

STEREOSCOPIC VIEWING OF TOMOSYNTHESIS PROJECTION IMAGES

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Rationale: We investigated the feasibility of viewing breast tomosynthesis projection images using a stereoscopic display. The imaging geometry of tomosynthesis lends itself to stereoscopic visualization. Stereoscopic visualization has the potential to reveal the true 3D structure of the breast, unlike cine or slice-by-slice viewing modes.

Methods: Tomosynthesis data were provided to us by Hologic, Inc. (Bedford, MA, USA). Each case comprised 15 projections, which spanned an angular range of 15 degrees. A stereoscopic pair was formed by selecting two projections that were approximately ± 4 degrees apart from the zero angle projection. We used 47 craniocaudal stereoscopic pairs in this study. The contrast of each pair was adjusted such that the two images had identically shaped gray level histograms. The stereoscopic pairs were displayed on a Planar PL2010M stereoscopic display (Planar Systems, Inc., Beaverton, OR, USA). The 47 cases consisted of 23 biopsy proven masses and 24 normals. An experienced radiologist who did not participate in the reader study verified the truth for each case stereoscopically. Two experienced mammographers participated in the study (blind, randomized cases) as readers after passing the Randot stereo acuity test. The readers rated their ability to perceive 3D information on a scale of 1-3 and also reported the location of the most suspicious abnormality.

Results: The two readers perceived moderate or excellent 3D information in 89% and 93% of the cases. Moreover, there was fairly good agreement between the readers in 3D perception. The sensitivities achieved by the two readers in abnormality detection were 86.9% and 91.3%, while the specificities achieved were 79.1% and 83.3%.

Conclusions: Stereoscopic display and interpretation of tomosynthesis projection images is possible. Readers with normal stereo acuity can achieve moderate to excellent 3D perception of breast structures.

Acknowledgement: We appreciate the support of Hologic, Inc. in this project.