QUS still requires the definition of diagnostic criteria and not less important a proof for treatment monitoring capability.

A short-term precision of SOS measurements of the Sunlight Omnisense? [Omnisense], an ultrasound device that measures speed of sound (SOS) at multiple sites, was determined by three operators, each performing repeated measurement after repositioning in 15 women age 20-70. The data obtained indicates intra-operator measurement CV of 0.40% at the Distal 1/3 Radius (RAD), 0.45% at the Mid-Shaft Tibia (TIB), 0.66% at the Metatarsal V (MTR) and 0.81% at the Proximal Phalanx III (PLX). Computed in T-score units, the intra-operator precision is 0.16, 0.18, 0.12 and 0.20 for the RAD, TIB, MTR and PLX respectively. The Inter-operator CV was 0.8% at the RAD, 1.3% for the TIB, and 1.4% at the MTR and the PLX. RAD, TIB, MTR and PLX range-normalized standardize precision sCV was 3.3%, 3.3%, 3.0% and 4.5% respectively. Within the Caucasian population, following menopause (age group 54-61), SOS declined sharply at an annual rate of 16, 35, 37 and 13 m/sec for the RAD, PLX, MTR and TIB respectively. Largest annual decline was 16 m/sec/y for the RAD, 35 m/sec/y for the PLX, 37 m/sec/y for the MTR and 13 m/sec/y for the TIB. This rate is close to the short-term CV, and could be used to compute the Monitoring Time Interval ($\approx 2.8 \times \text{Precision SD/Rate}$) or the Trend Assessment Interval ($\approx 1.8 \times \text{Precision SD/Rate}$). We conclude that the time interval between SOS measurements in normal women in this age range who do not have a bone-affecting disease and are not treated with bone affecting drugs should be at least two year apart. Only then, a meaningful change of at least two SD units could be expected.

Prospective studies to investigate the monitoring capability of the Omnisense are currently being performed.

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