Realizing Personalized Healthcare through AI

Joon S. Park, Ph.D.

Founder and CEO

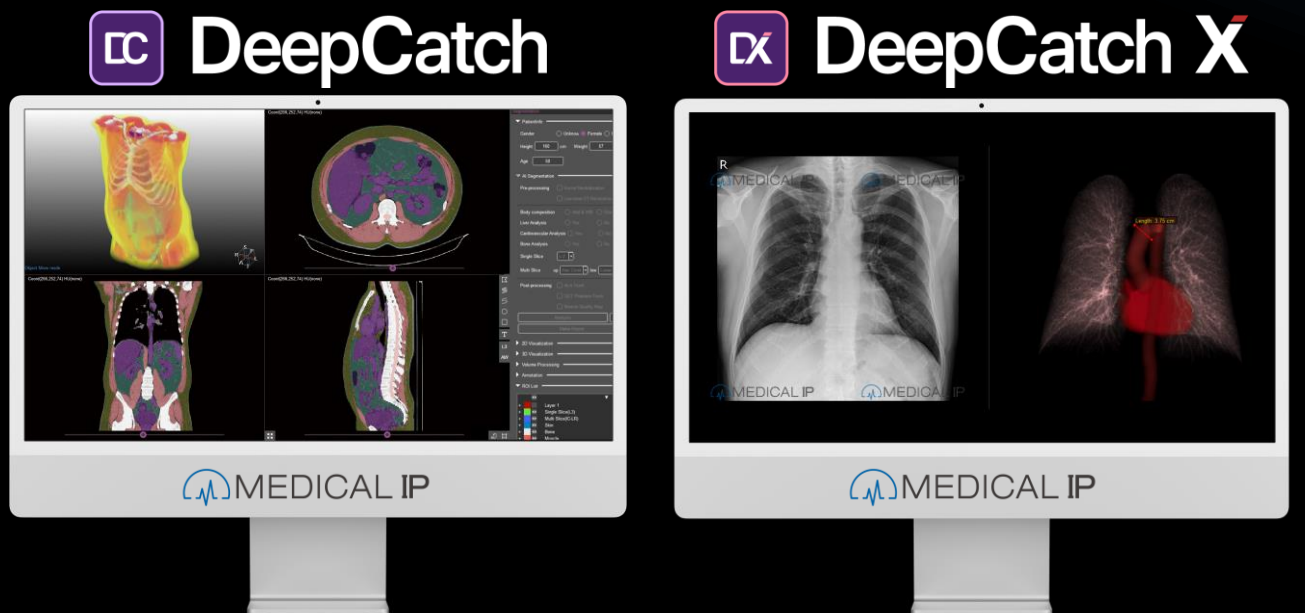
MEDICAL IP

MEDICAL IP

DeepCatch

AI for Patient

Segment. Quantify. Assess



Partnership

Vendor

Co-work

NVIDIA

The first and only medical technology connected with NVIDIA Omniverse
(3D Technology)

NVIDIA GTC
(GPU Technology Conference)

Member of the Council in Medical Imaging and Healthcare AI
(Only company in Asia)

aws

Cloud support for AI Deep learning

Letter of support for partnership on medical solution development

Mutual development of
Medical image de-identification
AWS cloud service

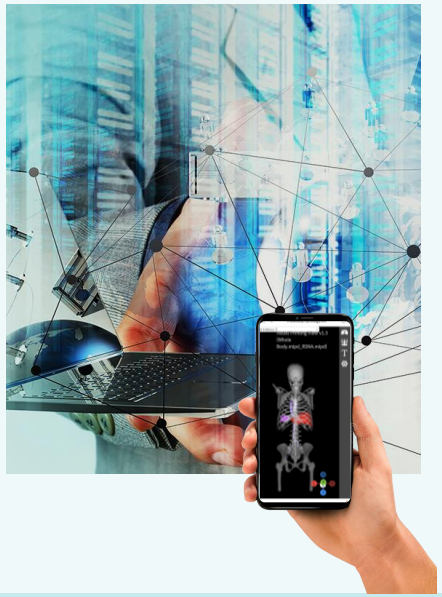
GE HealthCare

Vendor registered for CT machine and DeepCatch collaboration

Providing DeepCatch as a **supplementary function**

GE CT + DeepCatch

Gartner

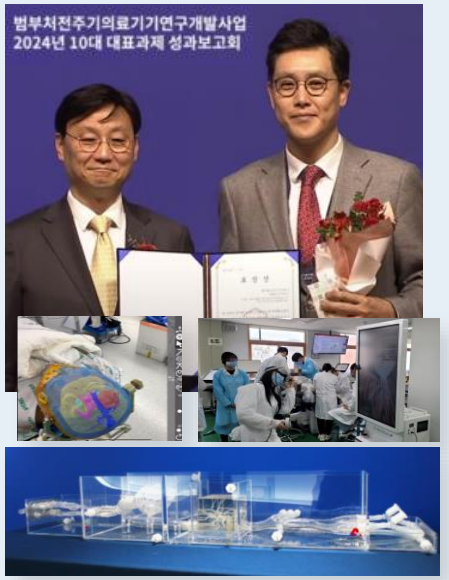


The first and only company in Asia to be **nominated as a Hype Cycle Sample Vendor** for **7 consecutive years**.

Reinforcing medical approach
Digital Care Delivery
Including Virtual Care

Nominated with other global NASDAQ companies
such as Materialize, Stratasys

Medtronic OLYMPUS
Johnson&Johnson
MEDICAL DEVICES COMPANIES



Ministry Medical Device Business,
10 Representative Project (2024)
The first domestic company with AR medical device class II (2022)

3D VR/Simulator for student education
Mutual Development & Marketing

APAC, Global extension

X-ray

No 3D Information

1895
X-ray discovered by Roentgen

CT

3D, but Radiation Exposure

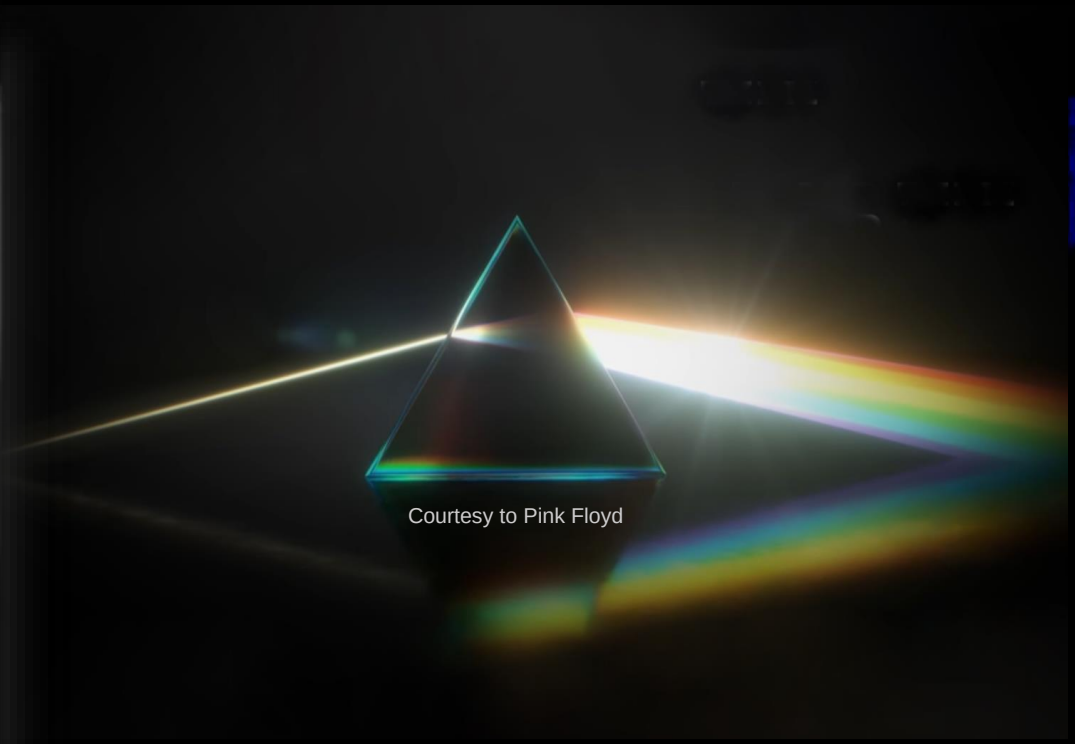
1972
CT Invented by Hounsfield

MRI

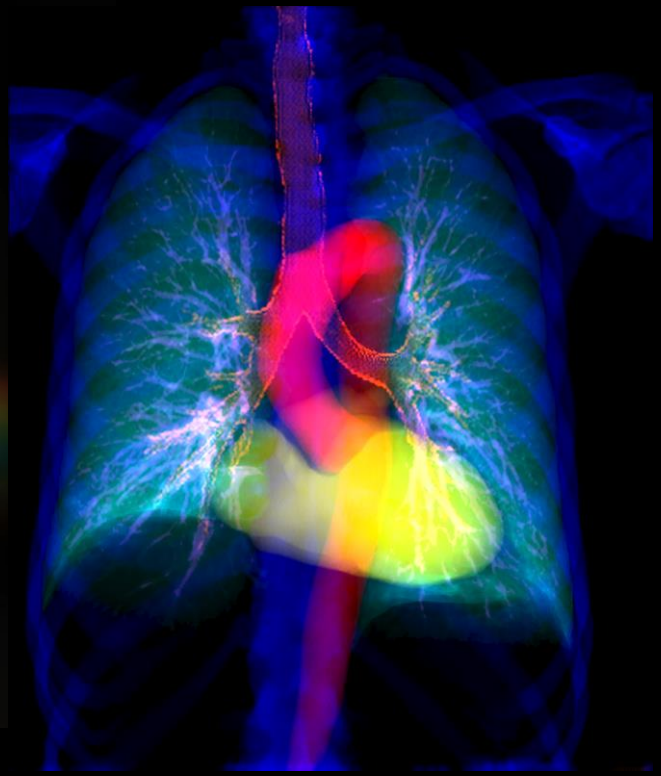
3D, but Expensive & Long acquisition

1977
MRI Invented by Lauterbur

! Conventional Diagnostic choices are…



Courtesy to Pink Floyd

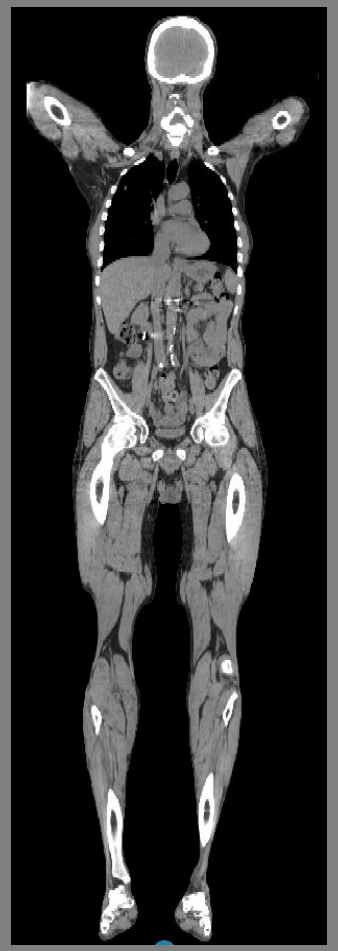


DEEPCATCH

World 1st FDA 510(k) Cleared
for AI Colorization

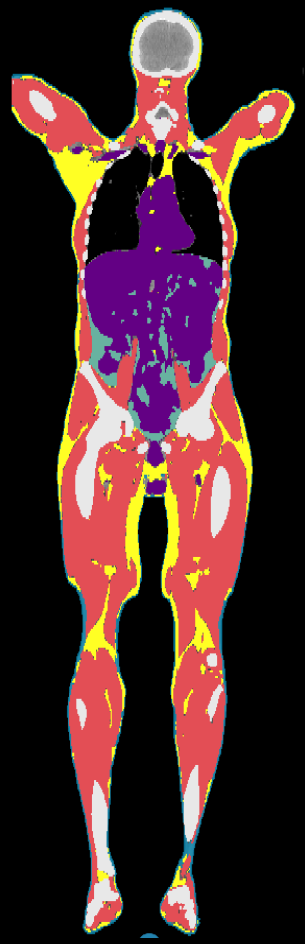
Opportunistic Screening & Longevity 100+

Whole-Body CT



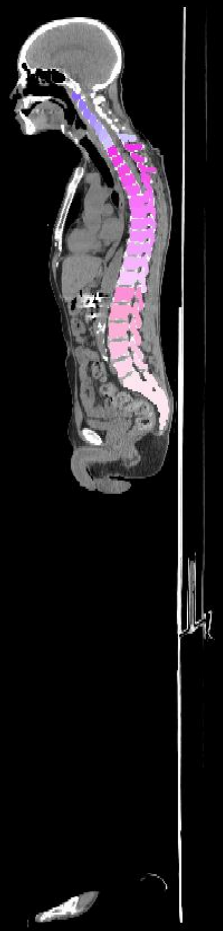
OLD WAY

Body composition



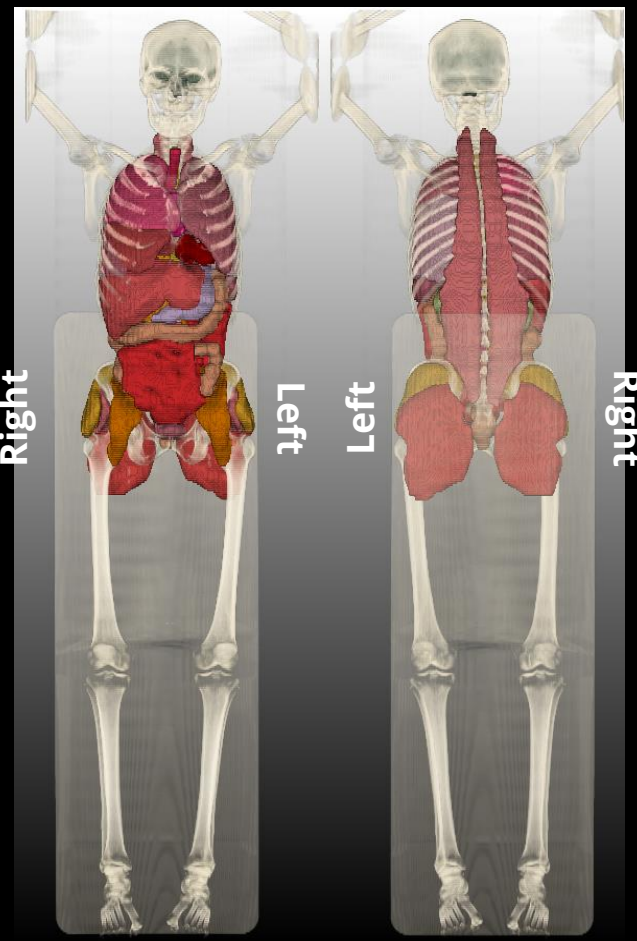
Organs

Vertebrae Bones



3D Anterior View

3D Posterior View



NEW WAY : **More informative, easier to understand**

One month after the declaration of COVID-19 pandemic...

