

# RADIOGRAPHERS' AGREEMENT ON MAMMOGRAPHY IMAGE QUALITY: EXPERIENCE OF A CANADIAN BREAST SCREENING PROGRAM

M Abdolell<sup>1,2</sup>, S Schofield<sup>2</sup>, R Duggan<sup>3</sup>, K Tsuruda<sup>4</sup>, S Iles<sup>1,5</sup>

<sup>1</sup> Department of Diagnostic Radiology, Dalhousie University  
<sup>2</sup> Department of Diagnostic Imaging, Nova Scotia Health Authority  
<sup>3</sup> School of Health Sciences, Dalhousie University  
<sup>4</sup> Cancer Registry of Norway  
<sup>5</sup> Breast Imaging, IWK Health Centre

## INTRODUCTION

- Mammography image quality (IQ) is most heavily reliant on proper positioning during image acquisition.
- Better IQ:
  - ↑ cancer detection rate
  - ↓ # of missed cancers
  - ↓ radiation dose
- Current schemes are visual, subjective & lack reliability/validity
- The IQ evaluation process and parameters vary geographically, as well as within breast imaging centers.

## OBJECTIVE

To assess the agreement between radiographers in a single centre evaluating image quality parameters and to determine which parameters are the most difficult to agree upon.

## METHODOLOGY

- Canadian breast imaging center: Halifax, Nova Scotia
- 3 Radiographers
- 1865 images
- Independent Assessments

### Mammography Image Quality Parameters

Inadequate inframammary fold (IMF)	Skin folds
Portion cut off	Missing posterior tissue
Inadequate pectoralis	Inadequate compression
Concave or thin pectoralis	Motion
Other body parts	Under exposure
Craniocaudal (CC) exaggeration	Inadequate sharpness
Too high on image receptor (IR)	Inadequate contrast
Sagging	Excess contrast
Diagnostic quality	Noise
Pectoralis–nipple line (PNL) length	Artefacts

- Interrater Agreement:
  - Continuous Parameters → Intraclass Correlation Coefficient (ICC)
  - Binary Parameters → Weighted Kappa

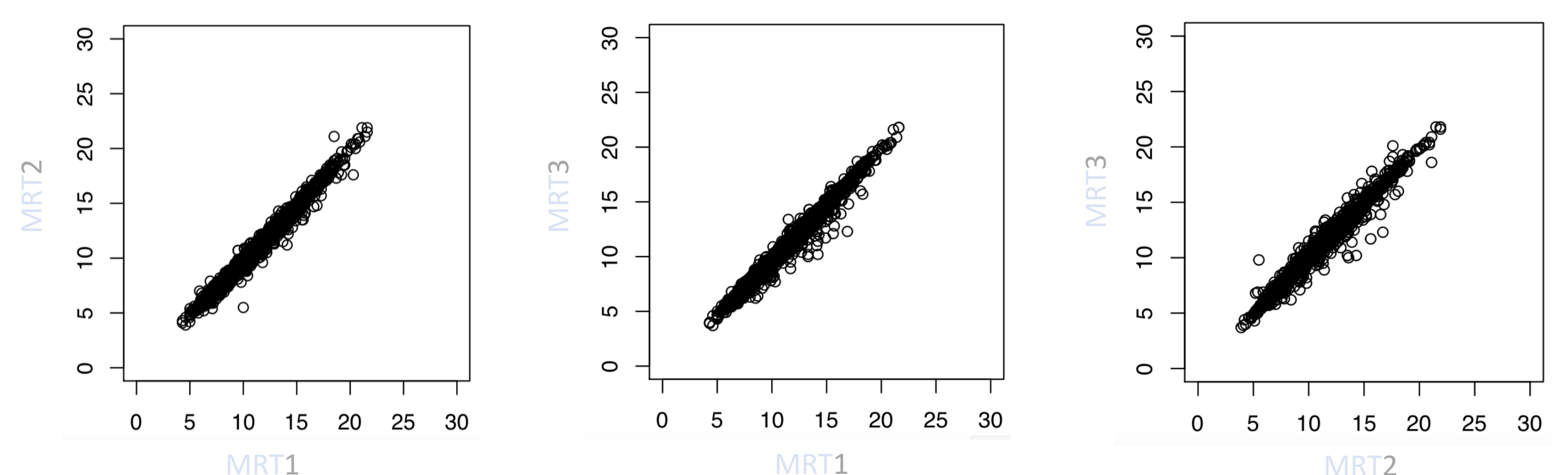
## RESULTS

**Table 1:** Ranking the mammography IQ parameters based on agreement between the three Radiographers

Image Quality Parameter	Fleiss' Kappa
Inadequate IMF	0.787
Portion Cut Off	0.743
Inadequate Pectoralis	0.641
Concave or Thin Pectoralis	0.593
Other Body Parts	0.490
CC Exaggeration	0.429
Under Exposed	0.428
Too High on IR	0.390
Sagging	0.369
Diagnostic Quality	0.355
Skin Folds	0.292
Posterior Tissue Missing	0.216
Inadequate Compression	0.143
Motion	0.086
Artefacts	0.082
Excess Contrast	0.077
Inadequate Sharpness	0
Noise	0

**Table 2:** The ICC associated with pairwise comparisons between the three Radiographers in the measurement of the PNL length

PNL Length	Intraclass Correlation Coefficient (ICC)		
	MRT 1 vs 2	MRT 1 vs 3	MRT 2 vs 3
	0.986 (0.985, 0.987)	0.980 (0.978, 0.982)	0.987 (0.986, 0.988)



## CONCLUSIONS

- Radiographers demonstrate varying levels of agreement when evaluating image quality parameters.
- Improved agreement for more objectively measured parameters.
- Implications: standardized and more objective definitions of imaging quality criteria may be necessary for improving agreement on image quality criteria

**DISCLOSURES:** M. Abdolell is CEO of Densitas Inc.  
 R. Duggan is the Director, Product Development and Informatics of Densitas Inc.