

UNIVERSITY  
*of York*

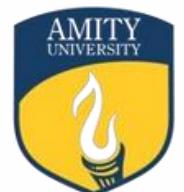
# BUILDING GLOBAL FUTURES - AI AND HEALTHCARE



**UKIERI**  
UK-India Education  
and Research Initiative

 **SPARC**  
Scheme for Promotion of Academic and Research Collaboration

Partnered with



**AMITY**  
UNIVERSITY



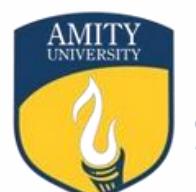
# WELCOME

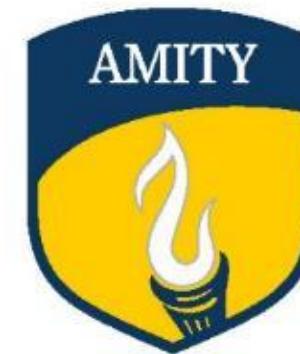
**Professor Charlie Jeffery, Vice-Chancellor and President, University of York**

**Professor (Dr.) Gurinder Singh, Group Vice Chancellor, Amity Universities**



Partnered with





**AMITY**  
EDUCATION GROUP

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INDIA'S LEADING EDUCATION GROUP

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# AMITY UNIVERSITY

## WELCOMES

### DELEGATION FROM

# UNIVERSITY OF YORK, UK

**MONDAY 17<sup>th</sup> FEBRUARY 2025**

- **Prof. Kiran Trehan**, Pro Vice Chancellor, University of York, UK
- **Mr. Michael Houlgate**, Deputy Director India, British Council India
- **Dr. Sushil Kumar Jain**, Senior Consultant, General, Anorectal, Laparoscopy & Gastroenterology Surgery
- **Dr. Gaurav Rathore** - Keynote Speaker, MS (Orthopedics), FRCS (Trauma & Orthopedics) Dr. Gaurav Rathore - Senior Orthopedic Consultant
- **Mr. Saurabh Shaligram** - Principal Data Scientist, Nihilent, Pune
- **Dr. Sapna Katiyar** - Advisor (Technology), Impledge Technologies
- **Prof. Sanjay Dhir** - Research Expert, IIT Delhi

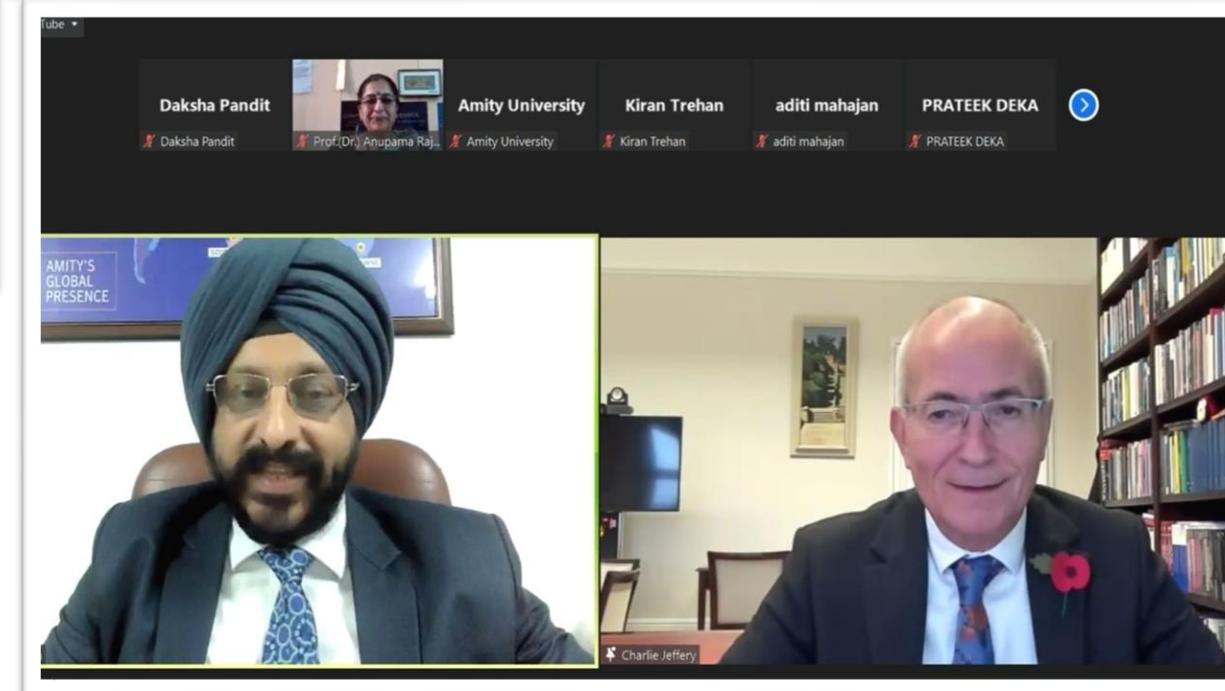


**UKIERI**  
UK-India Education  
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**AMITY**  
UNIVERSITY  
NOIDA

## AMITY, YORK, AND BRITISH COUNCIL

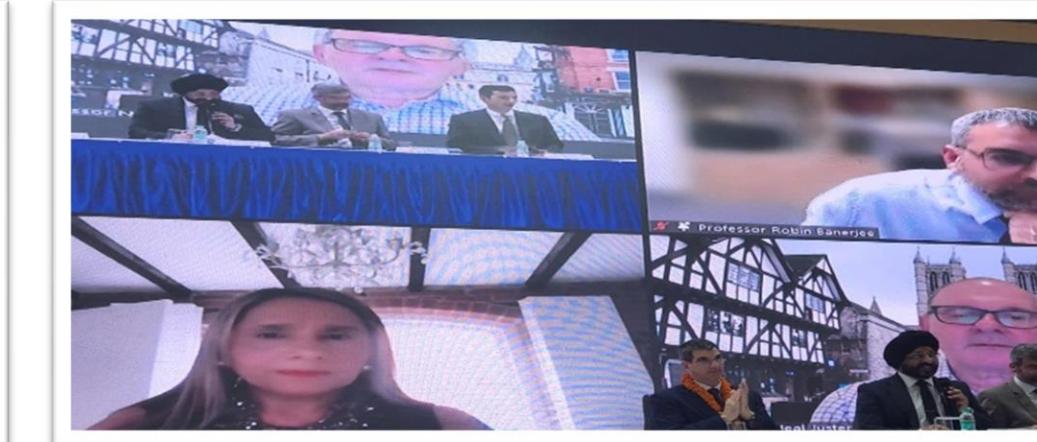


Partnered with

**UNIVERSITY  
of York**



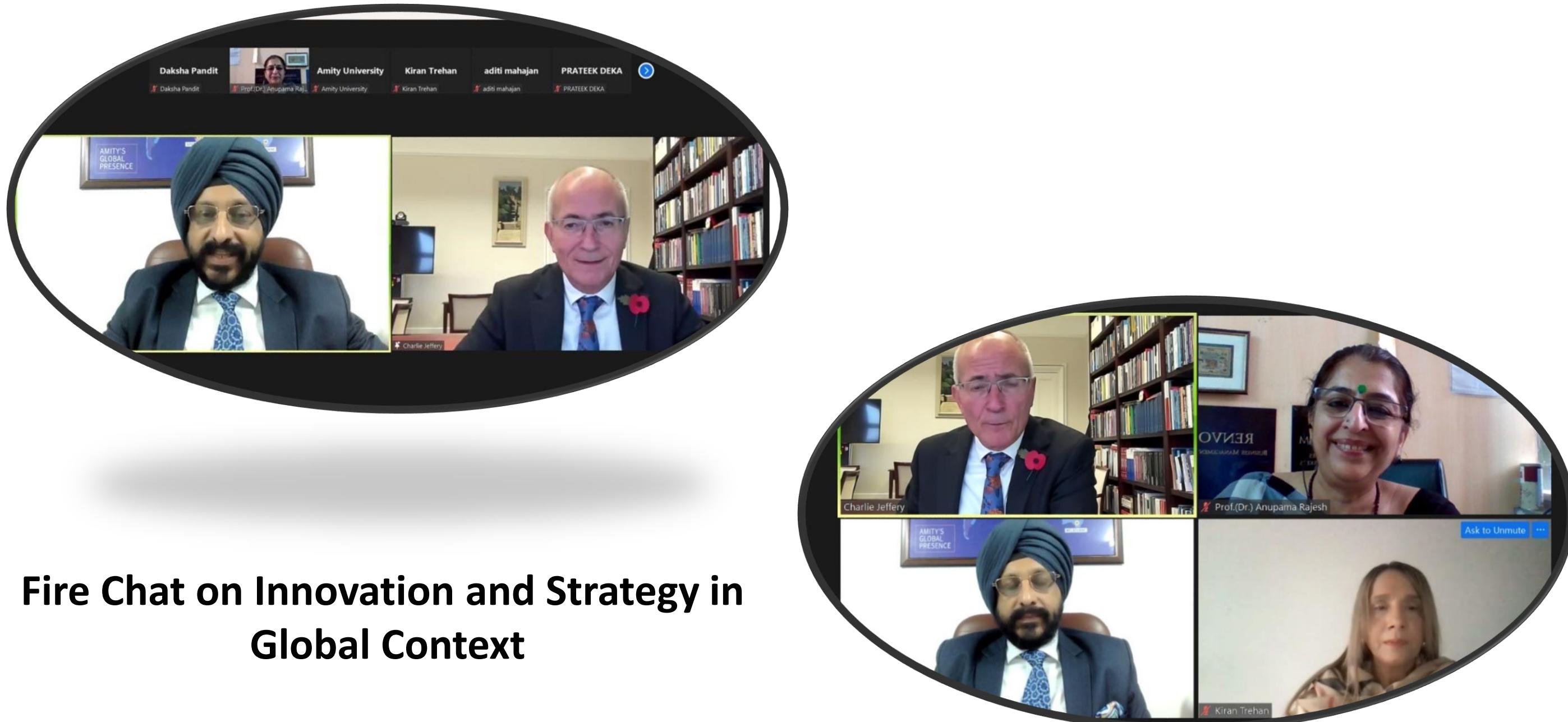
## AMITY, YORK, AND BRITISH COUNCIL



Partnered with



# AMITY-YORK



**Fire Chat on Innovation and Strategy in  
Global Context**

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# AMITY-YORK JOINT INITIATIVES

## PROJECTS BIDDING

- UKIERI :  
Strand 1: Institutional Research & Mobility Partnerships Grant  
Thematic Areas : Semiconductors, Advance computing and Next Gen Communication
- British Council Going Global Partnership Grant:  
Industry Academia Collaborative Grant

## INBUSH Conference:

Leadership of York's participation in the Conferences and Seminars.



**UKIERI**  
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UNIVERSITY  
NOIDA

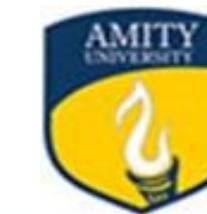


## AMITY CENTRE FOR ARTIFICIAL INTELLIGENCE

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Partnered with





## PROJECT OUTCOMES

Sr. No.	Title	Number	Status
1.	Patent	06	Filled
2.	Book Chapter	02	Accepted
3.	Research Paper	07	Presented (Publication in Process)
4.	Book	03	Published

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### Partnered with



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## AMITY-YORK AREAS OF MUTUAL COOPERATION

- Dual Degree Progression Pathways for Engineering, Science and Business
- Joint Research and Supervision of PhDs
- Short Term Mobility under UKIERI, Going Global, Turing Scheme & India Immersion Program.
- Short Term Mobility under Study Abroad Program



## AMITY

THE VISION OF

### DR. ASHOK K CHAUHAN

Founder President, Ritnand Balved Education Foundation  
(The Foundation of Amity Institutions and the  
sponsoring body of Amity Universities)  
Chairman, AKC Group of Companies

“ When God pushes somebody, inspires somebody,  
leads somebody, no power in the world can stop  
such a person ”

**200,000**

Most brilliant students

**6,000**

Faculty & Scientists

**11 Universities**

in Noida, Gurugram, Greater Noida, Lucknow, Jaipur, Mumbai, Gwalior, Kolkata, Raipur, Ranchi, Patna, Mohali and Bengaluru

**150+ Institutions**

in almost every facet of education

**Overseas Campuses**

in London, Singapore, New York, Dubai, Abu Dhabi, Sharjah, Mauritius, South Africa, Kenya, Amsterdam, San Francisco & Tashkent

**28**

Schools & Preschools

**2,000**

Acres of campuses

**20 Million**

sq. ft. of buildings

**400 Programmes**

Covering 60 Disciplines

**2000+**

Patents filed by faculty

**4,000**

Case Studies developed by faculty in the last years

**400**

Research Projects funded by the Govt.

**700,000**

Alumni across the world

**215+**

Patents Granted



## RESEARCH AND INNOVATION FOCUS

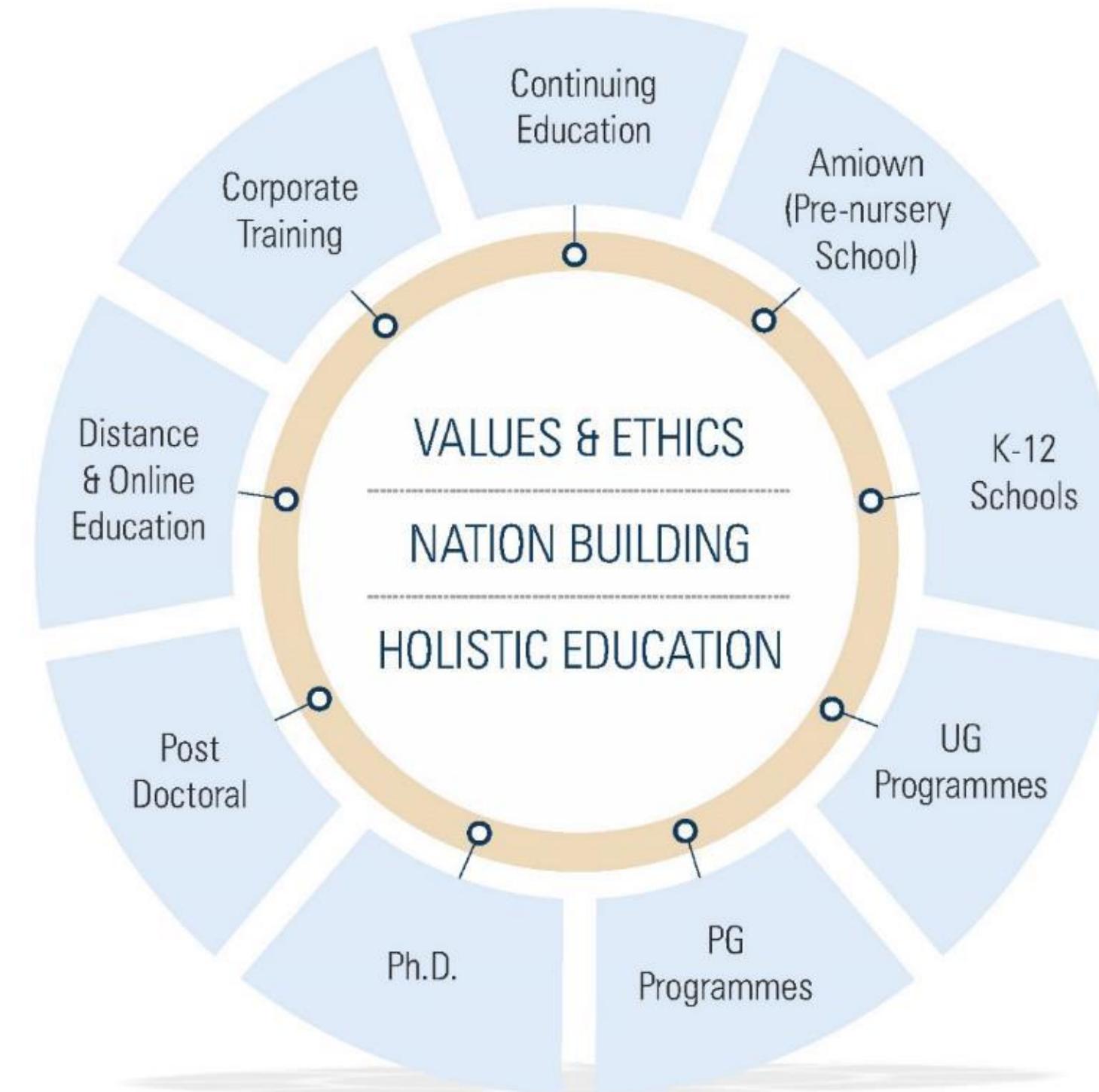
**133** University H - Index

**40+** Ramalingaswami/  
Ramanujan/  
Wellcome Trust /  
Inspire Fellows

**2100** patents filed,  
230 patents granted

**33** faculty in top 2%  
scientists lists - one of  
the highest in India

**Ongoing projects**  
worth 100+ crore INR  
including DST-FIST,  
DST-PURSE,  
DBT - BUILDER



## RECOGNITIONS & ACCREDITATIONS



Amity is fully recognised by the Government and accredited by leading international organisations



Recognized by University Grants Commission (UGC), an apex body of the Govt. of India



Established under the Amity University Act through Govt. Legislature



Grade 'A+' Accredited by NAAC



Amity University Uttar Pradesh member of Association of Indian Universities



Recognized by Department of Science & Technology, Govt. of India as Scientific & Research Organisation



Accredited by the Accreditation Council for Business Schools and Programs (ACBSP), USA



IET (UK) Accreditation for B.Tech Programmes



ISO 9001-2000 and ISO 14001-2004 Certificate from British Standards Institution (BSI)



Listed in United Nations list of Global Universities



Member of Association of Commonwealth Universities



Member of International Association of Universities



Distance Education Programmes accredited by Distance Education Council



Law Programmes accredited by Bar Council of India



Architectural Programmes accredited by Council of Architecture



Educational Programmes accredited by National Council of Teachers Education



'Premier Status' Accreditation from ASIC (UK)



Asia's only not-for-profit university to get US Regional Accreditation

# INDIA'S ONLY UNIVERSITY WITH US AND UK ACCREDITATION



# RANKED AMONGST THE TOP 3% UNIVERSITIES GLOBALLY

QS and THE are the world's leading  
Global University Rankings Organisations





AMITY  
UNIVERSITY

## AMITY AGAIN PLACED & RANKED AT TOP ON INTERNATIONALISATION PARAMETER

AS PER LATEST QS WORLD  
UNIVERSITY RANKINGS 2024



AMITY IS RANKED

**#1 IN INDIA**  
**#519 GLOBALLY**

**IN INTERNATIONAL  
STUDENT RATIO**

RANK	UNIVERSITY	SCORE
1	<b>Amity</b> (Noida)	<b>21.8</b>
5	Jamia Millia Islamia	4.4
7	Univ. of Mumbai	3.5
12	IIT Roorkee	2.2

**#3 IN INDIA**  
**#524 GLOBALLY**

**IN INTERNATIONAL  
RESEARCH NETWORK**

RANK	UNIVERSITY	SCORE
1	Anna University	33.8
2	Delhi University	24.7
3	<b>Amity</b> (Noida)	<b>22.4</b>
4	Banaras Hindu Univ.	15.3

AMITY UNIVERSITY  
GLOBAL INITIATIVES

Global Study Prog.

3 Continent Prog.

Study Abroad Prog.

India Immersion Prog.

RANKED AMONG THE  
**TOP UNIVERSITIES GLOBALLY**  
FOR PRODUCING THE MOST  
**EMPLOYABLE GRADUATES**



IN A SURVEY CONDUCTED AMONG  
11,000 EMPLOYERS WORLDWIDE BY  
TIMES HIGHER EDUCATION (UK)

AMITY IS INDIA'S  
ONLY PVT. UNIVERSITY  
TO BE FEATURED IN  
THE RANKING

ONLY THESE 6 INSTITUTIONS FROM INDIA MADE THE RANKINGS:

IIT  
Delhi

IISc.  
Bangalore

IIT  
Bombay

IIM  
Ahmedabad

IIT  
Kharagpur

Amity  
University

# RANKED INDIA'S #1 NOT-FOR-PROFIT PVT. UNIVERSITY FOR ELEVEN YEARS BY INDIA TODAY

As ranked by India Today in University Rankings

Issue dated: 14<sup>th</sup> August 2023

After being ranked #1 in India Today University Rankings.

