u!nnovation.

UNITED IMAGING

Global Spread of external contributors

Foreword

A Note from the Editorial Board

Welcome to this year's annual magazine from the Global Scientific Collaboration team.

uInnovation is a scientific magazine published by United Imaging Healthcare that has been successfully distributed for over past three years. It aims to serve as a platform for sharing ground-breaking advancements, emerging trends, and future possibilities in the vast expanse that is oncology.

uInnovation is currently in its fourth edition. This year's edition will inform, engage, and inspire you about the latest developments and applications of United Imaging Healthcare. This journal includes quick read sections for those in a rush, and appealing images to promote visual understanding.

United Imaging Healthcare is a provider of high-end medical equipment and medical IT solutions. From our headquarters in Shanghai's Jiading district to our network of research and development centers throughout the world, our global mission is to provide medical institutions with a full range of healthcare solutions, from diagnostic imaging and radiation therapy equipment to service, training, and medical IT solutions.

We are dedicated to expanding access to high-quality medical care and improving the value of our services.

VISION —— Leading Healthcare Innovation

MISSION —— To Bring Equal Healthcare for All

To learn more, visit https://www.united-imaging.com/

Disclaimer

The articles contained in this magazine are provided solely by the authors, and the author(s) of each article appearing in this magazine is/are solely responsible for the content thereof as well as personal data, which is used anonymously or complied with applicable data privacy laws or regulations. United Imaging Healthcare makes no representation or warranties, expressly or impliedly, with respect to the accuracy, timeliness, reliability, legitimacy, applicability, fitness, originality, or completeness of the contents of this magazine. United Imaging Healthcare assumes no legal responsibility or liability for any error, omission, or illegality with respect to the material contained within.

All articles contained in this magazine only represent the opinions and views of the authors and do not implicitly or explicitly represent any official positions or policies, or medical opinions of United Imaging Healthcare or the institutions with which the authors are affiliated unless this is clearly specified. Discussions of any brand, services, or products in the magazine should not be construed as promotion or endorsement thereof.

Articles published in this magazine are intended to inspire further general scientific research, investigation, understanding, and discussion only and are NOT intended to and should not be relied upon as recommending or promoting a specific medical advice, method, diagnosis, or treatment by physicians for any particular individual, nor to replace the advice of a medical doctor or other healthcare professional. Any individual wishing to apply the information in this magazine for the purposes of improving their own health should not do so without consulting with a qualified medical practitioner. All patients need to be treated in an individual manner by their personal medical advisors. The decision to utilize any information in this magazine is ultimately at the sole discretion of the reader, who assumes full responsibility for any and all consequences arising from such a decision. United Imaging Healthcare makes no representations or warranties with respect to any treatment, action, or application of medication or preparation by any person following the information offered or provided within or through the magazine. United Imaging Healthcare shall remain free of any fault, liability, or responsibility for any loss or harm, whether real or perceived, resulting from the use of information in this magazine.

The articles included in this magazine may contain work in progress, which represents ongoing research and development. Such technologies are not available for sale in the United States for clinical use and also may not be available for such sales in other countries around the world.

Please note that the magazine is intended to be distributed only within a limited scope instead of publication.

If you have any questions about the magazine, or simply wish to reach out to us for any other reasons, you are welcomed to contact us at the following email address: compliance@united-imaging.com

Empowering Radiologists: An AI-aided system for Breast Cancer detection and diagnosis

K. Kardinah[a], Syed Jamal Safdar Gardezi
[a]Department of Radiology, Dharmais Cancer Hospital, INDONESIA

The Challenge

Breast cancer is one of the most common cancers diagnosed in women and a leading cause of mortality worldwide. Detecting breast cancer early is crucial for effective treatment and improving patient outcomes. However, the process of identifying suspicious lesions in mammograms is time-consuming. Importantly, the rising volume of mammograms leads to longer waiting times. These challenges underscore the urgent need for reliable, consistent, and efficient solutions.

Integration of computer aided detection (CAD) systems with artificial intelligence (AI) based solutions offers a promising solution to address these challenges. Moreover, such tools will act as potential "second reader" for radiologists enhancing the work efficiency by streamlining the clinical workflow as well as diagnostic performance in terms of sensitivity and specificity can also be improved.

AI solution

We present the UIH Full-Field Digital Mammography (FFDM) application, an artificial intelligence (AI) powered deep learning-based application developed by United Imaging Intelligence® for the automatic detection and diagnosis of breast cancer. The FFDM application will act as a radiologist aide highlighting suspicious regions, lesion classification and provide accurate lesion measurements and location into a single streamline report.