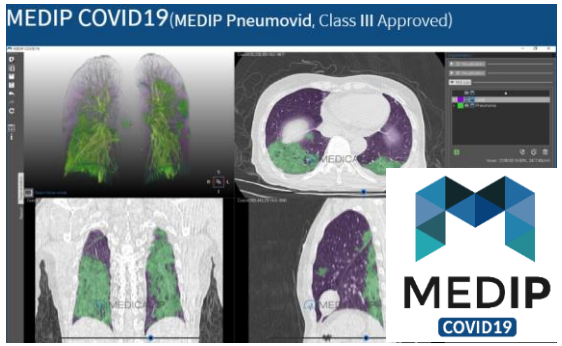
DEEPCATCH X

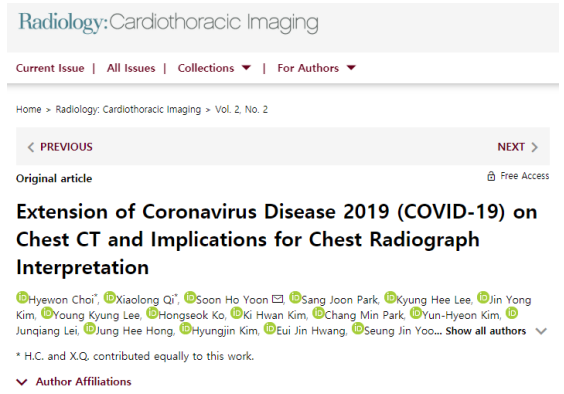
(2020 1st half)

57
Countries

1565
Institutions

2020-10-08 11:33:56 AM Current date (UTC+09:00)





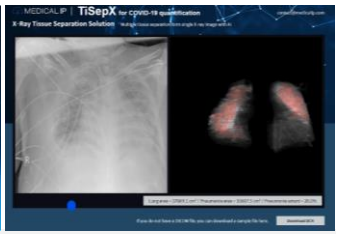
1. Extension of Coronavirus Disease 2019 (COVID-19) on Chest CT and Implications for Chest Radiograph Interpretation. Radiology: Cardiothoracic Imaging. Vol. 2, No. 2, Mar 30 2020
2. Automatic CT Quantification of Coronavirus Disease 2019 pneumonia: An international collaborative development, validation, and clinical implication. Radiology. Preprint, Jul 24 2020
3. Prognostic Implication of Volumetric Quantitative CT Analysis in Patients with COVID-19: A Multicenter Study in Daegu, Korea. Korean J Radiol. 2020;21:e130, Aug 04 2020
4. Anterior Pulmonary Ventilation Abnormalities in COVID-19. Radiology. Published Online: Aug 13 2020
5. Predictive Parameters for the Worsening Clinical Course of Mild COVID-19 Pneumonia. Radiology. Preprint, Aug 7 2020

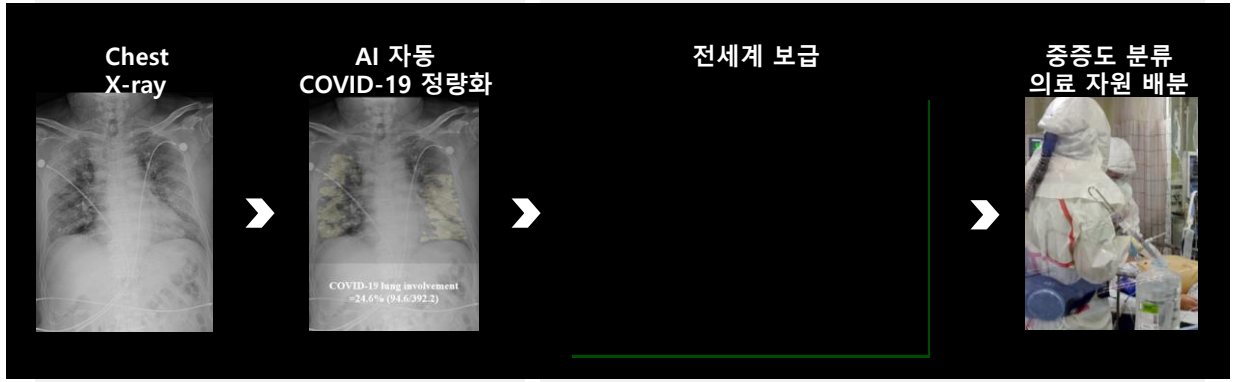
(2020 2nd half)

Completion of 3D X-ray technology using DeepCatch's and Pandemic's massive 3D dataset data

aws

Average validation result with SSIM for CT-driven X-Ray was 99.43% for lung image generation and 98.89% for lesion image generation.





개발 완료 → 현장 도입

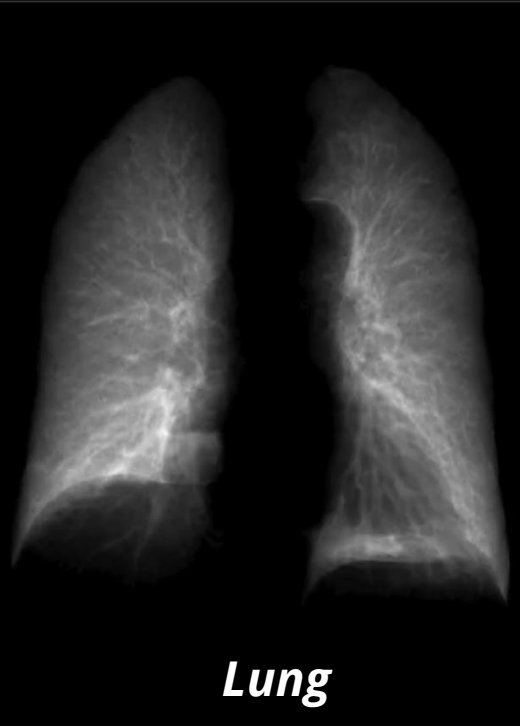
Average validation result with SSIM for CT-driven X-Ray was **99.43%** for lung image generation and **98.89%** for lesion image generation.

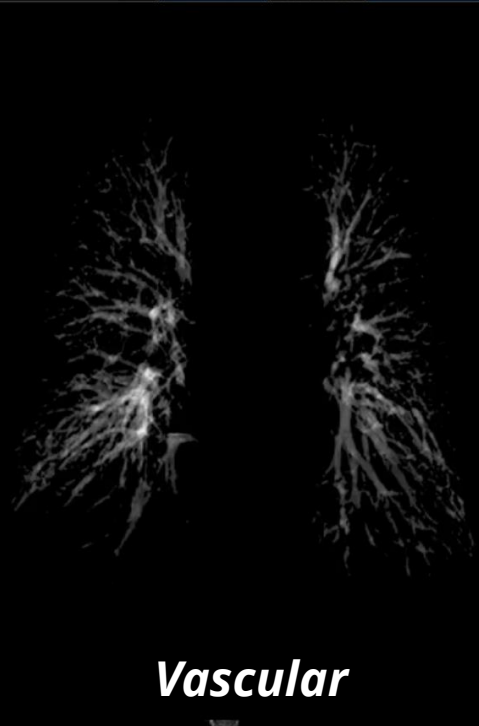
DeepCatch X

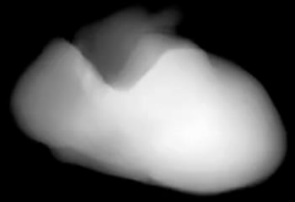
3D extraction from 2D X-ray


Original CXR


Bone


Lung


Vascular

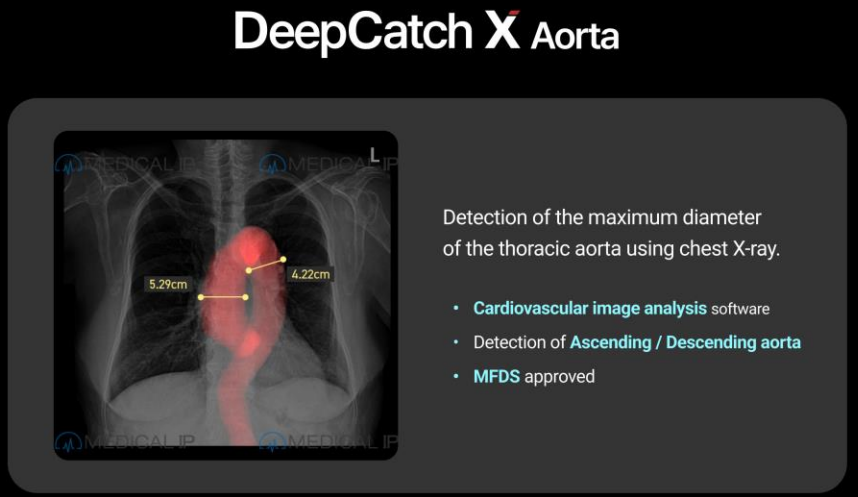

Heart


Ascending
Aorta


Descending
Aorta


Airway

DeepCatch X unveils its lineup, including Aorta, Heart, and Torso models.
Medical IP becomes the 1st Korean company to be awarded Best in Class in the Health Equity category at the 2024 Digital Health Awards



Performance and Novelty Recognized at Radiology, the Top Journal in the Field

Radiology

29.146 Impact Factor

Research published in Radiology since early development

2021

Original Research
Thoracic Imaging

Free Access

Deep Learning to Determine the Activity of Pulmonary Tuberculosis on Chest Radiographs

Seowoo Lee, Jae-Joon Yim, Nakwon Kwak, Yeon Joo Lee, Jung-Kyu Lee, Ji Yeon Lee, Ju Sang Kim, Young Ae Kang, Doosoo Jeon, Myoung-jin Jang, Jin Mo Goo, Soon Ho Yoon

2022

Original Research

Deep Learning for Estimating Lung Capacity on Chest Radiographs Predicts Survival in Idiopathic Pulmonary Fibrosis

Hyungjin Kim, Kwang Nam Jin, Seung-Jin Yoo, Chang Hoon Lee, Sang-Min Lee, Hyunsook Hong, Joseph Nathanael Witanto, Soon Ho Yoon

Radiology *Editorial Comment*

Introduced as possible alternative to replace traditional testing

Radiology

REVIEWS AND COMMENTARY • EDITORIAL

Imaging to Explore the Interface between Pulmonary Structure and Function

Ronald L. Sorkness, BS, MS, PhD

Ronald L. Sorkness is a pulmonary physiologist and professor emeritus at the University of Wisconsin–Madison School of Pharmacy and in the Departments of Medicine and Pediatrics in the School of Medicine and Public Health. His research has focused on mechanisms of airway dysfunction in humans and animal models, with use of pulmonary function measurements and hyperpolarized gas MRI tools.

function laboratory. If a quick, easy, low-risk image could be obtained with the patient in an upright position for TLC measurement, such an approach could be a valuable addition to the routine chest radiography and an alternative to plethysmography.

