



# RUBEE® Chest X-ray AI INSIGHT Package

Powered by Lunit INSIGHT CXR

Embedded intelligence, supporting the clinical workflow

That's life in **flow**.

**AGFA**   
HealthCare

# Embedded augmented intelligence, advancing the clinical workflow

## RUBEE® and the significance of the Enterprise Imaging platform

Healthcare systems across the globe are exploring the potential application and benefits of Artificial Intelligence when it comes to improving quality care, focused on outcomes.

The path towards realizing the benefits opens another opportunity: addressing the interoperability and integration aspects. Already, there are hundreds of start-ups and developers working in the healthcare arena, each focusing on highly specific applications. Selecting which ones you need, and then integrating them into your system and workflows is far from simple.

RUBEE®, as part of your Enterprise Imaging platform, enables a seamless Augmented Intelligence (AI) experience for your clinicians. Carefully curated 'packages' embed best-of-breed AI apps that work seamlessly to support your clinical workflow from start to finish.

You get more out of your AI investments, while enriching the value of your Enterprise Imaging. It's a win-win-win for your hospital, your clinicians and your patients.



### What are RUBEE® AI Packages?

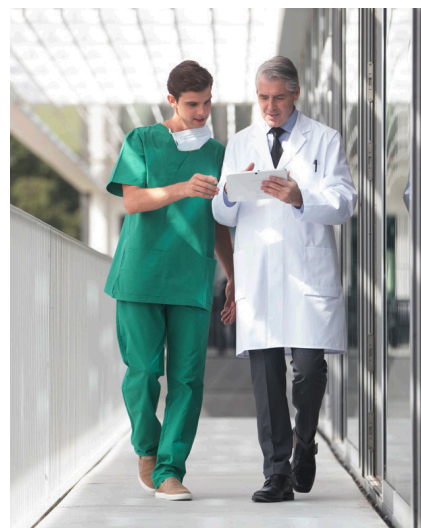
With RUBEE AI Packages, you can enable our AI specialty packages into your clinical workflows. RUBEE visualizes the metadata generated by algorithms such as deep learning, machine learning, image analysis and natural language processing. It also uses that information to automate and optimize your workflows, all within your Enterprise Imaging ecosystem.

## Forward-thinking and clinically relevant

'Augmented Intelligence' (AI) does just that: offering a set of tools that let your clinicians maximize the value of their own expertise, increase their productivity and enhance the diagnostic process. But to get the real benefits to your clinicians, the tools need to be embedded right into the workflows and systems they use every day.

**Your Enterprise Imaging system already offers a forward-thinking, multi-specialty platform that consolidates your hospital's wealth of data. With RUBEE AI Packages, it also becomes your AI-enabled ecosystem.**

Standards-based workflows are embedded with niche and specialty-focused AI apps, delivering clinical relevance. No need for an additional, complex and costly dedicated AI platform or marketplace. And, instead of worrying about which apps to select and how to integrate them, you are leaping ahead with an ecosystem of seamlessly embedded AI.



*“Your Enterprise Imaging already offers a future-proof, multi-specialty platform that consolidates your hospital’s wealth of data. With RUBEE® Packages, it also becomes your AI enabled ecosystem.”*



## **Best-of-Class AI apps, Specialty Packages**

We have taken the guesswork out of your AI journey. Our AI specialty packages have been carefully curated to enable interoperability and integration of best-of-class algorithms. You can be confident that all the algorithms come from reliable companies, and trained on evidence-based data.

Most of all, they are powered by RUBEE, ensuring that they meet your specific clinical needs from start to finish. So, there’s no ‘trial and error’: just proven value.

## **Enrich your Enterprise Imaging workflows**

With AI fully embedded in your Enterprise Imaging platform, your clinicians see benefits all along the line.

- Task assignments and case distribution are smoothly automated, based on the metadata generated from the AI apps.
- Hanging protocols get ‘smart’, with dedicated reading protocols.
- Report automation by auto-including AI results into the reporting workflow.

Offering advanced visualizations, workflow optimization and automation, RUBEE helps your clinicians to focus their efforts on cases that require immediate attention.



# RUBEE® Chest X-ray AI INSIGHT Package

Powered by Lunit INSIGHT CXR



## Clinical challenges in X-ray Analysis

- High volume of cases assigned to each radiologist, can create backlogs at healthcare facilities
- Unable to intelligently sort or prioritize workflow
- Incidental findings that might be otherwise missed
- Looking for actionable nodules on PACS workstation can be tedious
- Detection of Tuberculosis on CRs remains a labour and time-intensive task that requires an expert's interpretation <sup>(1) (2)</sup>

When it comes to detection of lung nodules, machine automation and deep learning algorithms can provide an added value to help address challenges associated with high volume of cases, identification of actionable nodules and workflow prioritization.