Issue dated: 15<sup>th</sup> August 2022, 9<sup>th</sup> August 2021, 10<sup>th</sup> August 2020,  
1<sup>st</sup> July 2019, 2<sup>nd</sup> July 2018, 26<sup>th</sup> June 2017, 13<sup>th</sup> July 2015,  
30<sup>th</sup> June 2014, 3<sup>rd</sup> June 2013 and 28<sup>th</sup> May 2012



YET ANOTHER RECOGNITION FOR AMITY, BESIDES TOP RANKINGS FOR AMITY INSTITUTES, INCLUDING:

AMITY SCHOOL OF  
ENGINEERING & TECHNOLOGY  
Ranked No.1 among Engg.  
Schools established in the  
last 20 years by India Today

AMITY BUSINESS  
SCHOOL Ranked  
amongst top-10 by  
Business Today, Outlook  
& Economic Times

AMITY  
INSTITUTE OF  
BIOTECHNOLOGY  
Ranked No.1  
by Biospectrum

AMITY LAW  
SCHOOL Ranked  
amongst top-10  
by India Today  
& Outlook

AMITY INSTITUTE OF  
TELECOM ENGINEERING  
& MANAGEMENT  
Ranked amongst top-5  
by Outlook

AMITY  
SCHOOL OF  
COMMUNICATION  
Ranked amongst  
top-5 by India Today

AMITY  
SCHOOL OF  
HOSPITALITY  
Ranked amongst  
top-10 by Outlook

AMITY  
SCHOOL  
OF FASHION  
TECHNOLOGY  
Ranked amongst  
top-5 by India Today

AMITY INSTITUTE  
OF EDUCATION  
Ranked amongst  
top-10 by  
India Today

AMITY INTERNATIONAL  
BUSINESS SCHOOL  
Ranked No. 1 for  
Industry Interface  
by Outlook Money

Winner of Indian Education Award for India's Best Research University



CONFERRED THE  
**BEST CAMPUS AWARD 2019**  
BY FORBES MIDDLE EAST



## MANY CAMPUSES CERTIFIED BY US GREEN BUILDING COUNCIL

LEED (Leadership in Energy and Environmental Design) is the world's foremost green building rating system.

The Platinum Certification is the highest achievable standard.





AMITY  
UNIVERSITY

# AMITY INDIA CAMPUSES

## AMITY UNIVERSITY

New Delhi NCR Campus

- 85 acre sprawling, most hi-tech Campus
- 4.1 million sq. ft. of buildings



AMITY UNIVERSITY  
Greater Noida Campus

- 21 acre campus



AMITY UNIVERSITY  
Lucknow Campus

- 40 acre campus



## AMITY UNIVERSITY Jaipur Campus

- 150 acre sprawling residential campus
- On-campus golf range & riding club



## AMITY UNIVERSITY Gurgaon (Manesar) Campus

- Spread over 110 acres
- 19 Inter-Disciplinary Practice, Research and Outreach Centres
- 20 acre sports complex



AMITY UNIVERSITY  
Mumbai Campus

- 30 acre campus



AMITY UNIVERSITY  
Gwalior Campus

- 100 acre campus



AMITY UNIVERSITY Kolkata Campus



## AMITY UNIVERSITY Raipur Campus



## AMITY UNIVERSITY JHARKHAND



AMITY UNIVERSITY Patna Campus



AMITY UNIVERSITY  
Mohali Campus

- 40 acre campus



AMITY UNIVERSITY  
Bengaluru Campus

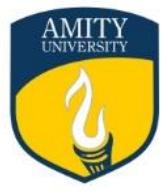
- 60 acre campus





AMITY  
UNIVERSITY

# AMITY GLOBAL CAMPUSES



AMITY  
UNIVERSITY

## AMITY UNIVERSITY DUBAI





CONFERRED THE  
**BEST CAMPUS AWARD 2019**  
BY FORBES MIDDLE EAST

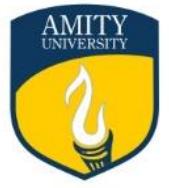




AMITY  
UNIVERSITY

## AMITY SINGAPORE

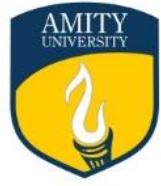




AMITY  
UNIVERSITY

## AMITY UNIVERSITY (IN) LONDON

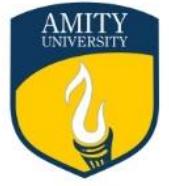




AMITY  
UNIVERSITY

## AMITY UNIVERSITY TASHKENT

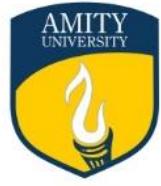




AMITY  
UNIVERSITY

# AMITY INTERNATIONAL SCHOOL, AMSTERDAM

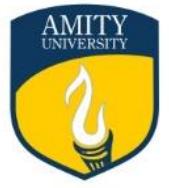




**AMITY**  
UNIVERSITY

## **AMITY INTERNATIONAL SCHOOL, ABU DHABI**





AMITY  
UNIVERSITY

## AMITY NEW YORK





## HARROW - AMITY PARTNERSHIP



AMITY  
EDUCATION GROUP

Amity Education Group has partnered with Harrow School, UK to establish Harrow International Schools in India and New York, which will take forward Harrow's 450 years old legacy





- Amity was the first university from India to establish a campus in London in 2009.
- We have been sending approximately 4000 students to UK every year.
- Trusted Partner with UK High Commission for grant of Visas
- Largest partner for UKERI projects with 7 UK universities in 2020.
- Partnered with 3 UK universities in Going Global Grant in 2021-22.
- Amity received the highest number of students from UK as part of our India Immersion program.

## NEW EDUCATION POLICY OPPORTUNITIES FOR UK & INDIAN UNIVERSITIES

- Offering Joint, twinning and dual Degrees
- Bringing UK Universities to India to have their joint campuses with Amity
- Integrating technology in building long term, profitable and sustainable partnership through E-learning and co-branded Programs
- Offering meaningful internships and exposures to UK students through India immersion program, Turing Scheme, UKIERI, Going Global etc.
- Building research, training and consulting partnerships with short duration joint programs and certifications.
- Building consortium of UK and Indian Universities to accept credits of each other & offer joint degrees and certifications.

## INTERNATIONAL FUNDED PROJECT



Amity University partnered with various Australian Universities for short duration programs which included projects under New Colombo Plan.



Amity University has been awarded the USAID project to admit students to pursue their Full time Post Graduate program across various disciplines and are admitted under three campuses viz. Noida, Lucknow & Gurgaon.



Under the prestigious ERASMUS+ Program (a European Union funded project) following Amity Institutes have been selected for Faculty and Student mobility:

Amity Institute of Geo-Informatics & Remote Sensing (AIGIRS) with University of Salzburg, Austria Amity School of Communication (ASCO) with Kaunas University of Technology, Lithuania.



Following UK Universities partnered Amity for Short Student Mobility Program under UKIERI Project:

- a) University of Sheffield
- b) University of Surrey
- c) University of Kent
- d) Ulster University
- e) University of Northampton
- f) Bristol University
- g) University of Winchester

# INDIA IMMERSION PROGRAM



## AMBASSADOR LECTURE SERIES



His Excellency Eric Garcetti, Ambassador  
Embassy of the United States of America in  
New Delhi



His Excellency Mr. Marten Van Den Berg,  
Ambassador of Netherlands to India



Her Excellency Ms. Ritva Koukku-Ronde,  
Ambassador of Finland to India



H.E. Mr. Alexander Alex Ellis CMG,  
British High Commissioner to India

## NOBEL LAUREATES ASSOCIATED WITH AMITY



**Muhammad Yunus**  
Bangladeshi social entrepreneur, banker,  
economist, and civil society leader  
**Yunus Social Business  
Center at Amity**



**Sir Richard J. Roberts**  
Nobel Prize Winner,  
Physiology and Medicine  
**Richard Roberts Center  
for GMO at Amity**



**Kailash Satyarthi**  
Indian children's rights activist  
**Kailash Satyarthi Center for Child Rights  
& Development at Amity**



**Prof. Sir Harry Kroto, FRS**  
Francis Eppes Professor in the  
Dept. of Chemistry and Biochemistry  
at Florida State University, USA



**Prof. Werner Arber**  
Honorary Professor of Biotechnology  
at Amity University



**Prof. Yuan T Lee**  
President Emeritus  
Academia Sinica, Taiwan

OVER 400 DEGREES ACROSS 60 DISCIPLINES



- BIOTECHNOLOGY
- NANO TECHNOLOGY
- MICROBIAL TECHNOLOGY
- ENGINEERING & TECHNOLOGY
- NUCLEAR SCIENCE & TECHNOLOGY
- ENVIRONMENT TOXICOLOGY,  
SAFETY AND MANAGEMENT
- ANTHROPOLOGY
- SOCIAL SCIENCES
- ENGLISH
- FINE ARTS
- LAW
- MASS COMMUNICATION
- ORGANIC AGRICULTURE
- FOOD TECHNOLOGY
- AEROSPACE ENGINEERING
- NATURAL RESOURCES AND  
SUSTAINABLE DEVELOPMENT
- SPACE SCIENCE AND TECHNOLOGY
- RENEWABLE AND ALTERNATIVE ENERGY
- VIROLOGY & IMMUNOLOGY

- **Advanced Materials & Devices**
- **Aerospace**
- Audiology
- **Avionics**
- Biocontrol & Plant Disease Mgmt
- Biofertilisers & Biopesticides
- **Biotechnology**
- Bioinformatics
- **Biomedical Science**
- Build Environment
- **Clinical Data Management.**
- **Clinical Engg./Research**
- **Cold Chain Management**
- **Competitive Intelligence & Strategic Management**
- Cyber Crime
- Diagnostic Imaging Tech.
- Dietetics & Applied Nutrition
- Disaster Management

- Environmental Toxicology Safety
- **Film and Drama**
- Food Technology
- **Forensic Science**
- Forensic Biology & Serology
- Foundation for Development Disabilities
- Global Warming & Eco Studies
- Herbal Management
- **Horticulture**
- Instrumentation
- Marine Science & Engg
- Medical Lab Technology
- Microbial Sciences
- Microfinancing
- **Nanotechnology**
- Natural Resources & Management Sustainable Development

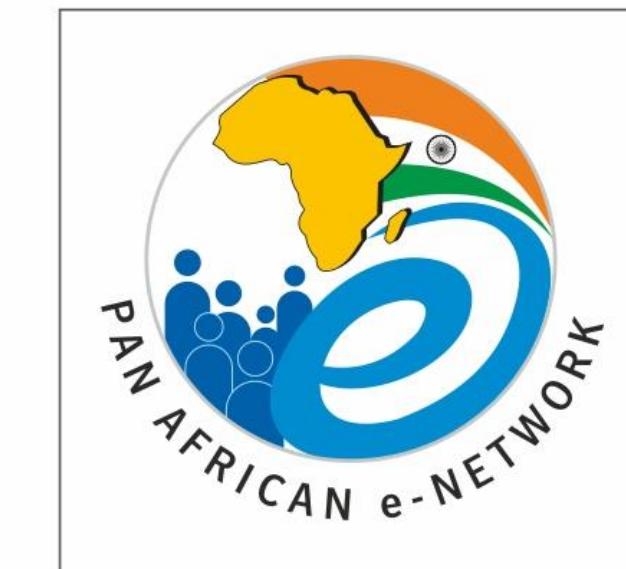
- Neuro Psychology & Neuro Sciences
- **Nuclear Science & Technology**
- Organic Agriculture
- Orthodontics & Prosthetics
- **Post Harvest Technology**
- Rural & Urban Management
- **Solar & Alternative Energy**
- **Virology & Immunology**
- Water Technology & Management
- Wild-Life Science



- Project of Govt. of India, an initiative of our Former President Late Dr. Abdul Kalam
- Amity, IGNOU, Delhi University, University of Madras and BITS (Pilani), selected by the Govt. of India (MEA) for PAN African e-Network Project

## Main Features

- To connect 53 countries of African Union through a dedicated fiber optic & under-sea cable network
- Use of dedicated Satellite to provide Tele-education & Tele-Medicine, Video conferencing, e-Governance, e-Commerce and VVIP node
- Amity University played a pioneering role and began Tele-Education
- Amity is the most preferred partner with about 15,000 students from 37 African Universities



## Highlight

Amity organised live Virtual Convocations with PAN-African Universities and students participated from their own respective university locations and received their diplomas and awards virtually

- Foreign Languages
  - French
  - German
  - Spanish
  - Arabic
  - Japanese
  - Chinese
  - Russian
- Communication Skills
- Behavioural Science
- Human Values
- Curriculum updated regularly with industry input
- Strong Mentoring Programme
- Military cum Adventure Training
- 101 Attributes of Amitians
  - Personality (21)
  - Values/ Ethics (21)
  - Extracurricular Activities (15)
  - Understanding of Socio-economic and Global Environment (18)
  - Academic Excellence (26)



Amity Skills, an initiative aligned to the Amity Group's commitment towards nation building through skilling, was set up to address the increasing demand for trained manpower in entry-level jobs across industries. Amity Skills aims at mainstreaming and ensuring economic security to youth, and empowering them with abilities to enter competitive job markets

## Sectors in which training is provided:

- Electrical • Electronics • Healthcare • Retail • Plumbing • IT ITES • Logistics
- Construction • Tourism & Hospitality • Manufacturing • Textiles

## Projects undertaken by Amity Skills





# AMITY INNOVATION INCUBATOR

## NURTURING ENTREPRENEURSHIP

SUPPORTED BY



RESEARCH & COLLABORATION PROJECTS  
Research is enhanced by networking in India and abroad



## EXCELLENT PLACEMENTS



TRAINING CONDUCTED FOR OVER 22,000 VOLUNTEERS FOR  
COMMON WEALTH GAMES 2010 IN NEW DELHI

**Training conducted for over 54,000 personnel of**

- Armed Forces (208 Offr's & 240 PBORs)
- CPOS-BSF, CRPF, CISF, ITBP (1169)
- State Police (46,000)
- IFS Officers (851)
- IAS (82)
- State/Central Government Officers (616)
- NGO/Farmers (637)
- PSUs (5021)
- Public Sector Banks (14800)
- Government - Election Commission (4940)



Aims to promote equitable social development of the economically challenged, marginalized and weaker sections of the society.

### Thrust Areas:

- Educating underprivileged children
- HIV/AIDS Awareness
- Women Empowerment
- Rehabilitation of physically disabled
- Village upliftment
- Healthcare



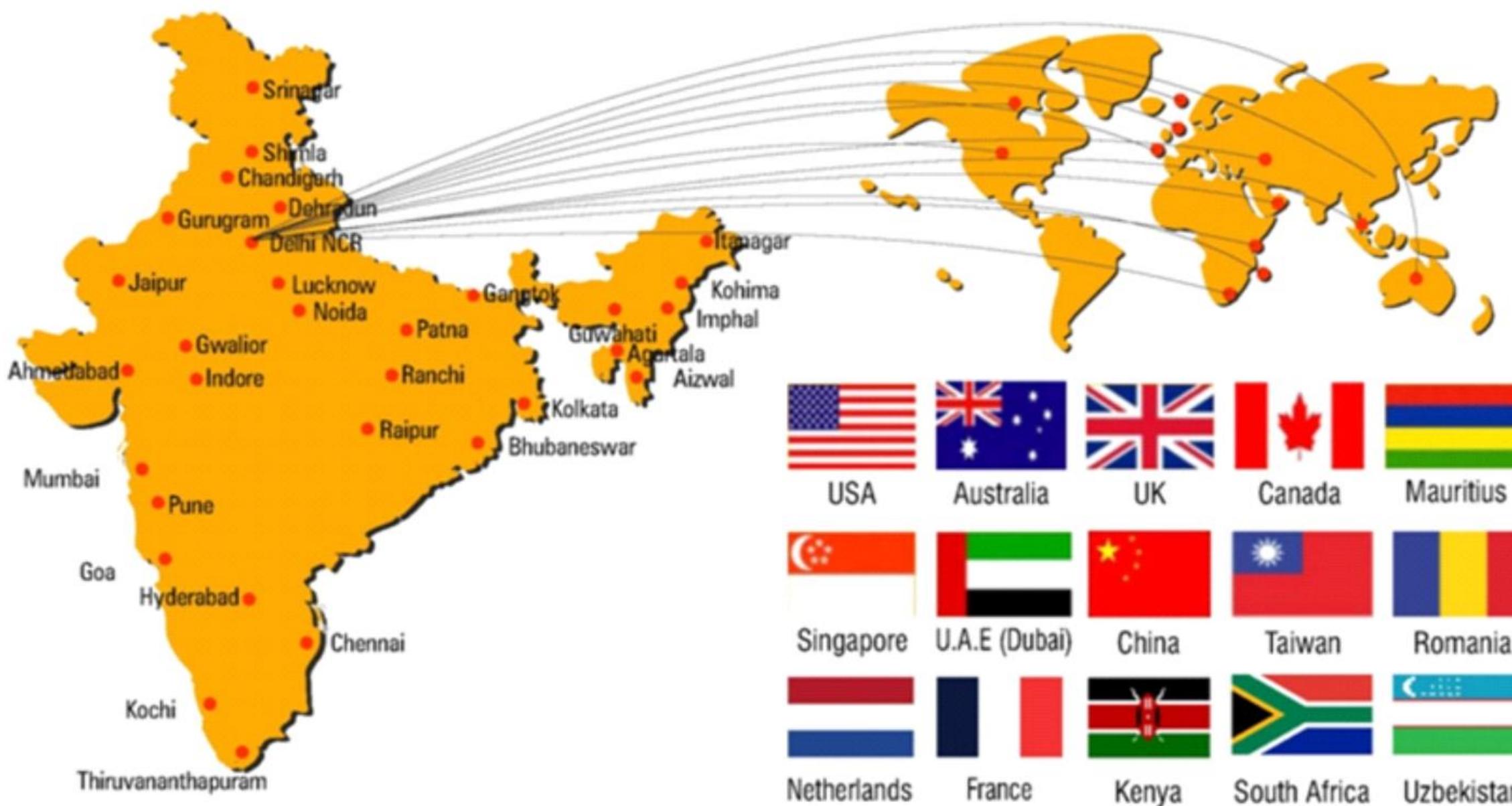
### AMITASHA SCHOOLS

Over 2,000 underprivileged girls are provided free education, uniform, healthcare & food

### ATULASHA SCHOOLS

Over 1,000 underprivileged boys are provided free education, uniform, healthcare & food

- 35 Amity Universities in every State & Union Territory of India
- 100 campuses across the country • Overseas campuses planned



# THANK YOU



[LinkedIn Profile QR Code](#)

**Prof (Dr) Gurinder Singh**  
Group Vice Chancellor  
Amity Universities

Email: [gsingh@amity.edu](mailto:gsingh@amity.edu)



[Instagram Profile QR Code](#)

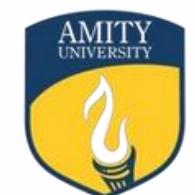


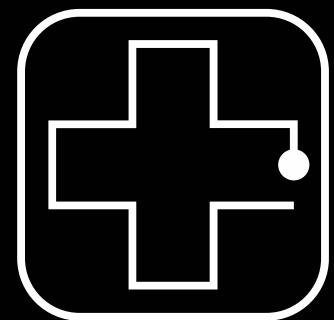
# THE GLOBAL ROLE OF UNIVERSITIES IN ADVANCING AI IN HEALTHCARE

Phil Baty, Chief Global Affairs Officer, Times Higher Education



Partnered with





# Digital Health

# The Global Role of Universities in Advancing AI in Healthcare

# Building Global Futures, February 2025

# Phil Baty

## Chief Global Affairs Officer



# Times Higher Education

# A great reckoning?



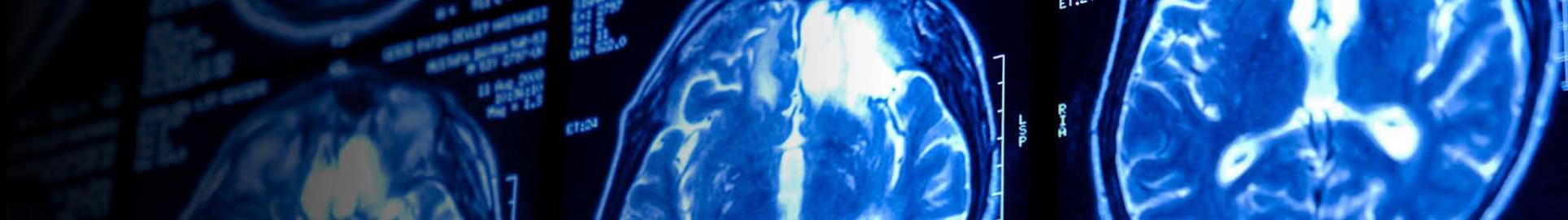
“In recent decades, certainly in places like the UK and the US, the public and politicians are increasingly asking, ‘What good do universities do for society? Who do universities serve?’