The article by Kim et al (6) in this issue of *Radiology* reports a deep learning algorithm to estimate TLC with use of a two-dimensional posteroanterior chest radiograph. The authors developed the algorithm with use of radiographs as well as covariates of age and sex. Initial network training

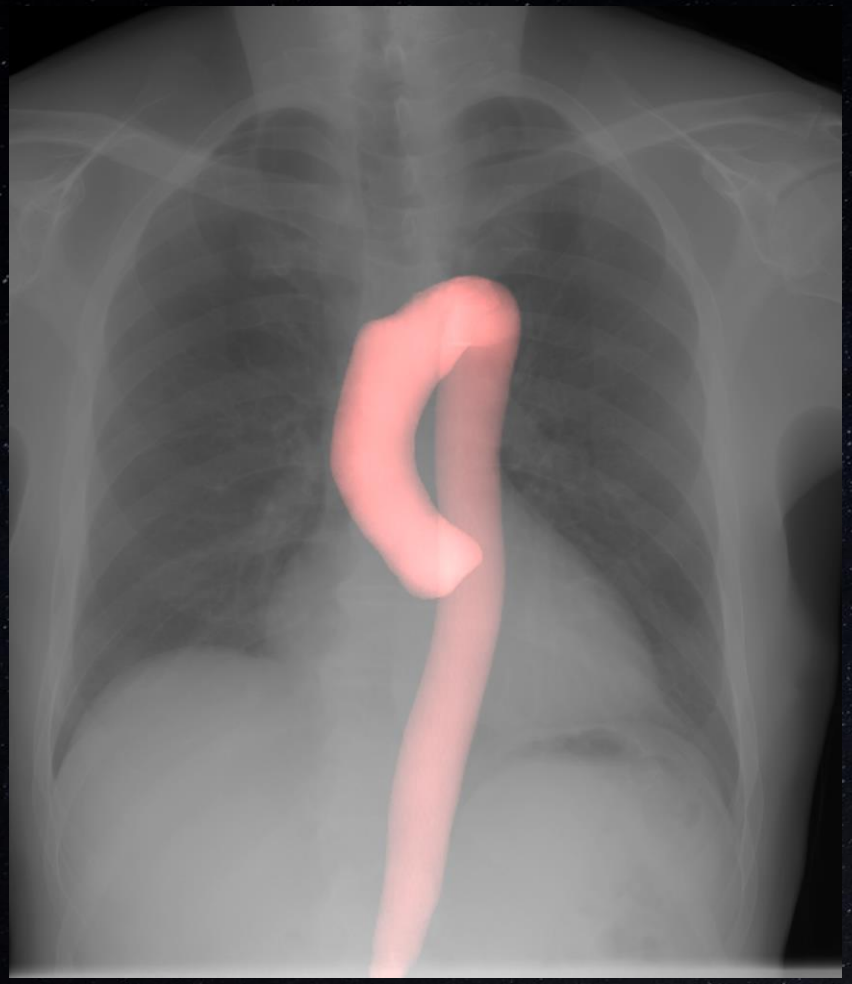
In conclusion, this study moves the radiology suite a little bit closer to the pulmonary function laboratory. It presents a method to obtain information from a basic chest radiograph that has the potential to make a valuable measurement of lung capacity widely available to clinicians. This will require further refining of the algorithm, along with standardization of the maximal deep breath maneuver.

DeepCatch X Aorta *MFDS approved* 2024 2Q

DEEPCATCH X

(2024 . 03)

Chest X-ray

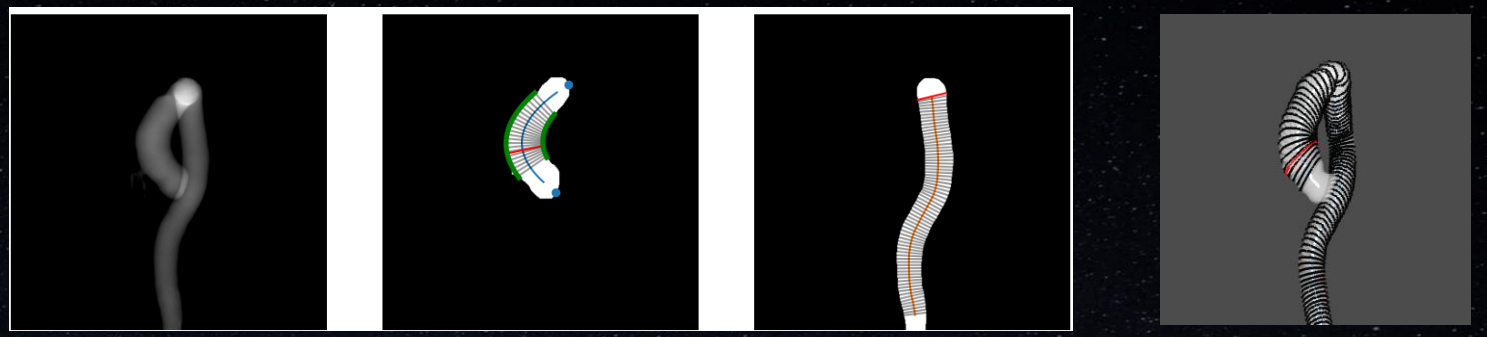


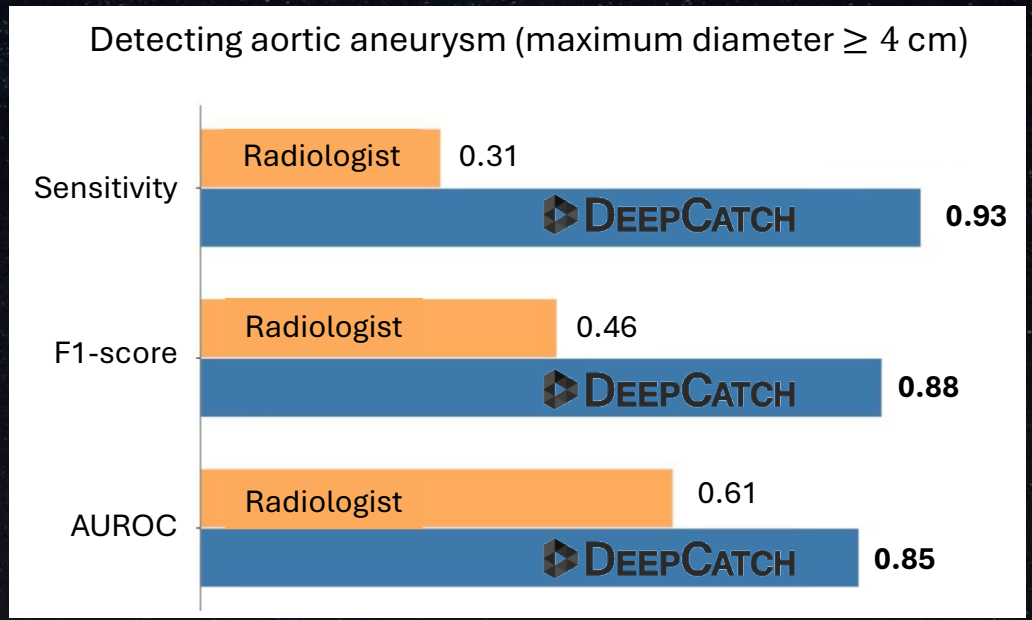
DeepCatchX Aorta

Mask – 2D (Ascending Aorta)

Mask – 2D (Descending Aorta)

