VINBRAIN DrAid™
AI PACS CLOUD

AI PACS CLOUD
REVOLUTIONARY PACS SOLUTION
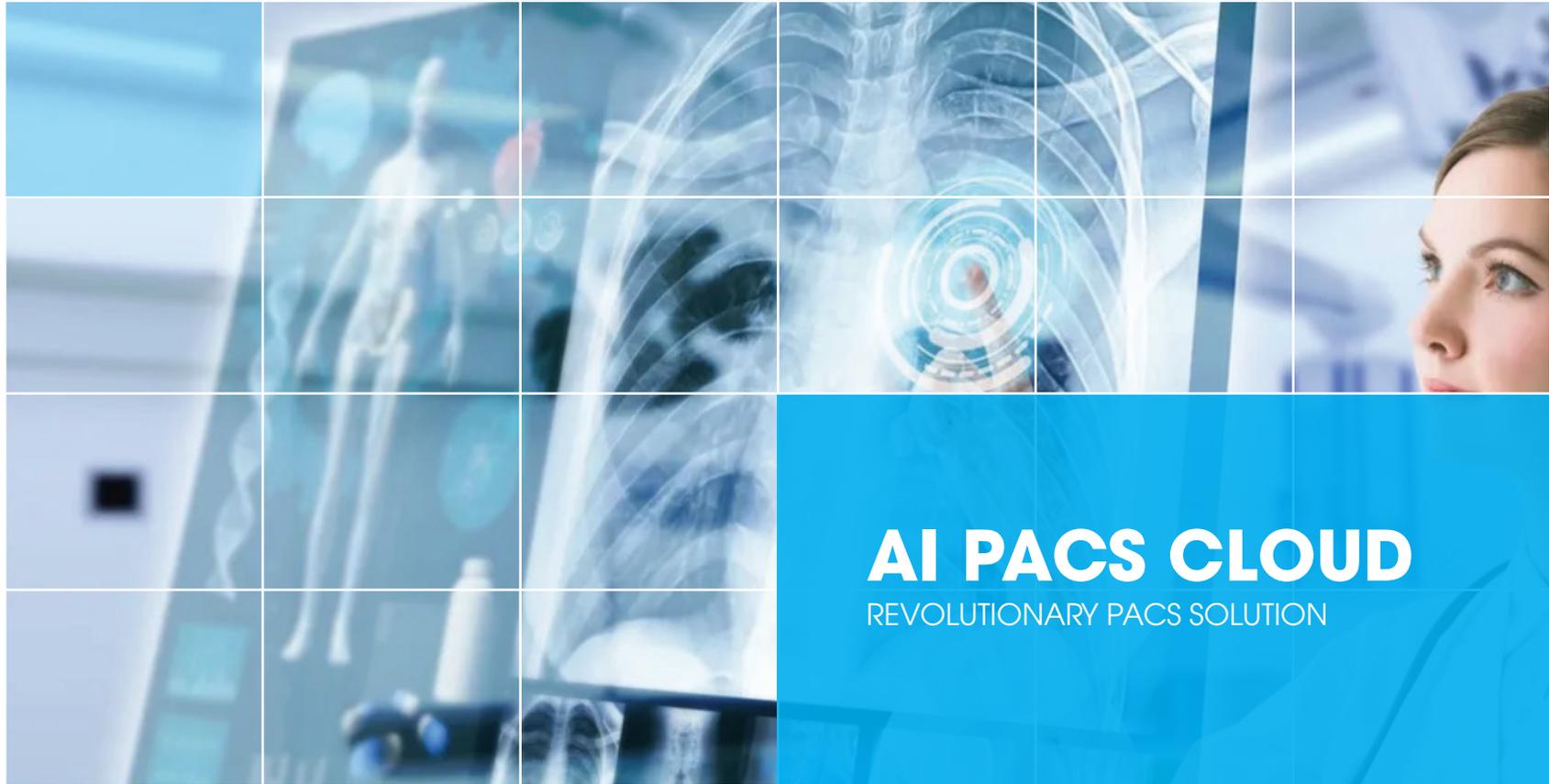
2021-2022

ABOUT DRAID™ AI PACS CLOUD

DrAid™ AI PACS Cloud is a PACS solution for storing, processing and transmitting medical images combining virtualization technology, artificial intelligence and cloud computing. The synergy of these modern technologies helps our PACS deliver outstanding values and benefits to both hospitals, doctors and patients.

