

Baptist Health South Florida

## Scholarly Commons @ Baptist Health South Florida

---

All Publications

---

3-2020

### Impact of a pressure-based flexible paddle in digital breast tomosynthesis on the participant and technologist

Kathy Schilling

*Boca Raton Regional Hospital; Christine E. Lynn Women's Health & Wellness Institute*

Follow this and additional works at: <https://scholarlycommons.baptisthealth.net/se-all-publications>

---

#### Citation

Schilling, Kathy, "Impact of a pressure-based flexible paddle in digital breast tomosynthesis on the participant and technologist" (2020). *All Publications*. 3630.

<https://scholarlycommons.baptisthealth.net/se-all-publications/3630>

This Conference Lecture -- Open Access is brought to you for free and open access by Scholarly Commons @ Baptist Health South Florida. It has been accepted for inclusion in All Publications by an authorized administrator of Scholarly Commons @ Baptist Health South Florida. For more information, please contact [Carrief@baptisthealth.net](mailto:Carrief@baptisthealth.net).



# Impact of a pressure-based flexible paddle in digital breast tomosynthesis on the participant and technologist

Kathy J Schilling, MD<sup>1</sup>; Monique G J T B van Lier, MSc<sup>2</sup>; Serge L Muller, PhD<sup>3</sup>

<sup>1</sup> *Lynn Women's Health & Wellness Institute, Boca Raton Regional Hospital, Boca Raton, USA*

<sup>2</sup> *Sigmascreening B.V., Amsterdam, The Netherlands*

<sup>3</sup> *GE Healthcare, Buc, France*





# Disclosure

Kathy Schilling Consulting Radiologist and Investigator; GE Healthcare

Monique van Lier Employee and Shareholder; Sigmascreening BV

Serge Muller Employee; GE Healthcare

# Compression paddle

- Real-time mean-pressure indicator

Pressure-based compression paddle:

- Adjusts the compression force to the size and stiffness of the **individual breast**

- Pressure =  $\frac{\text{Force}}{\text{Area}}$

- Real-time pressure visualization

- 8 LEDs
- 2kPa (~15 mmHg) per LED

- Visible for both **technologist** and **patient**





# Impact on clinical practice

- Real-time mean-pressure indicator in 2D mammography

Using a **target pressure range** and a rigid paddle with a **real-time mean-pressure indicator** in **2D mammography**:

- o **Avoids** extreme **high pressures**, a contributor of patient discomfort<sup>1,2</sup>
- o Improves **workflow**<sup>3</sup>
- o Contributes to the mammography quality improvement by compression **standardization**<sup>1,4,5,6</sup>

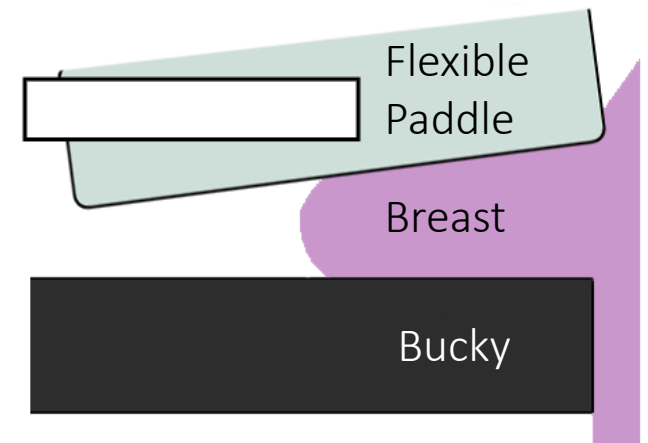
1. de Groot, J.E. et al. (2015) Eur J Radiol 84(3), 384-391.  
2. de Groot, J.E. et al. (2014) Med Phys 41(2)  
3. Christiaens, D. et al. (2019) EUSOBI 2019, P-53.

4. den Boer, D. et al. (2018) Eur J Radiol 105, 251-254.  
5. Moshina, N et al. (2019) Eur J Radiol 115, 59-65.  
6. Christiaens, D. et al. (2019) ECR 2019, EPOS C-1955.

# Study aim

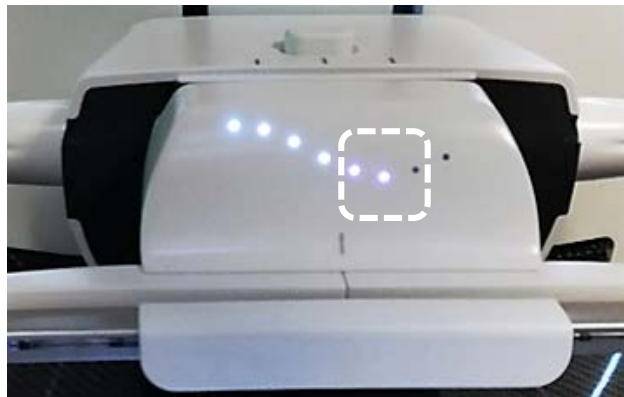
Evaluate the effect of a **pressure-based flexible paddle** for **Digital Breast Tomosynthesis (DBT)**

- o Technologist experience
- o Patient experience
- o Compression parameters
- o Average glandular dose

