Multi-Site Validation of OsteoSight™: An Artificial Intelligence Tool for Opportunistic Detection of Low Bone Mineral Density Using Simple Radiographs

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INTRODUCTION:
Osteoporosis and osteopenia commonly remain undiagnosed in older adults due to fragmented workflows and limited access to dual-energy x-ray absorptiometry (DXA). This creates missed opportunities for early intervention, especially in patients already undergoing X-ray imaging. This study assesses the clinical performance of *OsteoSight™*, an AI-driven tool that estimates bone mineral density (BMD) from routine hip and pelvic radiographs. The objective was to evaluate the diagnostic accuracy and reproducibility of *OsteoSight™* compared to the clinical gold standard in a large, diverse patient population.

METHODS:
We analyzed de-identified hip and pelvic X-rays and DXA T-score of the femoral neck of 2,458 patients across seven independent U.S. imaging centers. Patients with a DXA T-score below -1.0 SD (prevalence 67.7%) were categorized as having low BMD. Area under receiver operating characteristic curve (AUROC), specificity and sensitivity with 95% confidence intervals were calculated. Subgroup analyses for relevant clinical confounders and reproducibility testing were also conducted.

RESULTS:
OsteoSight™ demonstrated an AUROC of 0.836 (0.819-0.853), specificity of 0.942 (0.922–0.961), and sensitivity of 0.448 (0.387–0.500). The observed agreement in repeat measurements was 84%. The tool maintained consistent performance across subgroups stratified by age, sex, ethnicity and BMI, and X-ray hardware manufacturer.

DISCUSSION AND CONCLUSION:
OsteoSight™ provides an accurate, precise, and scalable method for identifying patients with low BMD using routine radiographs. This robust, high-specificity performance across real-world imaging data supports integration into clinical workflows for opportunistic detection with minimal false positives, enabling orthopedists to confidently flag at-risk patients for further evaluation without overwhelming clinical resource. This could enhance case-finding for early diagnosis and intervention, improving outcomes for patients at elevated risk of fragility fracture.

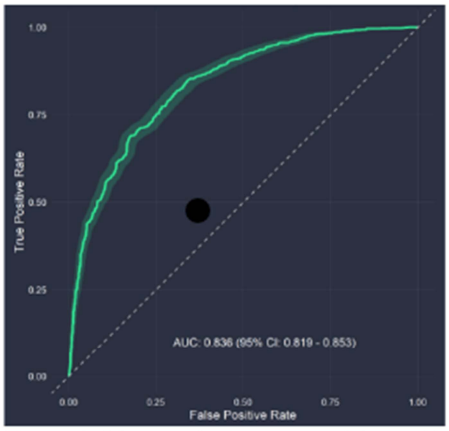

Figure 1. Diagnostic Accuracy of OsteoSight compared to DXA. Area under the curve (AUC), confidence interval (CI).