---

## Introducing the Chest X-ray AI INSIGHT Package

Powered by Lunit INSIGHT CXR

- AGFA HealthCare RUBEE® enables EI Desktop and XERO Universal Viewer AI visualizations
- INSIGHT CXR is CE cleared
- INSIGHT CXR helps detect 10 common chest x-ray findings and generates the analysis result which indicates the presence and the location of chest abnormalities

## Dedection

Innovative image enhancement technology designed to increase the clarity of chest X-rays by suppressing bone on digital images.

- **Atl** Atelectasis
- **Calc** Calcification
- **Csn** Consolidation
- **Fib** Fibrosis
- **Ndl** Nodule
- **PEf** Pleural effusion
- **Ppm** Pneumoperitoneum
- **Ptx** Pneumothorax
- **Cm** Cardiomegaly
- **MW** Mediastinal widening



Detection of areas of suspicious abnormal radiologic findings

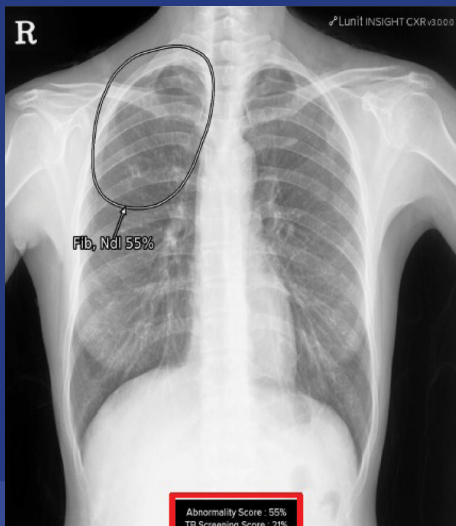


Automated analysis of chest radiographs via deep learning technology



Visualization and quantitative estimation of the likelihood of the presence of each abnormality

## Tuberculosis screening option can be turned on



Excellent and consistent performance in the detection of active pulmonary tuberculosis on CR, outperforming physicians, including thoracic radiologists <sup>(3)</sup>

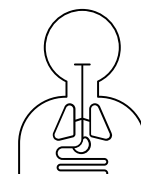
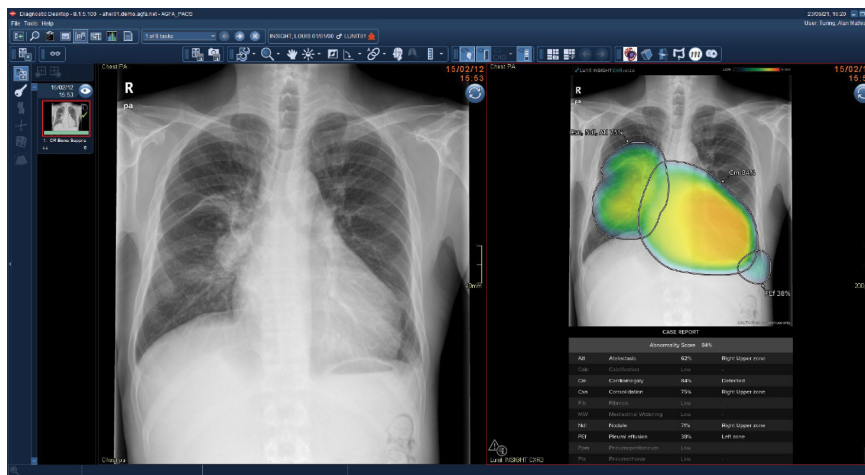
### v AI INSIGHT Package



- Detects 10 abnormal radiologic findings with **97-99% accuracy**
- Supports tuberculosis screening on chest x-ray images.

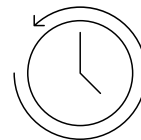
Product may not be available in all regions, contact your Agfa HealthCare representative for details.

## Dedection and Analysis



97-99%  
AUROC

Very high  
performance level



34%

Reduced  
reading time

### Detected Location

The AI generates the location information of detected lesions in the form of heatmaps and/or contour maps.

### Abnormality Score

The AI generates an abnormality score which reflects the AI's calculation of the actual presence of the detected lesion.