Mask – 3D from CT

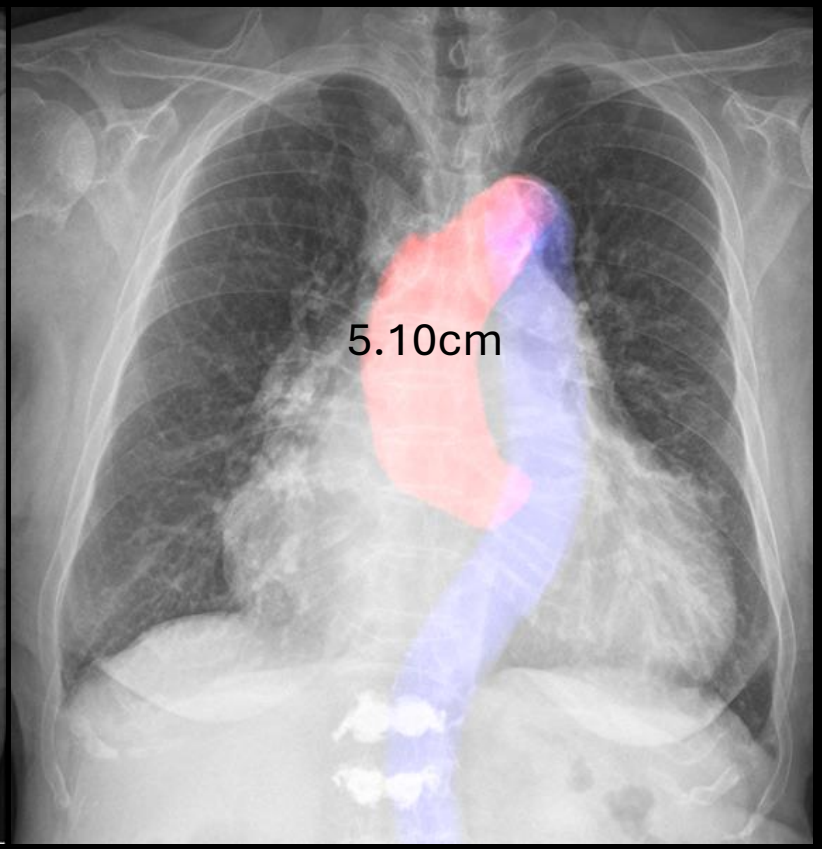


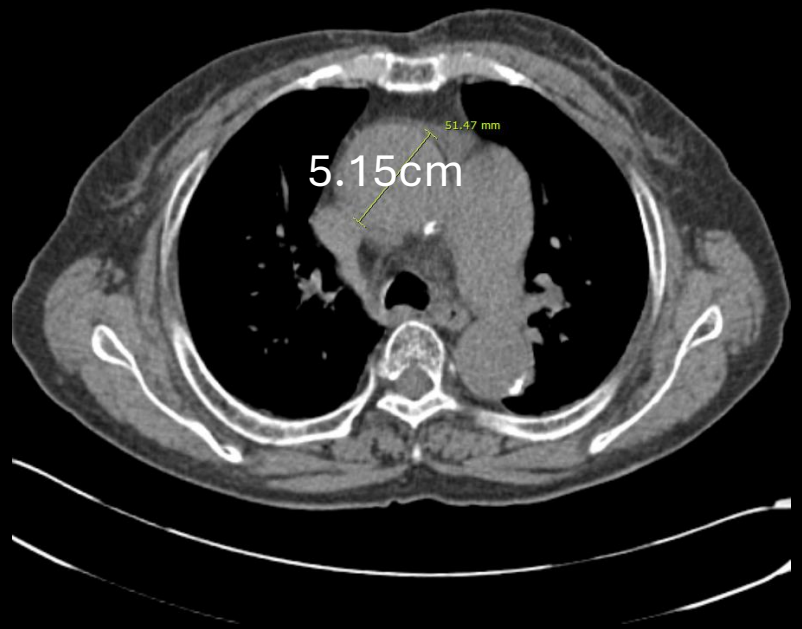


X-ray based Generative AI

DEEPCATCH X

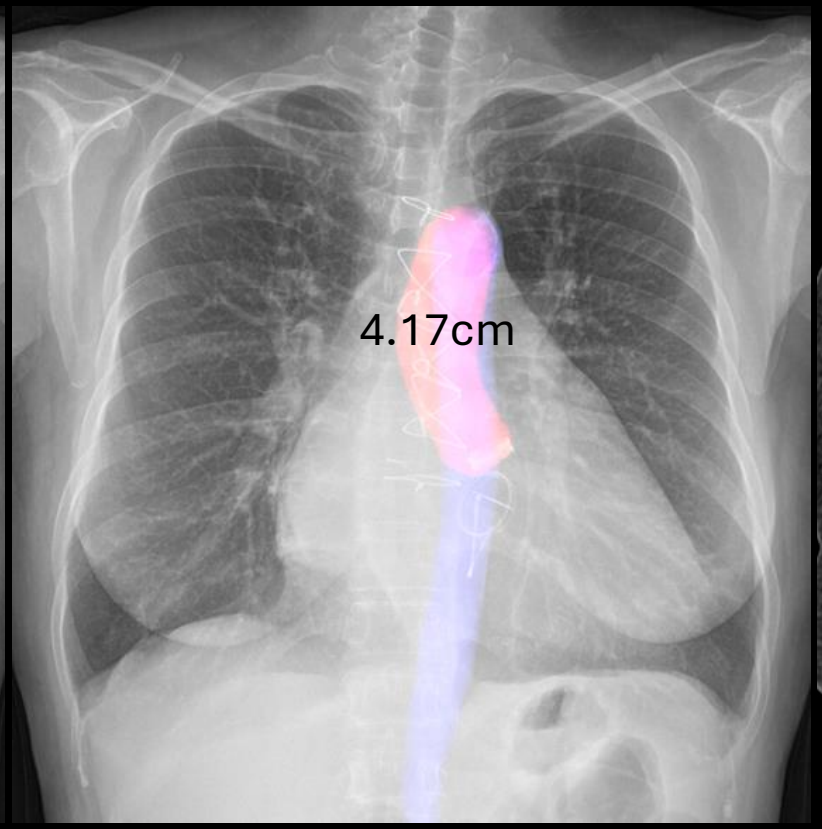
Aortic Aneurysm

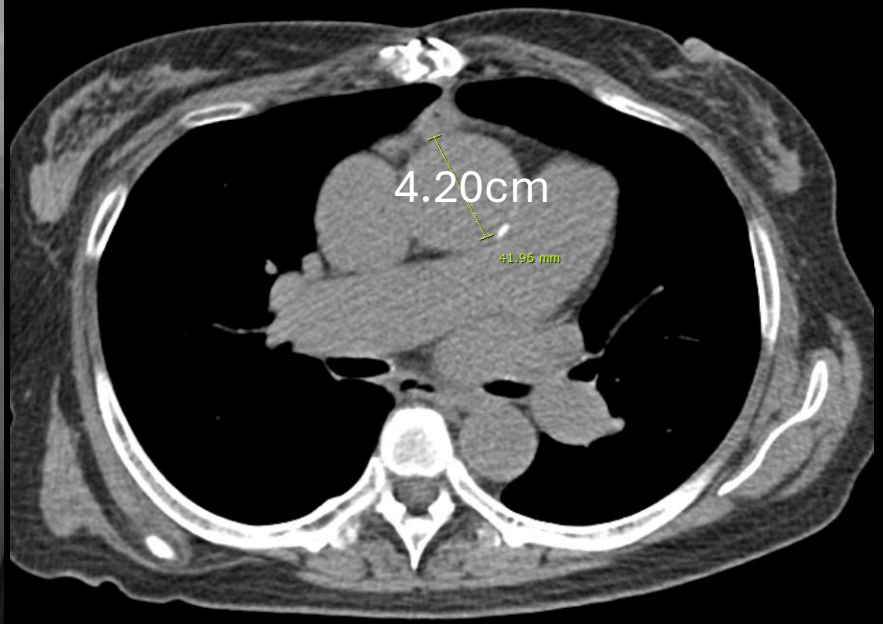




DEEPCATCH X

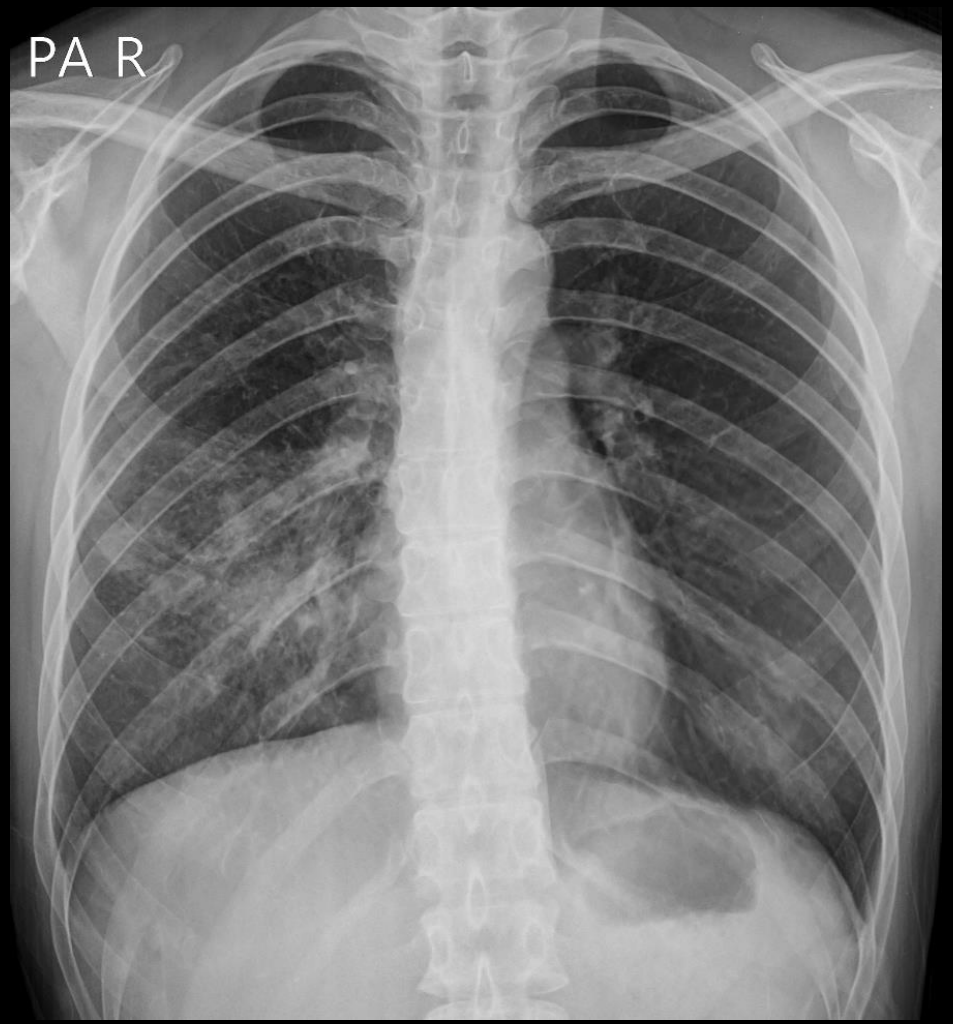
Normal (But, Aortic Dilation)

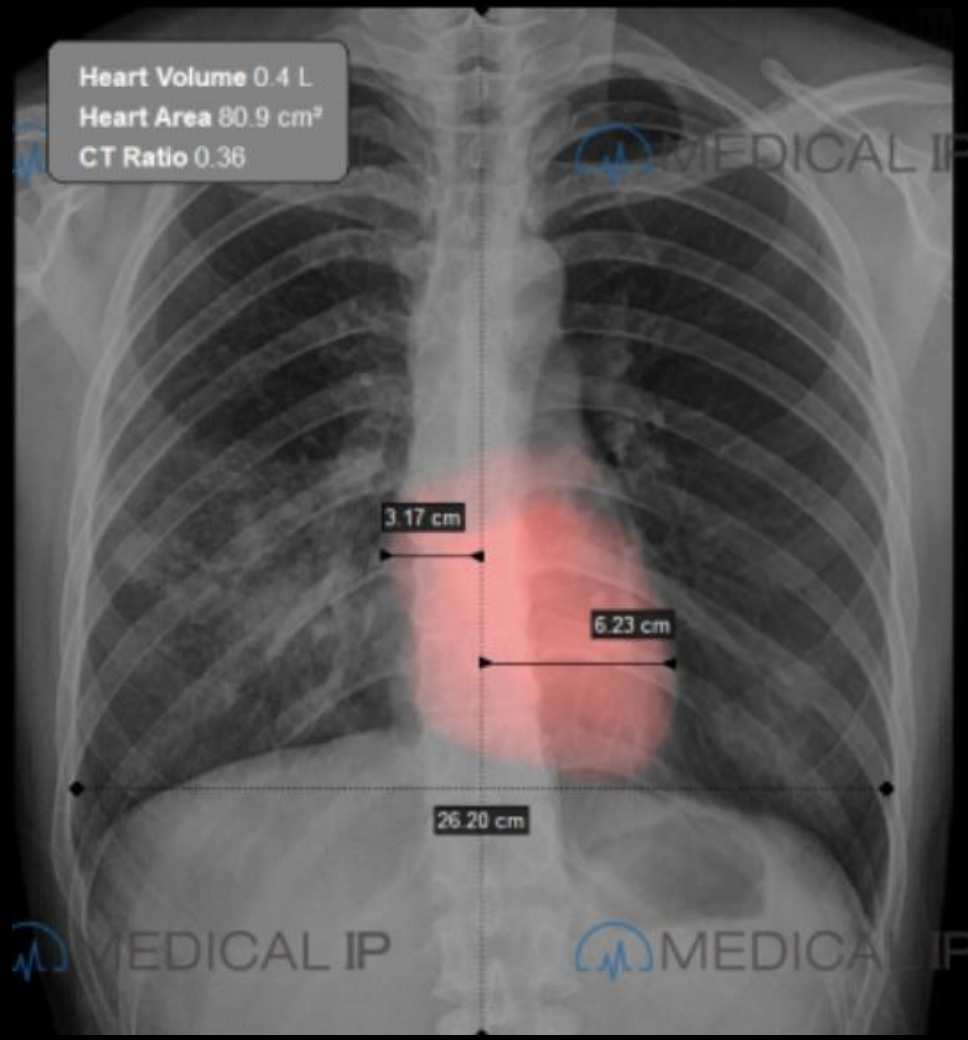




DeepCatch X Heart

DEEPCATCH X





Radiology: Artificial Intelligence

SPECIAL REPORT

AI for Detection of Tuberculosis: Implications for Global Health

Eui Jin Hwang, MD, PhD • Won Gi Jeong, MD • Pierre-Marie David, PhD • Matthew Arentz, MD, MPH • Morten Ruhwald, MD, PhD • Soon Ho Yoon, MD, PhD

From the Department of Radiology, Seoul National University Hospital and Seoul National University College of Medicine, 101 Daehak-ro, Jongno-gu, Seoul 03080, Korea (E.J.H., S.H.Y.); Department of Radiology, Chonnam National University Hwasun Hospital, Hwasun, Korea (W.G.J.); Faculty of Pharmacy, University of Montréal, Montréal, Canada (P.M.D.); OBVIA–Observatoire sur les Impacts Sociétaux de l'IA et du Numérique, Québec, Canada (P.M.D.); and FIND–The Global Alliance for Diagnostics, Geneva, Switzerland (M.A., M.R.). Received August 15, 2023; revision requested August 28; revision received December 3; accepted December 18. **Address correspondence to** S.H.Y. (email: *yshoka@gmail.com*).

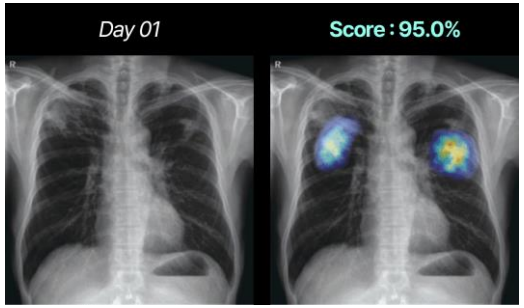
2024 Mar

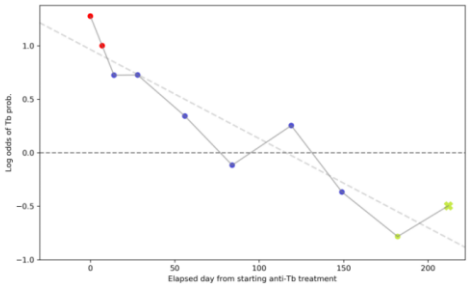
DeepCatch X TB

MEDICAL IP

Quantification of tuberculosis in X-ray images

"differentiating between active and inactive pulmonary TB"





Area under curve of receiver operating characteristics	The Neural Network	Human Reader			
		Pulmonologists		Thoracic Radiologists	
		Reader 1 *(L)*	Reader 2 *(K)*	Reader 3 *(Y)*	Reader 4 *(G)*
Internal validation dataset (n=148)	0.832 [0.762-0.888]	0.690 [0.608-0.763] (p=0.0004)	0.787 [0.712-0.850] (p=0.1586)	0.799 [0.725-0.860] (p=0.2337)	0.786 [0.711-0.849] (p=0.1402)
External validation dataset (pre-, post-treatment only, n=645)	0.821 [0.789-0.853]	-			
External validation dataset (truncated for human reviewer, n=200)	0.842 [0.784-0.890]	0.709 [0.641-0.771] (p=0.0001)	0.739 [0.672-0.798] (p=0.0010)	0.787 [0.724-0.842] (p=0.0784)	0.795 [0.733-0.849] (p=0.0629)

Table 2: Appraisal of Scientific Papers on CAD Development Based on the Checklist for Artificial Intelligence in Medical Imaging

Report [CAD Tool]	Methods							Results				
	Title/ Abstract, Introduction	Study Design	Data	Ground Truth	Data Partitions	Model	Training	Evaluation	Data	Model Performance	Discussion	Other Information	Total
No. of CLAIM criteria evaluated	4	2	7	5	3	3	3	5	2	3	2	3	42
Ajmera et al (45), 2023 [Genki]	4	2	5	3	2	3	2	5	2	2	2	1	33
Hogeweg et al (46), 2010 [CAD4TB]	4	1	0	0	0	2	0	2	0	1	0	0	10
Melendez et al (50), 2015 [CAD4TB]	4	1	1	1	2	3	2	3	0	2	2	2	23
Hogeweg et al (47), 2015 [CAD4TB]	2	1	3	3	2	3	3	5	0	2	1	3	28
Melendez et al (49), 2016 [CAD4TB]	3	1	3	1	1	3	2	4	0	2	1	1	22
Kwon et al (48), 2021 [JVIEWER-X]	4	2	5	1	2	3	3	5	1	2	2	3	33
Hwang et al (18), 2019 [Lunit INSIGHT CXR]	4	2	6	4	2	3	2	5	1	2	2	2	35
Putha et al (52), preprint [qXR]	3	2	5	3	3	2	3	4	1	2	2	1	31
Saporta et al (53), 2022 [DrAid]	4	2	0	4	1	3	2	4	0	2	2	3	27
Park et al (51), 2020 [VunoMed Chest X-ray]	4	2	5	4	2	3	2	4	1	2	2	2	33
Chopade et al (54), 2[illegible] [Chest AI]	2	1	2	0	0	3	2	0	0	0	0	0	10
[illegible] et al [illegible]20), 2021 [TiSepX TB]	4	2	7	5	2	3	2	4	2	3	2	2	38
[illegible]eh et al (19), 2023 [Google Health]	4	2	7	4	2	3	3	5	2	3	2	2	39
Seah et al (55), 2021 [Annalise Enterprise CXR]	4	2	7	4	2	3	2	4	2	2	2	3	37