Integrated with DrAid™ - the first complete artificial intelligence product for healthcare in Vietnam, helping doctors diagnose 21 diseases and abnormalities on chest X-ray images within 5 seconds with average 89.9% accuracy. The product helps optimize doctor's workflow, save time and increase the accuracy of diagnosis, thereby increasing the quality of healthcare services for everyone. Currently, DrAidTM has been deployed to 84 hospitals and medical facilities across Vietnam. As a result, the product's accuracy and effectiveness have been proven on a large scale.

DrAid™ AI PACS Cloud stores, processes and transmits medical images on Azure - Microsoft's world-leading global cloud service, enabling radiologists to access, read and share diagnostic results anytime anywhere. Microsoft Azure is considered to be the most secure platform in the world, trusted by more than 95% of Fortune 500 companies. Therefore, the system will ensure the highest level security for image data. In addition, the system's stability and large capacity storage are also notable advantages. Currently, DrAid™ AI PACS Cloud stores and transmits images according to HL7 and DICOM standards.

DrAid™ AI PACS Cloud fully meets the criteria of a PACS system specified in Circular 54/2017/TT-BYT of the Ministry of Health.

ADVANCED TECHNOLOGIES

Artificial Intelligence

Cloud Computing
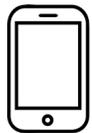
Ecosystem for mobile devices
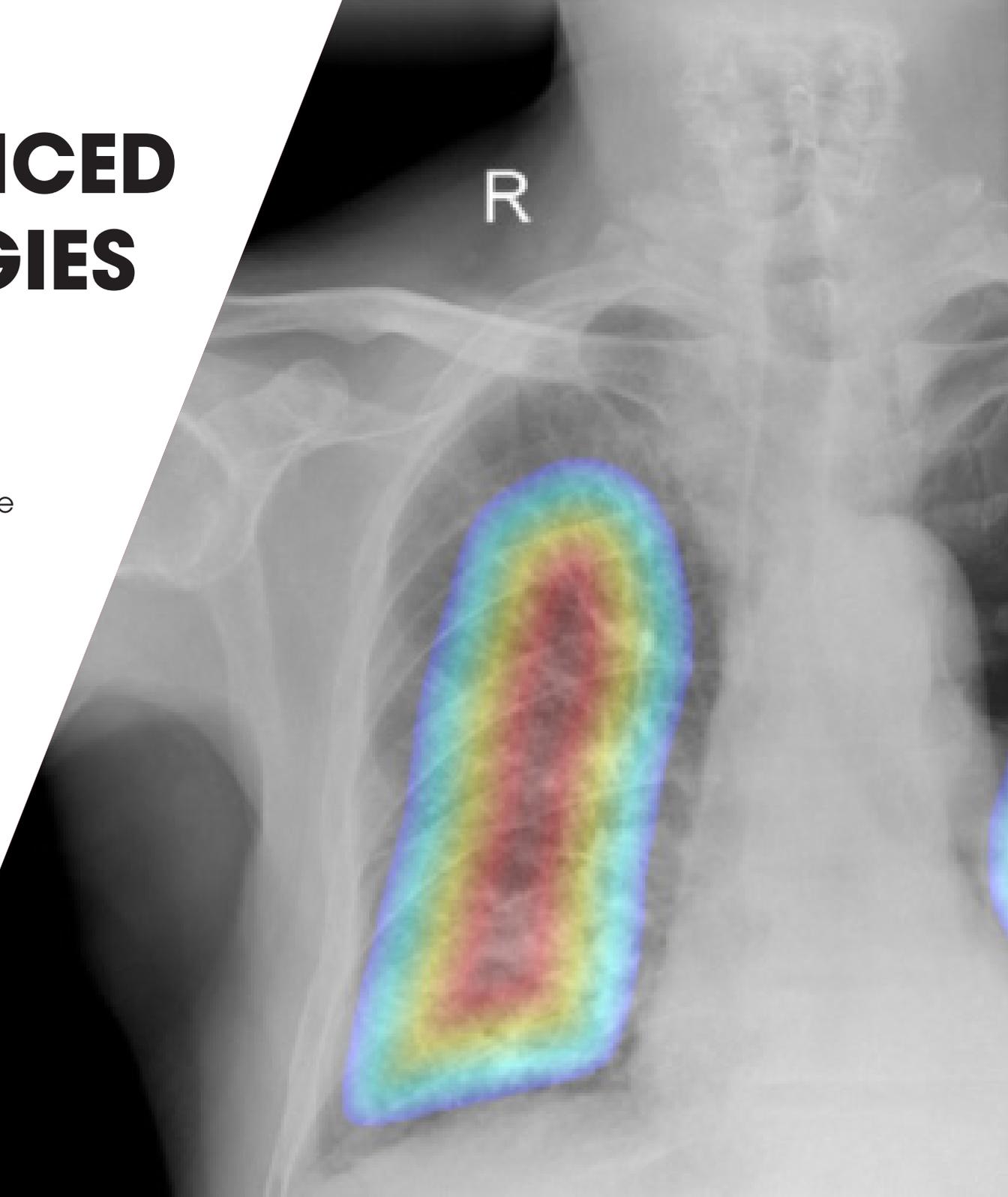
CORE FEATURES
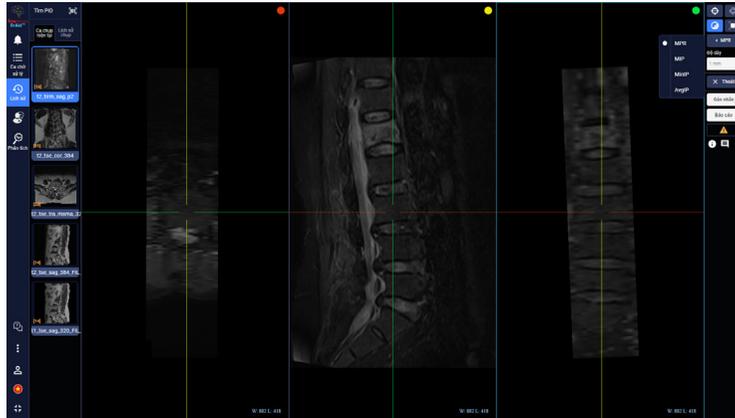
Full set of image analysis tools
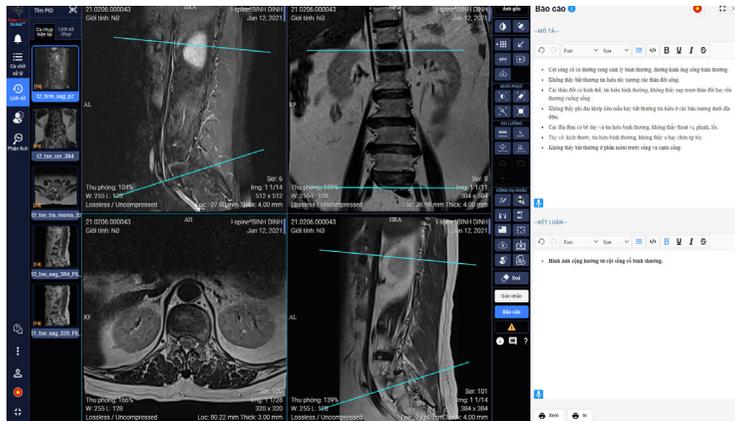
Supporting tool to generate medical reports following hospital's form, helping doctors to edit medical reports faster (using abbreviations, voice typing)

