**Merging of Computer-extracted Radiographic Features with Clinical Data in the Prediction of Bone Strength**

The purpose of this study is to develop models for predicting bone strength from computer-extract radiographic texture features, BMD measures, and patient clinical data.

A direct exposure technique was used to radiograph femoral neck specimens using a high resolution film. Films were digitized with 0.121-mm resolution and 10-bit quantization. Bone mineral densitometry (BMD) measurements were performed on the specimens using a Lunar DPX scanner. Specimens underwent compressive strength testing to determine their actual strength. Texture analysis was performed on regions of interest (ROI) selected from the medial portion of the femoral neck. Texture analysis methods included Fourier-based methods in which the RMS variation and first moment of the power spectrum (FMP) were calculated. Texture features, BMD measurements, and patient clinical information were combined using linear discriminant analysis. ROC analysis was used to evaluate the ability of the individual features and the output from the linear discriminant analysis to discriminate between strong and weak bone.

Linear discriminant analysis with three features (BMD, FMP, and age) achieved an area under the ROC curve (Az) of 0.83 while BMD achieved an Az of 0.75 in the task of distinguishing between strong and weak bone

Texture analysis of radiographic bone patterns, combined with BMD and patient information using linear discriminant analysis may aid in predicting bone strength.

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