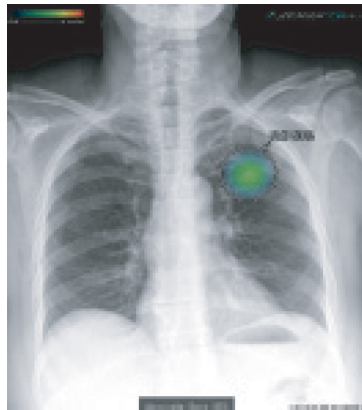
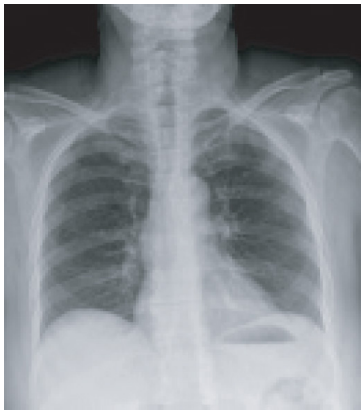
## AI report

The AI provides a “case report” that summarizes the overall analysis result. The analysis results are narrowed down to each finding if multiple findings are detected.

## Chest X-ray AI INSIGHT Package – Major features

- 1. Fast triage of normal cases:**  
Triage normal cases quickly and focus on reading abnormal cases where lesions might exist.
- 2. Efficient reading via exam prioritization:**  
In reference to the abnormality scores on the worklist, radiologists can prioritize exams in their reading order, resulting in a 13% reduction in reading time, and a 33% in reduction time for normal cases. <sup>(1)</sup>
- 3. Improved reading performance:**  
Non-radiology physicians, general radiologists, and even thoracic radiologists can improve their diagnostic accuracy for major chest abnormalities. <sup>(5) (6) (7) (8) (9) (10) (11)</sup>
- 4. Reduced overlooked lung cancers:**  
Automatic detection of small and subtle pulmonary nodules overlapped in the hilar shadow, ribs, heart, and diaphragm enables radiologists to reduce overlooked lung cancer cases, especially during regular check-ups. <sup>(1) (2)</sup>
- 5. Streamlined ED workflow:**  
Radiology residents can improve their diagnostic performance<sup>(13)</sup> and reduce their reading time<sup>(14)</sup>, which ultimately accelerates the decision-making process and treatment in the ED.
- 6. COVID 19 patient triaging and monitoring:**  
AI-aided chest radiograph interpretation can help medical professionals detect COVID-19 infected pneumonia quickly<sup>(15)</sup> and accurately<sup>(16)</sup>, enabling prompt isolation and timely treatment.

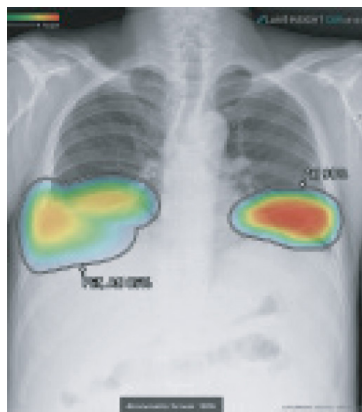
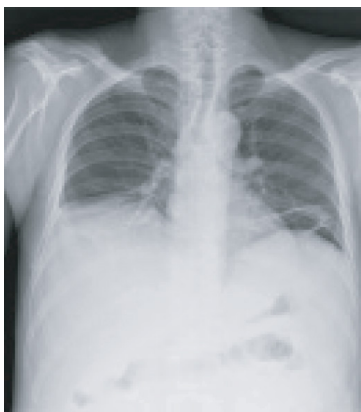
## AI embedded Xray – Major features