“I think that is causing **a reckoning** within the higher education community perhaps of comparable significance to the reckoning that led to the last major transformation of the university [in widening access] after the Second World War.”

*Fernando Reimers Unesco International Commission on the Futures of Education. November 2021*



Digital Health



# Who do universities serve?



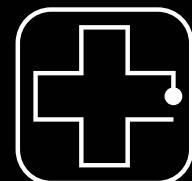
“A university for public good” – University of York

“To serve society” – University of California

“For the wellbeing... of the world” – Tsinghua University

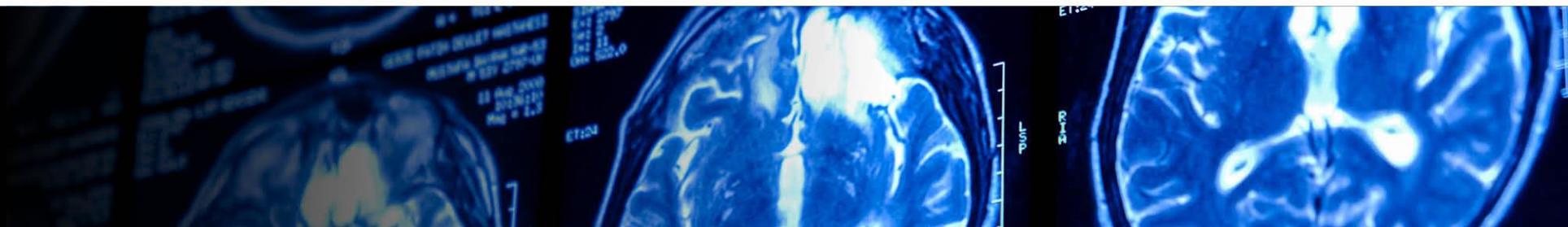


“Building... society” – Amity University



Digital Health

LOGOS.ADA96.COM



# The Sustainable Development Goals as a framework for understanding universities' public good

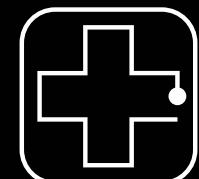


“Universities are here to address the big questions and challenges facing our world, and there’s **no better framework for this than the UN’s Sustainable Development Goals** which apply to all countries and sectors of society.”

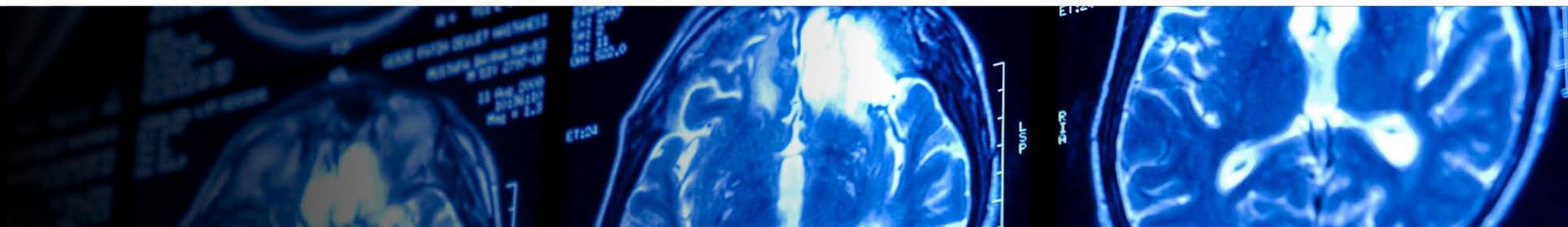
Nancy Rothwell, former vice chancellor, University of Manchester



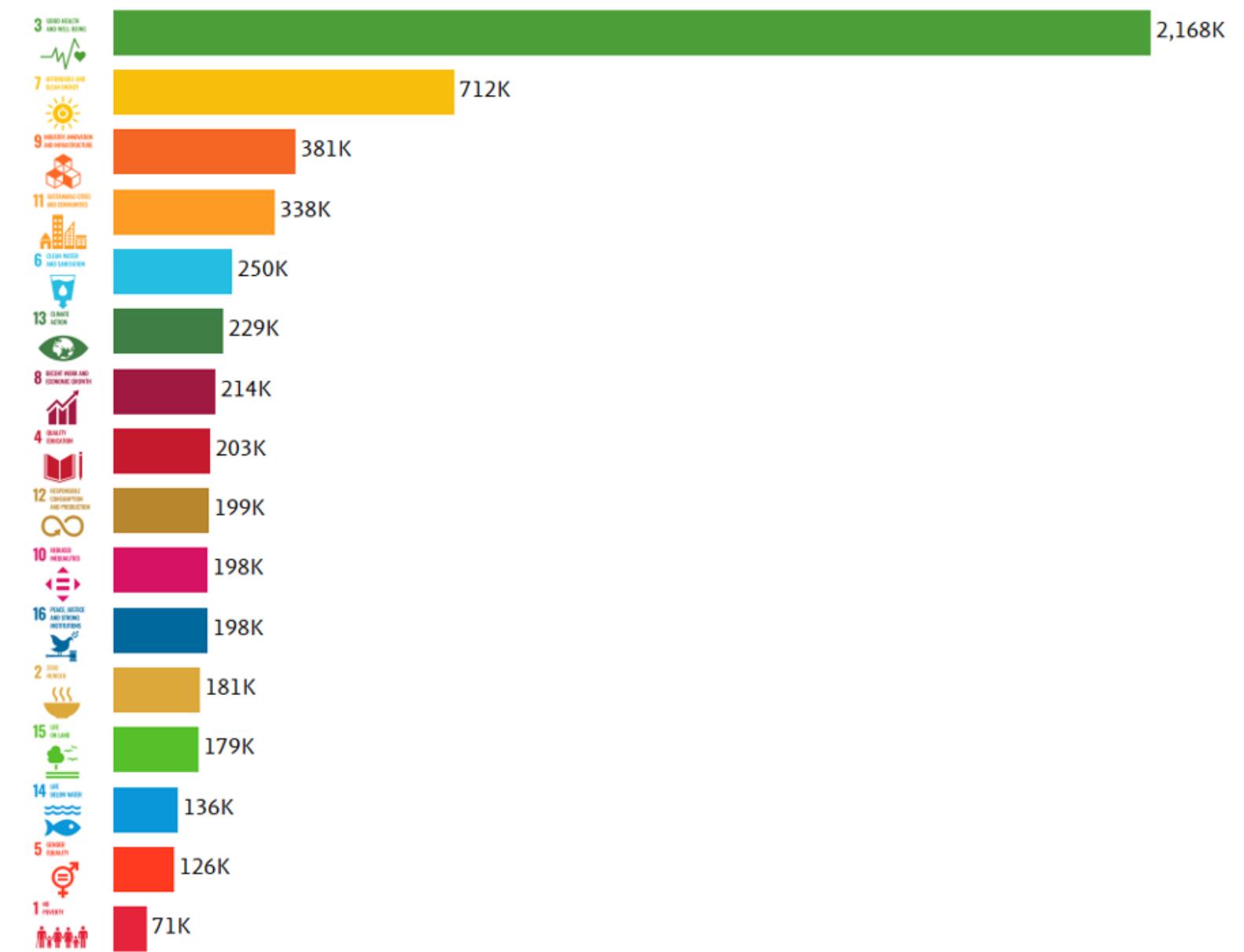
Times Higher Education  
**Impact Rankings**



Digital Health



# Of all SDGs, SDG3 (good health and wellbeing), dominates



Research publication output by SDG 2016 – 2020. Source: Elsevier



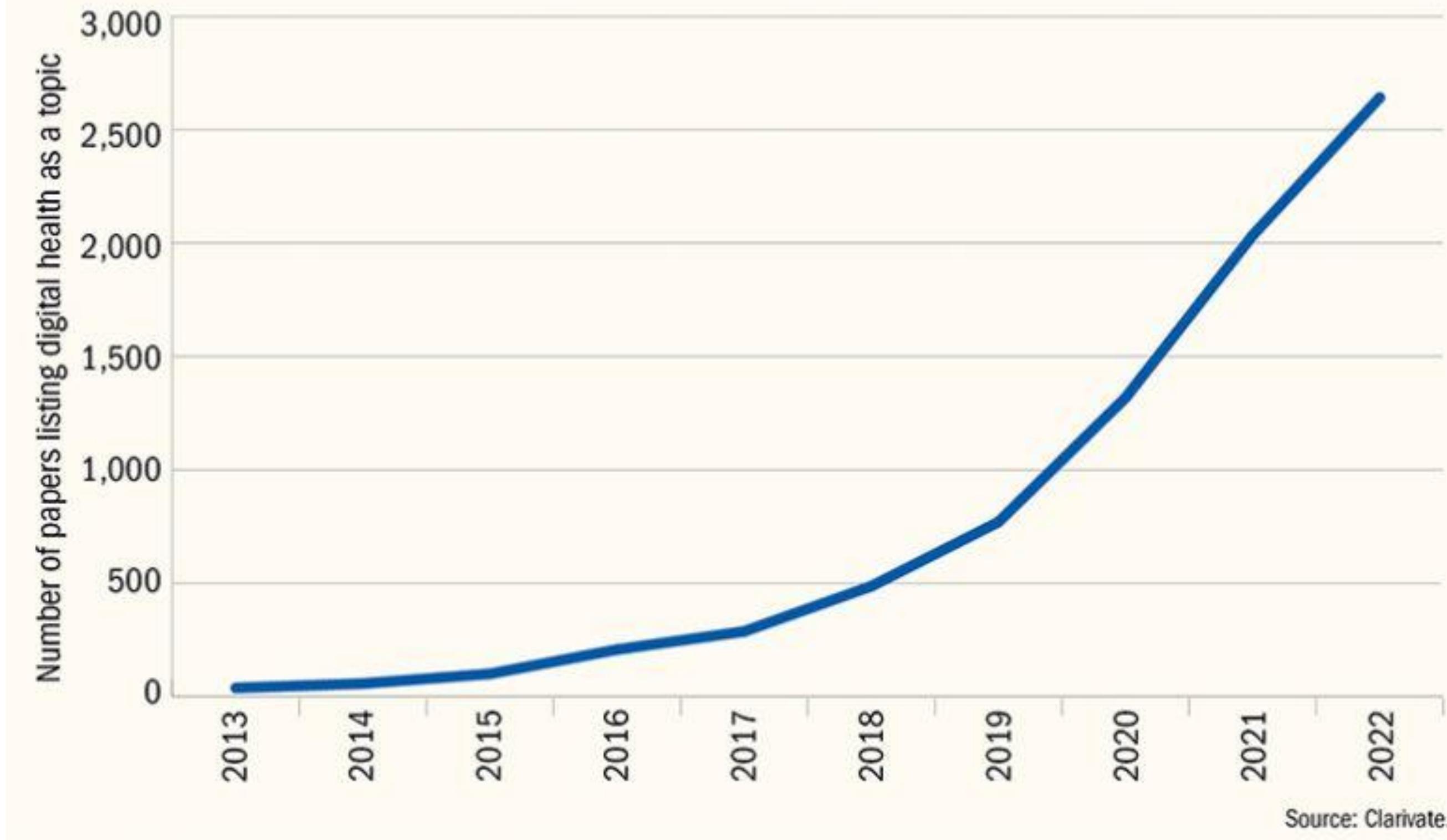
Digital Health



# An explosion in research outputs on “digital health”

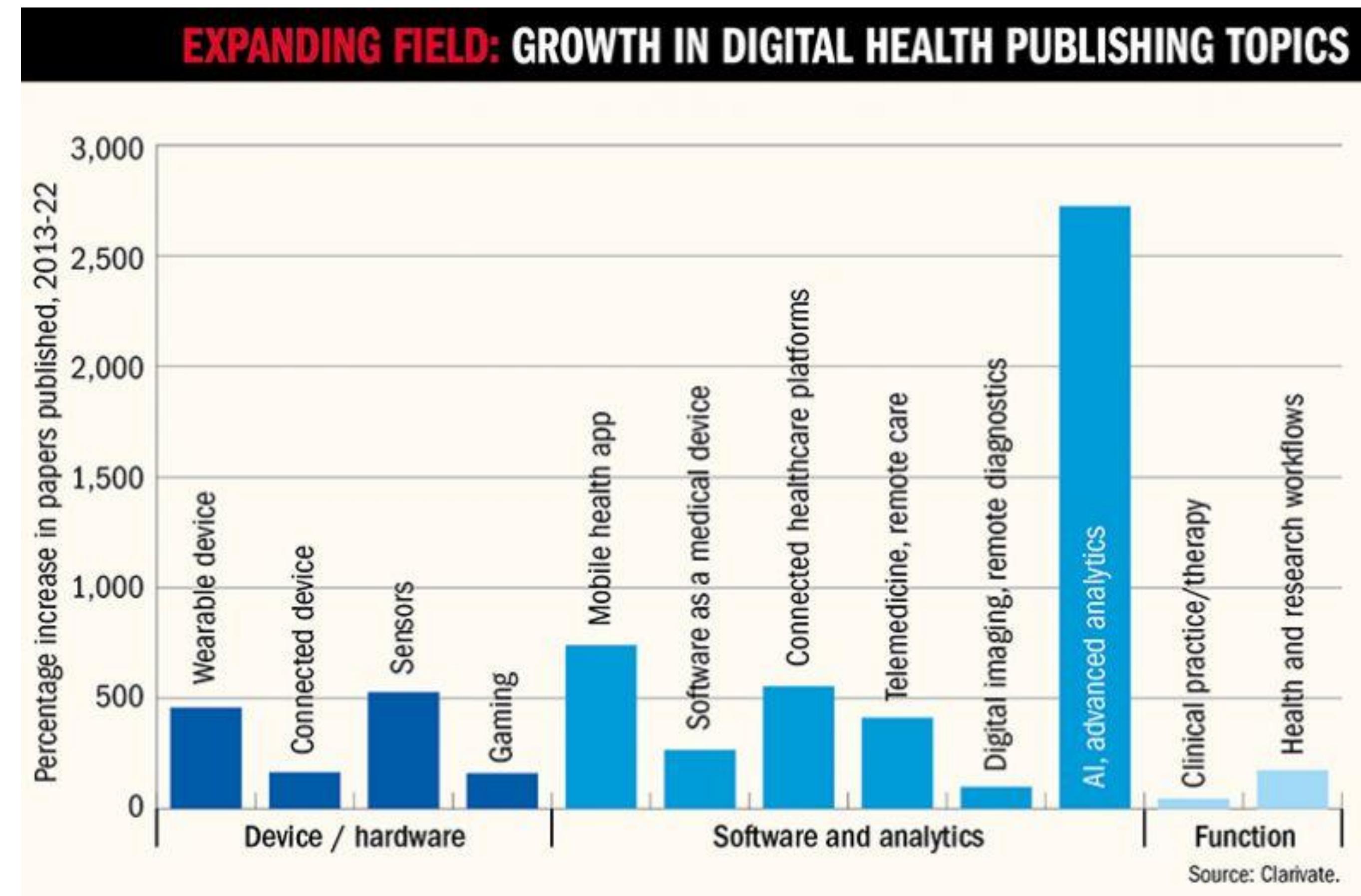
Publications on “digital health” have risen nearly 70-fold between 2013 and 2022, from a mere 39 Web of Science-indexed papers to 2,641.

**UPTICK: PAPERS ON DIGITAL HEALTH**



Digital Health

AI and advanced analytics the most rapidly growing research field in “digital health”

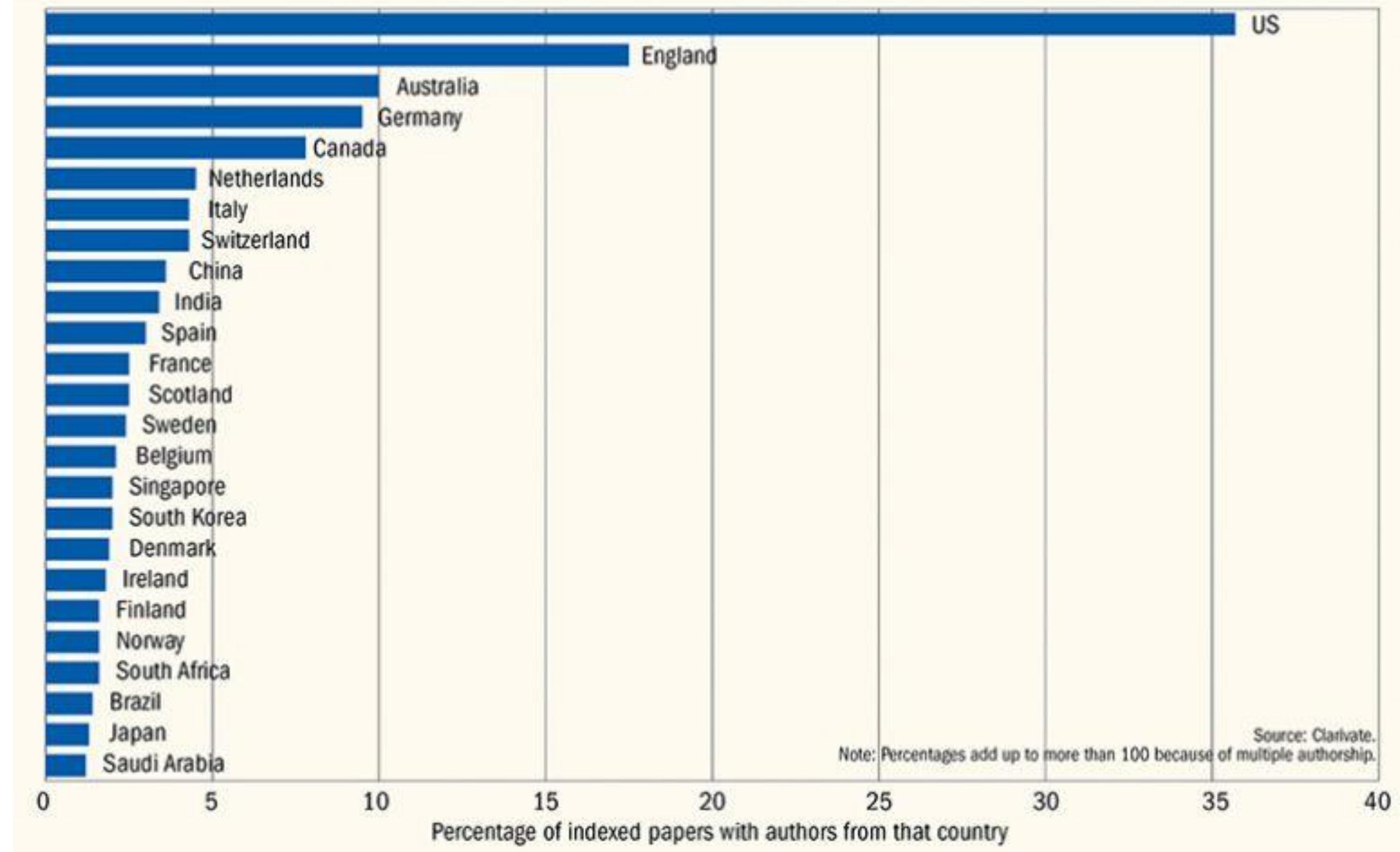


Digital Health

# Research outputs: an uneven spread

Clarivate analysis reveals that the top eight most prolific countries in terms of digital health publications produced between 2013 and 2022 are Western – with China 9<sup>th</sup> and India 10<sup>th</sup>

## LEADING LIGHTS: COUNTRY SHARE OF INDEXED PAPERS



# The rise and rise of AI health research....

“The vast streams of medical data emitted from thousands of wearable devices or mobile phones would have once overwhelmed even the most data-savvy researcher. But thanks to artificial intelligence, researchers do not need to be skilled coders to meaningfully navigate such oceans of information.

