

Comparison of inter-site bone densitometry measurements, and the short-term precision of two bone quantitative ultrasound scanners.

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Background and Purpose.

The use of quantitative ultrasound [QUS] has become a widely accepted method of assessing human bone in-vivo. However it is mainly seen as a screening tool, which can assist in the management of osteoporosis. The rate of bone loss varies depending on both sex and the age of the patient, normal changes in bone occur at a rate of about 0.5-2% per year for most adults; however this can increase to 2-5% in early postmenopausal women.^[1] The purpose of the study was firstly, to calculate the short term-precision of two scanners, within a healthy group and a group considered to have a risk factor for osteoporosis. The risk factor group contained both healthy and osteoporotic individuals. The second purpose was to investigate the relationship between different measurement sites around the body. The two QUS devices used in this study are the Sunlight Omnisense [Sunlight Ultrasound Technologies Ltd., Rehovot, Israel.] and the CUBA Clinical [McCue Plc., Winchester, UK].

Materials and Methods.

The short-term precision was calculated using the guidelines laid out by C.-C.Gluer et al. [1995]^[2]. The healthy group consisted of 16 individuals, [10 males aged 25–58, and 6 females aged 25-58], four repeated scans were performed on each individual. The risk group consisted of 60 females aged between 33 and 80, with two measurements performed on each individual.

The inter-site correlation was calculated by comparison of the results of the risk group, at the different measurement sites, around the body.

Results.

Table 1. Short-Term Precision.

Short-Term Precision	Sunlight Omnisense		
	Distal Radius	Proximal Phalanx	Mid-Shaft Tibia
Risk Group	0.64%	0.98%	0.65%
Healthy Group	0.29%	0.55%	N/A

Short-Term Precision	CUBA Clinical	
	BUA	VOS
Risk Group	3.24%	0.12%
Healthy Group	2.88%	0.31%

Table one shows that the precision differed depending on the group. The healthy group showed better precision compared to those of the Sunlight Omnisense manufacturers guidelines and the previously published precision.^[3,4] The risk group

however showed lower precision than both the manufacturers guidelines and the previously published data.

In both groups the CUBA Clinical showed an inferior precision than supplied by the manufacturers, however the results were comparable to those reported in previous studies.^[5,6]

Table 2 Inter-site Correlations.

	Distal Radius	Proximal Phalanx	Mid-Shaft Tibia
Proximal Phalanx	0.567**		
Mid-Shaft Tibia	0.484**	0.261*	
BUA Calcaneus	0.441**	0.525**	0.338*
VOS Calcaneus	0.410**	0.532**	0.360*

*p<0.05, **p≤0.001

The results in table two showed a weak but statistically valid relationship between the different sites around the body, with the best being between the distal radius and proximal phalanx [r=0.567, p<0.001], and the worst being between the proximal phalanx and the mid-shaft tibia [r=0.261, p=0.046]

Conclusions.

The conclusions of this study are that greater care must be taken when measuring patients suspected of osteoporosis, to ensure the precision of the results. The correlation of bone sites shows that ultrasound is suitable for assessment of bone status within the population, but should be used as a screening tool and not as a definitive answer of a patients bone status.

Acknowledgements.

Funding was provided by the department of transport, through the BOSCOS project.

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⁴ W.M.Drake et al. Journal of Clinical Densitometry. 2001, Fall; Vol.4, No.3: p.239-248.

⁵ W.C.Graafmans et al. Bone. 1996, August; Vol.19, No.2: p.97-100

⁶ S.L.Greenspan et al. Journal of Bone and Mineral Research. 1997; Vol.12, No.8: p.1303-1313.