01 Support the reading of medical images

- Support doctors read medical images and localize inflicted regions (21 features)
- Tools and features to support doctors read CT/MRI (35 features)

02 Storing and transmitting images

- Storing images and information on global cloud system of Microsoft Azure
- Allow doctors to access every time everywhere to read images, share images and diagnostic result immediately
- Large data storage, easy to scale up
- Meet storage time according to the regulations of the Ministry of Health for each specific type of photo
- Bidirectional connection to HIS, RIS, EMR system

03 Support doctors' workflow

- Upload medical images from computer to system in DICOM or JPEG format
- Push medical images from imaging devices into system in DICOM format
- Fill in clinical information related to the diseases
- View list of cases already diagnosed
- View list of pending cases
- View number of cases by diseases, machine types, image types…
- Medical report (synchronize medical reports to HIS, print or share directly to patients via QR code or link)
- New case notification

04 AI Doctor Assistant

- Support analyze and diagnose 21 diseases and abnormalities
- Ask second doctor's opinion
- Automatic report generation
- Text input using voice

05 Other features

- Tele-radiology
- Connect and sync with AI Smartcare - Telehealth application that centralizes patients' images and diagnostic reports storage, allow easy access anytime anywhere and share via QR code or link
- Multiplatform: available on both web and mobile
- Identify and cover any personal identifiable information
- Support both English and Vietnamese