“Similarly, hospitals and health centres across the world are sharing patient records in a way that lets algorithms pick up trends, even identifying new pandemics in their early stages....”



Digital Health



# Which countries are producing the most AI health research?

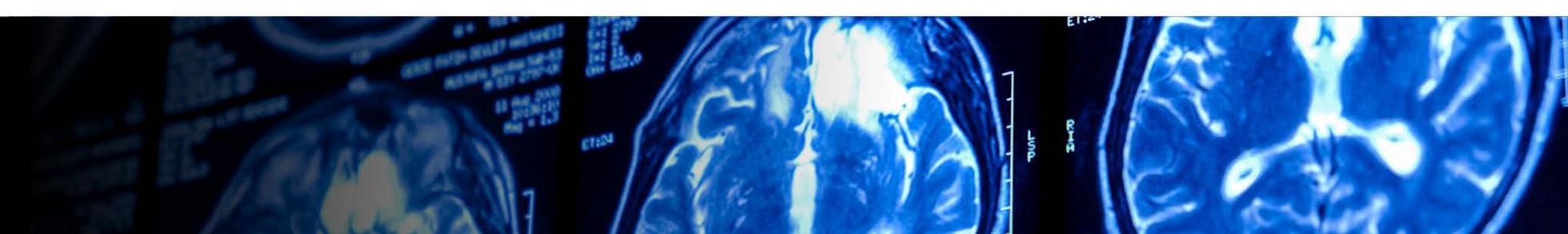
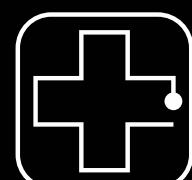
Table 1: Top 10 countries/regions ranked by output of articles on 'digital health and AI and related methods' published in journals indexed in the Web of Science, 2013-2022. (Data source: Web of Science and InCites™, Clarivate)

	Web of Science Items	Citations	Category Normalized Citation Impact (CNCI)	% Top 10%
Dataset baseline	7662	170877	1.99	26.82
Mainland China	2191	62362	2.26	27.93
United States	1808	52565	2.51	33.74
India	721	11529	1.79	24.27
United Kingdom	687	20374	2.69	36.83
South Korea	379	8141	1.90	26.65
Canada	362	11158	2.81	36.19
Italy	336	7821	2.15	33.04
Australia	301	6924	2.23	30.23
Germany	298	6206	2.19	29.87
Saudi Arabia	278	4421	2.33	34.89

AI and advanced analytics have seen the greatest growth over the past decade.

Beginning with just 93 papers in 2013, the publication pool expanded to 7,662 papers for the period 2013- 2022, rising annually through 335 (2018), 1,320 (2020), and 2,626 (2022).

This upward trend predates the popularization of AI technologies like ChatGPT



# Which institutions are leading on AI health research?

Table 2: Research institutions ranked by output of articles on 'digital health and AI and related methods' published in journals indexed in the Web of Science, 2013-2022. (Data source: Web of Science and InCites, Clarivate)

	Web of Science Items	Citations	Category Normalized Citation Impact (CNCI)	% Top 10%
<b>Dataset baseline</b>	<b>7662</b>	<b>170877</b>	<b>1.99</b>	<b>26.82</b>
Harvard University	234	8714	3.16	37.18
University of Toronto	113	3369	3.00	39.82
Stanford University	106	4403	3.95	50.00
Huazhong University of Science & Technology	97	5792	4.36	47.42
Chinese Academy of Sciences	95	2903	2.06	33.68
University College London	88	3306	3.24	43.18
Shanghai Jiao Tong University	83	2304	2.17	25.30
Massachusetts General Hospital	81	3756	3.95	41.98
Xi'an Jiaotong University	77	9465	7.30	54.55
Imperial College London	73	1523	2.23	41.10



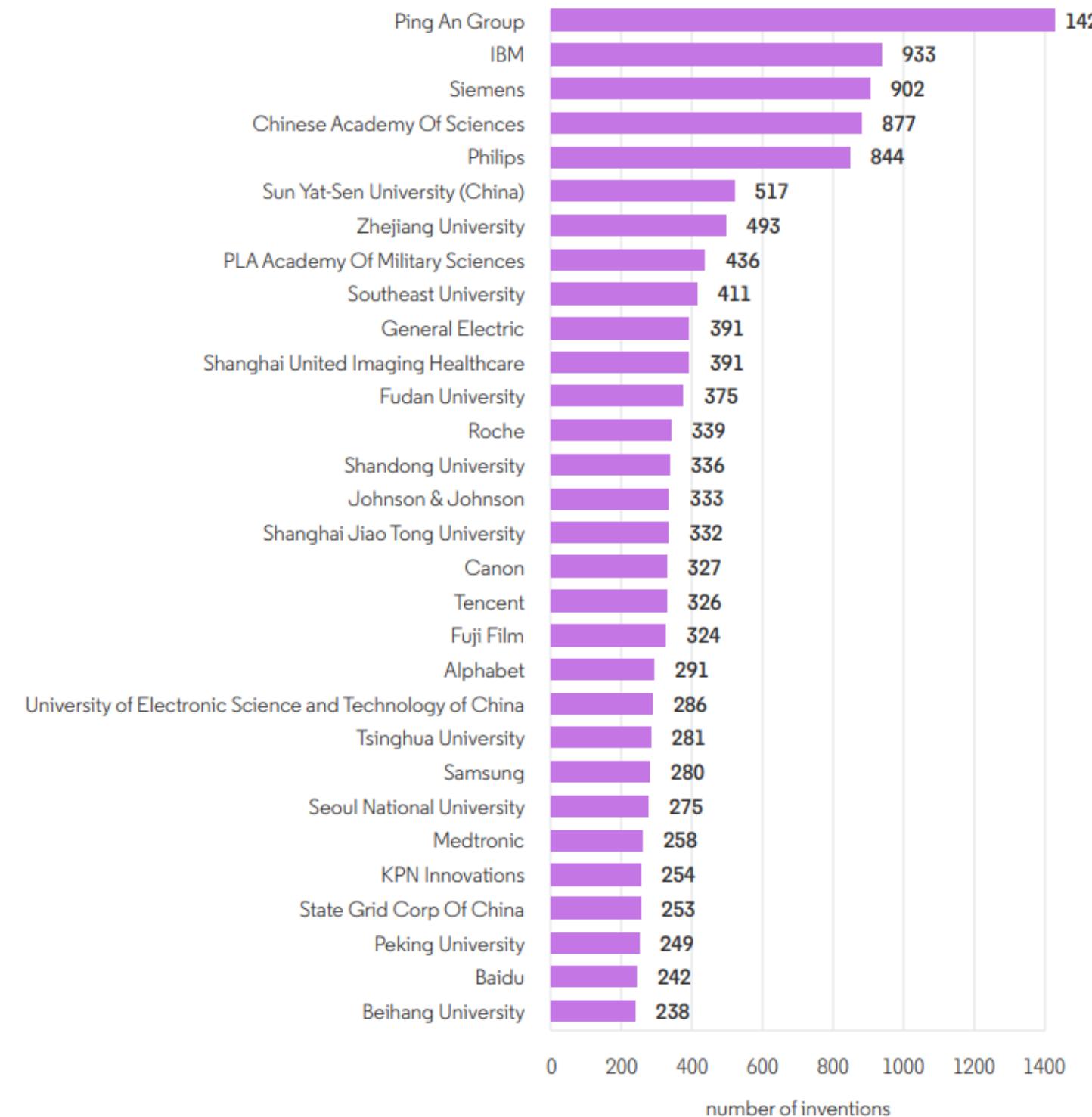
# Which institutions are most successfully exploiting research?

## Top institutions for AI health patents: China dominates

As was evident in the analysis of the journal literature, Mainland China, represented by the Chinese Academy of Sciences, Mainland Chinese universities, and Mainland Chinese corporations, is the dominant national player in AI patenting related to digital health

Figure 4. Number of patent filings and assignees related to AI and digital health, 2013-2022, revealing the extensive activity of Mainland Chinese institutions. (Data source: Derwent World Patents Index, Clarivate)

Top portfolios AI/Advanced Analytics in Digital Health  
Inventions filed, based on ultimate parent information



Digital Health



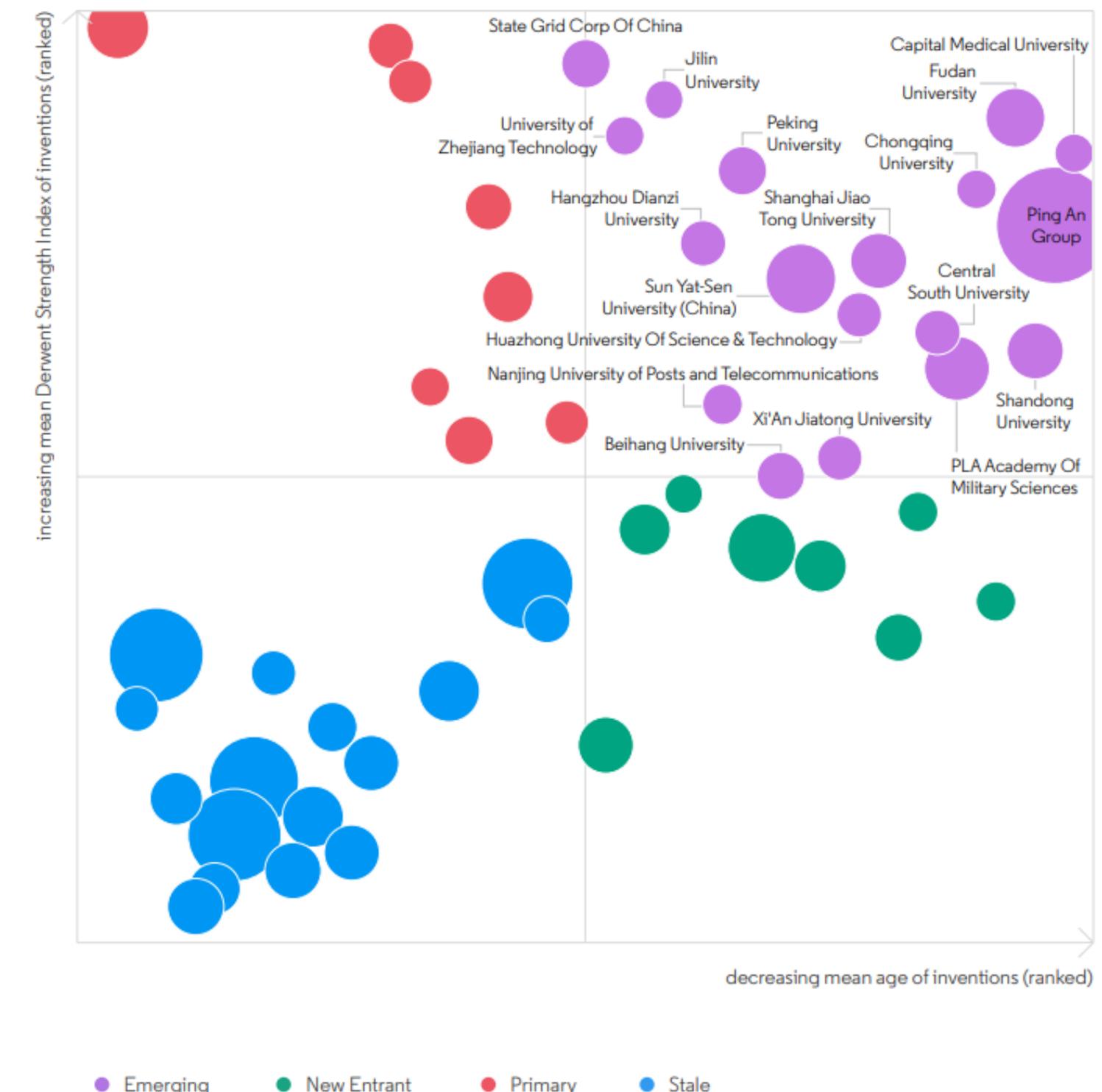
# Top institutions for AI health patents

Clarivate's Derwent Strength Index™ uses facets of the international patent system to score inventions based on their significance, including normalized citation impact (adjusted for geography, time and subject area), the GDP of patent protection locations, investment levels in patent protection by the patent applicant, and the rarity of the technical approach mix described in the invention.

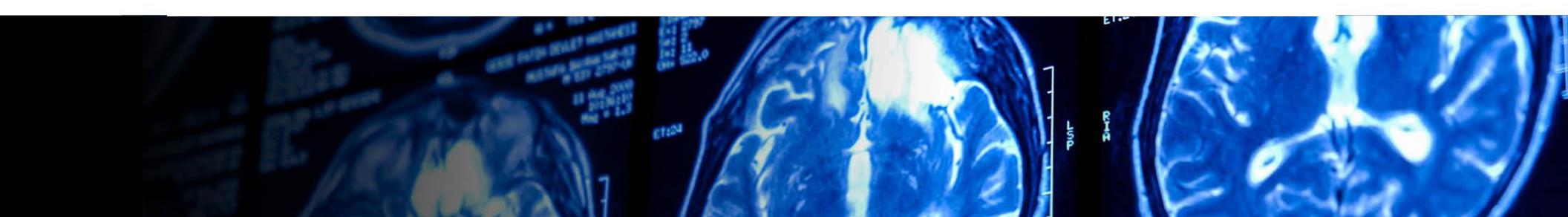
Figure 5. Mainland Chinese institutions dominate the emerging quadrant of patenting in AI and digital health, which combines strength and age of a portfolio. (Data source: Derwent World Patents Index, Clarivate)

AI/ Advanced Analytics commercial dynamic model

Plot of mean Derwent Strength Index v mean age of top 50 portfolios by volume

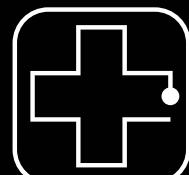


# Digital Health

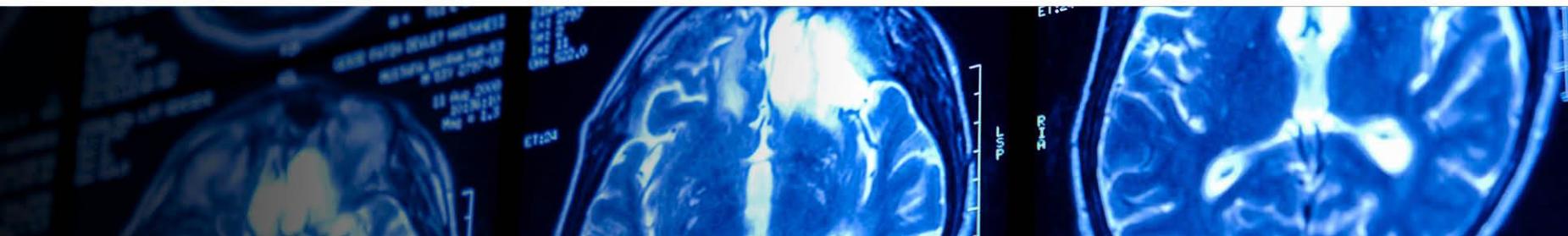


# Clarivate key findings

- **Significant growth in digital health publications:** There has been a nearly 70-fold increase in academic papers featuring the term digital health in the decade to 2022. This has been recently driven by advances in artificial intelligence (AI) and advanced analytics, predating the popularization of AI technologies such as ChatGPT.
- **Strength of AI patenting in digital health:** Mainland China, represented by the Chinese Academy of Sciences, universities and corporations, plays a pivotal role in this field.



Digital Health

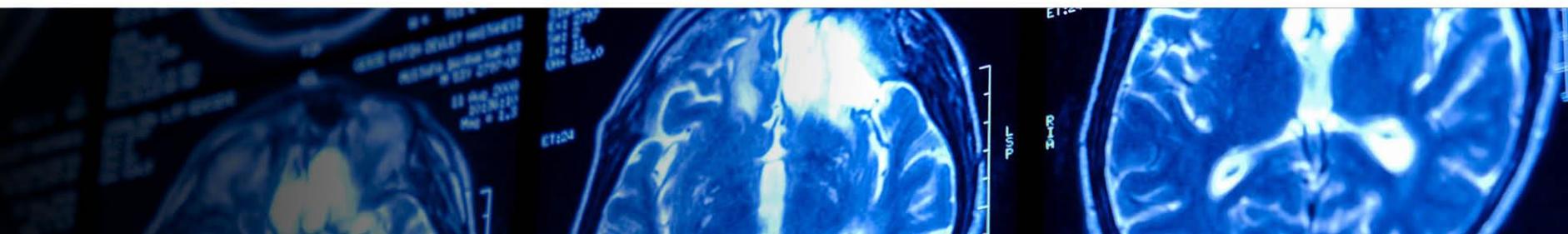


# Clarivate key findings

- **Impact of university research on digital health innovation:** University research significantly influences digital health innovation, with research papers frequently cited by patents, highlighting their role in driving intellectual property advancements.
- **Rapid increase in digital health patenting activity:** Patenting activity in digital health has outpaced the growth in publications, with approximately 140,000 patent inventions identified from 2013 to 2022 – indicating robust efforts within the industry to secure intellectual capital and gain market advantage.



Digital Health



# Join us at one of our Digital Health events...



**Digital Health**

In partnership with

UNIVERSITY OF  
**WATERLOO**

10-11 April 2025  
Waterloo, Canada

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The banner features a background image of a brain scan with a white crosshair icon. The text is white and the partnership logo is in white on a dark background. The ticket button is white with black text.



**Digital Health**  
**Asia**

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**CityU** 香港城市大學  
City University of Hong Kong

**Hong Kong**  
8-10 September 2025

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The banner has a black background with a red border. The text is white and the partnership logo is in white on a red background. The ticket button is red with white text.



**Digital Health**

# RESEARCH OVERVIEWS

## GLOBAL CONFLUENCE: NEW AGE TECHNOLOGY AND MANAGEMENT HORIZONS

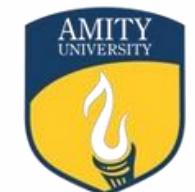


# Professor Ibrahim Habli

# Department of Computer Science



Partnered with





UNIVERSITY  
*of York*



# Safe Clinical AI

Ibrahim Habli



Centre for  
Assuring  
Autonomy

**S**AI  
NTS  
UKRI AI Centre for Doctoral  
Training in Safe AI Systems

# Practice-oriented perspective

## Technology centric

## How can AI substitute for humans?

## How can we be confident that an AI is safe?

How can we put a human in the loop to ensure that AI decisions are safe?

## Systems perspective

## How can AI *augment* human performance?

How can we be confident that the *use* of AI is safe?

How can a *human/AI team* make decisions safely?

Future Healthcare Journal 11 (2024) 100179

Contents lists available at ScienceDirect

Future Healthcare Journal

journal homepage: <https://www.sciencedirect.com/journal/future-healthcare-journal>

## Moving beyond the AI sales pitch – Empowering clinicians to ask the right questions about clinical AI

Ibrahim Habli <sup>a,\*</sup>, Mark Sujan <sup>a</sup>, Tom Lawton <sup>b</sup>

<sup>a</sup> Centre for Assuring Autonomy, University of York, United Kingdom

<sup>b</sup> Improvement Academy, Bradford Institute for Health Research, United Kingdom

### A B S T R A C T

We challenge the dominant technology-centric narrative around clinical AI. To realise the true potential of the technology, clinicians must be empowered to take a whole-system perspective and assess the suitability of AI-supported tasks for their specific complex clinical setting. Key factors include the AI's capacity to augment human capabilities, evidence of clinical safety beyond general performance metrics and equitable clinical decision-making by the human-AI team. Proactively addressing these issues could pave the way for an accountable clinical buy-in and a trustworthy deployment of the technology.

### Introduction

A team from a healthcare software company walks into a hospital. Their goal is to promote their latest AI-based decision support system for recognising deteriorating patients. The pitch, delivered by a sales officer, a clinician and an IT specialist, centres on the AI's impressive performance, regulatory approval and the company and partnering academic reviewed papers demonstrating the AI's performance, or exceeding that of human clinicians has been obtained. More assuringly, it has been deployed in other hospitals. Early adoption, with a year discount, with flexible cancellation, the hospital, the pathways supported by the AI, with clinicians making the final decision, an overstretched workforce, a key short-term potential to reduce backlogs and long-term potential to be exacerbated by the COVID-19 pandemic.