Small module detected

63%

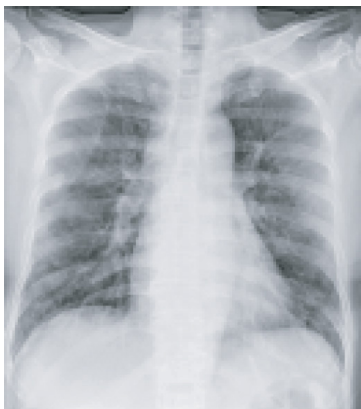
Abnormality score



Multiple findings including atelectasis, pleural effusion

98%

Abnormality score



COVID-19 infected pneumonia detected

77%

Abnormality score

- (1) Melendez J, Sánchez CI, Philipsen RH, et al. An automated tuberculosis screening strategy combining X-ray-based computer-aided detection and clinical information. *Sci Rep* 2016; 6:25265.
- (2) Hoog AH, Meme HK, van Deutekom H, et al. High sensitivity of chest radiograph reading by clinical officers in a tuberculosis prevalence survey. *Int J Tuberc Lung Dis* 2011; 15:1308–14.
- (3) Lee, J.H., Park, S., Hwang, E.J. et al. Deep learning-based automated detection algorithm for active pulmonary tuberculosis on chest radiographs: diagnostic performance in systematic screening of asymptomatic individuals. *Eur Radiol* 31, 1069–1080 (2021).
- (4) Ju Gang Nam, Minchul Kim, et al. Development and validation of a deep learning algorithm detecting 10 common abnormalities on chest radiographs. *European Respiratory Journal*. 2020
- (5) Ju Gang Nam, Sunggyun Park, et al. Development and Validation of Deep Learning-based Automatic Detection Algorithm for Malignant Pulmonary Nodules on Chest Radiographs. *Radiology*. 2018
- (6) Eui Jin Hwang, Sunggyun Park, et al. Development and Validation of a Deep Learning-based Automatic Detection Algorithm for Active Pulmonary Tuberculosis on Chest Radiographs. *Clinical Infectious Diseases*. 2018
- (7) Eui Jin Hwang, Sunggyun Park, Kwang-Nam Jin, et al. Development and Validation of a Deep Learning-Based Automated Detection Algorithm for Major Thoracic Diseases on Chest Radiographs. *JAMA Network Open*. 2019
- (8) Jong Hyuk Lee, Sunggyun Park, et al. Deep learning-based automated detection algorithm for active pulmonary tuberculosis on chest radiographs: diagnostic performance in systematic screening of asymptomatic individuals. *European Radiology*. 2020
- (9) Eui Jin Hwang, Jung Hee Hong, et al. Deep learning algorithm for surveillance of pneumothorax after lung biopsy: a multicenter diagnostic cohort study. *European Radiology*. 2020
- (10) Jong Hyuk Lee, Hye Young Sun, et al. Performance of a Deep Learning Algorithm Compared with Radiologic Interpretation for Lung Cancer Detection on Chest Radiographs in a Health Screening Population. *Radiology*. 2020
- (11) Hyunsuk Yoo, Ki Hwan Kim, et al. Validation of a Deep Learning Algorithm for the Detection of Malignant Pulmonary Nodules in Chest Radiographs *JAMA Network Open*. 2020
- (12) Sowon Jang, Hwayoung Song, et al. Deep Learning-based Automatic Detection Algorithm for Reducing Overlooked Lung Cancers on Chest Radiographs. *Radiology*. 2020
- (13) Eui Jin Hwang, Ju Gang Nam, et al. Deep Learning for Chest Radiograph Diagnosis in the Emergency Department. *Radiology*. 2019
- (14) Jae Hyun Kim, Jin Young Kim, et al. Clinical Validation of a Deep Learning Algorithm for Detection of Pneumonia on Chest Radiographs in Emergency Department Patients with Acute Febrile Respiratory Illness. *Journal of Clinical Medicine*. 2020
- (15) Eui Jin Hwang, Hyungjin Kim, et al. Implementation of a Deep Learning-Based Computer-Aided Detection System for the Interpretation of Chest Radiographs in Patients Suspected for COVID-19. *Korean Journal of Radiology*. 2020
- (16) Se Bum Jang, Suk Hee Lee, et al. Deep-learning algorithms for the interpretation of chest radiographs to aid in the triage of COVID-19 patients: A multicenter retrospective study. *PLOS ONE*. 2020

# Contact your AGFA HealthCare Client Executive to get started

or email [enterpriseimaging@agfa.com](mailto:enterpriseimaging@agfa.com)



AGFA, the AGFA rhombus, and the AGFA HealthCare logo are trademarks of Agfa-Gevaert N.V., Belgium, or its affiliates. The Enterprise Imaging Platform logo, GRIP, GRIP Services, Imaging Health Network, Imaging Health Record, IMPAX, RUBEE, That's life in flow, XERO, and XERO Viewer are trademarks of AGFA HealthCare N.V., Belgium or its affiliates. All rights reserved. All other trademarks are held by their respective owners and are used in an editorial fashion with no intention of infringement. The data in this publication are for illustration purposes only and do not necessarily represent standards or specifications that must be met by AGFA HealthCare. All information contained herein is intended for guidance purposes only, and characteristics of the products and services described in this publication can be changed at any time without notice. Products and services may not be available for your local area. Please contact your local sales representative for availability information. AGFA HealthCare diligently strives to provide as accurate information as possible but shall not be responsible for any typographical error.