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Oral Presentation

Exploring the Use of Computer-Aided Imaging for HER2 Immunohistochemistry Scoring in Breast Cancer: A Single-Center Experience in a Developing Country

Josh Matthew B. Chen, Steffanie Charlyne A. Tamayo, Manuelito A. Madrid

Institute of Pathology, St. Luke's Medical Center – Quezon City



ABSTRACT

Background. Contemporary breast cancer treatment relies on precise diagnostic categorization for tailored therapy. HER2 status, assessed using immunohistochemistry (IHC), is a key biomarker guiding the choice for the antibody-drug conjugate trastuzumab deruxtecan, which is effective even in HER2-low/ ultralow breast cancer (defined as HER2 IHC score 0+, 1+ or 2+ without ISH amplification). While manual slide interpretation of IHC is subjective and prone to inter- and intra-observer variability, digitization potentially enables computer-assisted image analysis to improve accuracy. However, implementation and infrastructure barriers persist, especially in low- to middle-income countries such as the Philippines.

Objective. This study evaluated the concordance between manual and AI-assisted HER2 IHC scoring at St. Luke's Medical Center – Quezon City (SLMC QC) and identified areas of discrepancy and their possible causes.

Methodology. This retrospective study included all Invasive Breast Carcinoma, No Special Type (IBC, NST) tumors diagnosed on core needle biopsy and with HER2 IHC performed in SLMC QC from January 1 to December 31, 2024. Original HER2 IHC slides were independently scored by two breast pathology consultants; consensus results served as the ground truth. Slides were digitized using Microvisioner, and three regions of interest (with ≥ 100 tumor cells) selected by a senior breast pathologist were analyzed using an AI-based image deconvolution algorithm to produce computer image-enhanced HER2 scores. After a minimum of two-week washout, the senior breast pathologist re-evaluated the digitized slides with AI-generated outputs to derive the Computer Image-Enhanced (AI-Assisted) Scores. Concordance between ground truth and AI scores was then assessed.

Results. A total of 161 HER2 IHC slides from patients with invasive breast carcinoma were evaluated. Manual and AI-assisted scoring showed an overall percent agreement of 65.22% and a Cohen's kappa of 0.53, indicating moderate concordance. Weighted analysis demonstrated markedly higher alignment (95.10% agreement; kappa 0.85, almost perfect). Discrepancies were most common among manual scores of 0 to 2+, largely driven by background staining, whereas manual score 3+ classifications remained highly consistent with AI output.

Conclusion. The study supports the emerging role of AI as a valuable complementary tool in HER2 interpretation. With proper validation and integration, AI-assisted image analysis can strengthen standardization in HER2 assessment, improving precision in patient care especially in resource-limited settings.

Key words. breast, HER2, artificial intelligence