On the face of it, this seems like a good idea!

The scenario is hypothetical, but perhaps not that far from reality in recent times with the extraordinary adoption of AI in healthcare. However, despite the appeal of additive concerns, such as escalation of care and improved patient safety, there is an oversimplification and a technocentrism that can detract from the clinical and patient experience. While AI can be used with high accuracy in retrospective analyses, it has not been deployed successfully in clinical practice.

is weak.<sup>1,2</sup> Arguably, this problem of 'the last mile'<sup>2</sup> ie, of making the transition from AI development and testing into clinical practice, arises because clinical systems are complex socio-technical systems with inherent variability and uncertainty.<sup>3</sup> This disconnect illustrates a fundamental point: healthcare providers and clinicians must be empowered to ask the right questions about the AI's role within the wider clinical sys-

Royal College of Physicians

# Behind the paper - Moving beyond the AI sales pitch

### About resource

## Empowering clinicians to ask the right questions about clinical AI

This article reflects the opinions of the authors.

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E-mail address: [ibrahim.habli@york.ac.uk](mailto:ibrahim.habli@york.ac.uk)

<https://doi.org/10.1016/j.fhj.2024.100179>

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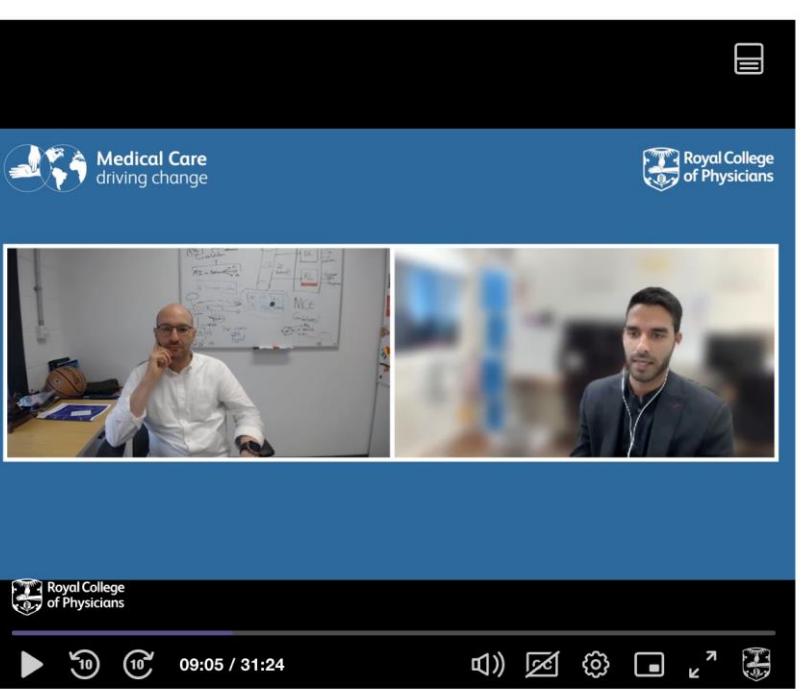
<http://creativecommons.org/licenses/by-nd/4.0/>

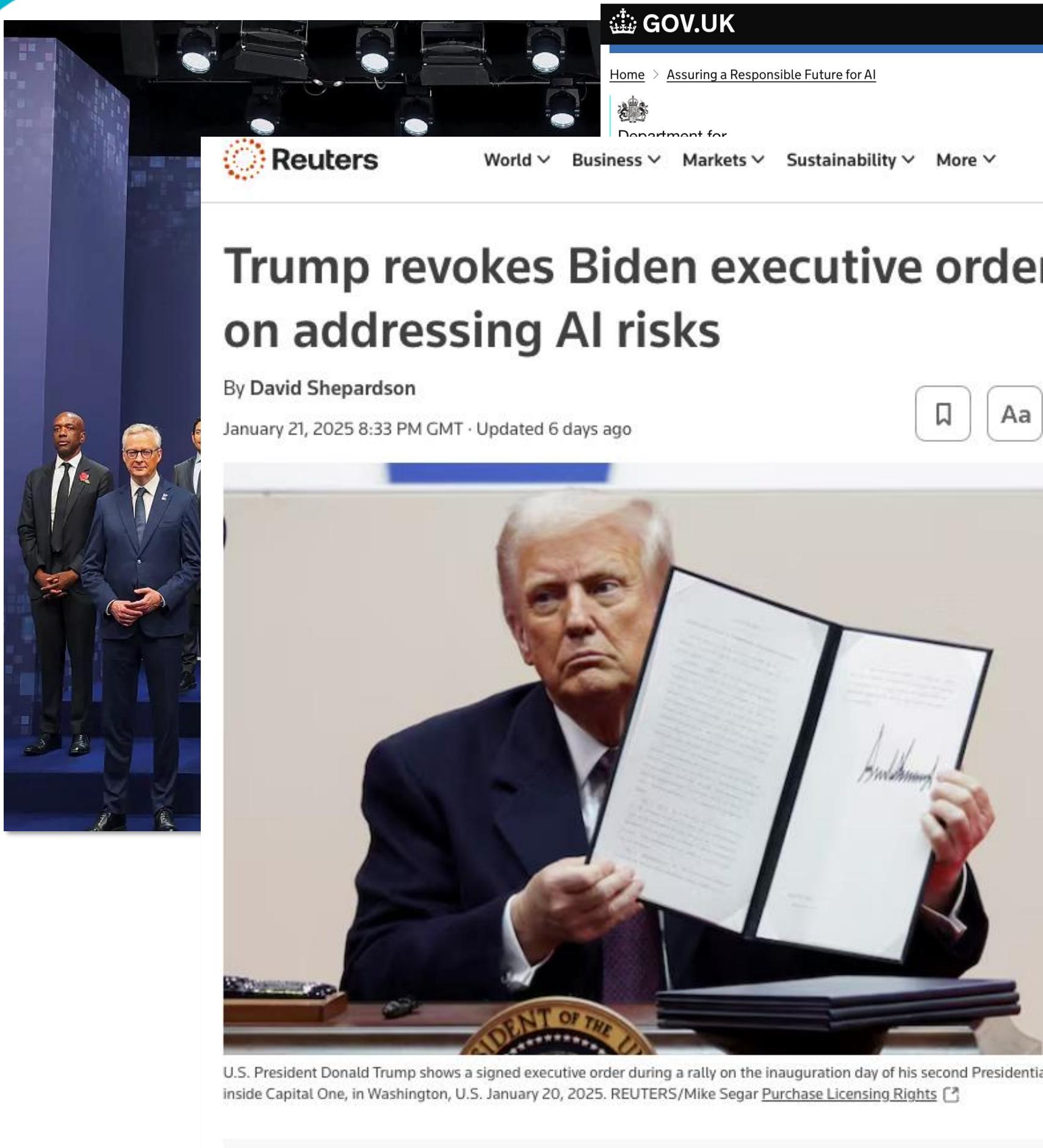
Medical Care  
driving change

# Behind the paper - Moving beyond the AI sales pitch

## about resource

Empowering clinicians to ask the right questions about clinical AI





**Trump revokes Biden executive order on addressing AI risks**

By David Shepardson

January 21, 2025 8:33 PM GMT · Updated 6 days ago

U.S. President Donald Trump shows a signed executive order during a rally on the inauguration day of his second Presidential term, inside Capital One, in Washington, U.S. January 20, 2025. REUTERS/Mike Segar [Purchase Licensing Rights](#)

Reuters

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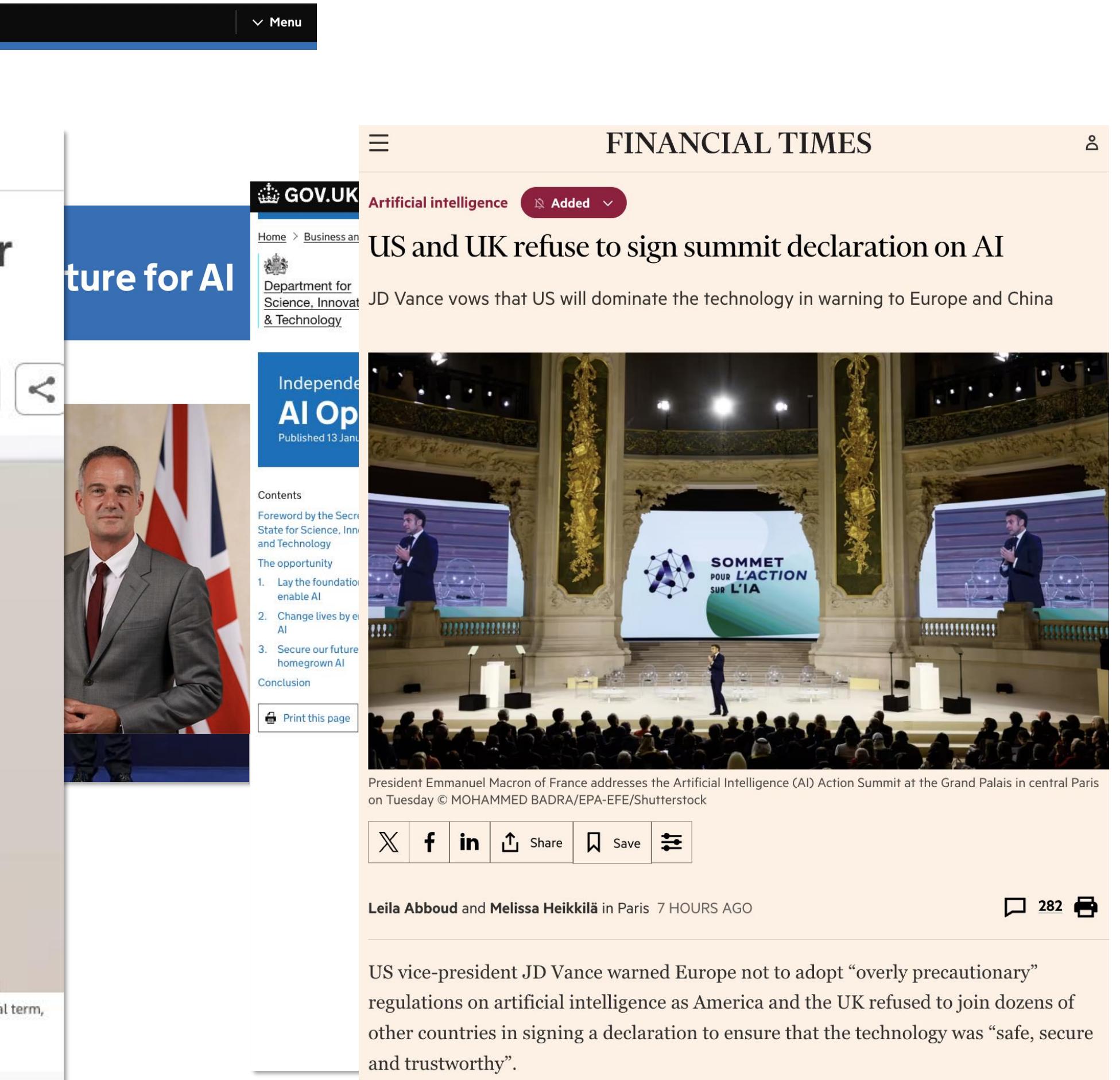
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**US and UK refuse to sign summit declaration on AI**

JD Vance vows that US will dominate the technology in warning to Europe and China

President Emmanuel Macron of France addresses the Artificial Intelligence (AI) Action Summit at the Grand Palais in central Paris on Tuesday © MOHAMMED BADRA/EPA-EFE/Shutterstock

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282

Leila Abboud and Melissa Heikkilä in Paris 7 HOURS AGO

US vice-president JD Vance warned Europe not to adopt “overly precautionary” regulations on artificial intelligence as America and the UK refused to join dozens of other countries in signing a declaration to ensure that the technology was “safe, secure and trustworthy”.

FINANCIAL TIMES

Artificial intelligence

Added

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& Technology

Independent

AI Op

Published 13 Jan

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State for Science, Innov

and Technology

The opportunity

1. Lay the foundat

enable AI

2. Change lives by en

AI

3. Secure our future

homegrown AI

Conclusion

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# Areas of expertise

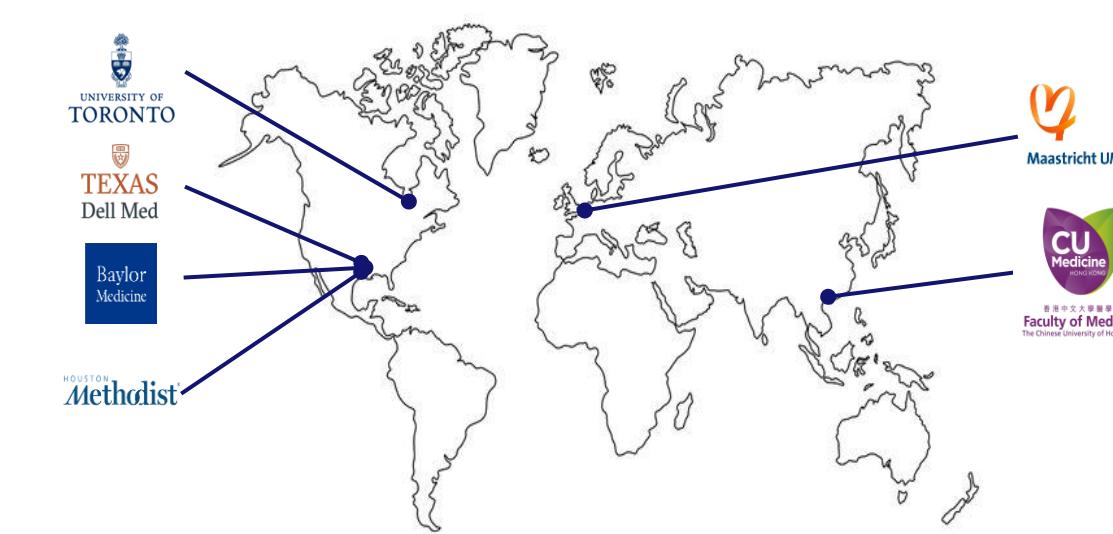
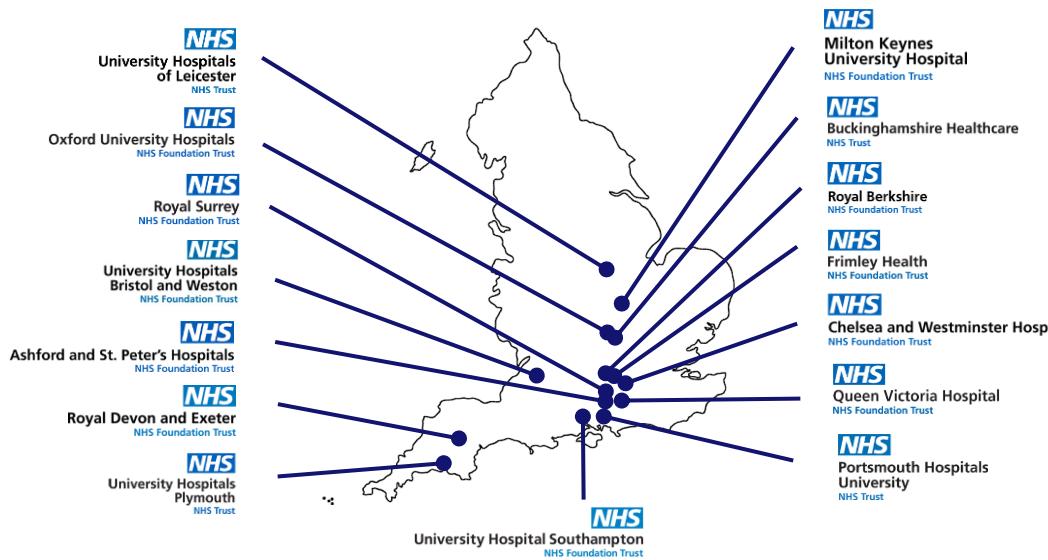
- Safety-driven development and assurance of AI-based clinical decision support systems
- Safe deployment and evolution of AI-based clinical decision support systems
- Human-centred approach
  - Human-AI interactions
  - Human factors
  - Human-centred explanation
  - Moral responsibility and legal liability

Inherently Interdisciplinary



<https://www.flipsnack.com/assuringautonomy/aaip-demonstrator-review/>

# Example Research: Safe, Empathetic and Multilingual Clinical AI Assistants



CALL LISTS

Mr James Godwin

DOB : 01/01/1980 MRN: 267t3267t36t63t76t763 P#: +44776385

NO INTEGRATIONS INFO LOGO

**Supervisor**

**INBOUND**

Final Call Status

Completed (finished)

Data to Label

LLM Authentication

How did the patient respond?

Authenticated

LLM History Taking

How did the patient respond?

Significant redness

Significant pain

Significant issue with vision

Significant new floaters

dora: Hey, this is Dora the automated assistant from Demo Hospital following up on your cataract surgery. Is this Mr James Godwin speaking?

patient: yes it is 0.9338 - Google

dora: That's good to hear, Mr Godwin. How are you doing today?

patient: uh yeah I'm okay I'm just about to leave the house to go play golf though actually so could we uh keep it quite quick 0.9543 - Google

dora: Okay, and I'll try to keep it brief. Before we get started, I just need to confirm a few details. What's your date of birth, Mr Godwin?

patient: it's 1980 0.8868 - Google

dora: Thanks a lot! I want to check on your cataract surgery recovery. How's your eye doing since your surgery?

patient: um it's okay it's a bit painful in the morning 0.9742 - Google

dora: Got it, so you're experiencing some pain in the morning. Hmm, that can be uncomfortable. Is the pain more like a scratchy or dry feeling, or is it a deeper kind of pain?

patient: um yeah like scratchy and dry I think that's yeah it's like that 0.8715 - Google

dora: Okay, so it's more of a scratchy and dry feeling, that's good to know. That's usually not a concern and should resolve on its own within a few days. Does that make sense? Now, I want to ask, do you experience this scratchy feeling all the time, or is it just some of the time?

patient: yeah yeah 0.8593 - Google

dora: Let me write that down. So, you're experiencing a scratchy and dry feeling in your eye;

Playback speed: 0.5 1

0:00 / 5:33

REVIEW FINISHED

v-10.10.0-3.0 CE UK CA Copyright © 2025 Ufonia Limited



Centre for  
Assuring  
Autonomy



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[assuring-autonomy@york.ac.uk](mailto:assuring-autonomy@york.ac.uk)  
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# Ministers plan AI tools for CVs to ease pressure on jobcentres

ANNA GROSS AND DELPHINE STRAUSS

Ministers are developing artificial intelligence tools to write CVs and covering letters for job seekers, as they seek to free up Jobcentre staff to work on more complex cases and reduce the UK's welfare bill.

Officials hope to set out their plans within a year and are working to establish if the tools can be built in house or would need to be contracted from the private sector, according to people briefed on the plans.

"Work coaches' time is so limited and they could be doing much more valuable things than sitting and rewriting people's CVs," one senior official said, referring to Jobcentre staff who provide employment advice.

The plan is part of a wider drive by the Labour government to get more people into work and bring down the cost of the benefits system.

Prime minister Sir Keir Starmer has set a goal to reach an 80 per cent employment rate, up from 75 per cent today, by getting around 2mn more people into work. This will mean boosting employment not only for unemployed

jobseekers, but also among people receiving health-related benefits who are not currently required to look for work. The UK currently spends about £65bn a year on incapacity and disability benefits, more than it does on defence, according to the House of Lords economic affairs committee.

But jobcentres, the main point of contact for benefit claimants, are currently too overstretched to offer the support needed for people with complex health conditions.

There are about 650 jobcentres across the UK, staffed by roughly 16,500 work

coaches. Each coach can be responsible for upwards of 100 claimants and by the government's own admission, spend much of their time policing benefits claims.

A report published last summer by the Tony Blair Institute in collaboration with the company Faculty AI, urged the Department for Work and Pensions to embrace the technology across its operations. AI tools could help jobseekers to tailor CVs and covering letters, spot gaps in their experience and practise interviews, the report found.