Ai doctor assistant automatically detects abnormalities and disease on Chest X-rays
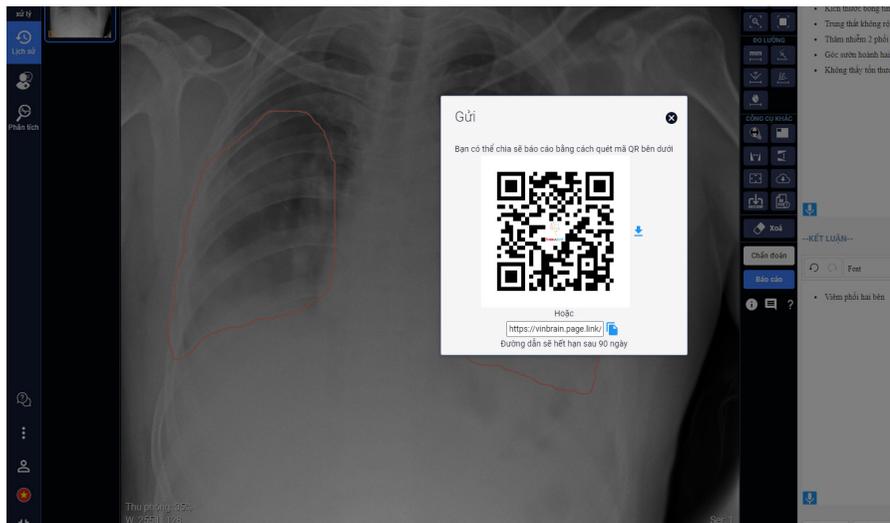
Real-time image and medical report sharing via QR Code or link
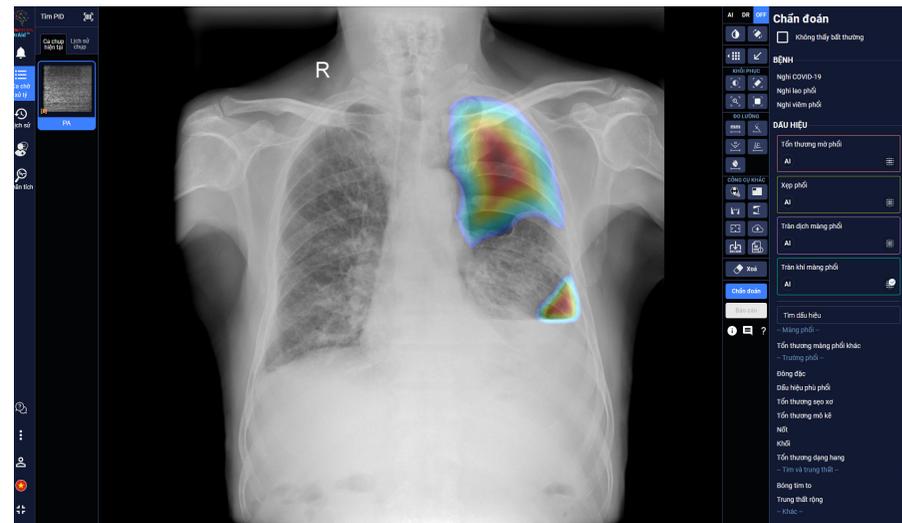
AUto-generated medical report by AI wwith heatmap and border

DIFFERENCES OF
DRAID™ AI PACS CLOUD

DrAid™ AI PACS Cloud	Other PACS solutions
System runs on Azure Cloud - no IT infrastructure investment is needed	Initial IT infrastructure investment: Require high configuration and synchronization
Can connect and sync with AI Smartcare - Telehealth application that centralizes patients' images and diagnostic reports storage, allow easy access anytime anywhere and share via QR code or link	Range of operation: Within the hospital
Virtualization technology and storage on cloud computing platform	None
Tools to support radiologists, second doctor's opinion feature, automatic report generation	Only has tools to support radiologists
Use Microsoft Azure platform with security certification: PCI DSS, SOC 1, SOC 2, SOC 2, ISO/IEC 27001:2013, ISO 22301:2012	System security: Depending on system firewall
Apply artificial intelligence into medical imaging	None
Tele-radiology	None

DrAid™ - AI Doctor Assistant

Support the diagnosis of 21 diseases and abnormalities on chest X-ray images within 5 seconds with average 89.9% accuracy. The product helps optimize doctor's workflow, save time and increase the accuracy of diagnosis, thereby increasing the quality of healthcare services for everyone.

**Help doctors increase efficiency by:**

- Speed up image reading process
- Classifying and prioritizing severe cases, optimizing doctors' workflow and allowing timely diagnosis and treatment for patients
- Save time for doctors by automatically generating doctors' report with heat map, measurement and localization of inflicted regions.

Help doctors increase accuracy in diagnosis by:

- Provide diagnostic suggestions for doctors, thereby, help avoid missing abnormalities. Experiment shows that AI helps increase the accuracy of doctors' diagnosis by 9%-25%.
- The "Ask second doctor" feature allows doctors to consult other doctors on difficult cases.

