

Quantitative Ultrasound (QUS): Intra and Inter Precision in a Multi-Center Study Against its Potential Monitoring Ability.

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There is a growing interest in the use of QUS measurement in the management of Osteoporosis. However, one of the major criticism of the QUS compared to the DXA technology is the lack of definition of diagnostic criteria and not less important a proof for treatment monitoring capability. The objective of this multi-center study is to determine the precision and monitoring ability indicators of the device, as measured at the distal 1/3 Radius and proximal Phalanx III.

Sixty five women (mean age 40 years ranging from 20 to 60 years old) were recruited in 4 different centers. Speed of sound (SOS) at multiple sites, was assessed at each centers by two operators, each performing repeated measurement after repositioning according to the same stringent protocol and using the Sunlight Omnisense™ (Omnisense). Additionally, precision was also assessed in a sub-group of 19 age-matched women at the calcaneum (CA) using the Hologic Sahara® Device.

Beside the average short-term precision (intra and inter-operators) of SOS measurements, we also calculated change and monitoring indicators such as the Least Significant Change (LSC), Trend Assessment Margin (TAM), Monitoring Time Interval (MTI) and Trend Assessment Interval (TAI).

The data obtained indicates intra-operator measurement combined CV of 0.52% at the Distal 1/3 Radius (RAD), 0.78% at the Proximal Phalanx III (PLX), 0.22 % and 3.04 % for the calcaneum (CAL) SOS and BUA respectively. The Inter-operator CV was 1.1% at the RAD, 1.8% at the PLX, 0.37% and 4.2 % for the CAL SOS and CAL BUA respectively.

Skeletal Site	Response Rate (%) [*]	Precision Error (%)	Change Criteria (%)		Follow-up times (years)	
			TAM	LSC	TAI	MTI
RAD SOS	0.39	0.52	0.94	1.45	2.4	3.7
PLX SOS	0.89	0.78	1.40	2.18	1.6	2.5
CAL SOS	0.08	0.22	0.40	0.62	4.95	7.7
CAL BUA	0.74	3.04	5.47	8.51	7.4	11.5

* Response rate (average change per annum) was computed for the post menopausal age, 55-59.

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 to four years apart but not at the calcaneum in our study, where at least five years are required. Only then, a meaningful change of at least two SD units could be expected.

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