Proposals to overhaul the Jobcentre

network, set out in November, are meant to help work coaches give more "personalised" support, including through the use of machine learning to respond to queries faster. But encouraging benefit claimants to submit covering letters wholly written by AI would go against the DWP's own rules for applicants to work within the department.

The department's guidance says this is an "unacceptable" use of the technology, although it can be used to research and plan a pitch. "Statements written by GenAI are often generic and may not personally represent you or your skills and experience . . . You must draft your statement yourself to ensure it accurately reflects your personal experience and aligns with the job advert," the guidance states.

The government said it had no intention of replacing work coaches through the use of AI. "AI technology offers options to enhance the services offered through jobcentres and can be a great tool to help people apply for jobs but even the most innovative version is incapable of building the empathic connection that is needed to help those looking for work," it said.



Each coach at a Jobcentre can be responsible for upwards of 100 claimants — Danny Lawson/PA

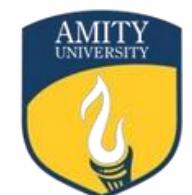


# Professor Dan Watts

# School of Physics, Engineering and Technology



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**AMITY**  
UNIVERSITY



UK Research  
and Innovation

EPSRC



Science & Technology  
Facilities Council

# AI derived quantum entangled PET

## Current status

Prof Dan Watts  
(University of York)

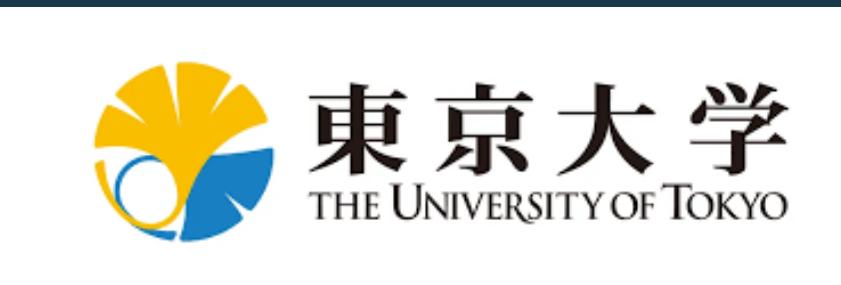
Dr Nick Zachariou, Dr Jamie Brown, Dr Julien Bordes, Dr Mikhail Bashkanov, Dr Ruth Newton, Dawid Grabowski, Laura Stephenson

Prof Karla Evans, Cameron Kyle-Davidson (AI imaging group, Psychology)

Prof Kenji Shimazoe, Dr Mizuki Uenomachi (University of Tokyo)

Prof Steve Archibald, Dr John Wright (King's College London)

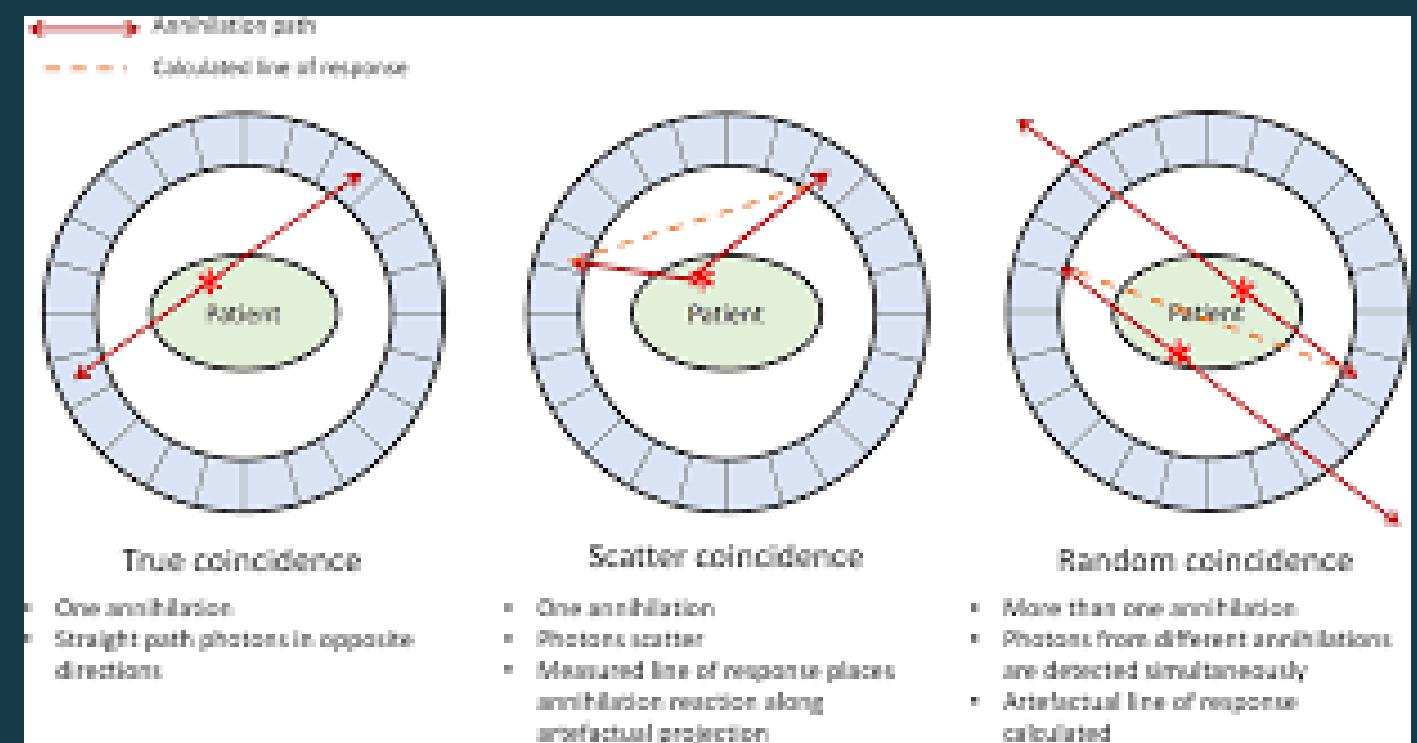
Prof Harry Tsoumpas (Groningen PET research centre)



UNIVERSITY *of York*

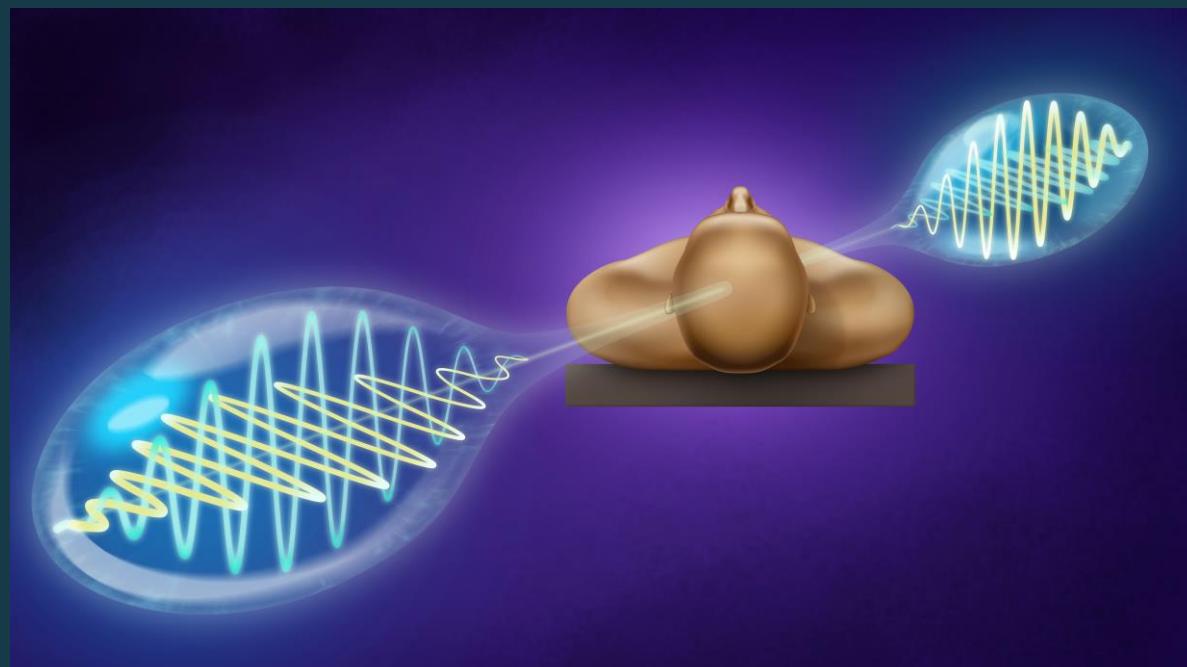
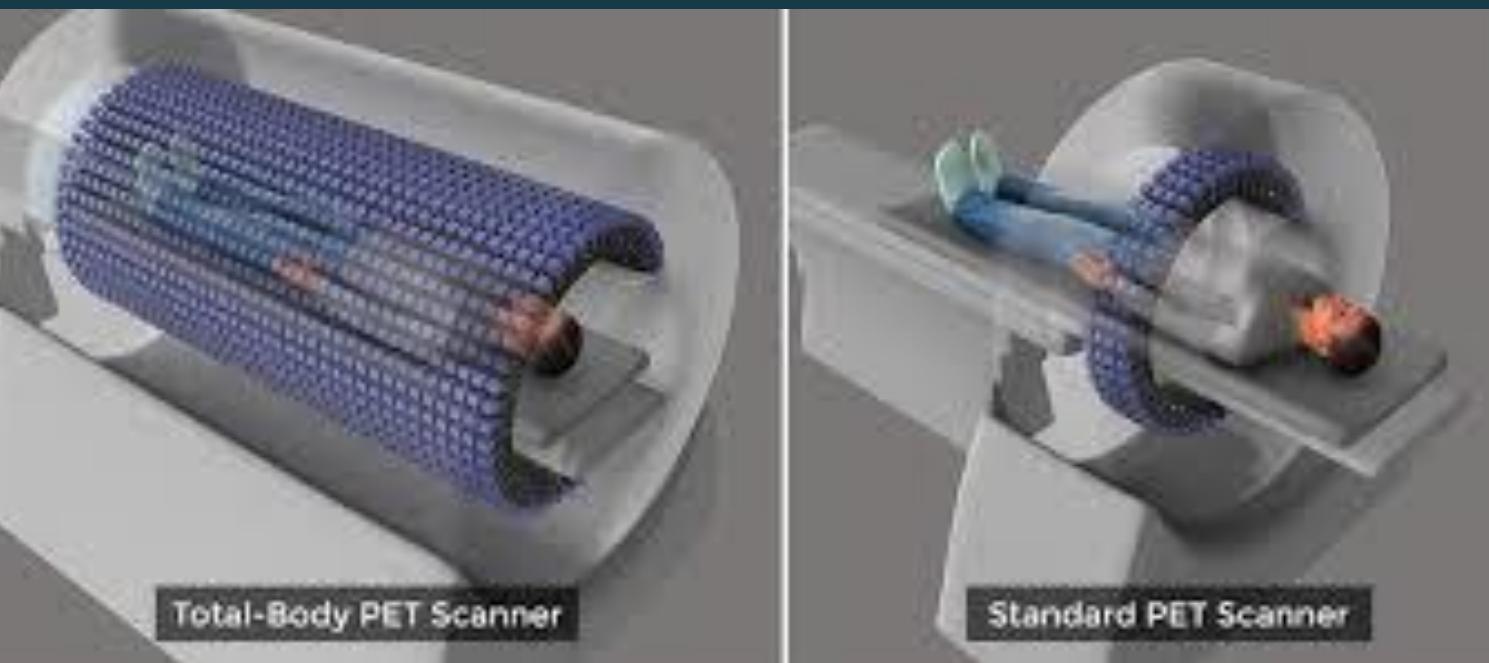
# PET imaging

- PET scan - main clinical tool to diagnose cancer and Alzheimer's
- Patient injected with a radioactive isotope ( $^{18}\text{F}$ ;  $e^+$  positron emitter) attached to a biologically active compound
- Emitted positron annihilates rapidly with nearby electron  
$$e^- + e^+ \rightarrow 2\gamma$$
- 😞 The PET scan gives no anatomical information (relies on associated CT – typically gives more radiation dose than PET...). Accounting for patient movement an unmet challenge
- 😞 CT scan used to remove contribution of scatter events to the image – with problems/artefacts/CPU time/..



# What is your research question?

- Up to 90% of the events detected in PET are of “scatter” type and thrown away. Can we use them?
- Next generation PET - “whole body”  
Scatter an increasing problem,  
Whole body CT scans needed...
- To utilize the scatter data - need accurate models of PET photon propagation for training data
- It had been overlooked for decades that the two PET photons are quantum entangled in polarization – strong influence on how photons propagate



ARTICLE

<https://doi.org/10.1038/s41467-021-22907-5> OPEN

Photon quantum entanglement in the MeV regime and its application in PET imaging

D. P. Watts<sup>1</sup>✉, J. Bordes<sup>1</sup>, J. R. Brown<sup>1</sup>, A. Cherlin<sup>1,2</sup>, R. Newton<sup>1</sup>, J. Allison<sup>3,4</sup>, M. Bashkanov<sup>1</sup>,  
1 School of Physics, Engineering and Technology, University of York, York, YO10 5DD, United Kingdom

PHYSICAL REVIEW LETTERS 133, 132502 (2024)

Featured in Physics

First Detailed Study of the Quantum Decoherence of Entangled Gamma Photons

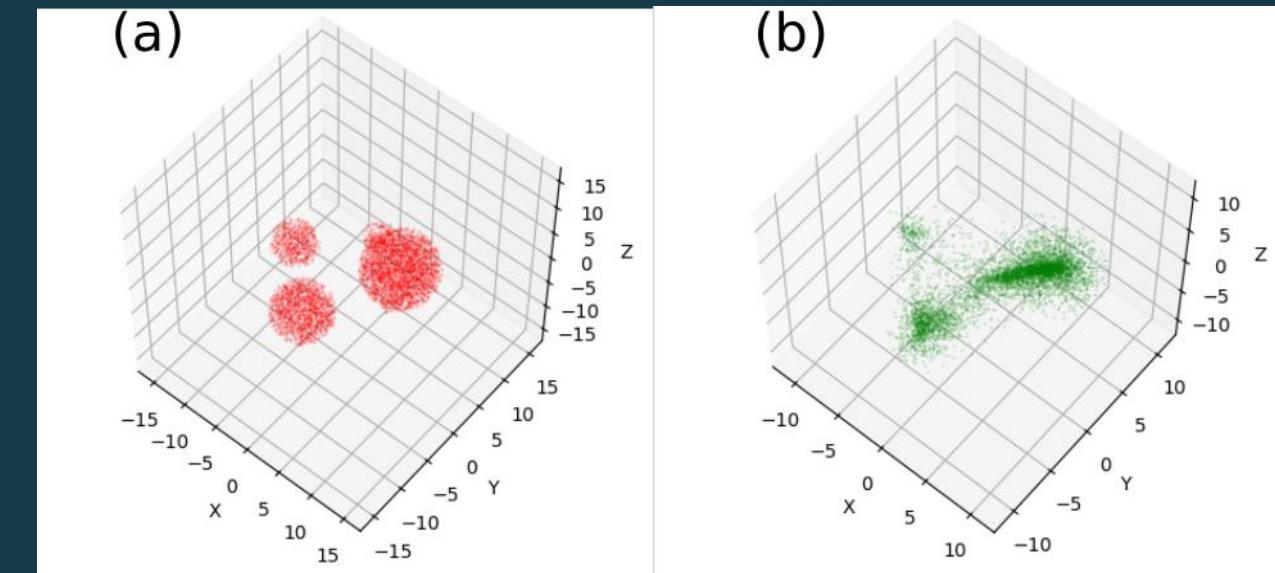
Julien Bordes<sup>1</sup>, James R. Brown<sup>1</sup>, Daniel P. Watts<sup>1</sup>,\* Mikhail Bashkanov<sup>1</sup>,  
Kieran Gibson<sup>1</sup>, Ruth Newton<sup>1</sup>, and Nicholas Zachariou<sup>1</sup>  
School of Physics, Engineering and Technology, University of York, York, YO10 5DD, United Kingdom

(Received 8 December 2023; revised 21 March 2024; accepted 27 June 2024; published 25 September 2024)

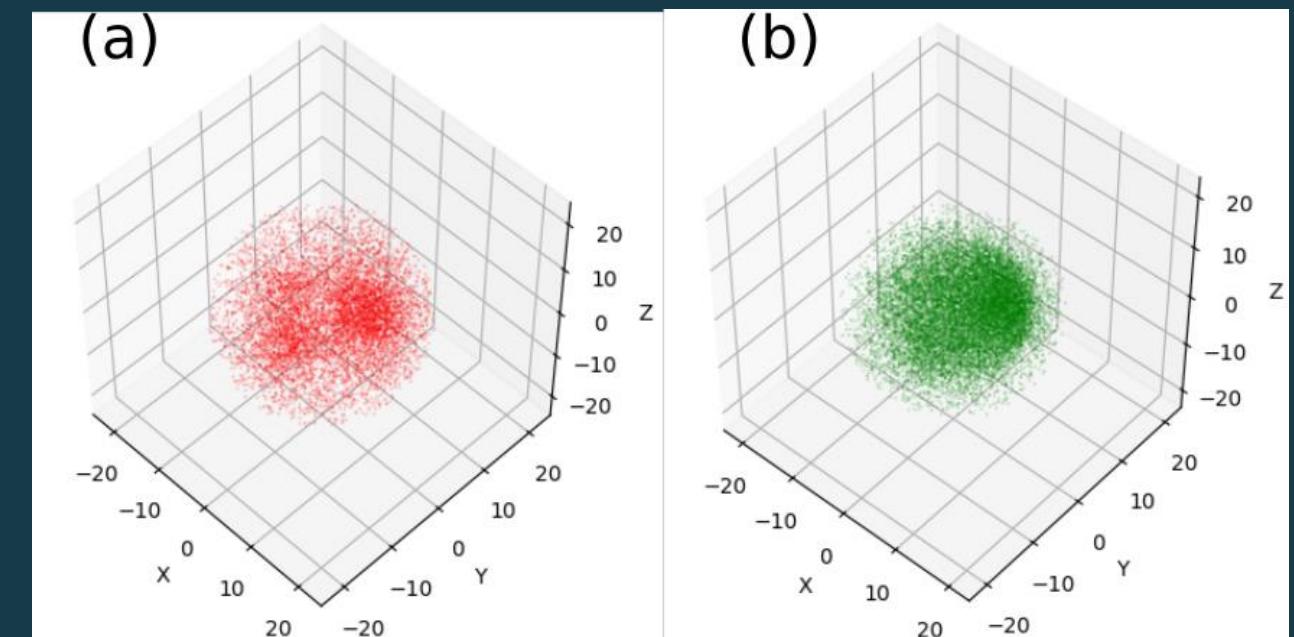
# Very early preliminary results from AI studies

- Simple trained AI network – using event-by-event reconstruction only
- Training data generated with entanglement
- The first ever “accurate” training data for PET scatter events
- Early results show promise!
- Clear improvements in annihilation and scatter site reconstruction from using the quantum information

