RSNA®
Radiological Society of North America

A Quick QUIC Update

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Co-chair of the RSNA Quantitative Imaging Committee (QUIC)

Acknowledgements

- RSNA Staff: Joseph Koudelik & Fiona Miller
- Co-chairs: Tammie Benzinger & Paul Kinahan
- RSNA Board Liaison: Birgit Ertl-Wagner
- AAPM Liaision: Cynthia McCollough
- RSNA Informatics Council Liaision: Kent Hutson
- RSNA Science Council Liaision: Masoom Haider
- Biostatistician: Nancy Obuchowski
- Private practice: Marta Heilbrun
- Early Career: Jana Ivanidze *Working Group Chair: Amyloid PET Quantification*
- Industry: Greg Goldmacher
- Amy Fowler *Working Group Chair: Breast Density Quantification*
- Karen Ordovas *Working Group Chair: Coronary Plaque Quantification*
- Claude Sirlin *Working Group Chair: Chronic liver disease*

RSNA Quantitative Imaging Committee (QUIC)

- Formed in 2024 after wind-down of QIBA

Mission statement

To improve patient care, clinical research and education by guiding and promoting implementation of quantitative imaging biomarkers

Approach

- Develop an Implementation Roadmap for each use case that covers all the needed steps and stakeholders

Current Use Cases and modalities

- Breast density in cancer screening (mammography)
- Amyloid plaque in Alzheimer's disease (PET)
- Chronic liver disease: liver fat, liver fibrosis, MASH (MR and US)
- Cardiac plaque (CT)

Quantitative Biomarkers in Clinical Practice



QUIC identified several key biomarkers for which there was strong evidence for clinical use but barriers to implementation, including complex path, multiple stakeholders, viewpoints, priorities



Collaborations with industry have been key to development of solutions that work for radiology practice



QUIC roadmaps are the first approach which integrates informatics, industry tools and radiology workflows

Deliverables: Implementation Roadmaps

- Structured documents for a specific Use Case that is appropriate for quantitative imaging
- Describe motivations, stakeholders, drivers, challenges, and guidelines for implementation of a selected quantitative imaging biomarker (QIB), or a relevant collection of QIBs, for a specific disease, i.e. the Use Case

QUIC Implementation Roadmap considers the entire process for a use case

QUIC Implementation Roadmap Use Cases

Quantitative Imaging Biomarker Use Case	Modality	Status
Amyloid PET Quantification	PET	Published
Breast Density Quantification	Mammography	Published
Coronary Plaque Quantification	CT	Near completion
Chronic liver disease: liver fat, liver fibrosis, MASH	MR and US	Near completion

QUIC-Roadmaps

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1 RSNA Quantitative Imaging Committee (QUIC) Roadmaps
1.1 QUIC Roadmaps in Development
1.2 QUIC Roadmaps Available for Public Comment
1.2.1 **Amyloid Plaque in Alzheimer's Disease Roadmap Comment submission form** I We are processing feedback now, but welcome additional comments
1.2.2 **Breast Density in Cancer Screening Roadmap** (Quantitative breast density assessment, primarily in mammography**) Comment submission form** I We are processing feedback now, but welcome additional comments

RSNA Quantitative Imaging Committee (QUIC) Roadmaps

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QUIC Roadmaps in Development

Chronic Liver Disease (Quantitative assessment of liver fat, fibrosis and MASH using MR and ultrasound)

Coronary Plaque Quantification (Quantitative plaque assessment, primarily using CT)

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Publication site: https://qibawiki.rsna.org/index.php/QUIC-Roadmaps