These capabilities enhance diagnostic efficiency, reduce reporting time and provide real-time decision support. Ultimately, this platform supports timely clinical decision-making and contributes to improved patient outcomes.

Background on Mammography

Mammography is one of the most common tools used to detect breast cancer. It is a low dose and non-invasive X-ray imaging technique. Breast is compressed between two plates and low-dose X-rays. Different breast tissues such as glandular, fatty, dense glandular tissues have different attenuation values. The X-ray passes through these tissues densities and is detected by a digital detector, and a high-resolution breast image is captured.

Full-field digital mammography (FFDM, 2D) and digital breast tomosynthesis (DBT, 3D) improve cancer detection by generating clearer, layered images of the breast. Conventionally, the mammograms are acquired in two views, first the craniocaudal (CC)view, the mammography unit is in a vertical position such that the X-ray beam is perpendicular to the floor, these do not contain any pectoral parenchyma of the breast. Second, the mediolateral (MLO) view that are acquired typically with mammography unit tilted between 40-60 degrees to match slope of pectoral muscles. For each exam four mammograms are acquired i.e. 2 left breasts (CC, MLO) and 2 right breasts (CC, MLO).

UIH AI Auto-Detect & Diagnose

The application analyzes mammographic images and identifies the suspicious lesion including masses, calcifications, architectural distortions, and asymmetries. The FFDM application classifies the lesions according to BI-RADS criteria. The FFDM uses multi-style and multi-view contrastive learning framework to learn the varying breast tissues, shapes, sizes and mammogram views. In the multi-view setting, the craniocaudal (CC) and mediolateral oblique (MLO) views of the same breast are treated as positive pairs, promoting view-invariant representation learning. These strategies are jointly optimized to produce robust, domain-agnostic embeddings. By leveraging deep learning algorithms trained on large-scale annotated datasets, FFDM provides radiologists with real-time decision support, highlighting potential areas of concern and generating probability-based assessments of malignancy. This not only enhances the accuracy and consistency of breast cancer detection but also optimizes workflow efficiency and supports early diagnosis, ultimately contributing to improved patient outcomes.

Table 1: BI-RADS classification and Interpretation

BI-RADS	Assessment	Interpretation
BI-RADS 0	Incomplete	Needs additional Imaging
BI-RADS 1	Negative	No abnormal findings. Continue Screening mammograms
BI-RADS 2	Benign	non-cancerous findings like cysts or fibroadenomas.
BI-RADS 3	Probably Benign	<2% chance of malignancy, short interval follow-up recommended.
BI-RADS 4	Abnormal suspicious -4A Low suspicion -4B Moderate suspicion -4C High suspicion	Biopsy should be considered
BI-RADS 5	Highly suggestive Malignant	Biopsy recommended
BI-RADS 6	Known biopsy proven	Awaiting treatment, surgical excision