21 abnormalities & diseases

- No findings
- Suspected COVID-19
- Suspected Tuberculosis
- Suspected Pneumonia

DISEASES

- Pneumothorax
- Pleural Effusion
- Pleural other

PLEURA

- Lung Opacity
- Atelectasis
- Consolidation
- Edema
- Pulmonary scar
- Lung lesion
- Nodule
- Mass
- Cavitation

CENTRAL LUNG

- Enlarged cardiomediastinum
- Cardiomegaly
- Widening Mediastinum

HEART & MEDIASTINUM

- Fracture
- Medical device

OTHERS
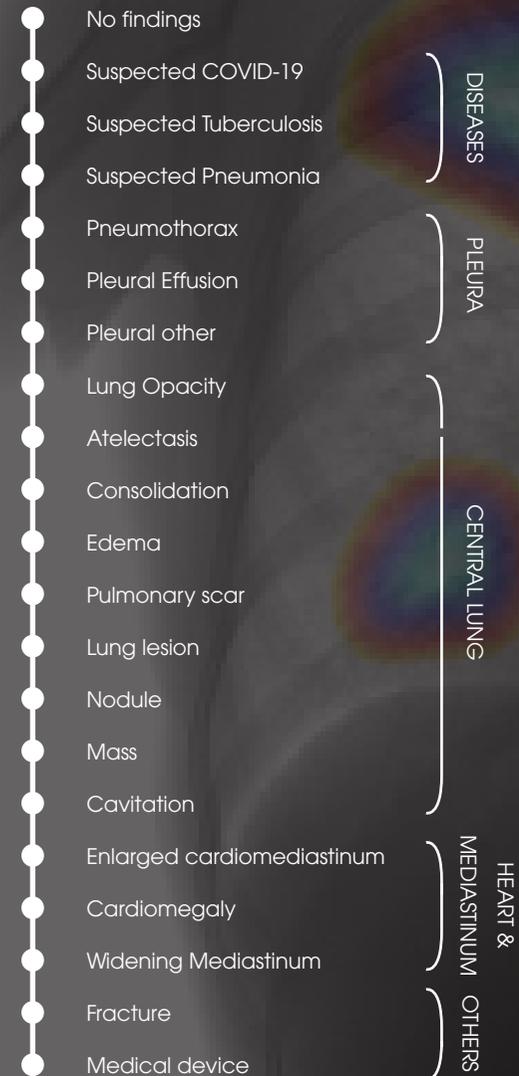
DIFFERENCES OF
DRAID™ AI PACS CLOUD

AI SUPPORTING THE DIAGNOSIS AND PROGNOSIS OF COVID-19

DrAid™ for COVID-19 is the result of 2 national scientific researches on: "Using artificial intelligence (AI) to support the diagnosis of COVID-19 in Vietnam based on chest X-ray images" co-authored by the IT Department of the Ministry of Health and VinBrain in 2020; and "Using artificial intelligence (AI) to support the diagnosis of new variants of SARS-CoV-2 in some provinces in Vietnam based on chest X-ray images" co-authored by the Department of Medical Service Administration of the Ministry of Health and VinBrain in 2021.