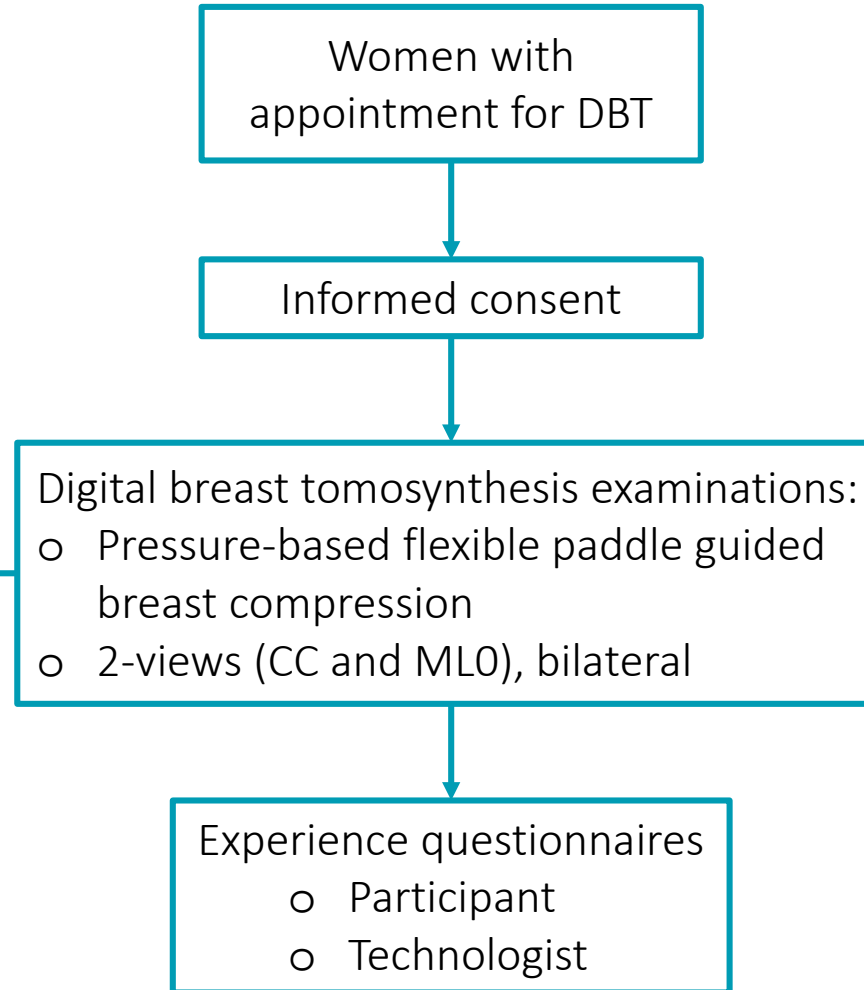


# Methods

- Study protocol



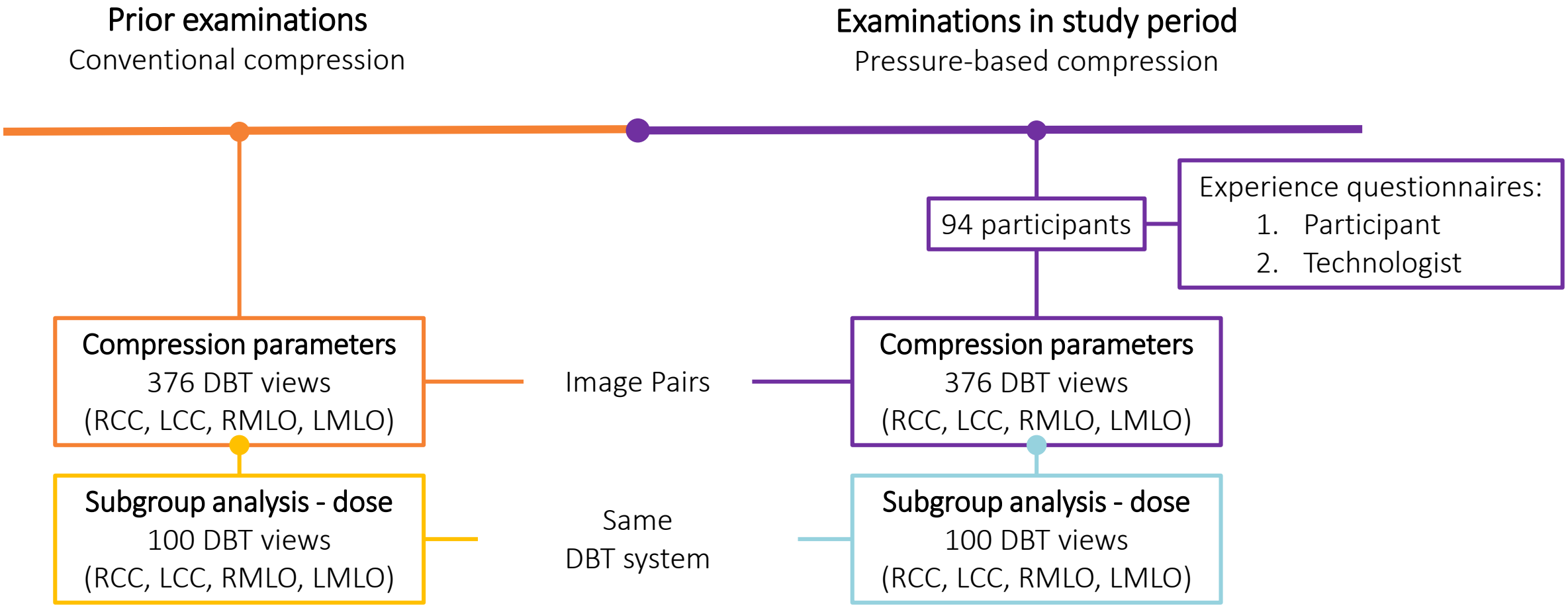
Aiming for LED 5-7  
pressure range: 8-14 kPa