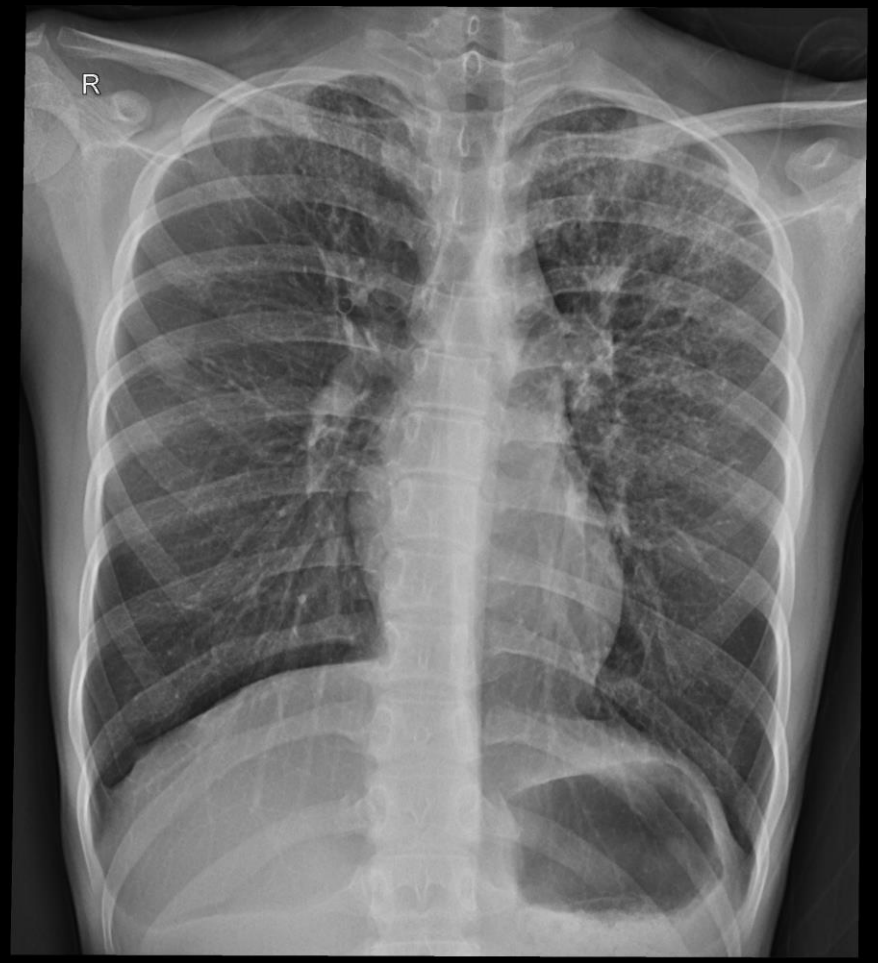
Note.—Values are the numbers of criteria evaluated. CAD = computer-aided diagnosis.

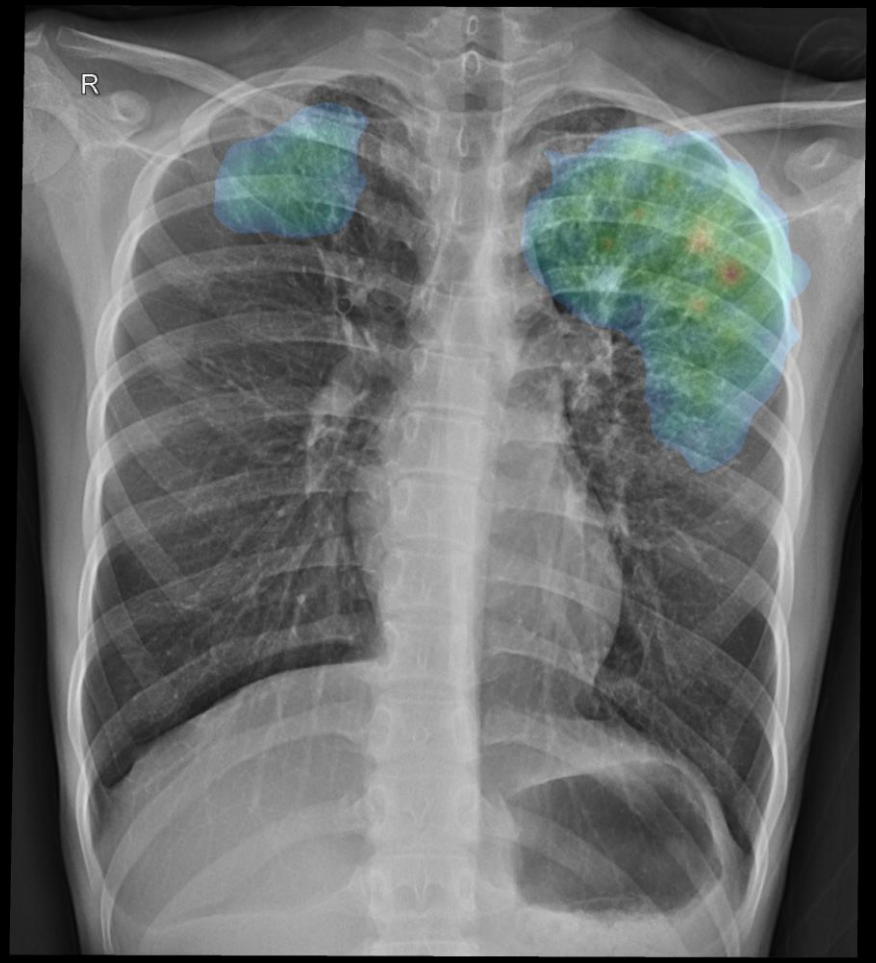
MEDICAL IP

Google Health

DEEPCATCH X

Active TB (Active TB score = 99%)

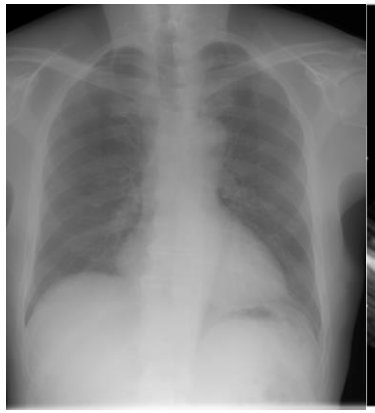




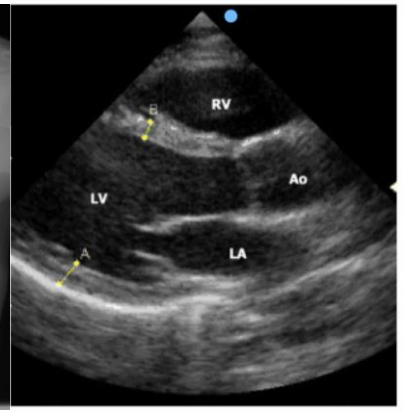
Healed TB (Active TB score = 3%)

DeepCatch X as a novel modality

Organ		Plethys-mography	US (Echocardiography)	DeepCatch CT	MRI	X-ray	DeepCatch X
Lung	**Lung Volume**	**O**	**X**	**O**	**-**	**X**	**O**
Heart	**Cardiomegaly**	**X**	**O**	**O**	**O**	**O**	**O**
Thoracic Aorta	**Dimension of Aorta**	**X**	**X**	**O**	**-**	**X**	**O**
Bone	**Osteoporosis/Fracture**	**X**	**X**	**O**	**-**	**O**	**O**
Vascular/airway	**Compliance**	**X**	**X**	**O**	**-**	**-**	**O**

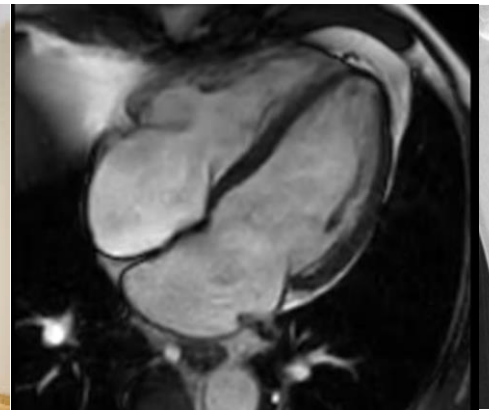


Chest X-ray



Echocardiography

Plethysmography



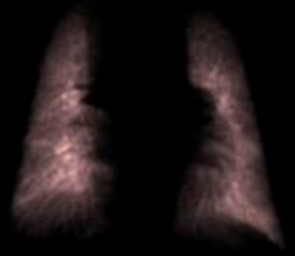
Cardiac MR

Chest CT

2yrs

Original CXR

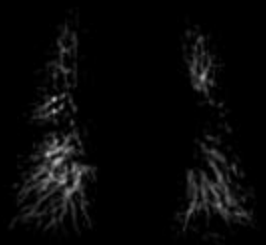
Lung



Heart

Aorta

Vascular



Bone

Airway

DeepCatch

Application Case (24.09.27 Agreement with KT Wiz)

kt wiz suwon

X

MEDICAL IP

Purpose of Use: To build a network for injury prevention, development, training and player management of the team.

Partnership

World Health Organization

Stop TB Partnership

HLTH 2024 Quarterfinalist (Health Equity Track)

Journal Publication (130+)

THE LANCET Digital Health

ATS Journals

Radiology

SCIENTIFIC REPORTS
nature research

“ Digital Cadaver Literacy™ ”

MEDIP Box

Life is Better in 3D

MEDICAL IP

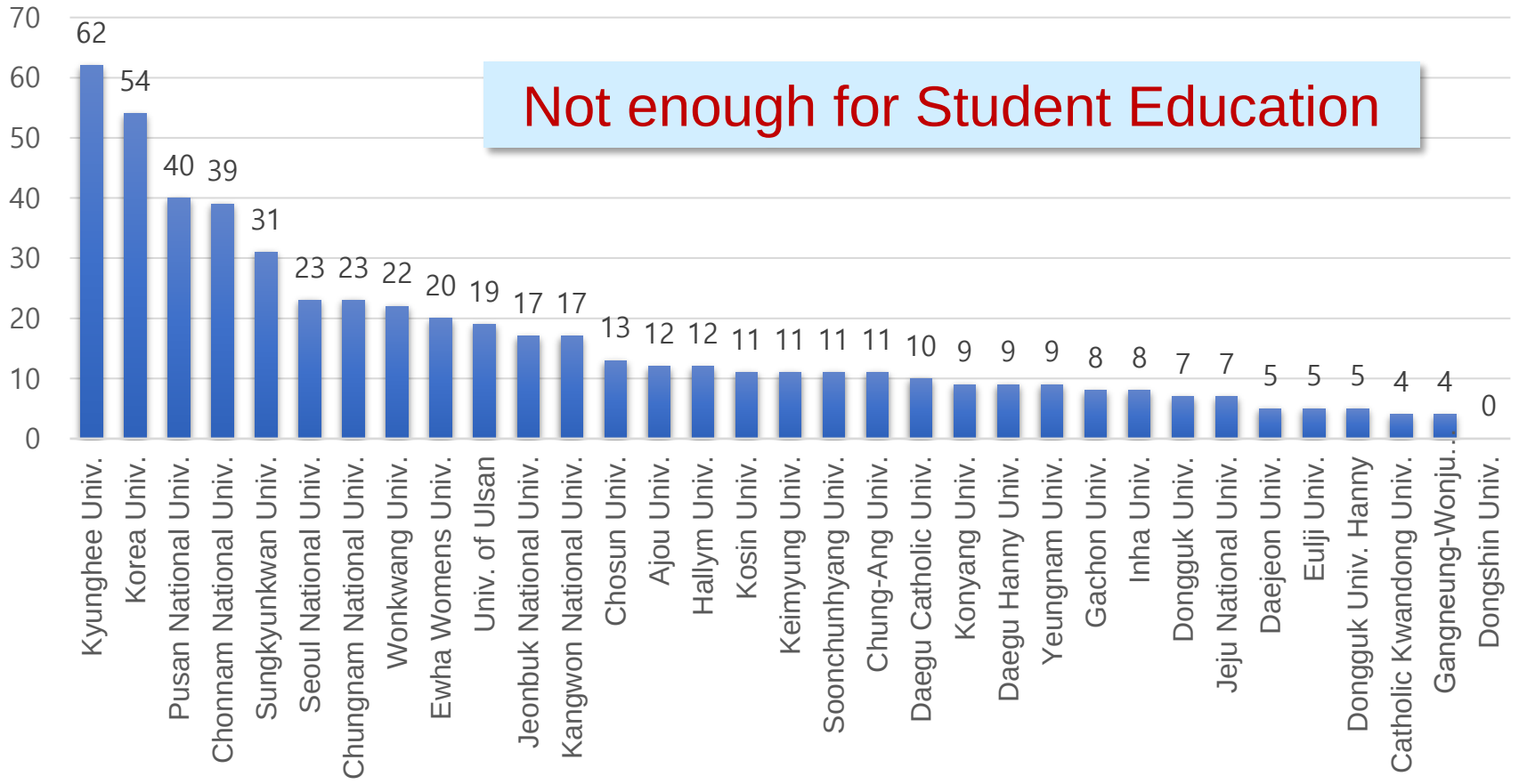
6,500

Anatomical Structure Dissection

MEDIP Box

The average annual number of Cadaver donations over the past five years.