Annihilation site



Scatter site



Truth data

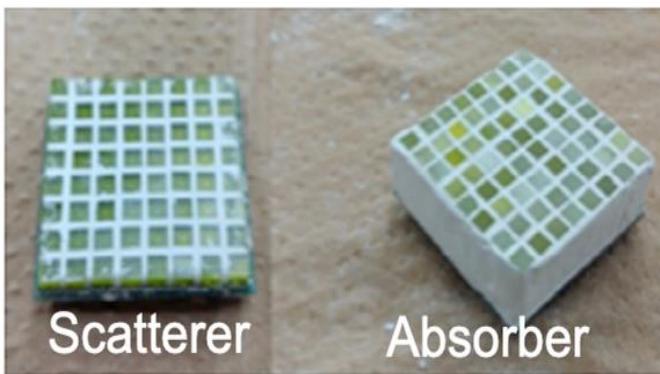


AI reconstructed

# York/Tokyo: Large acceptance 2 $\gamma$ , 3 $\gamma$ PET/SPECT system

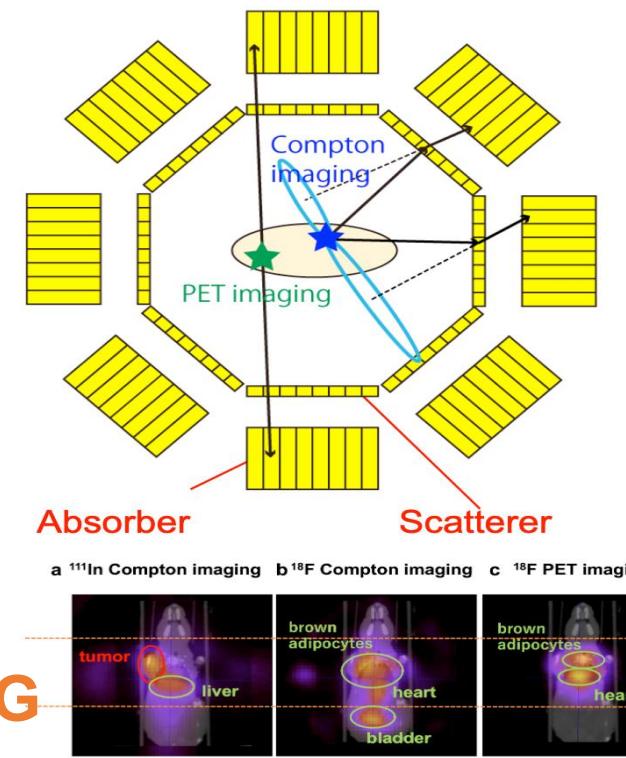


High resolution GAGG

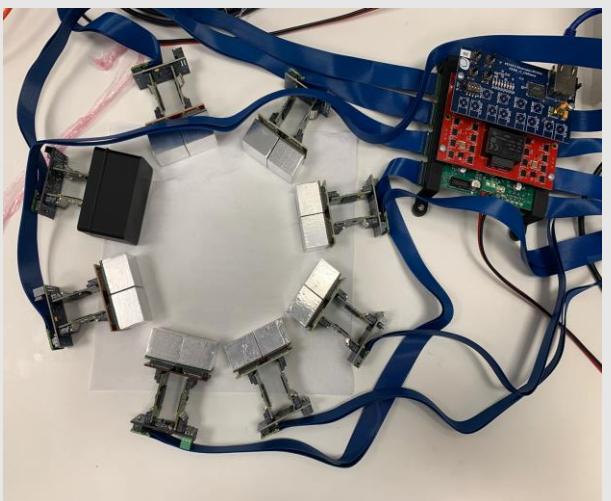


1024 2.5x2.5x1.5(or 9) mm GAAG

M. Uenomachi et al 2022 JINST 17 P04001



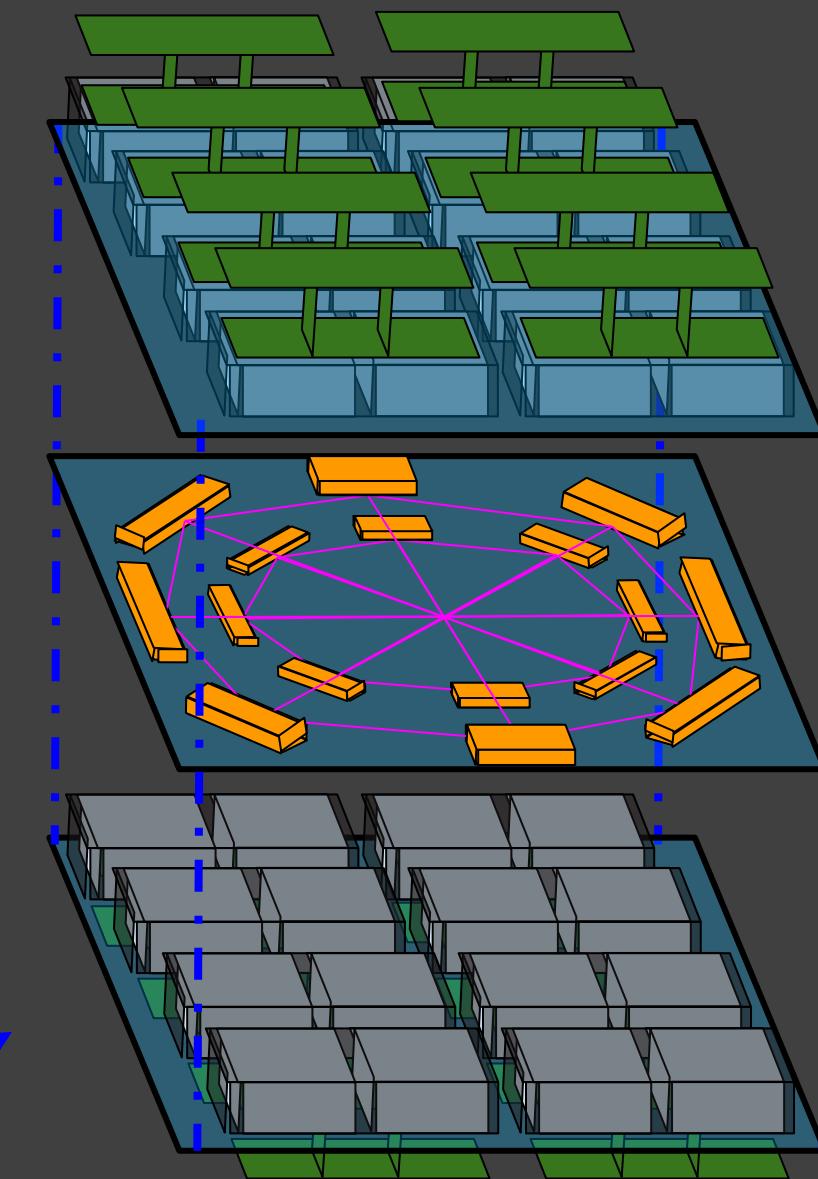
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2046 3x3x20 mm LYSO



York – 0.2 GBq  $^{22}\text{Na}$  source  
KCL PET centre –  $^{18}\text{F}$  and  $^{111}\text{I}$  with controlled pH,  $\text{p}(\text{O}_2)$



# Larger acceptance -> Environment sensing in PET/SPECT, tests

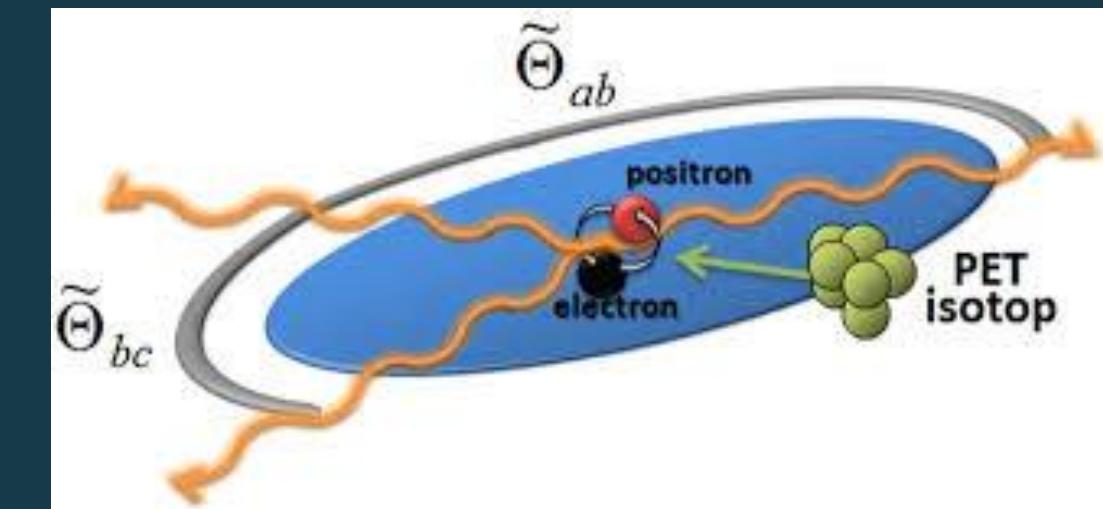
**3 $\gamma$  PET** – relative yield sensitive to oxygen concentrations.

e.g. *Radiation Physics and Chemistry* 203 (2023) 110610

Hypoxic (low oxygen) tumours less sensitive to radiotherapy – influence treatment pathways?

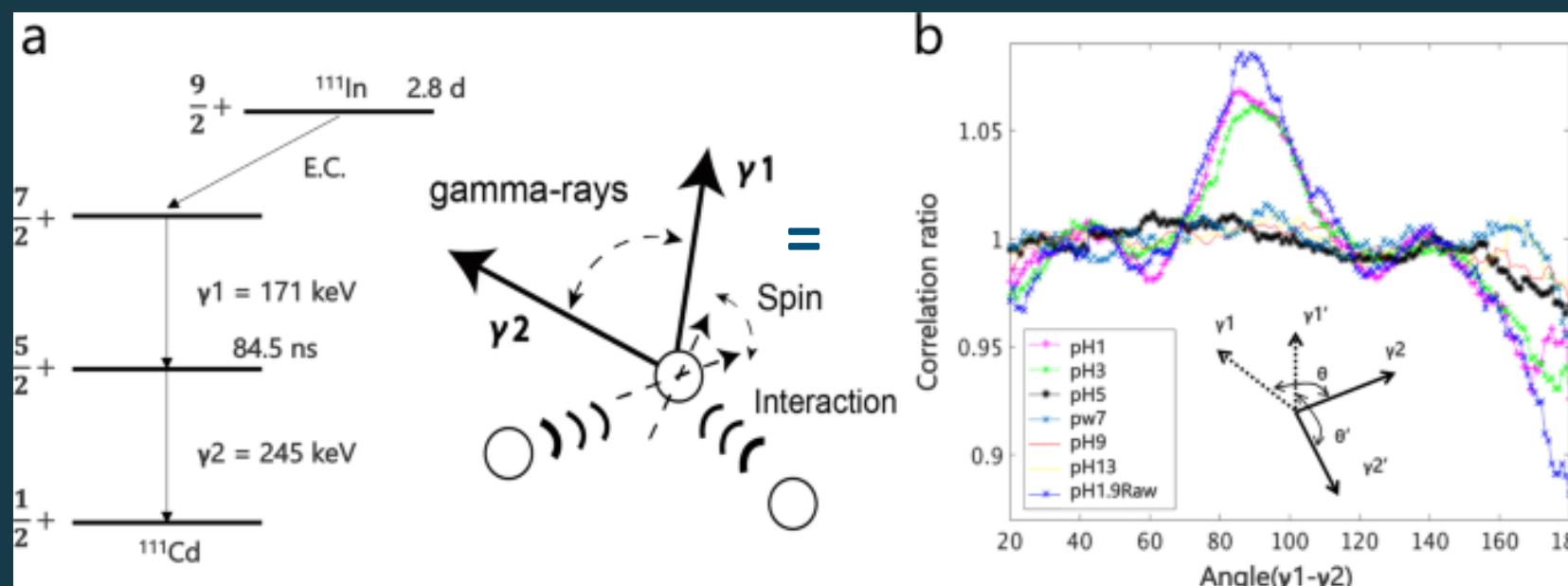
Fundamental tests – QE in genuine tripartite system, CP/CPT violation

e.g. *Hiesmayer, Sci. Reports* 15349 (2017)



**Cascade gamma** – sensitive to pH of environment

*Nat Comms* vol5, Article number: 24 (2022)

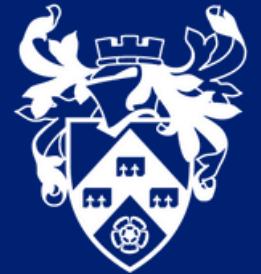


**Main clinical aims:**

Measure the “missing piece” for understanding QE decoherence in PET

Polarisation correlations and QE unexplored for both 3 $\gamma$  and cascade- $\gamma$  – crucial to deeper understanding

Analyse large acceptance PET and SPECT data for clinical images using AI-QE trained algorithms



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# Professor (Dr) Anupama Rajesh

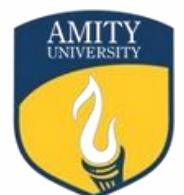
## Amity University



**UKIERI**  
UK-India Education  
and Research Initiative

 **SPARC**  
Scheme for Promotion of Academic and Research Collaboration

Partnered with



**AMITY**  
UNIVERSITY

# AI Workshop

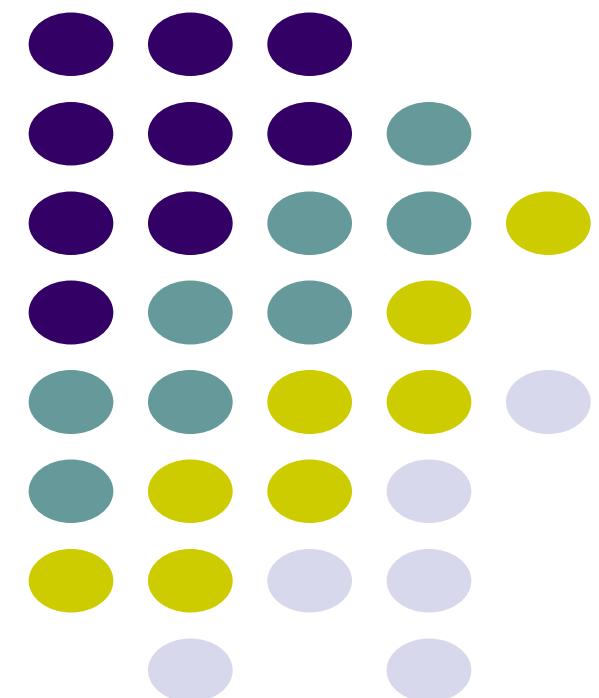
## *Artificial Intelligence in Healthcare*

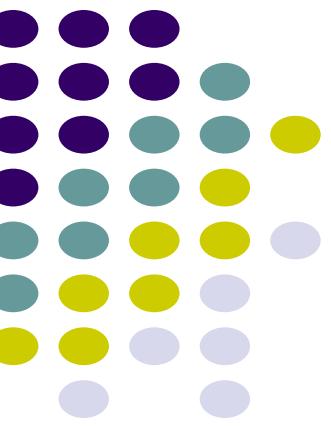
Organized by Yorkshire University, UK

### **Using AI-Enabled Predictive Insights to improve Hospital Operations & Patient Care**

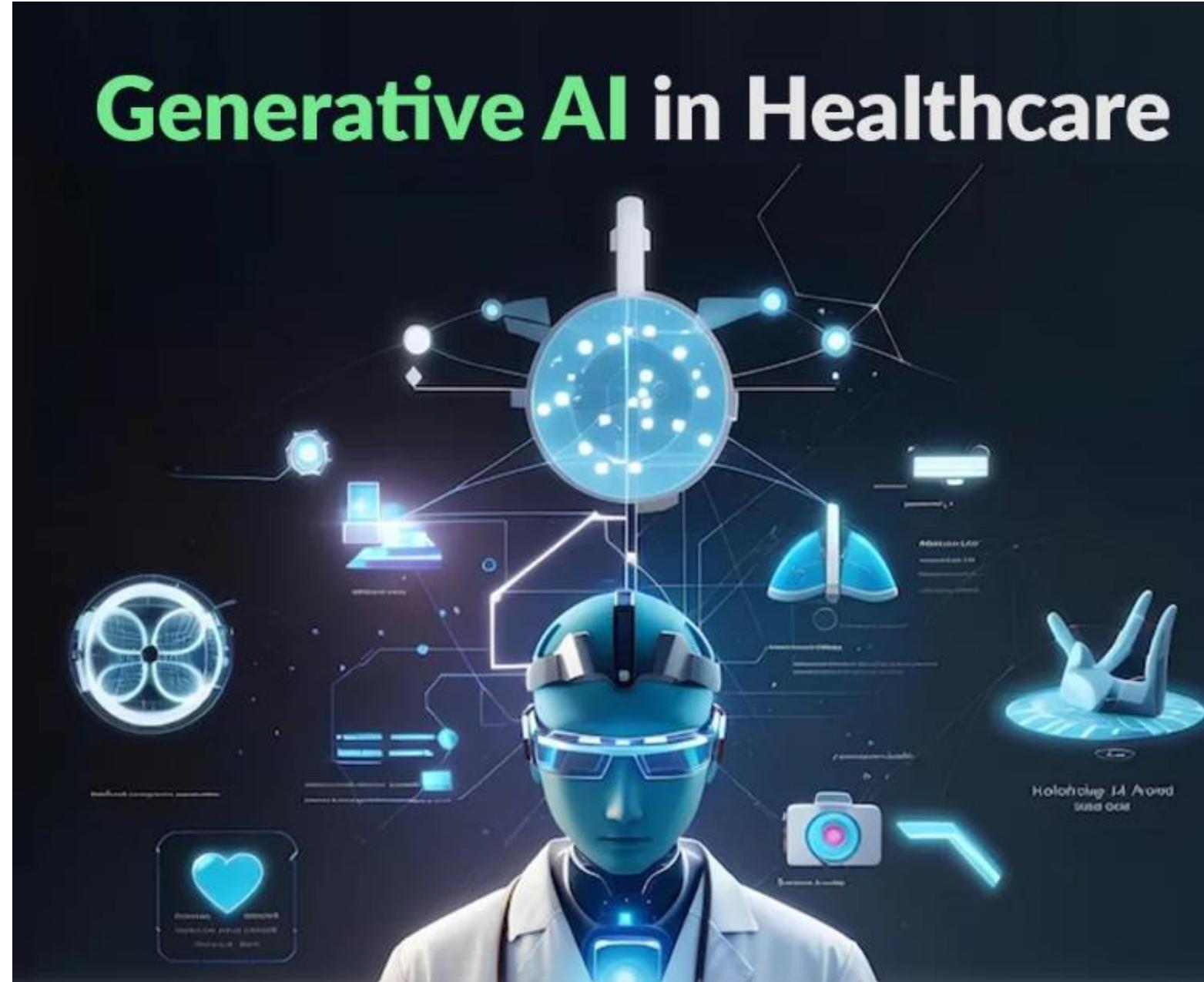


Dr. Anupama Rajesh  
Professor  
Amity International Business School  
Amity University Noida India





# Introduction



## Key Points:

- Healthcare systems face challenges such as rising costs, resource constraints, and increasing patient demands.
- AI-enabled predictive insights offer a transformative solution to optimize hospital operations and enhance patient care.
- This presentation explores how AI can improve efficiency, reduce costs, and deliver better outcomes for patients.

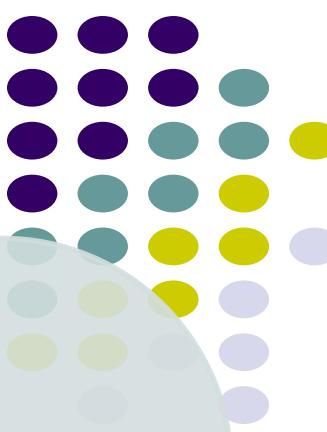
## What Are AI-Enabled Predictive Insights?

### Definition:

AI-enabled predictive insights use machine learning, data analytics, and artificial intelligence to analyze historical and real-time data, identifying patterns and predicting future outcomes.

### Applications in Healthcare

- Predicting patient admissions and discharges.
- Forecasting staffing needs.
- Identifying at-risk patients for early intervention.
- Optimizing resource allocation (e.g., beds, equipment).



