

Augmented Reality Microscopy (ARM)

Utility for Measuring Breast Tumor Size, Distance to Margin and Lymph Node Metastases

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Introduction: Pathology reports about breast carcinoma require pathologists to accurately measure tumor size, distance to surgical margins, and the size of lymph node metastases. This study aimed to assess whether novel Augmented Reality Microscopy (ARM) was easier to use and more accurate to obtain these measurements compared to using a ruler with a Manual Optical Microscope (MOM) and annotation with Whole Slide Imaging (WSI).

Materials and Methods: Thirty archival cases of breast cancer were reviewed including 10 invasive ductal carcinomas (IDC), 10 with ductal carcinoma in situ (DCIS), and 10 with lymph node metastases. All measurements were compared in the same manner using MOM (Olympus BX43 light microscope), ARM (Augmentiqs) and WSI (ImageScope viewer, Leica). Concordance was defined as ≤ 0.2 mm difference.

Results: All (100%) cases showed concordance between ARM and WSI measurements, and 80% showed concordance between MOM and WSI. Measurements ≤ 0.5 mm were most challenging with the MOM method, especially at 20x magnification. At low magnification (2x and 4x) WSI measurements were most challenging. MOM measurements were most time-consuming, while ARM was the fastest method followed by WSI.

Conclusion: ARM required no prior digitization of slides, was easy to use and quicker than MOM, and was as accurate as WSI when measuring breast tumor size, distance to margins, and size of lymph node metastases.