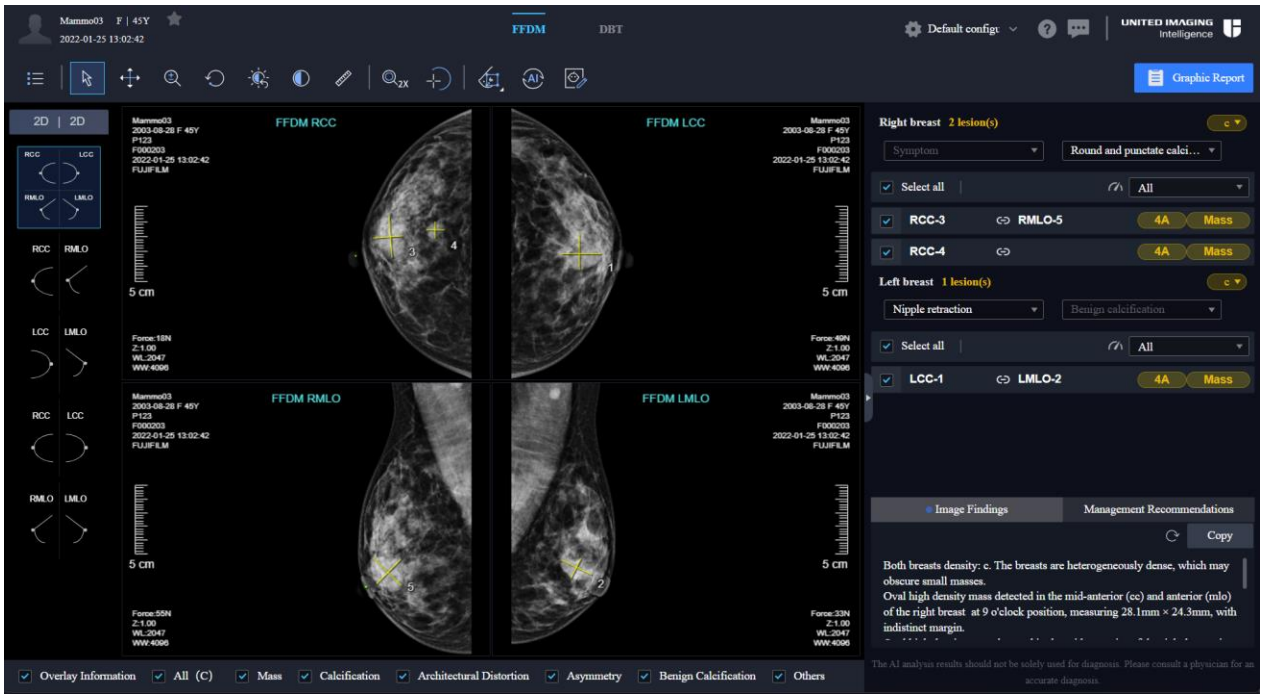


Figure 1: UIH FFDM Application Interface[#]

[#]UIH FFDM is a CE-marked but not a FDA cleared application. This product is not available for sale in the U.S. for clinical uses