# Methods

- Study protocol



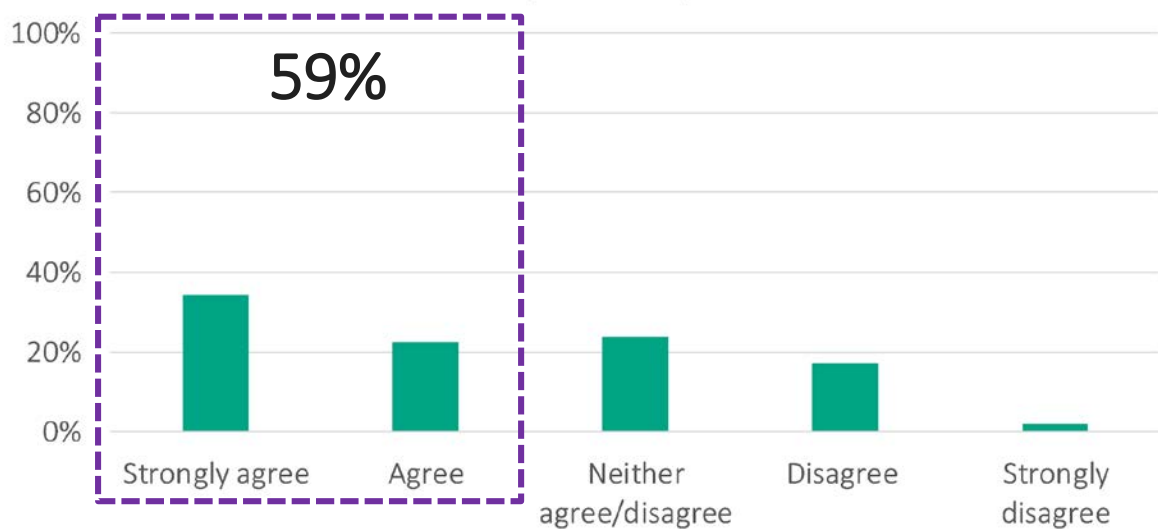




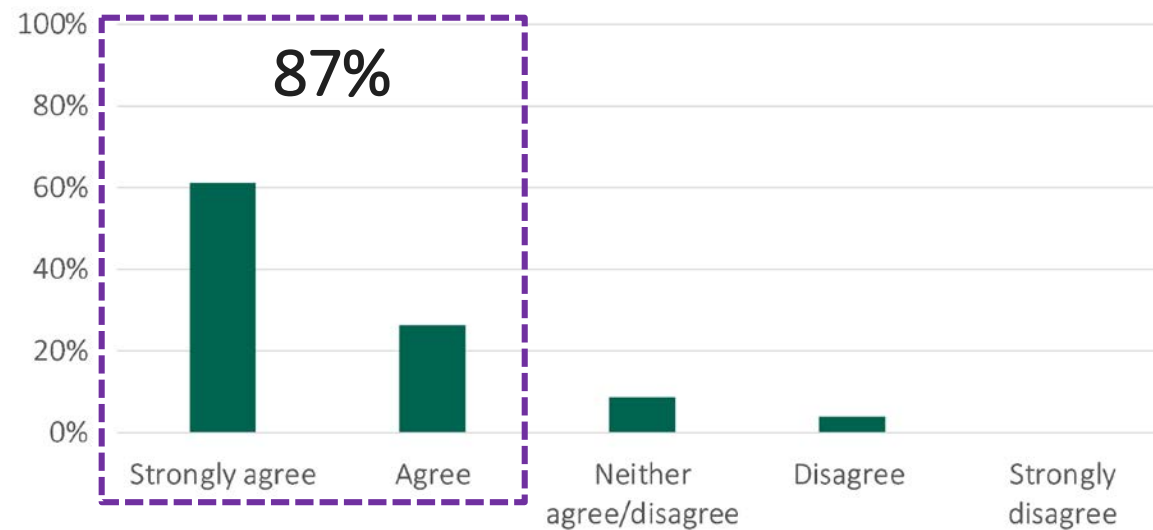
# Results

## 1. Participants questionnaire

**Less uncomfortable** compared to previous examination?



**Recommend** pressure-based compression to a friend?

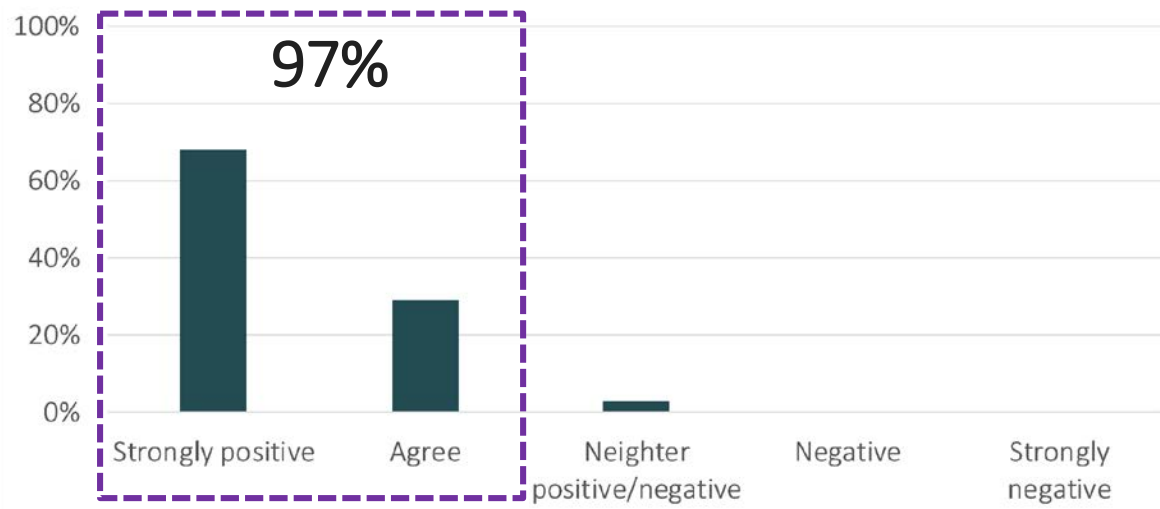