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Illustration

Breast Density in Cancer Screening Roadmap

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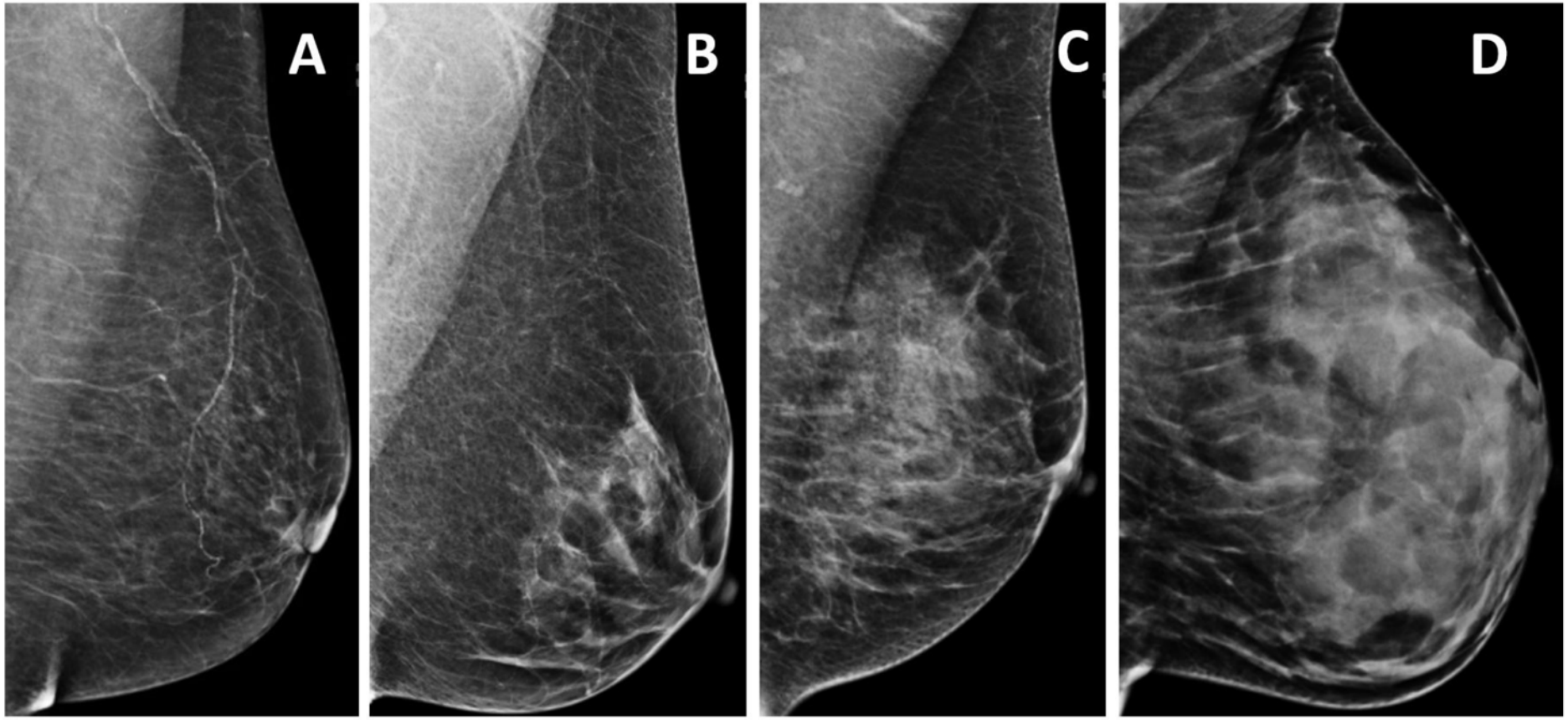
Implementation Roadmap: Breast Density Quantification

ACR BI-RADS describes mammographic breast density is a categorical, ordinal variable

It can also be described as a continuous numerical variable

Quantitative methods measure absolute or percent breast density

- **Category A –** "The breasts are almost entirely fatty".
- **Category B** – "There are scattered areas of fibroglandular density".
- **Category C** – "The breast are heterogeneously dense, which may obscure small masses".
- **Category D** – "The breasts are extremely dense, which lowers the sensitivity of mammography".