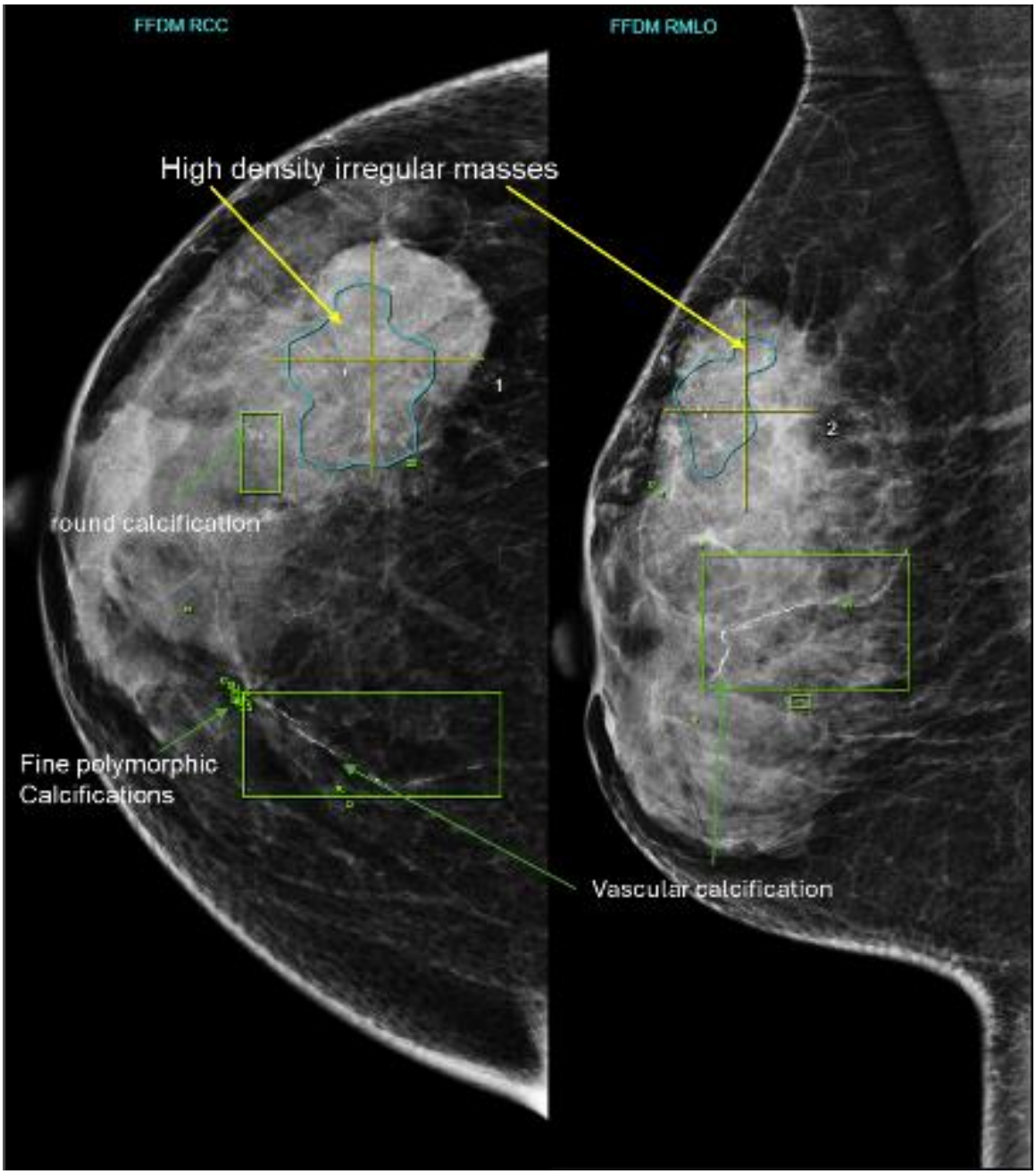


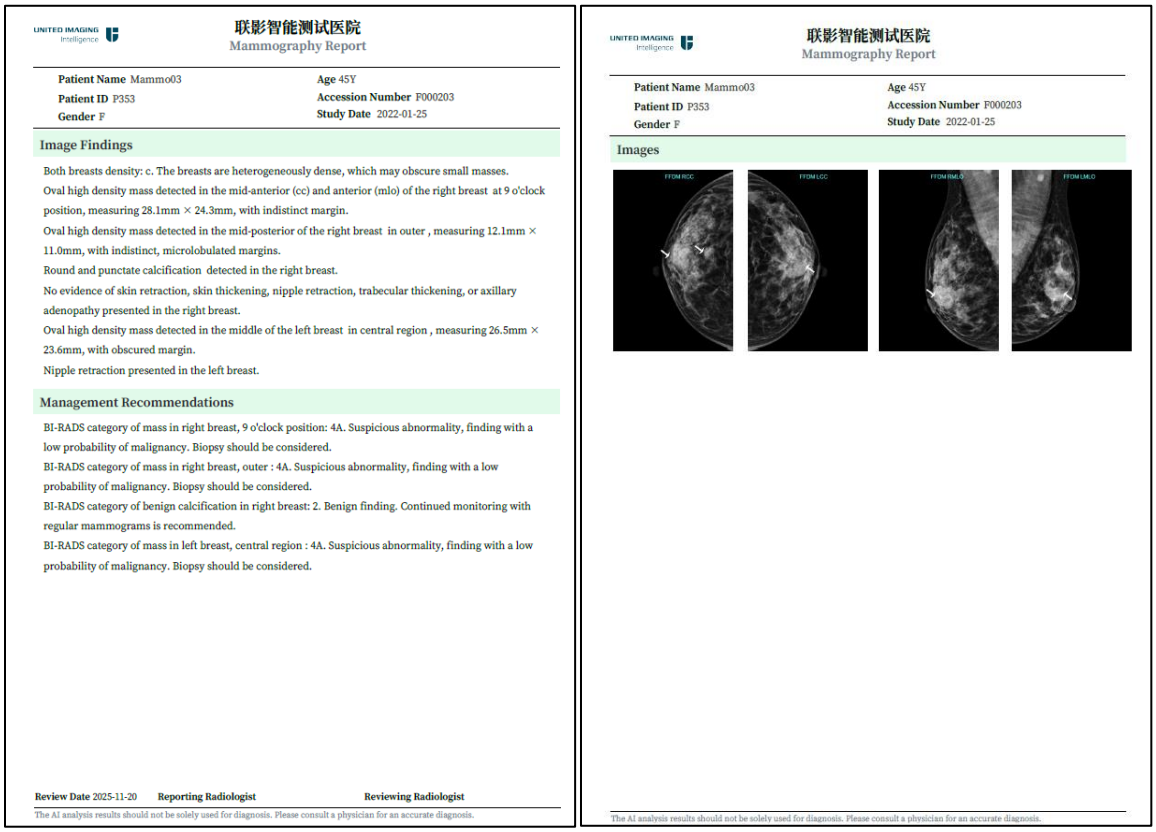
Figure 2: Masses and calcifications detected by UIH FFDM application and its findings. The breasts are heterogeneously dense, which may obscure small masses. Irregular high-density mass detected in the mid-posterior (cc) and middle (MLO) of the right breast in upper outer quadrant (cc 10-40/45; mlo 1-31/47), measuring 39.0mm × 28.7mm (16/47), with indistinct margin and grouped distribution of fine pleomorphic calcification can be seen in green bounding boxes. Rim or sphere calcification, round and punctate calcification, vascular calcification detected in the right breast. No evidence of skin retraction, skin thickening, nipple retraction, trabecular thickening, or axillary adenopathy presented in the right breast.

