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Letter to the Editor

Standardization of Measurements for Assessing BMD by DXA

In a recent article, Genant et al. [1] published the results of a trial sponsored by the dual X-Ray absorptiometry (DXA) manufacturers Hologic, Lunar, and Norland to provide the basis for the standardization of measurement units used for the assessment of bone mineral density (BMD) by DXA. In a meeting of the Committee for Standards in DXA held during the annual meeting of the Radiological Society of North America in Chicago on November 30, 1994, the Committee gave final approval to the standardization of postero-anterior (PA) spine BMD measurements by DXA, as published by Genant et al.

In brief, effective September 1, 1995, all participating manufacturers will provide an option on newly shipped instruments which will permit users to select between spine BMD being reported with either the traditional, manufacturer-specific units in g/cm^2 or the standardized, nonmanufacturer-specific units in mg/cm^2. New systems will be configured to report standardized units by default. Upon request, software will be available from the manufacturers for upgrading existing instruments to provide the standardized units option.

The equations used to convert existing units (g/cm^2) into standardized units (mg/cm^2) for PA spine (L2-L4) BMD are as follows:

For Hologic instruments:

$$sBMD = 1000[BMD_{Hologic} \cdot 1.0755]$$

For Lunar instruments:

$$sBMD = 1000[BMD_{Lunar} \cdot 0.9522]$$

For Norland instruments:

$$sBMD = 1000[BMD_{Norland} \cdot 1.0761]$$

Spine BMD values obtained by scanning a patient on any one of these manufacturers instruments should fall within 2–5% of each other. These equations were determined such that, on average, the central vertebra of the ESP [2] reads 1000 mg/cm^2 on all scanners. However, the Committee for Standards in DXA does not endorse a single phantom for the determination of standardized units. The Committee believes that the equivalence of new DXA scanner types cannot be established by measuring a single object, regardless of whether that object is a phantom or a single patient. For that purpose, a study similar to the one described by Genant must be performed *in vivo* on individuals spanning the clinical range of BMD. Different phantoms are available from different manufacturers which, when used in accordance with manufacturers' directions and specifications, can serve to verify instrument calibration and stability.

The Committee for Standards in DXA will continue its work to expand standardization to other anatomical sites assessed by DXA and will report periodically on its progress using Letters to the Editor as a means of communication.

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References

1. Genant HK, Grampp S, Glüer CC, et al. (1994) Universal standardization for dual x-ray absorptiometry: patient and phantom cross-calibration results. J Bone Miner Res 9:1503–1514
2. Kalender WA, Felsenberg D, Genant HK, Fischer M, Dequeker J, Reeve J (in press) The European spine phantom: a tool for standardization and quality control in spinal bone mineral measurements by DXA and QCT. Eur J Radiol