[33 Universities / From year 2018 ~ 2022]



Not enough for Student Education

Analysis	Number
Average	16
Maximum	62
Minimum	0

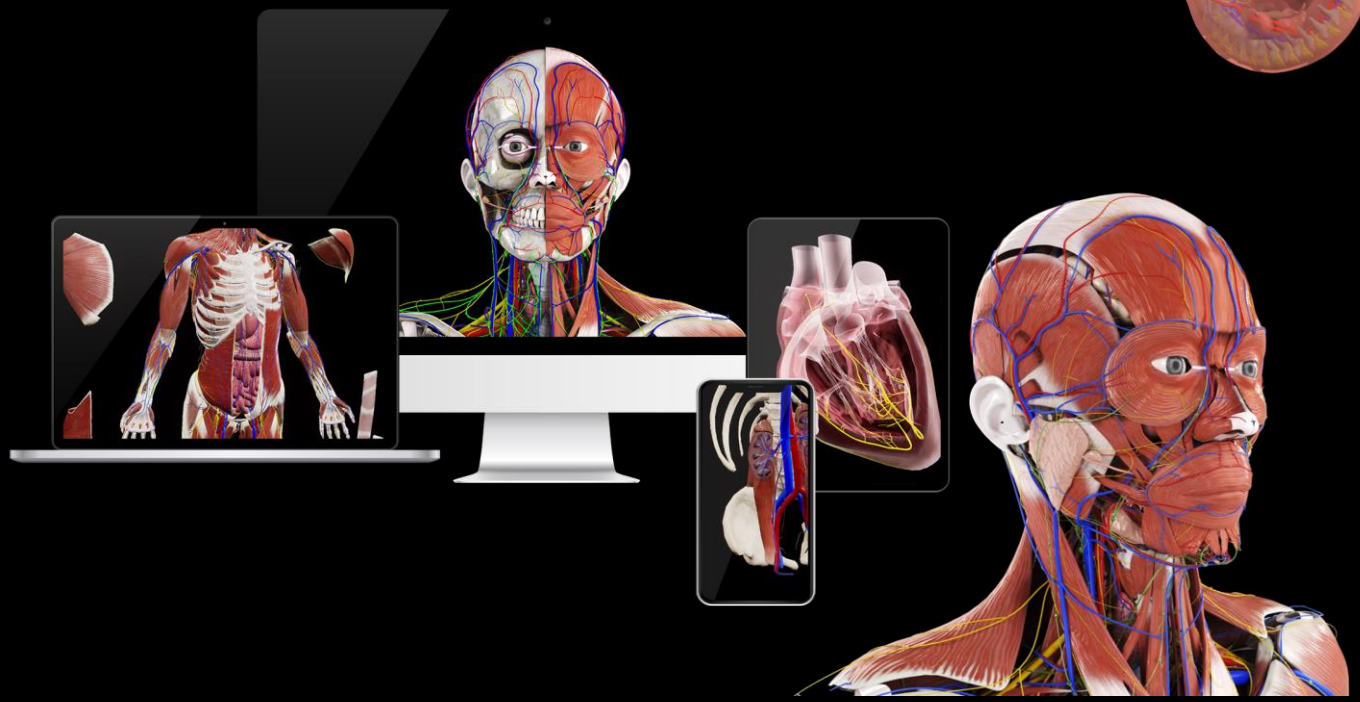
Shortage of Cadavers for Anatomy Practice

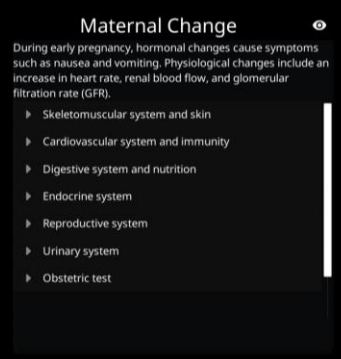
Reference: Ministry of Health and Welfare [Korea]

MEDIP Box

Advanced

Anatomy Education Solution





MEDIP Box

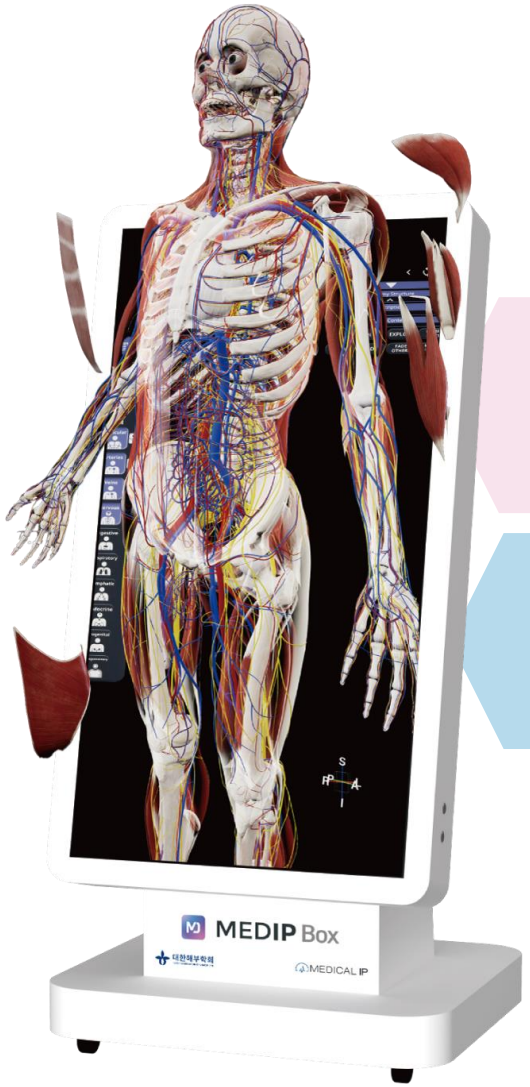
EDUCATION

“Educare” Related to Latin roots to draw out the ability

It's Time to Revolutionize Education

MEDIP Box

➡ **Digital Human Anatomy Program**



10 years of development

Anatomical structures
Implemented until now

6,500 ⬆

How to use?

Apply to your Class

MEDIP Box Virtual Reality (VR) can be utilized to provide a more immersive experience for examining human organs, and mirroring technology enables classmates to learn simultaneously.

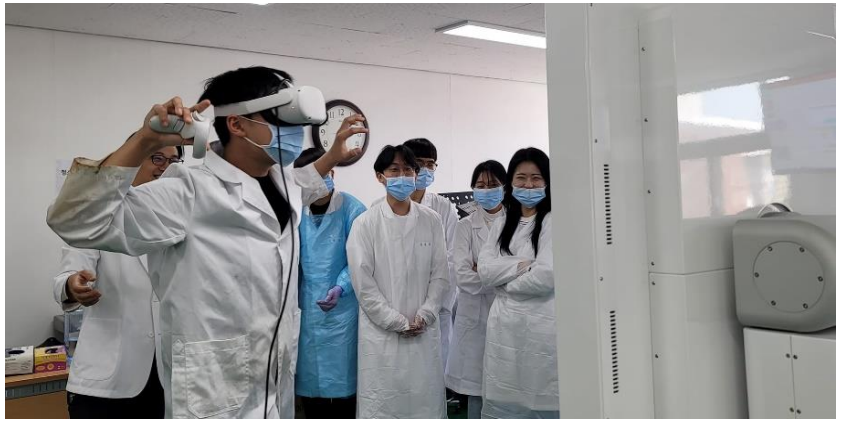
Anatomy **Orientation** in SNU MED

MEDIP Box

Click here to see the video

References

서울대학교 SEOUL NATIONAL UNIVERSITY
SNU MEDICINE Seoul National University College of Medicine
UEMF UNIVERSITÉ EURO-MÉDITERRANÉENNE DE FÈS EURO-MEDITERRANEAN UNIVERSITY OF FEZ الجامعة الأورومتوسطية بفاس
사단법인 아프리카미래재단 Africa Future Foundation
ESWATINI MEDICAL CHRISTIAN UNIVERSITY
충북대학교 CHUNGBUK NATIONAL UNIVERSITY
KNU 강원대학교 KANGWON NATIONAL UNIVERSITY
제주대학교 JEJU NATIONAL UNIVERSITY
MILSEONG JEIL HIGH SCHOOL
SAEKYUNG UNIVERSITY 세경대학교



Student Survey Result

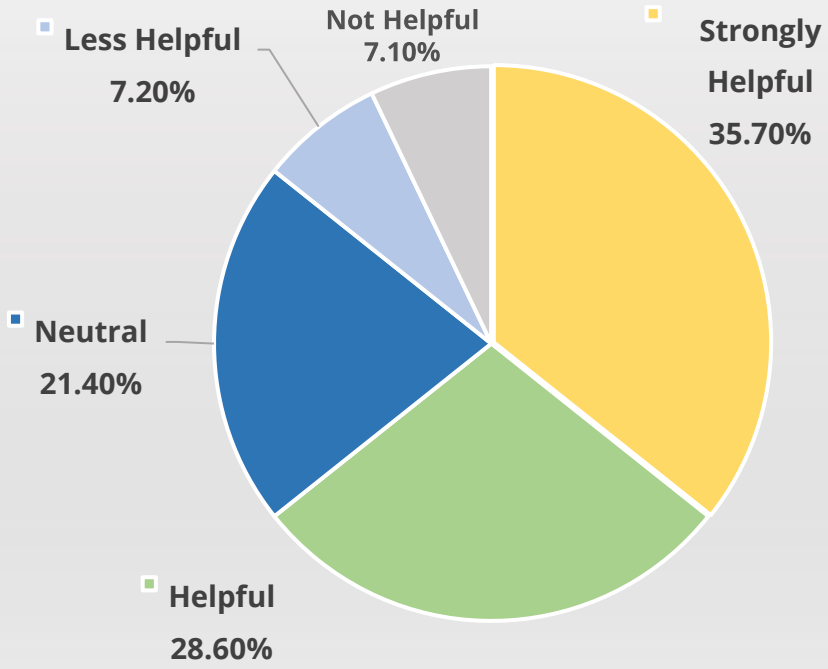
MEDIP Box

Survey with Seoul National Univ. Anatomy Class (30 students)

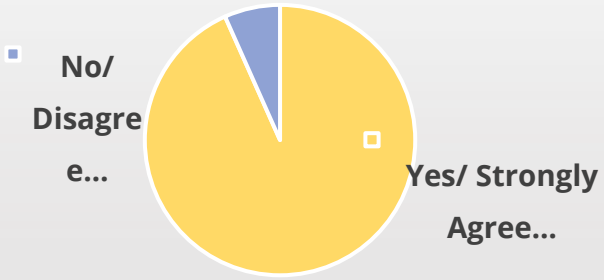
서울대학교 SEOUL NATIONAL UNIVERSITY · SNU MEDICINE Seoul National University College of Medicine · UEMF Université Euro-Méditerranéenne de Fès Euro-Mediterranean University of Fez · 사단법인 아프리카미래재단 Africa Future Foundation · ESWATINI MEDICAL CHRISTIAN UNIVERSITY

충북대학교 CHUNGBUK NATIONAL UNIVERSITY · KNU 강원대학교 KANGWON NATIONAL UNIVERSITY · 제주대학교 JEJU NATIONAL UNIVERSITY · MILSEONG JEIL HIGH SCHOOL · SAEKYUNG UNIVERSITY 세경대학교

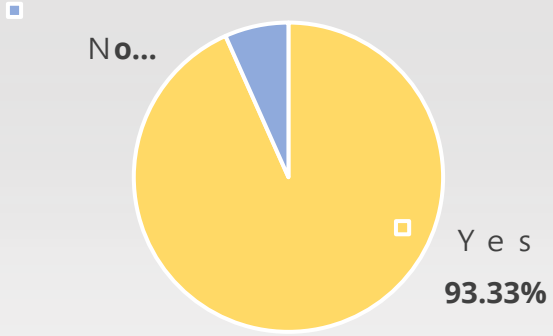
Has the MEDIP Box Anatomy content been helpful for your anatomy studies?