FFDM AI – Radiologist's Aide

The FFDM application provides quantitative measures such as tumor size, its shape and tissue density distribution. The AI powered system classifies the localized suspected region of interest according to BI-RADS categories, differentiating between benign, probably benign, and suspicious or malignant findings. The application highlights the potential areas of suspension and produces comprehensive reports for radiologists including morphological information (i.e. size, shape, tissue density and location) and a structured, probability-based report that summarizes lesion characteristics, risk assessment, and BI-RADS scoring.

UIH FFDM application provides a complete decision support tool for radiologists that not only enhances diagnostic accuracies but also streamlines the workflow efficiency. The integration of automatic detection, diagnosis and standard categorization into a single workflow supports timely treatment for patients as early detection is key to reducing the mortality rates.

The UIH FFDM AI application demonstrates significant potential as a radiologist aid, acting as a double-reading tool that highlights suspicious regions, characterizes BI-RADS classifications, and provides accurate lesion measurements and locations within a single streamlined report. These capabilities enhance diagnostic efficiency, reduce intra-observer variability, shorten reporting time, and deliver real-time decision support. The generated report also facilitates follow-up and supports treatment planning. Ultimately, this AI-powered platform strengthens radiologists' capabilities, supports timely clinical decision-making, and contributes to improved patient outcomes.



联影智能测试医院
Mammography Report

Patient Name Mammo03 **Age** 45Y
Patient ID P353 **Accession Number** F000203
Gender F **Study Date** 2022-01-25

Image Findings

Both breasts density: c. The breasts are heterogeneously dense, which may obscure small masses.
Oval high density mass detected in the mid-anterior (cc) and anterior (mlo) of the right breast at 9 o'clock position, measuring 28.1mm × 24.3mm, with indistinct margin.
Oval high density mass detected in the mid-posterior of the right breast in outer , measuring 12.1mm × 11.0mm, with indistinct, microlobulated margins.
Round and punctate calcification detected in the right breast.
No evidence of skin retraction, skin thickening, nipple retraction, trabecular thickening, or axillary adenopathy presented in the right breast.
Oval high density mass detected in the middle of the left breast in central region , measuring 26.5mm × 23.6mm, with obscured margin.
Nipple retraction presented in the left breast.

Management Recommendations

BI-RADS category of mass in right breast, 9 o'clock position: 4A. Suspicious abnormality, finding with a low probability of malignancy. Biopsy should be considered.
BI-RADS category of mass in right breast, outer : 4A. Suspicious abnormality, finding with a low probability of malignancy. Biopsy should be considered.
BI-RADS category of benign calcification in right breast: 2. Benign finding. Continued monitoring with regular mammograms is recommended.
BI-RADS category of mass in left breast, central region : 4A. Suspicious abnormality, finding with a low probability of malignancy. Biopsy should be considered.

Review Date 2025-11-20 **Reporting Radiologist** **Reviewing Radiologist**

The AI analysis results should not be solely used for diagnosis. Please consult a physician for an accurate diagnosis.

联影智能测试医院
Mammography Report

Patient Name Mammo03 **Age** 45Y
Patient ID P353 **Accession Number** F000203
Gender F **Study Date** 2022-01-25

Images

The AI analysis results should not be solely used for diagnosis. Please consult a physician for an accurate diagnosis.

Figure 3: Sample Report generated by UIH FFDM

Author Biography

Dr. K. Kardinah, MD, Sp.Rad(K), Department of Radiology, Dharmais Cancer Hospital, INDONESIA

Dr. Kardinah (dr. K. Kardinah), Sp.Rad (K), is a senior diagnostic radiologist at **Dharmais Cancer Hospital** in Jakarta, where she has served as Chair of the Medical Committee. She has been a driving force in bringing nuclear medicine to Dharmais, including establishing PET/CT capabilities, and has emphasized rigorous quality control and radiation safety. She is also deeply involved in breast cancer early detection, spearheading training programs for medical staff in breast examination and ultrasound screening, as documented in peer-reviewed research. In addition to her clinical and administrative roles, Dr. Kardinah participates in national research and policy development, contributing to strategies for cancer control in Indonesia.

PASSION for CHANGE

If you have any questions about the magazine, or simply wish to reach out to us for any other reasons, you are welcome to contact us at the following email address: compliance@united-imaging.com