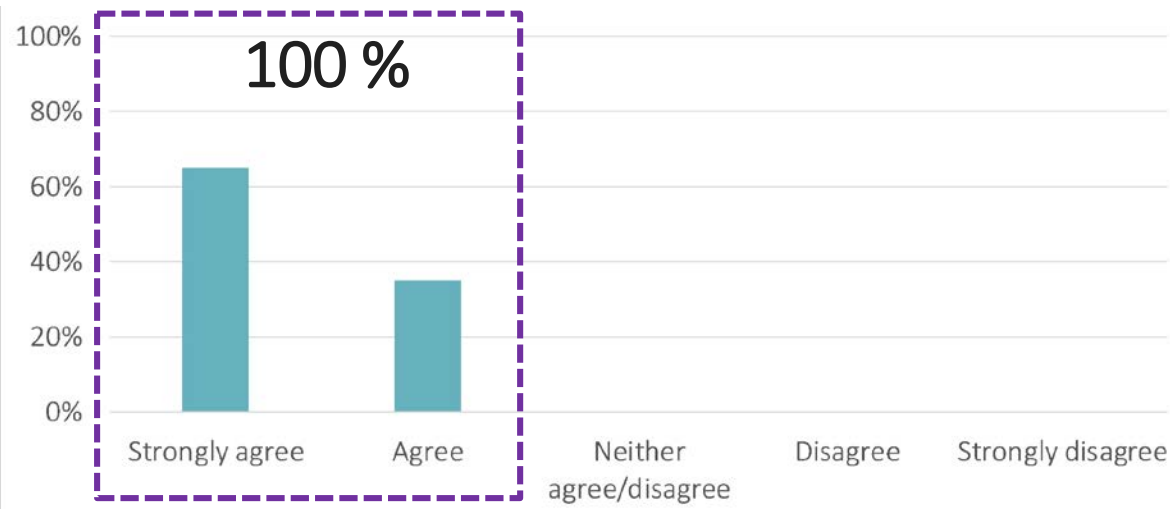
# Results

## 2. Technologist questionnaire

What was the **impact** of the pressure-based compression paddle on your **workflow**?



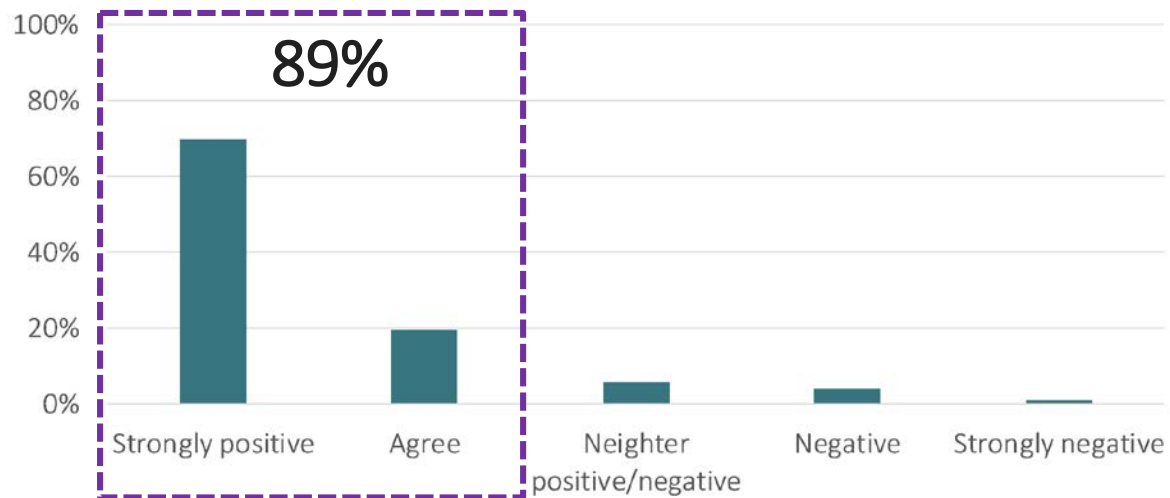
The pressure-based compression paddle makes it **easier to explain compression**



