Comparative Analysis of Mammography and Tomosynthesis Efficacy in White and Black Patients at UMC

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BACKGROUND

- **Breast cancer is the most common cancer worldwide**, accounting for 11.7% of all new cancer cases in 2020.
- Digital 2D mammography is the current standard of care, with sensitivity ranging between 63-98%, but limited to certain types of breast cancer.
- Digital breast tomosynthesis (DBT), 3D mammography, has been shown to reduce false positives, which can occur when overlapping tissue in 2D mammography creates the illusion of a mass or lesion.
- The potential benefits of better detection earlier with DBT may outweigh the risk of increased radiation exposure in DBT.
- Ideally, screening with DBT will improve cancer detection compared to standard 2D mammography.

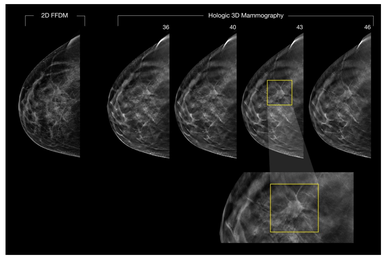

Figure 1. 2D vs 3D mammography. Traditional mammography creates a two-dimensional image. 3D mammography creates a series of imaging slices at different levels of the breast. This allows breast imaging specialists to view each slice and detect breast cancer that can be hidden where the tissue overlaps on a 2D image.

PRIMARY OBJECTIVE

To evaluate the sensitivity and positive predictive value of 2D mammography and DBT in detecting breast cancer in and underserved and predominantly minority population in Louisiana.

METHODS

- **Using Epic SlicerDicer function, identified 45,475 subjects who underwent either 2D or DBT screening between January 21, 2020, and Jan 1, 2021 at UMC.**
- Excluded patients less than 18 years of age.
- 30,843 patients received 2D mammography and 14,632 patients received DBT screenings.
- Patient Demographics:
  - 18,924 white
  - 22,465 black
  - remaining “other”
- **SlicerDicer was used to pull true positive, true negative, false positive, and false negative results with 2D mammogram and DBT screens for each race category.**
- This data was then used to calculate the sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of 2D mammography and DBT.
- Patient’s charts were not reviewed directly; all information was pulled using SlicerDicer.

RESULTS

White	2D	DBT	Variance
Sensitivity	81.5%	76.9%	4.6%
Specificity	90.9%	94.2%	3.3%
PPV	8.0%	15.6%	7.6%
NPV	99.8%	99.7%	0.1%

Black	2D	DBT	Variance
Sensitivity	89.2%	92.5%	3.3%
Specificity	90.6%	92.2%	1.6%
PPV	9.5%	22.0%	12.5%
NPV	99.9%	99.8%	0.1%

Table 1. Sensitivity, specificity, PPV, NPV, and the variance was determined for 2D and DBT mammography in black and white women at UMC from 1/21/20-1/1/21.

DISCUSSION

- DBT has a lower false positive rate and higher true positive rate, as evidenced by higher specificity and higher PPV, in white and black women.
- The PPV of DBT is two times greater than the PPV of 2D in both white and black women.
- The sensitivity of DBT in white women is significantly lower than in black women.
- Both 2D and DBT are not reliable for accurately predicting the absence of malignant breast tissue in both white and black women.
- **Overall, data suggests that DBT could be the stronger option to accurately rule in and detect the presence of malignant breast tissue.**

CONCLUSION

- **Digital breast tomosynthesis has the potential to be the new gold standard for breast cancer screening.**
- Future studies can explore the ability of tomosynthesis to detect breast cancer at an earlier stage, compared to 2D mammography.
- Notable constraints of this data evaluation are SlicerDicer's inability to investigate further the patient's medical history, including information on family history, TNM, histology, clinical stage, pathologic stage, and use of neoadjuvant chemotherapy.
- A targeted chart review will be necessary to obtain these parameters for further analysis.

References:

1. R. Hong, B. Xu, Breast cancer: an up-to-date review and future perspectives. Cancer Communications 42, 913-936 (2022).

2. J. R. Hawley et al., Diagnostic Accuracy of Digital Breast Tomosynthesis in the Evaluation of Palpable Breast Abnormalities. Acad Radiol 25, 297-304 (2018).