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**Best Abstract — Clinician**

148 *Thomas N. Hangartner, PhD*
IMPACT OF LONG-TERM PRECISION ON LEAST SIGNIFICANT CHANGE

**Best Abstract — Technologist**

111 *Patricia Garrett, RT, CDT*
PRECISION SHOULDN'T STOP WITH SCAN ACQUISITION

# Best Abstracts
# Best Abstract – Clinician
# Best Abstract – Technologist

**Abstracts**

**Title:** **148 — IMPACT OF LONG-TERM PRECISION ON LEAST SIGNIFICANT CHANGE**

**Author:** ***Thomas N. Hangartner, Ph.D.*** Professor of Biomedical Engineering, Medicine OH USA

ISCD recommendations require the local establishment of limits for the least significant change (LSC) based on repeat patient measurements. These repeat measurements are performed over a short time period when scanner drifts or maintenance/repair related changes are unlikely to occur.

The ISCD recommendations on how to handle changes due to maintenance/repair foresee contacting the manufacturer for service/correction in the case phantom measurements result in a higher than 1% change in BMD. In practice, changes considerably higher than 1% have been observed over a 3-year period in some scanners despite the manufacturer s corrective action.

We studied the percentage of patients classified wrongly as having a BMD change assuming various levels of LSCs combined with uncorrected scanner-induced shifts in BMD values. For instance, for an established LSC of 2.8% (1% precision), a 1% scanner shift would result in 11% of patients being misclassified although they had no actual BMD change. With lower levels of LSC, the number of misclassified patients increases. With an LSC of 2.1% (0.75% precision), the same 1% scanner shift would result in 16% of patients being misclassified.

If we assume a manufacturer service standard that attempts to calibrate the BMD values within ±1%, it would allow the possibility for changes up to 2%; a service standard of ±2% would allow changes up to 4%. Such service standards permit even larger numbers of misclassified patients.

We recommend that the recalibration limits be assessed for the various scanner models in use and that the site-specific LSCs be appropriately increased.

**Title:** **111 — PRECISION SHOULDN'T STOP WITH SCAN ACQUISITION**

**Authors:** ***Patricia Garrett,*** Radoliogy Technologist, Helen Hayes Hospital, West Haverstraw, NY New York USA; Elizabeth Vasquez, Helen Hayes Hospital; Kelly Doherty, Helen Hayes Hospital; Robert Lindsay, Helen Hayes Hospital; Jeri Nieves

The accuracy of DXA and the impact of positioning errors on DXA results have been published. However, emphasis for DXA scan analysis is placed on the auto analysis features, with little operator intervention. The aim of this study is to determine the impact on DXA results of various potential errors during analysis. Errors while using auto-analysis software can have an impact on BMD results, particularly in the osteoporosis-range. In the spine analysis (n=57 Lunar; n=86 Hologic), errors in the auto analysis include the placement and angulation of the intervertebral markers and problems in bone mapping, where large areas are sometimes automatically excluded. BMD of the spine was different when the bone mapping was adjusted to account for auto-analysis errors using Hologic ($p=0.09$) with no difference by Lunar. In the hip analysis (n=24 Lunar; n=34 Hologic), errors in auto analysis result from incorrect placement of the femoral neck box (e.g. soft tissue should be contained in both ends) and improper bone mapping. These errors changed Lunar DXA BMD results, where the auto analysis placed the femoral neck box to include a portion of the greater trochanter or ischium and manual adjustment led to significant differences in bone area and BMD for the femoral neck and total hip ($p<0.01$), whereas there was no change by Hologic. Emphasis needs to be placed on what is considered a good analysis, based on each manufacturer s guidelines, and what potential errors commonly occur. DXA operators can then correct the automated systems when necessary.