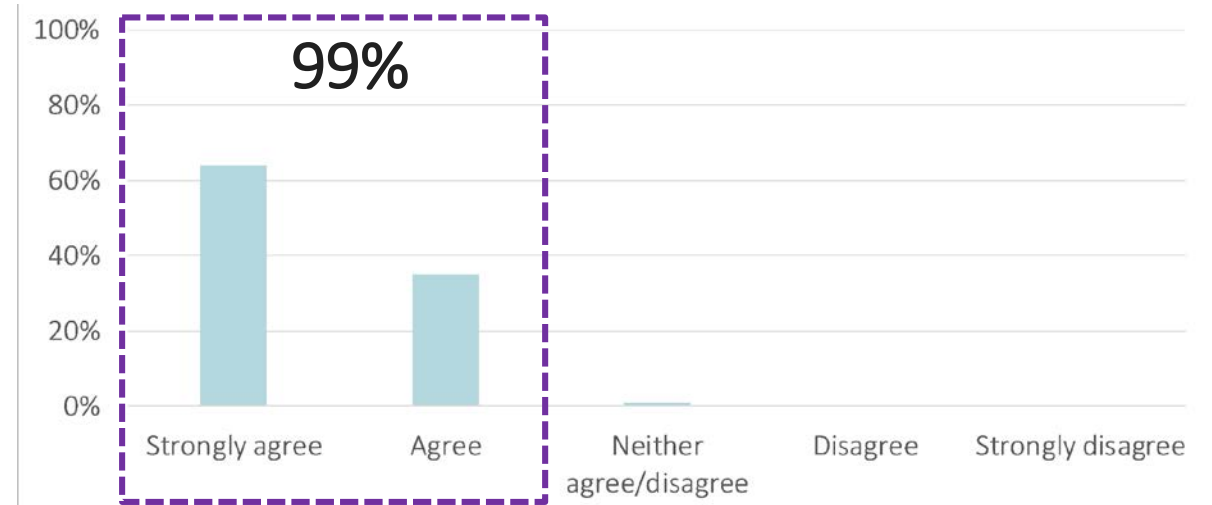
# Results

## 2. Technologist questionnaire

What was the impact of the pressure-based compression paddle on your **interaction with the patient**

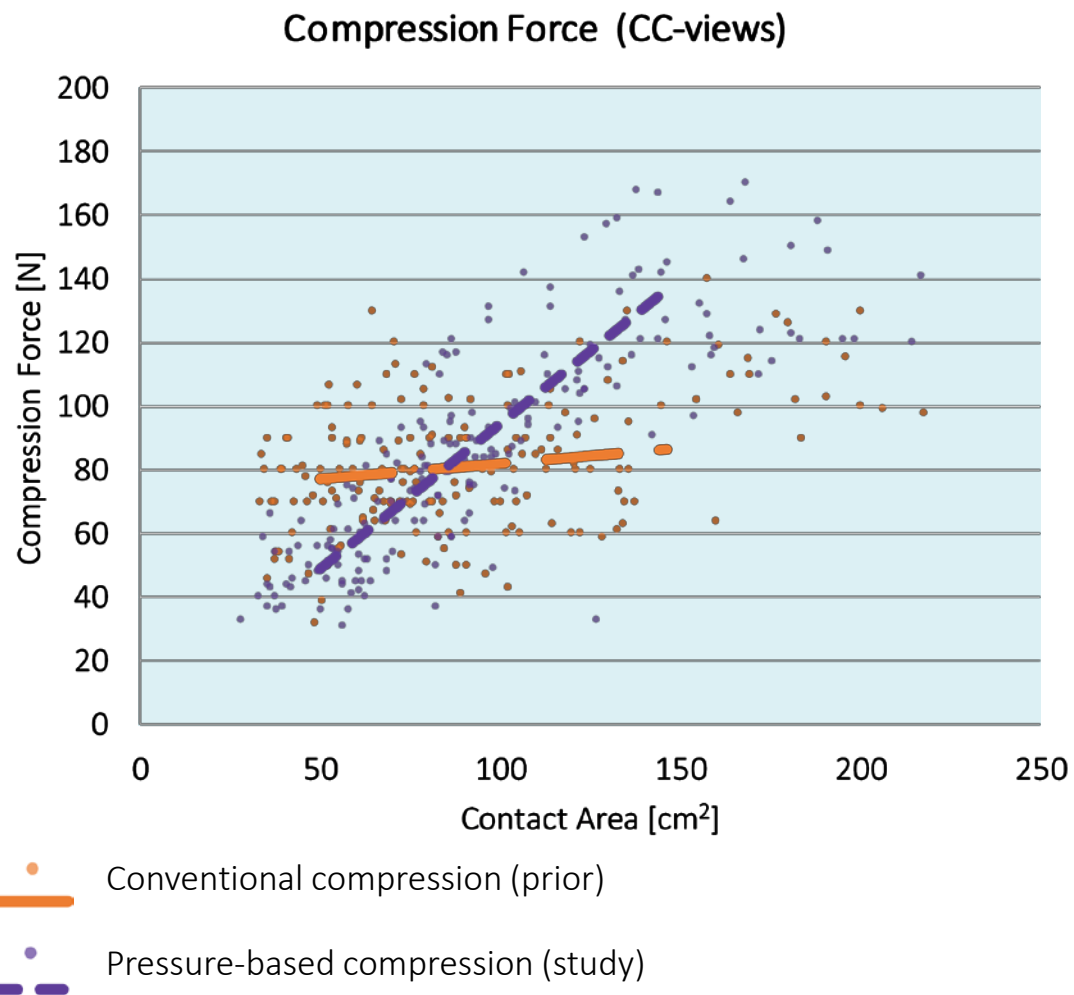


The pressure-based compression paddle helped to **involve the patient** in the compression procedure