Both researches were highly praised and accepted by the Scientific Council of the Ministry of Health with the conclusion that "it has practical value in supporting the assessment of the prognosis of COVID-19 patients in hospitals and medical facilities in Vietnam" and "should apply DrAid™ for COVID-1 into daily use in hospitals".
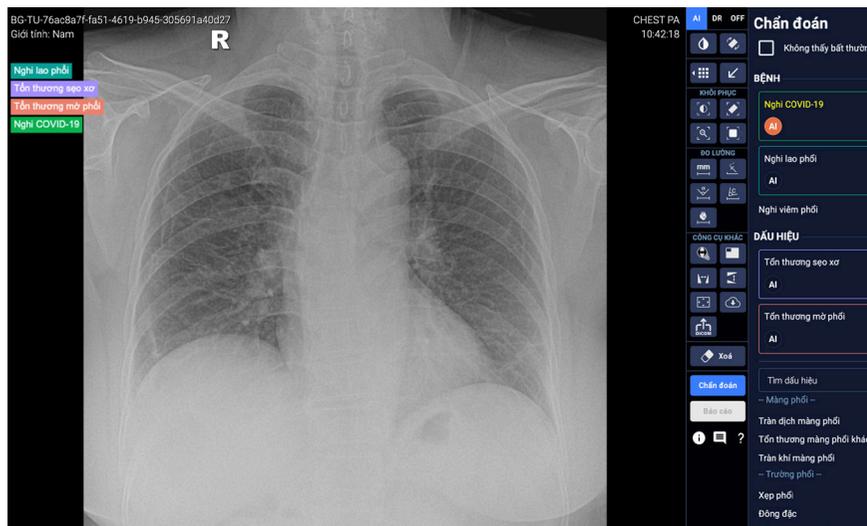
Doctor suspected pulmonary tuberculosis (June 4), AI suspected pulmonary tuberculosis and COVID-19 (June 4), PCR identified COVID-19 (June 6)
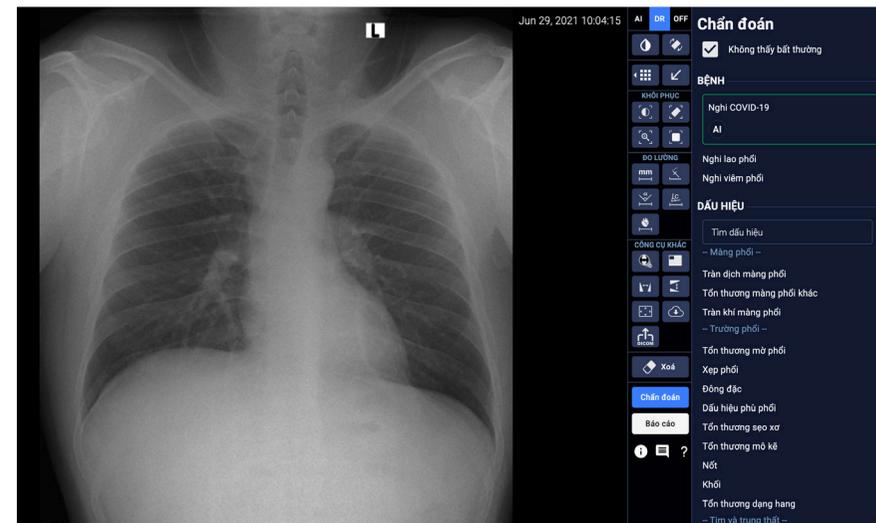

Doctor suspected no findings, AI suspected COVID-19 (June 29), PCR identified COVID-19 (July 3)

⭐ **Finalist** of "Global COVID-19 Pandemic Response Challenge" competition organized by XPRIZE and Cognizant, selected from 104 teams of 28 countries

⭐ Directly ordered by **Children's Hospital Colorado** - America's the largest children's hospital to develop an AI model to diagnose COVID-19 for children

⭐ **The first and only** AI product to support both the diagnosis and prognosis of COVID-19 in Vietnam which was certified by the Ministry of Health

⭐ **The first version** was given to the Ministry of Health for free to serve the prevention of COVID-19 on August 25th 2020

⭐ Currently being used in **9 field hospitals and COVID-19 emergency centers** in Ho Chi Minh City and Ha Tinh Province.
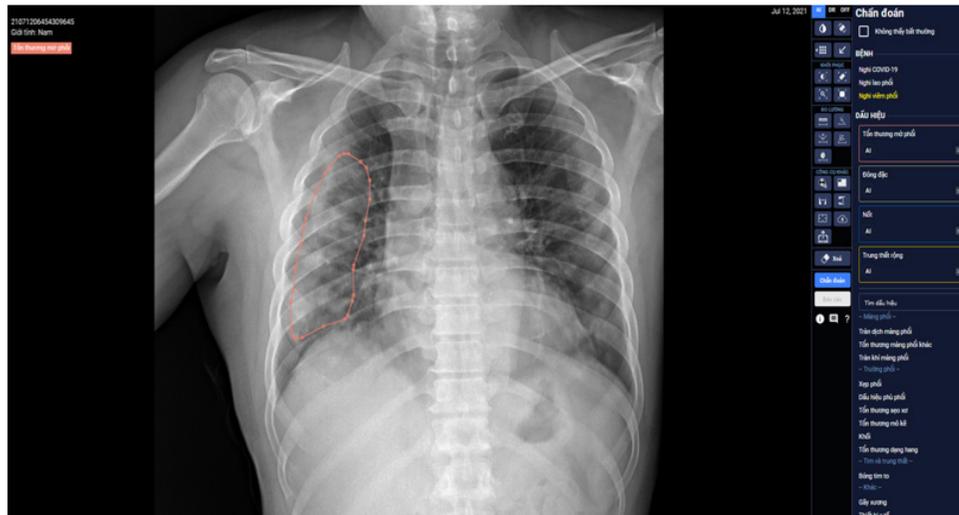
X-ray image taken on July 7, AI suspected pneumonia and lung opacities
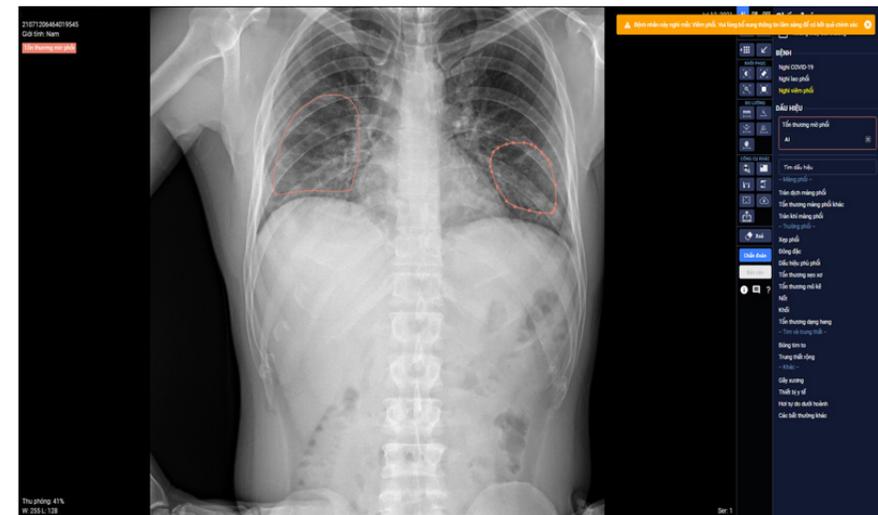
X-ray image taken on July 11, AI suspected pulmonary tuberculosis, diffusing pulmonary opacities on the right lung and pulmonary opacities on the lef lung