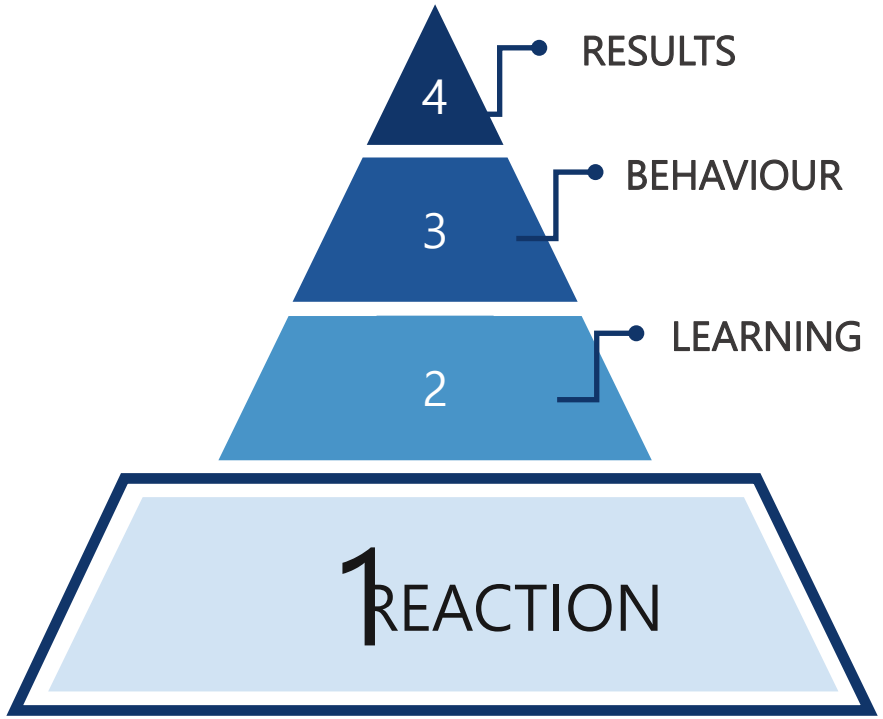


Do you think there is value in using VR for anatomy education?



Do you think the VR anatomy experience has advantages compared to cadaver dissection?





The Kirkpatrick Model Pyramid

Young Hyun Yun, et al. SNU. 2023

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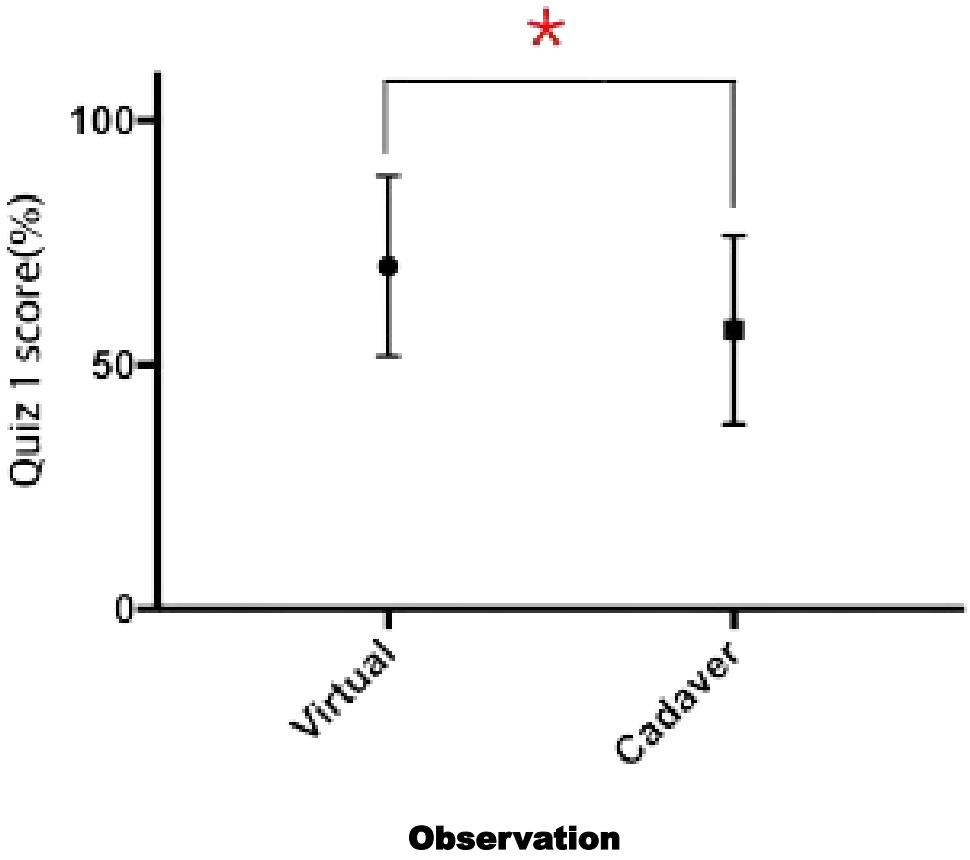
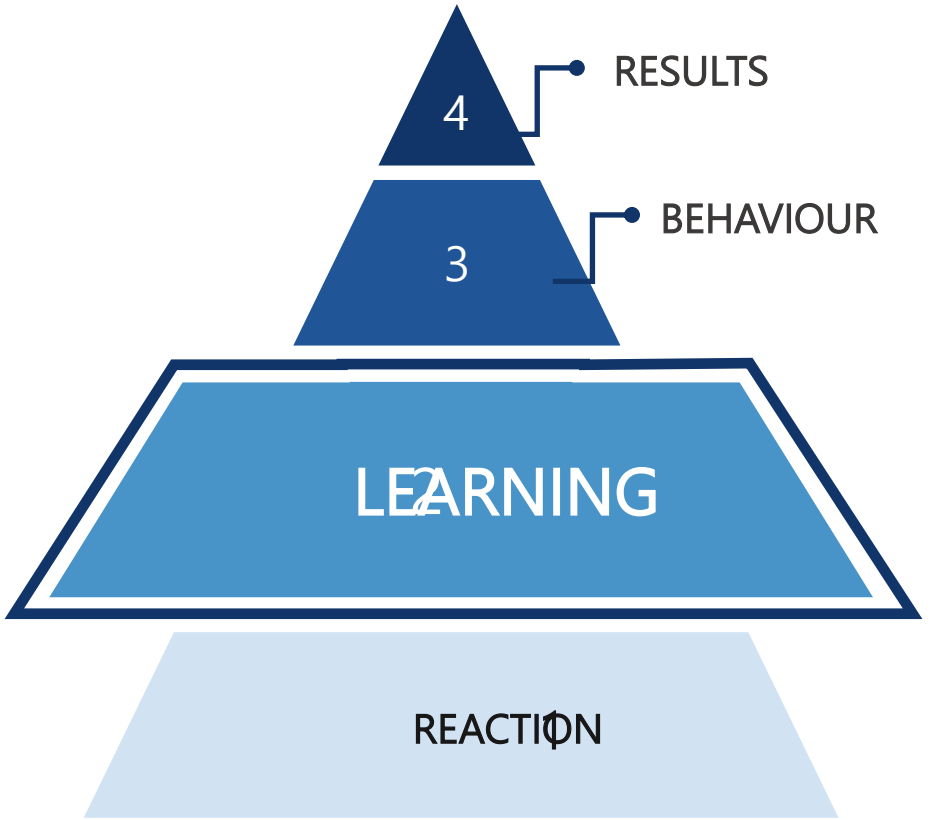
Comparison of Effectiveness





The Kirkpatrick Model Pyramid

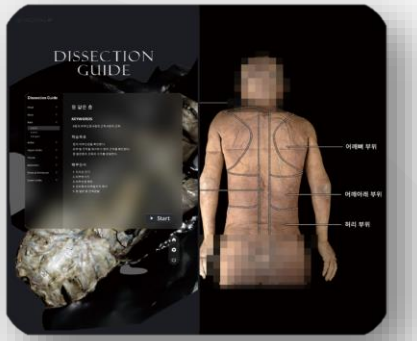
Young Hyun Yun, et al. SNU. 2023

MEDIP Box

Feature 1”

Anatomy Photo

Comparing and contrasting real cadaver anatomy photos with 3D rendered models.



Feature 2”

Dissection Guide

Providing a dissection guide for detailed anatomical insights, highlighting crucial dissection steps, and serving as an essential teaching tool.

Feature 3”

Mother & Fetus

Creating 3D content that allows observation of the progression of pregnancy by weekly cycles, showcasing perspectives from both the mother and fetus.

Feature 4”

Facial Anatomy

Producing ultra-fine, realistic facial anatomy content with a focus on bones and muscles.

MEDIP Box

Feature 1”

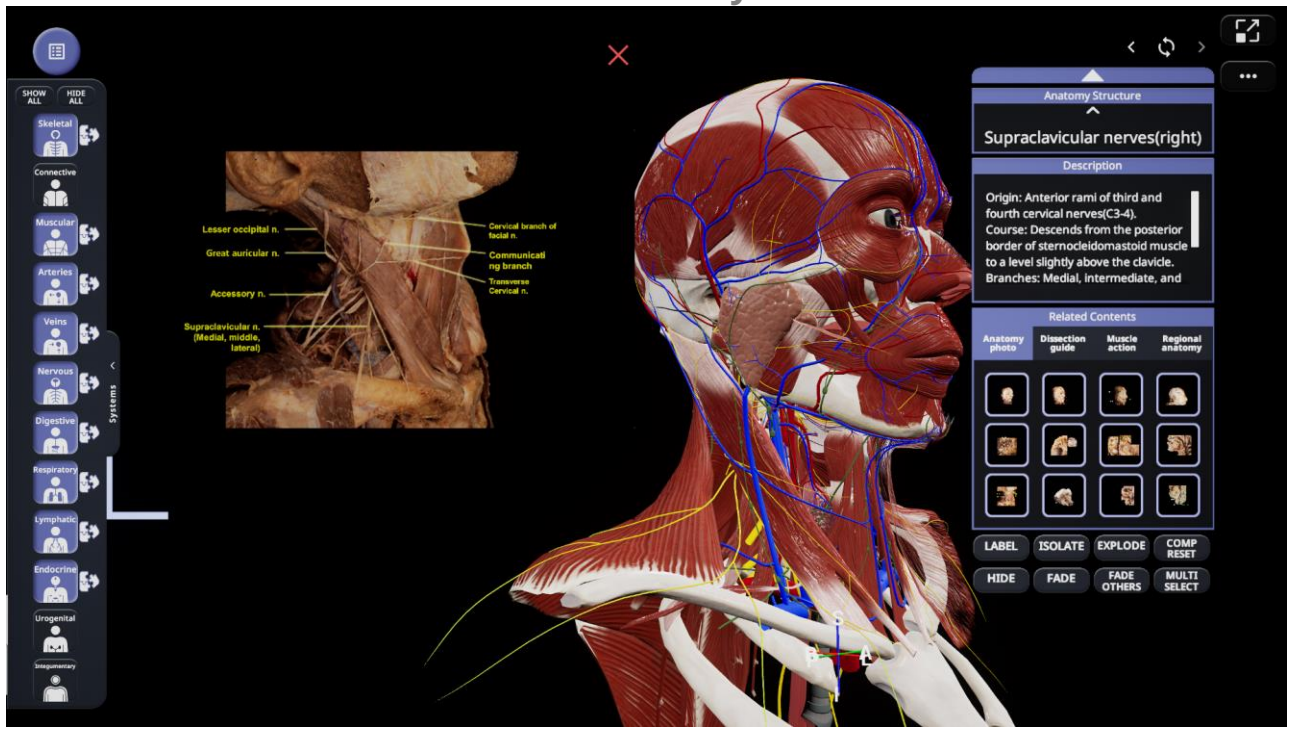
Anatomy Photo

Comparing and contrasting real cadaver anatomy photos with 3D rendered models.

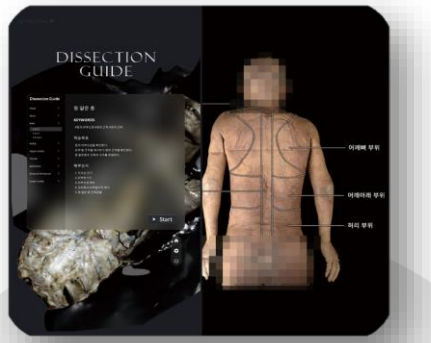
KOREAN ASSOCIATION OF ANATOMISTS

Partnership with the Korean Association of Anatomists

In collaboration with the Korean Association of Anatomists, we are conducting a real cadaver dissection alongside a 3D model. This allows students and professors to observe and compare the 3D models more intuitively.