# Results

## - Compression parameters - Force

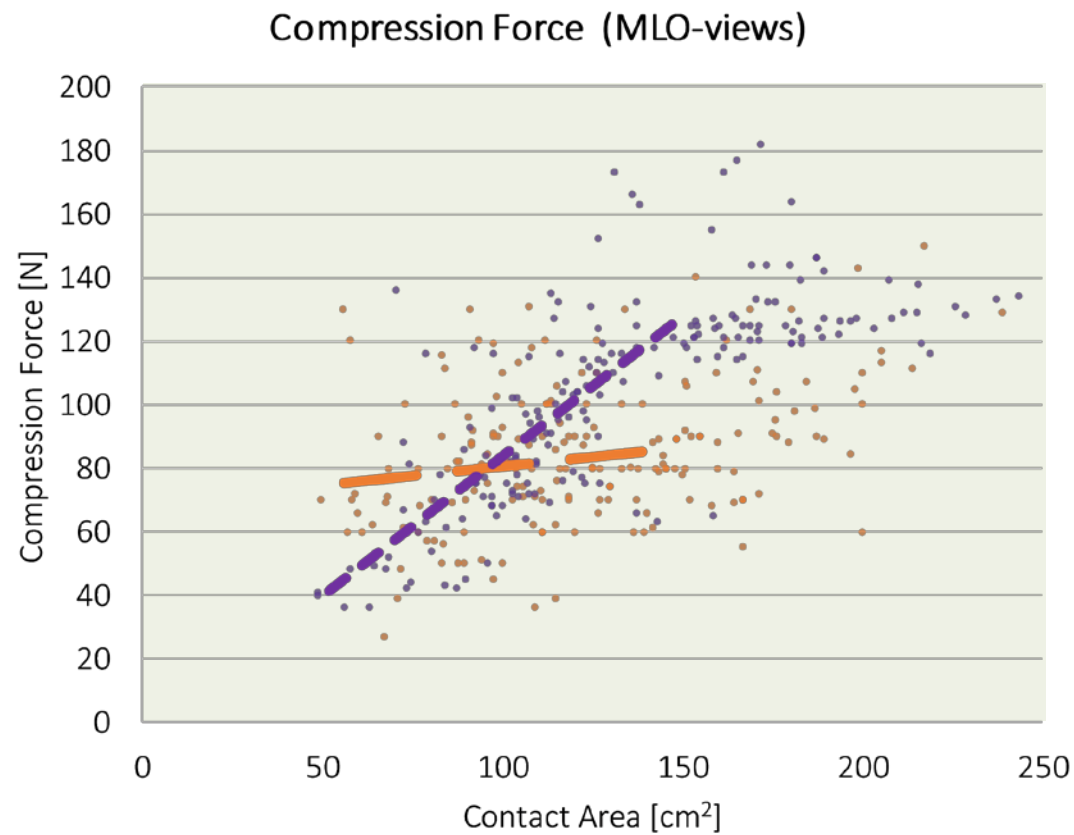
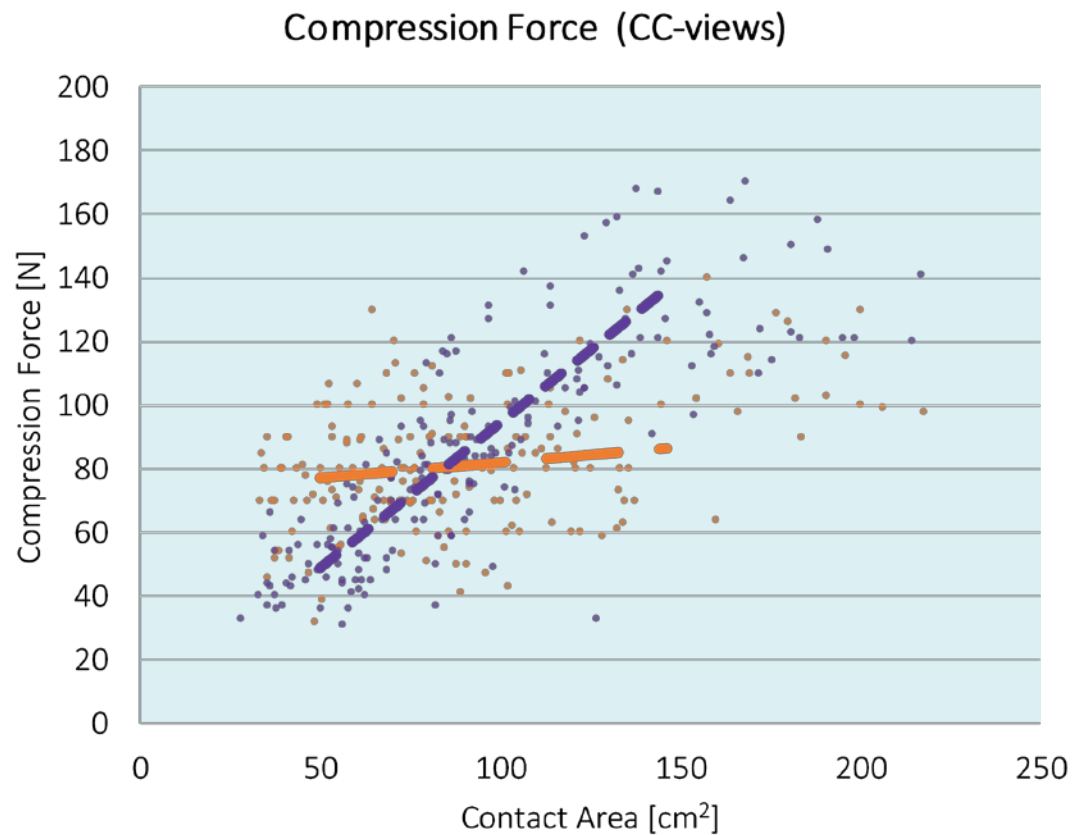


Force became dependent on contact area:

- o Indication for correct execution of the pressure-based compression protocol

# Results

- Compression parameters - Force

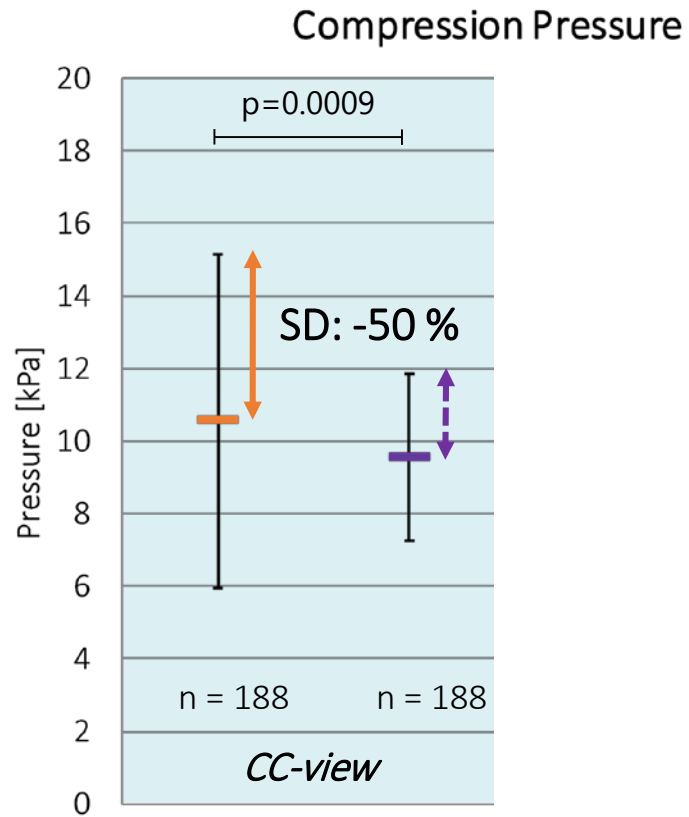


- Conventional compression (prior)
- Pressure-based compression (study)

Force became dependent on contact area

# Results

- Compression parameters - Pressure

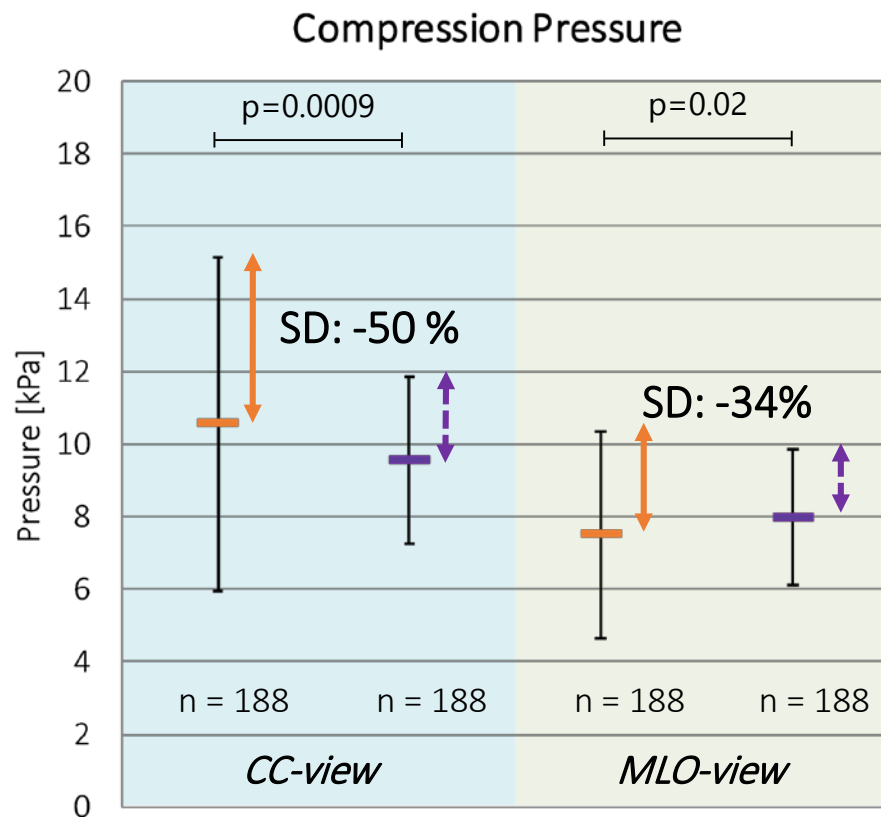


Pressure variability decreased significantly

- Conventional compression (prior)
- Pressure-based compression (study)

