Patient Specific Mean Glandular Dose Estimated From Full Field Digital Mammography And Digital Breast Tomosynthesis

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Background

- As breast is **radiosensitive**, it is essential to keep mean glandular dose (MGD) as low as reasonably achievable.
- **Patient specific MGD** measurement enable radiologists and radiographers to be aware of the MGD received by each **individual woman**.
- MGD estimation is **dependent on breast density**.
Background

• Previously, when no patient specific breast density measurement was available, MGDs were often estimated based on crude assumptions.
  ➢ e.g., MGD estimated by the manufacturers.

• Currently, automated software is available to estimate patient specific breast density and hence, patient specific MGD.
  ➢ e.g., Volpara and Quantra.
Background

• Volpara incorporates both
  ➢ Dance’s model; and
  ➢ patient specific volumetric breast density
  into the computation of patient specific MGD.
Purposes

To assess and compare the patient specific MGDs in both full field digital mammography (FFDM) and digital breast tomosynthesis (DBT) based on volumetric measurement (Volpara).
Methods

Raw FFDM & DBT images from 206 women (mean age 59±9 years)

FFDM and DBT images were acquired on a Hologic Selenia Dimensions system.

The CC and MLO FFDM images were acquired under the same compressions as the corresponding CC and MLO DBT images.
Methods

These images were processed and analyzed using Volpara software.
Methods

Patient specific MGDs estimation from FFDM and DBT images
Methods

Statistical analysis to compare patient specific MGDs between FFDM & DBT

Patient specific MGDs estimation from FFDM and DBT images
## Results

<table>
<thead>
<tr>
<th>Parameter measured</th>
<th>FFDM (n = 206) mean ± sd</th>
<th>DBT (n = 206) mean ± sd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient specific MGD (mGy)</td>
<td>1.9±0.7</td>
<td>2.1±0.6</td>
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</table>

![Box plot of Patient Specific MGDs from FFDM and DBT](image)
Results

Although patient specific MGDs estimated from FFDM and DBT were strongly and positively correlated ($r=0.87$, $p<0.0001$), the patient specific MGD estimated from FFDM was significantly lower than the one estimated from DBT ($p<0.0001$).
The MGDs reported by the manufacturer were generally lower than the patient specific MGDs estimated by Volpara for both FFDM and DBT.
Conclusion

• It is feasible to use automated software for monitoring patient specific MGD in routine breast screening.

• The differences in MGDs reported by the manufacturer and Volpara were due to the different approaches used in computing the results.
Conclusion

• MGDs were **generally underestimated** by the manufacturer of the DBT system.

• We expect the results computed by the automated software to be more accurate and useful as they were patient specific and based on volumetric approach.
Acknowledgments

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References


Thank you