MEDIP Box



Feature 2”

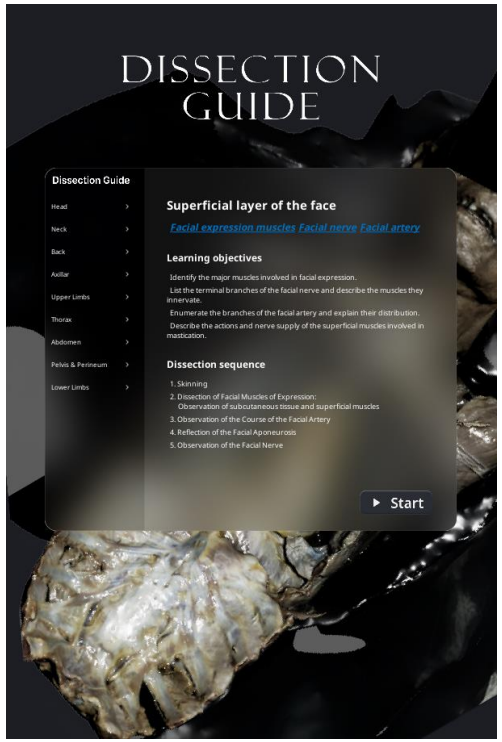
Dissection Guide

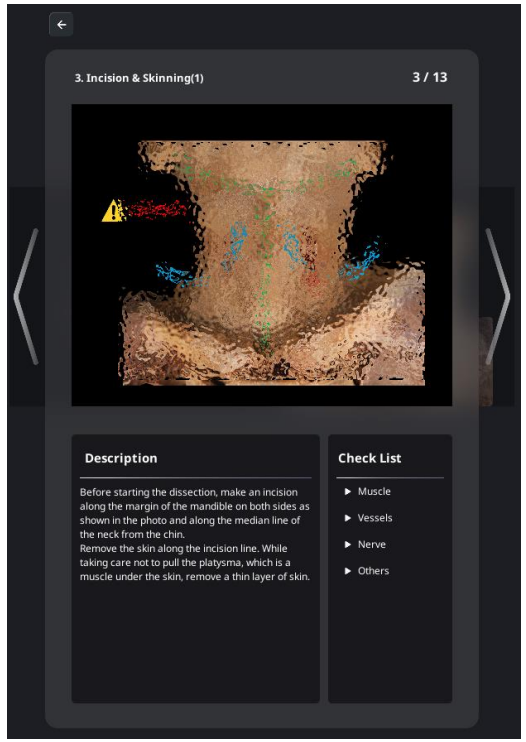
Providing a dissection guide for detailed anatomical insights, highlighting crucial dissection steps, and serving as an essential teaching tool.

KOREAN ASSOCIATION OF ANATOMISTS

Real Lecture Dissection Procedure from KAA

A comprehensive guide for medical students on the dissection procedure, using real cadaver images. The guide includes detailed dissection steps, cadaver images, descriptions, and a checklist.





MEDIP Box

Feature 3”

Pregnancy Cycle

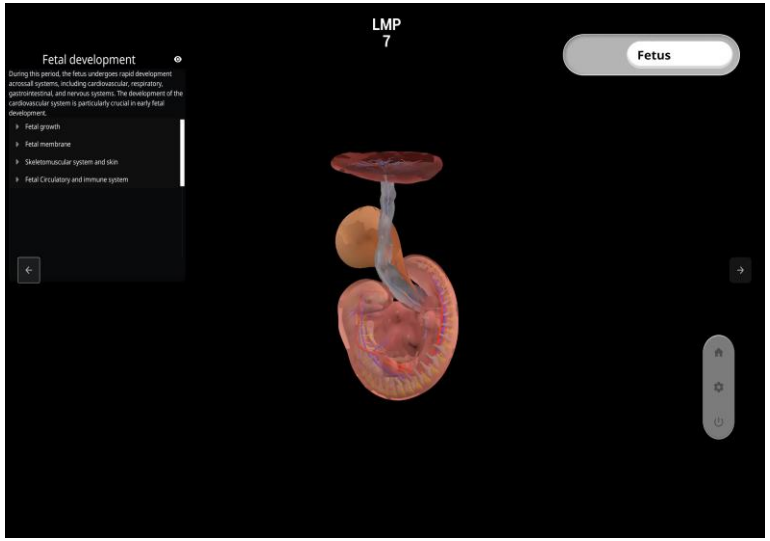
Creating 3D content that allows observation of the progression of pregnancy by weekly cycles, showcasing perspectives from both the mother and fetus.

Animation Video of the Pregnancy Cycle

In addition to our static 3D models, we are also developing an animation video that illustrates the pregnancy cycle. This animation will provide a detailed and dynamic representation of the physiological changes that occur during pregnancy. By visually depicting each stage, we aim to enhance understanding and provide a valuable educational tool for students.

Animation Video of Mother & Fetus

Click here to see the video



Animation Video of Fetus

Click here to see the video

Feature 4”

Facial Anatomy

Producing ultra-fine, realistic facial anatomy content with a focus on bones and muscles.

Restructuring Facial Anatomy in 3D

Under the guidance of professional anatomy professors, we are meticulously reconstructing the facial anatomy in 3D. This process involves a detailed and precise construction of both the bone and muscle structures to ensure anatomical accuracy.

Once the ultra-fine detailing of the facial anatomy is completed, MEDIP Box will extend this high level of detail and precision to the rest of the body parts. This comprehensive approach ensures that every aspect of the anatomy is accurately represented and rendered in 3D, providing a valuable resource for educational and professional purposes.

MEDIP Box

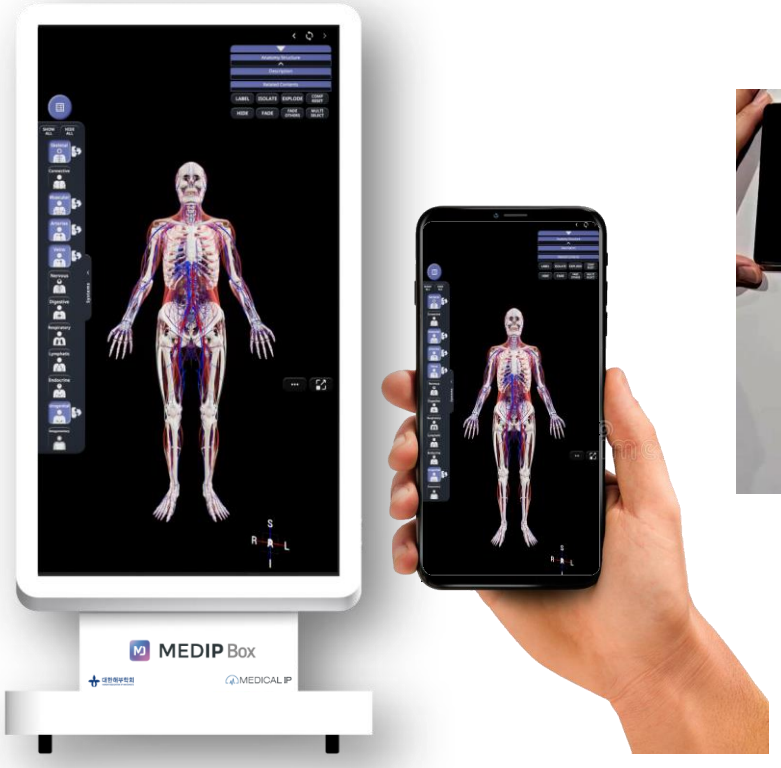
Multi-play

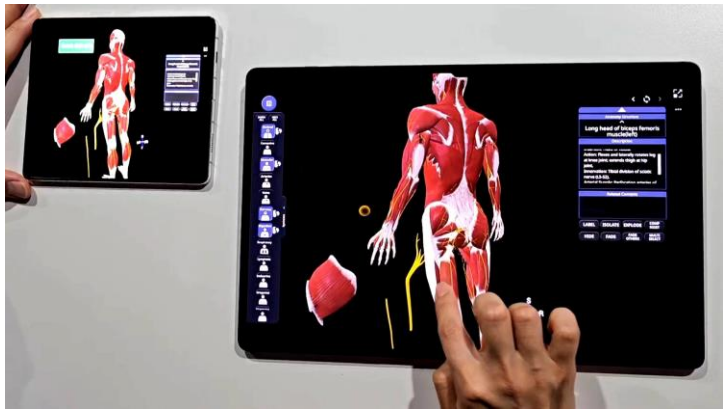
MEDIP Box Multi-player

Connection between MEDIP Box and mobile devices allows students to simultaneously view the professor's operation on their mobile devices.

Multiplayer mode

We are pleased to announce that MEDIP Box now features a multiplayer mode. This innovative functionality allows users connected to the same Wi-Fi network to join a class and observe the professor's operations in real-time on their individual mobile devices. This efficient feature is specifically designed to enhance the educational experience.





Click here to see the video

What is different ?

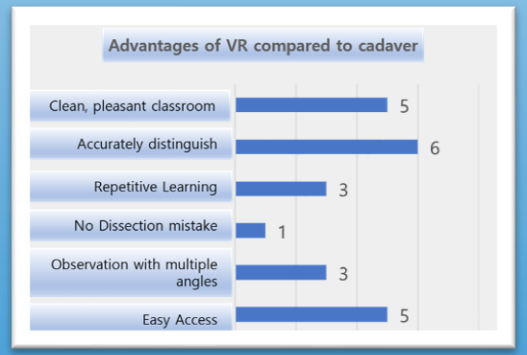
MEDIP Box

Old Anatomy Tables

- **Education relying on textbooks that are** 'far removed' **from actual clinical situations**
- **The** 'managerial, ethical, cost' **issues with the annually decreasing donated cadavers (cadavers)**
- **Certification needed from the** 'Korean Association of Anatomists'
- **Absence of periodic** 'updates' **for software products**
- **The financial burden due to the** 'high cost' **of foreign products**

MEDIP Box

SNU Anatomy Class Survey Result



KOREAN ASSOCIATION OF ANATOMISTS

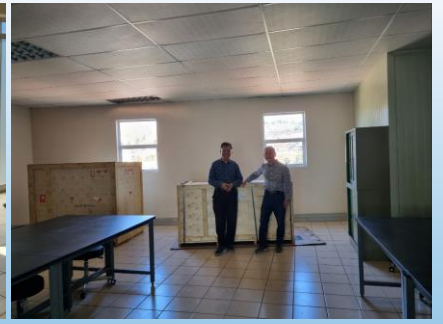
Exclusively Partnered

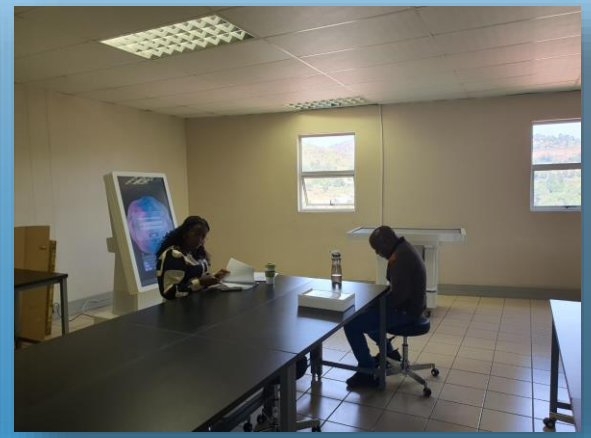
Association in Progress

Mobile MEDIP Box

MEDIP Box

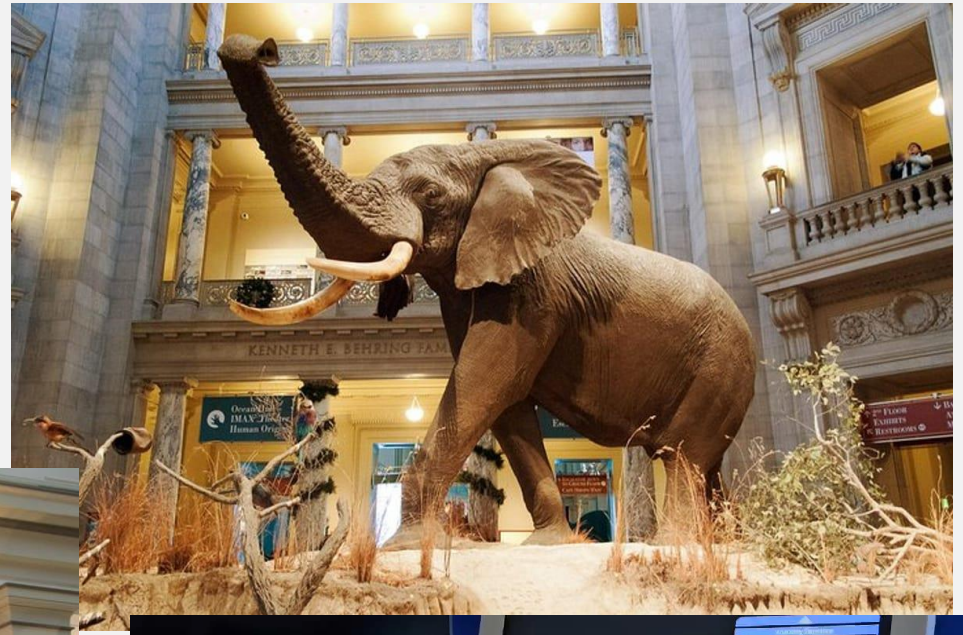
- Contribution to the construction of a medical school in Eswatini, Africa, a project set to span the 10 years

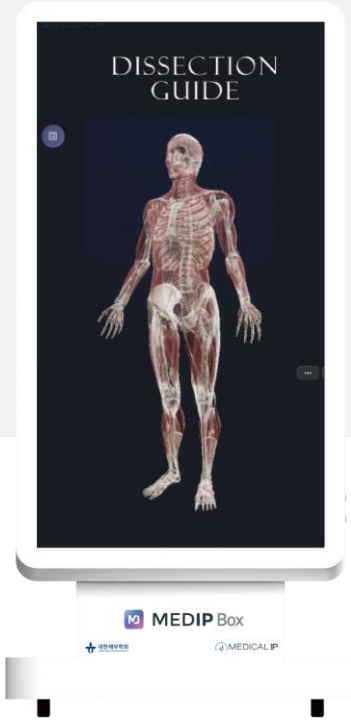



MEDIP Box

Smithsonian





Stay Healthy

Thank you

MEDICAL IP