# Results

## - Compression parameters – Pressure



Pressure variability decreased significantly

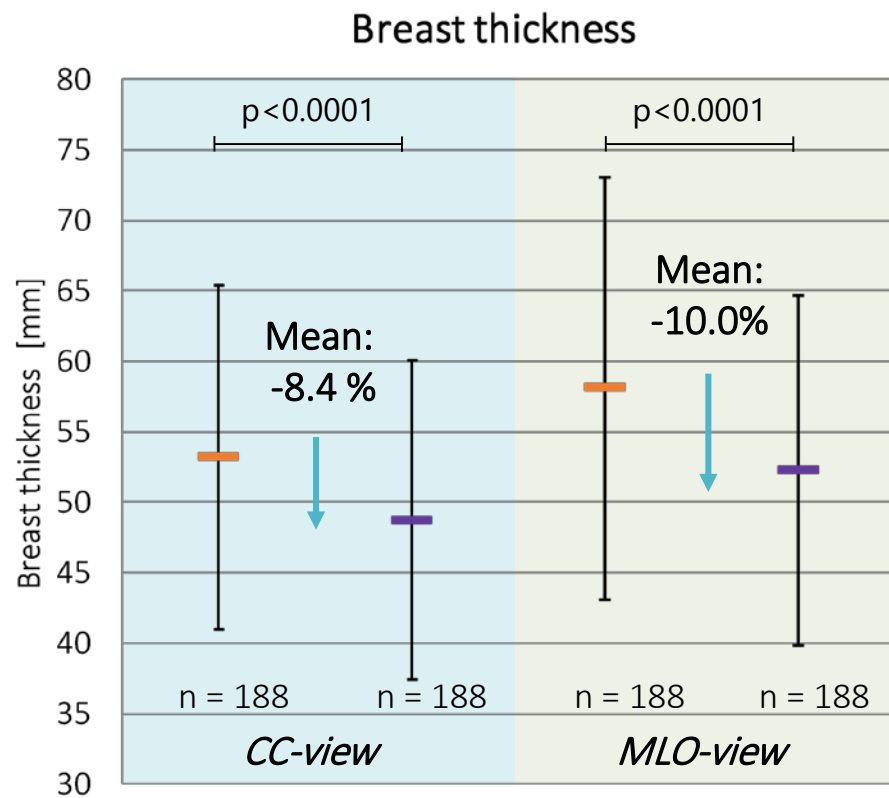
o In line with prior studies in mammography<sup>1,4,5,6</sup>

- Conventional compression (prior)
- Pressure-based compression (study)

1. de Groot, J.E. et al. (2015) Eur J Radiol 84(3), 384-391. 3. Moshina, N et al. (2019) Eur J Radiol 115, 59-65.  
2. den Boer, D. et al. (2018) Eur J Radiol 105, 251-254. 4. Christiaens, D. et al. (2019) ECR 2019, EPOS C-1955.

# Results

- Compression parameters – Breast thickness



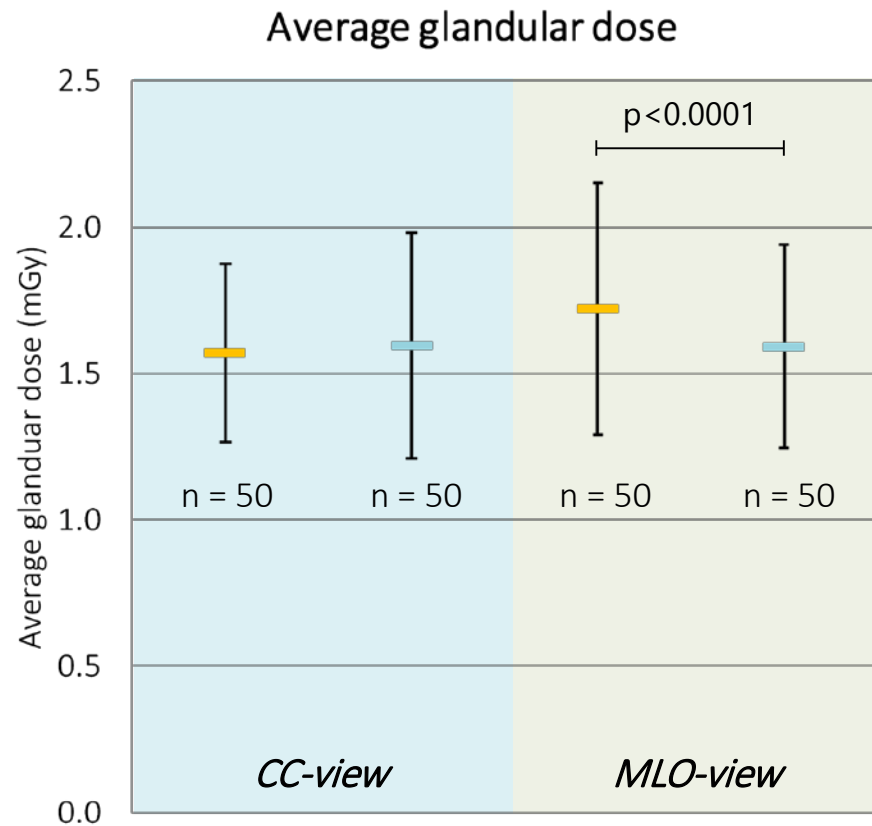
Mean breast thickness decreased significantly

- Conventional compression (prior)
- Pressure-based compression (study)



# Results

- Sub-group analysis - Average glandular dose



CC-view:  
Average glandular dose unchanged

MLO-view:  
Average glandular dose decreased significantly

Conventional compression (prior)  
Pressure-based compression (study)



# Limitations

Conventional compression and pressure-based compression were **not** executed **on the same day** in the same patient.

- **Reduced comparability** between the examinations due to a different:
  - DBT-system for image acquisition
  - Technologist performing the procedure
- **Time between the examinations** may have affected the memory of the prior examination experience by the participant.



# Conclusions

Using a **pressure-based flexible** paddle for **Digital Breast Tomosynthesis** improved:

- **Compression standardization**

- Reducing pressure variability
- Lowering breast thickness and average glandular dose (large breasts)

- **Participant appreciation**

- Less uncomfortable
- Recommend it to a friend

- **Technologist experience**

- Improved interaction with the patient
- Helped involving the patient in the compression procedure
- Eased compression explanation
- Positively impacting workflow

# Acknowledgements

- Lynn Women's Health & Wellness Institute,  
Boca Raton Regional Hospital, Boca Raton, USA  
Technologists  
Radiologists
- GE Healthcare

## Ethics statement

- The study was approved by the institutional review board
- All participants gave written informed consent



GE Healthcare