Patient Nguyen Van B was confirmed COVID-19 positive at Ky Anh Medical Center - Ha Tinh Province: Progress of F0 case in 02 scans, on July 11 and July 7 2021

DIFFERENCES OF
DRAID™ AI PACS CLOUD

COMPREHENSIVE
ANALYSIS SYSTEM

The analysis and reporting feature of DrAidTM AI PACS Cloud aggregates data from the system, runs data queries, creates and displays reporting metrics through dashboards, and visualize the data to provide information to users and decision makers.

This is and effective support feature for leaders, managers and functional staffs of hospitals in monitoring the operation of the Diagnostic Imaging Department, helping them retrieve the data needed to make appropriate decisions.

Users can use filters, multi-dimensional interactive functions designed specifically for each type of metric as well as exporting data to different formats depending on the intended use.

BENEFITS

◆ **Optimizing** the flow of managing and processing reporting information

◆ **Speed up** decision making process when looking directly at important indicators

◆ **Transparency** of information, improving the operational efficiency of the hospital

◆ **Smart analysis** helps Board of Directors and management to monitor the health of the organization, ensuring the achievement of strategic goals

◆ **Easily integrated** into the reports of other systems towards the future of smart hospitals

List of reports

1. Report of total number of visits
2. Report of visits by machine type (X-ray, CT, MRI)
3. Report of patient information (age, sex)
4. Report of total number of diagnoses
5. Report of total number of diagnoses by doctor
6. Report of radiologist performance
7. Report of total number of diseases
8. Report of comparison between radiologist's diagnosis and AI's diagnosis
9. Report of the medical history of a specific patient

List of features

1. Collect data from multiple sources
2. Data transformation and standardization
3. Automated report generation from different data sources
4. Export report
5. Report sharing
6. Dynamic authorization for users to access

BENEFITS &
RETURN ON INVESTMENT

For the Hospital

1. Access to new technology, in line with the development criteria and orientation of Government and Ministry of Health
2. Improve efficiency and quality of healthcare services, increase the level of satisfaction of patient and improving the image of the hospital
3. Actively track and monitor hospital's performance through reports from the system
4. Save initial IT infrastructure investment compared to traditional PACS
5. Save the cost of printing film, protecting the environment
6. Tele-radiology with national and international hospitals
7. Image storage via cloud system, easy to access and download when required, easy to scale up. Meet storage time according to the regulations of the Ministry of Health for each specific type of photo
8. Bidirectional connection to HIS, RIS, EMR system

For the Patient

1. Reduce waiting time to receive diagnostic results
2. Directly share your images and medical reports via QR code or link
3. Store images taken at the Diagnostic Imaging department, compare and share with other doctors for consultation without re-scanning, reducing travel and hospital costs.
4. Linking results of medical examination and treatment through AI SmartCare (need consent of both parties), making it easier to manage and use results for future visits.

For the Doctor

1. Professional and efficient image processing toolset to help doctors speed up reading time and return results, improve the quality of diagnosis imaging.
2. Artificial intelligence helps optimize doctor's workflow and increase efficiency and accuracy.
3. Easily access the patient's scan history at the hospital on DrAid™ AI PACS Cloud when the patients take re-visits.
4. Read images anytime, anywhere, supporting multi-platform (web, mobile), 2 languages (English and Vietnamese).
5. Easily share medical images and reports with patients via QR code or link.