Dividing lines are ambiguous

Implementation Roadmap: Breast Density Quantification

1. Specific QIB(s) and Definitions
2. Relevant Disease and Patient Populations
3. Motivation and State of the Evidence
4. Indications
5. Pre-Approval and Scheduling
6. Protocols, Acquisition, and Image Generation
7. Extraction of QIB(s), Software Vendors, Validation Methods
8. Relevant QIBA Profiles ***none***
9. FDA-Qualified Biomarkers ***none***
10. Other Data Needed for Clinical Implementation
11. Interpreter Qualifications and Interpretation of Results
12. Path for Interpreter Feedback
13. Context of QIB: Reliability, Confidence Intervals
    a. Reliability and Confidence Intervals
    b. Quality Control
14. Informatics Considerations
15. Stakeholders
    a. Patients and Patient Advocacy Groups
    b. Radiologists
    c. Radiology Residents and Breast Imaging Fellows
    d. Technologists
    e. Medical Physicists and Imaging Scientists
    f. Referring Healthcare Providers
    g. Medical Professional Societies
    h. Informatics Teams
    i. Insurance
    j. Industry Vendors
16. Financial Implications
17. Gaps or Barriers and Potential Solutions in Technology
    a. Lack of “ground truth to compare software
    b. Limited data comparing density across systems
    c. Limited data comparing different imaging systems
    d. Limited data on consistency over time
18. Gaps or Barriers and Potential Solutions in Implementation
19. Potential Timeline Needed for Implementation
20. Metrics for Tracking Success
21. Future research and areas of further work

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Implementation Roadmap: Breast Density Quantification

7. Extraction of QIB(s), Software Vendors, and Validation Methods

The first breast density software was cleared by the FDA for clinical use in 2008. Currently, several FDA 510k-cleared software systems are commercially available for breast density quantification in clinical practice (examples included in **Table 1; Supplemental Excel file**). Research-based software systems have also been developed (examples included in **Table 2, Figure 5**); however, these are not for clinical use.

Table 1: FDA 510(k) Cleared Automated Breast Density Assessment Software Systems

Software	**Vendor**	**Output Data (in addition to categorical density A-D)**
Volpara TruDensity	Lunit International Ltd	Volumetric Breast Density
Quantra Version 2.2	Hologic Inc	
IntelliMammo densityai	Densitas	
Visage Breast Density	Visage Imaging Inc	
Transpara Density 1.0.0	ScreenPoint Medical	Volumetric Breast Density
Saige-Density v.2.5.0	DeepHealth Inc	
PowerLook Density Assessment V4.0	iCAD Inc	
WRDensity	Whiterabbit AI Inc	
DenSeeMammo version 1.2	Statlife	
Insight BD	Siemens	Volumetric Breast Density
MammoScreen BD	Therapixel	

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WRDensity	Whiterabbit AI Inc	
DenSeeMamm		
Insight BD		
MammoScreer		

Table 2: Research Software for Breast Density Quantification (not for clinical use)

Software	Developer
Cumulus	Sunnybrook Health Sciences Centre, Toronto, ON, Canada
Laboratory for Individualized Breast Radiodensity Assessment (LIBRA)	University of Pennsylvania
TomoLIBRA	University of Pennsylvania
TRACE4BDensity	DeepTrace Technologies
MedDensity	University of Genoa, Italy

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Table 3: Reproducibility of volumetric breast density measurements (Reproducibility Coefficient)

Software	Reported reproducibility of volumetric breast density measurement	Derived $RDC_{0.95}$ estimates
Transpara Density 1.0.0	Mean absolute deviation of 1.1-1.2%[1].	RDC~2.2-2.4%
Volpara TruDensity	Absolute difference in means of 2.7%[2] Within-breast standard deviation of 0.99%[5]	RDC~5.3% RDC~2.7%
Insight BD	Mean absolute deviation of 1.5-2.8%[3].	RDC~2.9-5.5%
Quantra	Mean absolute deviation of 1.91%.[4] Within-breast standard deviation of 1.64%[5]	RDC~3.7% RDC~4.5%
Cumulus ABD Cumulus V	Within-breast standard deviation of 3.32%[5] Within-breast standard deviation of 3.59%[5]	RDC~9.2% RDC~9.9%

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Implementation Roadmap: Breast Density Quantification

Summary from a patient advocate

Value added, Metrics, Targets, Future

- QUIC Implementation Roadmaps provide an outline of all aspects relevant to the clinical implementation of the QIBs relevant to a specific use case
- QUIC will have a 4 Implementation Roadmaps developed in 3 years, i.e. by the end of 2026 (our target was 3)
- Next steps
  - Presentations at 2026 RSNA meeting
  - Publishing summary articles
  - Patient advocacy statements
  - Advertising the QUIC Implementation Roadmaps
- Longer term steps are TBD, as the QUIC program runs through the end of 2026 and was not renewed by the RSNA

QUIC: The Mercury Mission to Quantitative Imaging



NotebookLM