FULL PACS WORKFLOW

✚ HOSPITALS & HEALTHCARE FACILITIES

Medical Imaging machines

VB OneBox

DrAid™ application (web, mobile, 3rd parties)

Medical Imaging report

HIS

DICOM images

1

2 Preprocessor (PII removed, compressed)

Doctor analyse + check PII

Classification & segmentation

6

Radiology report

7

Report saved

8

Patient

Demographic info

PII removed, compressed images

3

AI predictions

4

5

Doctors decision

API

VINBRAIN CLOUD

DrAid™ server

DICOM server

VB Staff

PII removal manual check

PII post-check

INTEGRATED WORKFLOW

AI integrated into hospital PACS system

✚ HOSPITALS & HEALTHCARE FACILITIES

Medical imaging machines

DICOM images

PACS Server

Report saved

5

4

Radiology report

1

PACS Viewer

Demographic info

Doctor decision

6

PII removed, compressed images

2

AI predictions

3

VINBRAIN CLOUD

DrAid™ Server

PARTNERS & CUSTOMERS USING VINBRAIN **DRAID™**

84 **Hospitals**

>600 **Doctors**

DrAid™ has been used by top special hospitals such as:

⭐ 108 Military Central Hospital

⭐ Hue Central Hospital

⭐ Thai Nguyen Central General Hospital

⭐ University Medical Center Ho Chi Minh City

🟧 *City & Provinces where our products have been deployed*

CUSTOMER FEEDBACK

Professor Nguyen Thanh Long
Minister of Health

"DrAid™ for COVID-19 should be applied to all medical facilities nationwide, and in the future, will gradually refine the big data and enrich AI, to further apply AI for other usage scenarios."

Mr. Le Ngoc Chau
Vice Chairman of Ha Tinh Province

"The implementation of DrAid™ helps to create a centralized database for scientific research, assessment of the structure of pathology and related issues, thereby improving the capacity of diagnosis. Also thanks to this database, patients will not have to carry a hard film bag when seeing doctors."

Professor, MD, Ph.D Pham Nhu Hiep
Director of Hue Central Hospital

"DrAid™ AI PACS Cloud helps Hue Central Hospital to systemize medical images and especially provides accurate diagnostic results to ensure best treatment and patient care."

Doctor Htoo (Tony) Maung Ohn
Parami General Hospital - Myanmar

"We would like to use VinBrain's products as soon as possible."

INTERNATION & NATIONAL PRIZES

Winner of ACM SIGAI Industry Award 2021

Finalist SIIA CODiE Awards 2021 under "Best Technology in Healthcare"

Top 2 SIIA CODiE Awards 2021 under "Best Artificial Intelligence Solution in Healthcare"

Finalist of "Global COVID-19 Pandemic Response Challenge" by XPRIZE and COGNIZANT

Best Digital Solution - National Prize "Make-in-Vietnam 2020"

Honored as a Pioneer in Digital Transformation in Healthcare by Vietnam's Ministry of Health

LEGAL DOCUMENTS

◆ Decision No. 52-NQ/TW dated September 27, 2019 of the Political Bureau on a number of guidelines and policies to actively participate in the Fourth Industrial Revolution.

◆ Decision No. 127/QD-TTg dated January 26, 2021 of the Prime Minister promulgating the National Strategy on Research, Development and Application of AI to 2030.

◆ Decision No. 749/QD-TTg dated June 3, 2020 of the Prime Minister approving the "National Digital Transformation Program to 2025, towards 2030".

◆ Decision No. 5316/QD-BYT dated December 22, 2020 of the Ministry of Health approving the "Program for digital transformation of health care to 2025, looking forward to 2030.

◆ Decision No. 4888/QD-BYT dated October 18, 2019 of the Ministry of Health approving the project on application and development of smart medical IT, 2019 -2025.
Circular 54/2017/TT-BYT dated December 29, 2017 of the Ministry of Health promulgating a set of criteria for IT application in medical examination and treatment facilities.

◆ Decision No. 176/QD-KCB dated July 28, 2021 of the Medical Examination and Treatment Administration - Ministry of Health on the acceptance of research on the application

◆ of Artificial Intelligence in the diagnosis of COVID-19 through chest X-ray image of VinBrain Joint Stock Company.

CONTACT US!

VinBrain JSC

⊙ No. 7 Bang Lang 1 Street, Vinhomes Riverside
   Hanoi, Vietnam

▢ Mobile phone: 024 7106 8680

✉ Email: info@vinbrain.net

⊕ Website: https://vinbrain.net/