# Joint Research Initiatives & Academic Outcomes

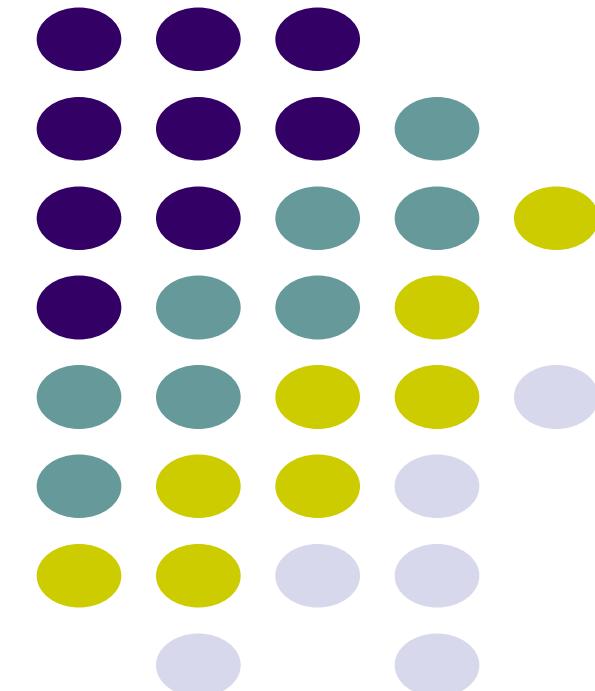
- Initiative 1 :

## RESEARCH PAPER

01

02

03



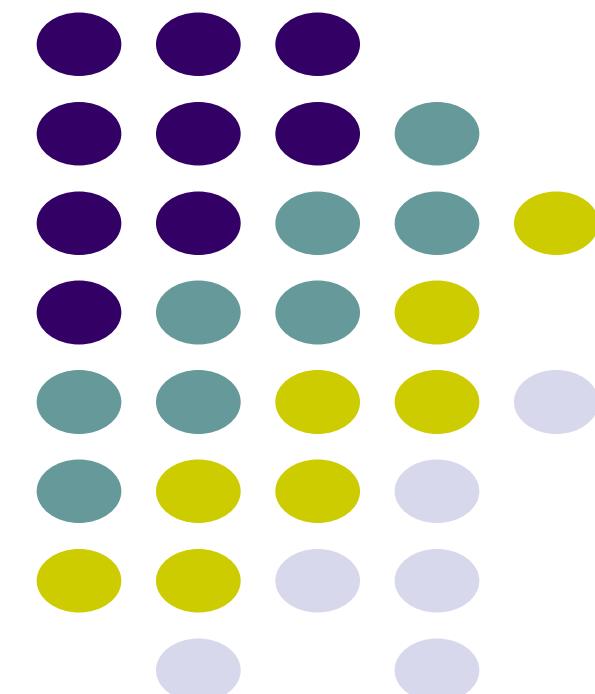
- Initiative 2 :

**PATENT**

**01**

**02**

**03**



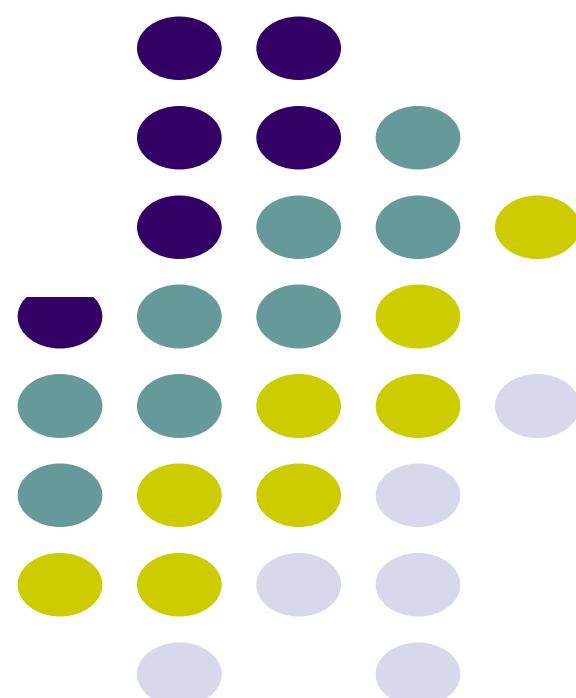
•Initiative 3 :

### BOOK CHAPTER

01

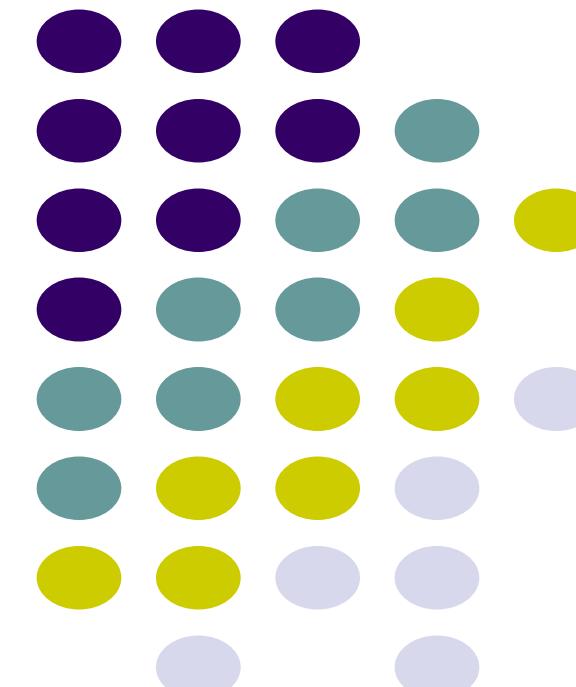
02

03



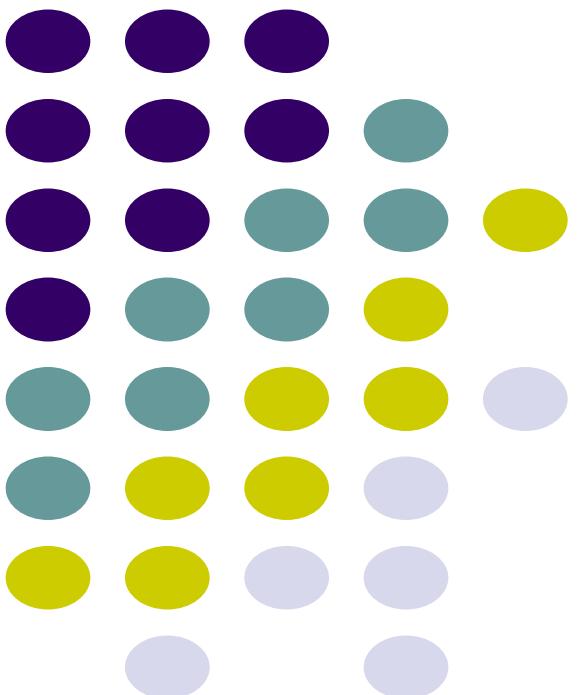
# Accomplishments to Date

Sr. No.	Title	Number	Status
1.	Patent	06	Filled
2.	Book Chapter	02	Accepted
3.	Research Paper	07	Presented (Publication in Process)
4.	Book	03	Published



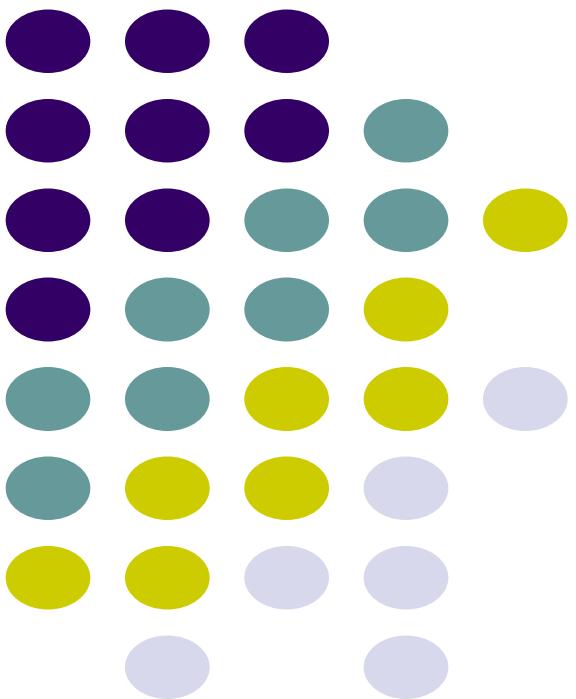
- Patent

- Title 1 : Model Based on Machine Learning Approach for Cervical Cancer Screening and Prognosis
- Title 2 : Plant Leaf Disease Detection Using Machine Learning



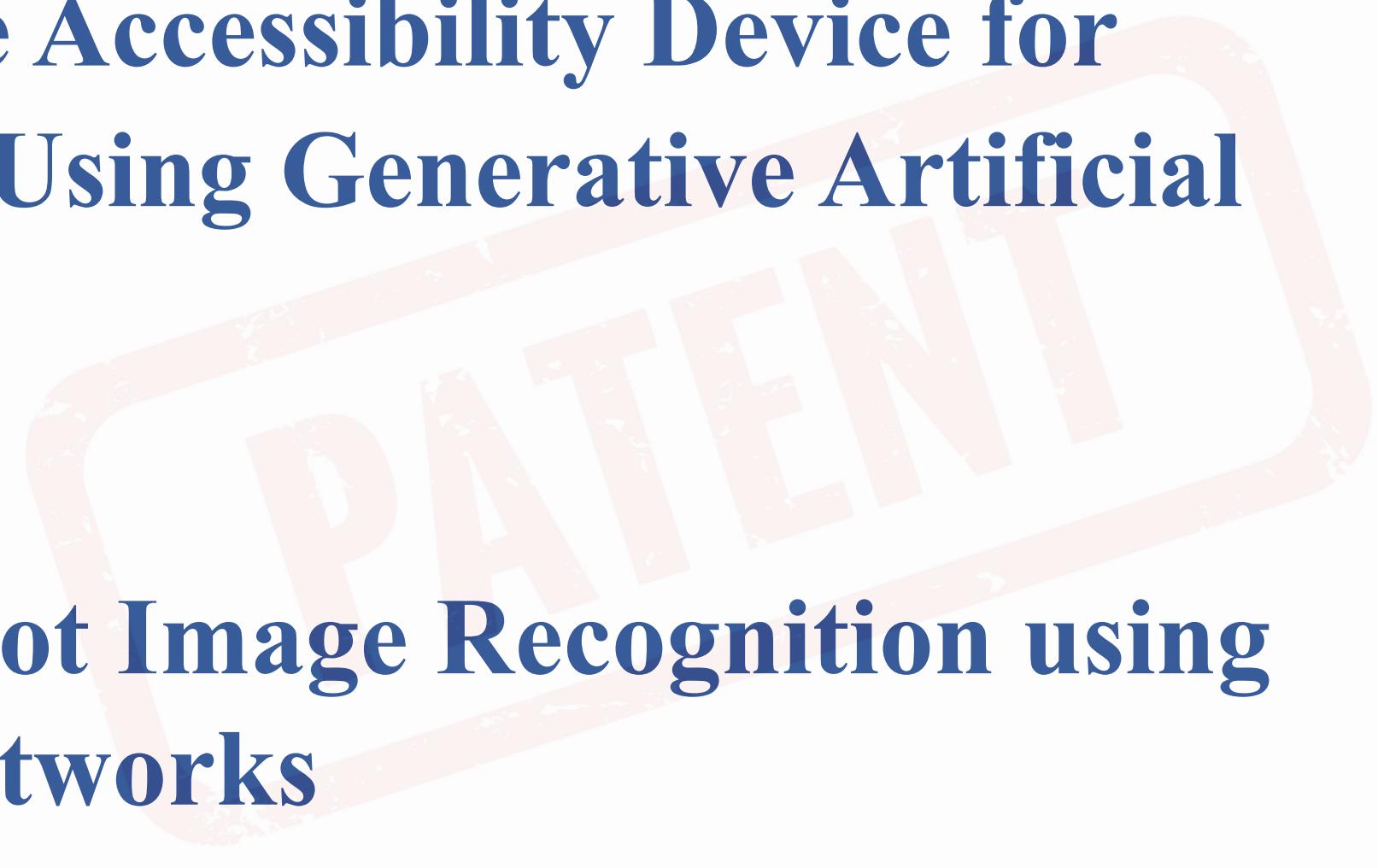
## ● Patent

- **Title 3 : Machine Learning Approach for Breast Cancer Screening and Diagnosis**
- **Title 4 : End-to-End System for Real-Time Stutter Detection and Personalized Intervention**

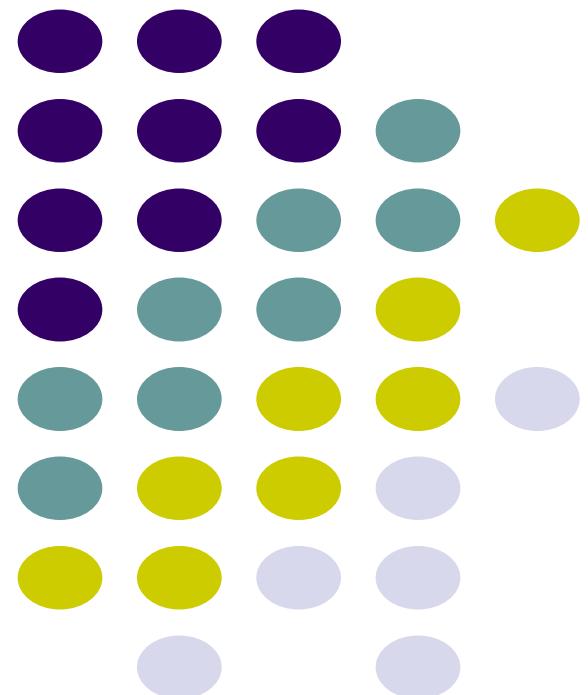


- Patent

- Title 5 : Wearable Accessibility Device for Visually Impaired Using Generative Artificial Intelligence Vision



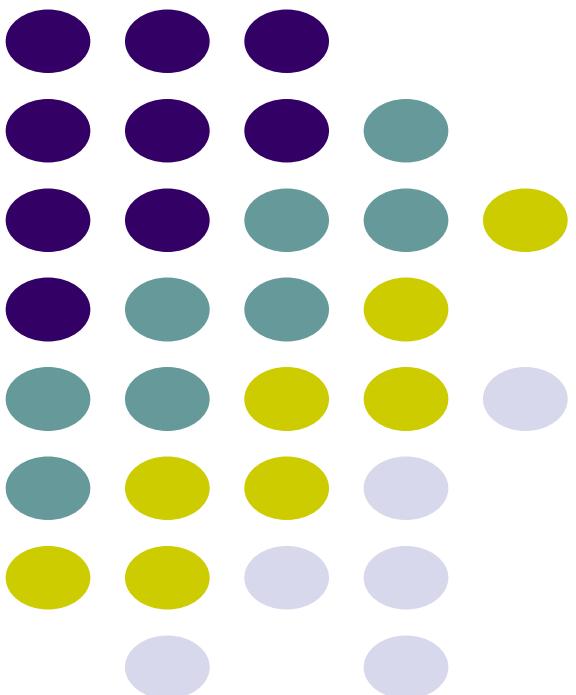
- Title 6 : Single Shot Image Recognition using Siamese Neural Networks



# Book Chapter

- **Title: Framework Using Big Data for Patient Detection and Identification System.**

1. **Chapter Title:** "Framework Using Big Data for Patient Detection and Identification System"
2. **Book Title:** "Generative AI for Business Analytics and Strategic Decision-Making in-Service Industry"
3. **Publisher:** IGI Global Publication



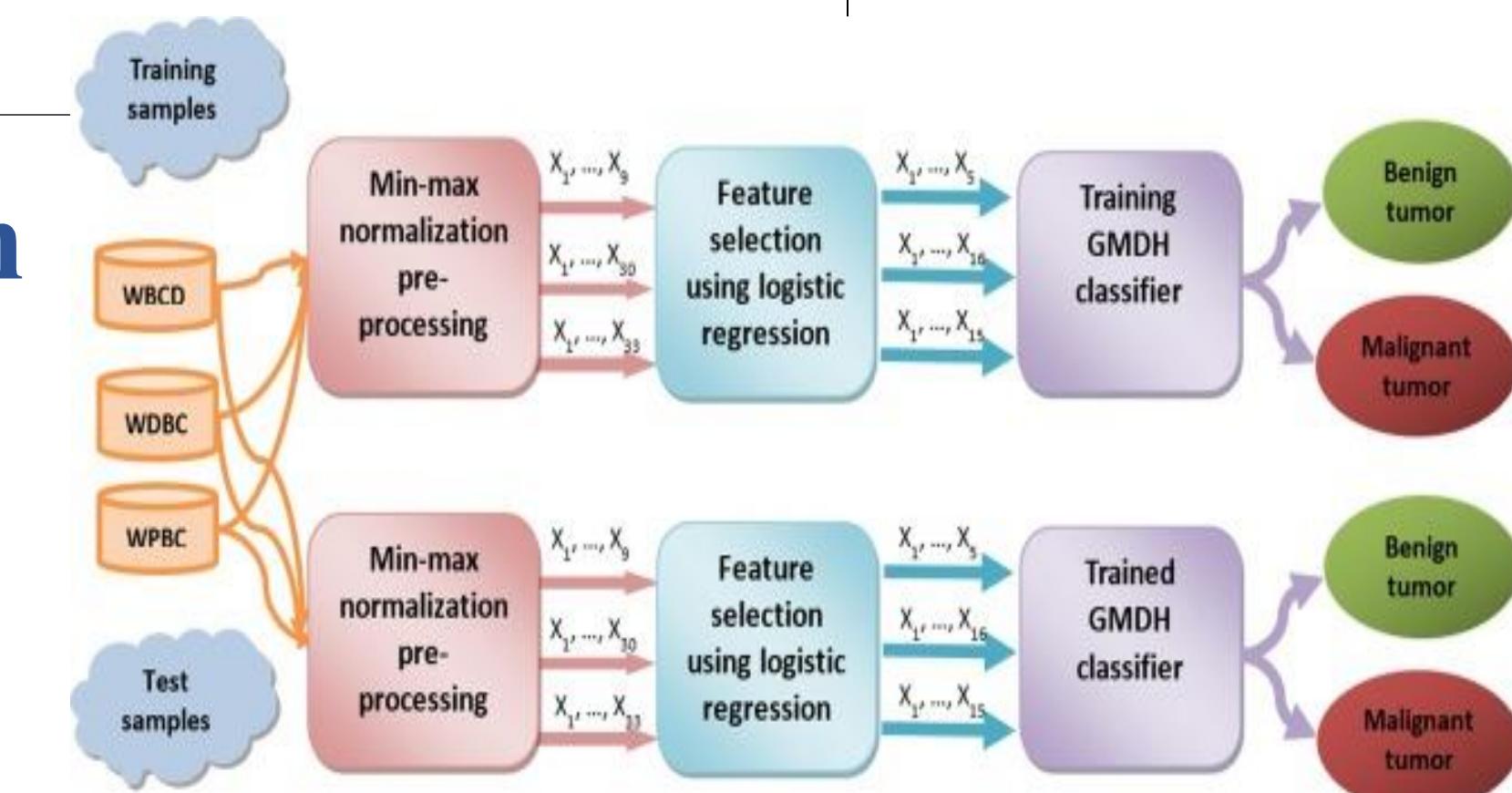
# Book Chapter

## Bifaceted Breast Cancer Examination Via Logistic Regression Model

Conference Proceedings in SPRINGER

"Algorithms for Intelligent Systems"

Book Series



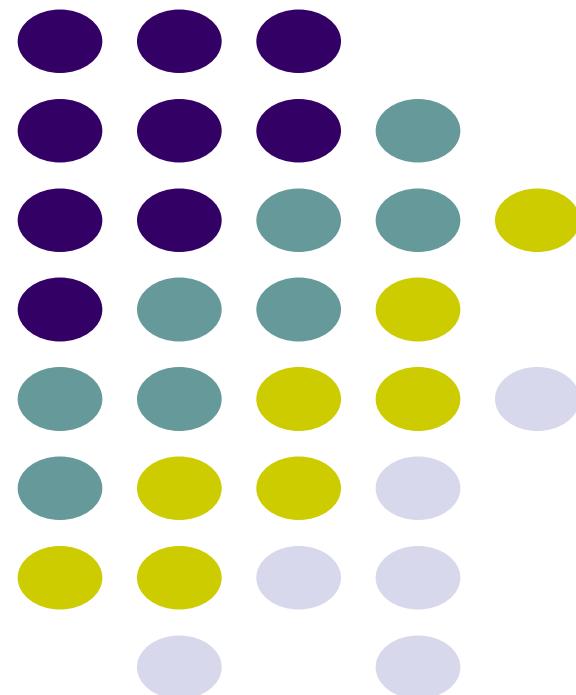
# Research Paper

- **Title 1 : Performance Evaluation of Machine Learning Algorithms for Paediatric Epilepsy Detection Using EEG Data**

**Publisher:** Scientific Reports

- **Title 2 : Separating Ventricular Tachyarrhythmias & Supraventricular Arrhythmias Using Probabilistic Neural Network and Wavelet Transformation Approach**

**Publisher:** PLOS Journal

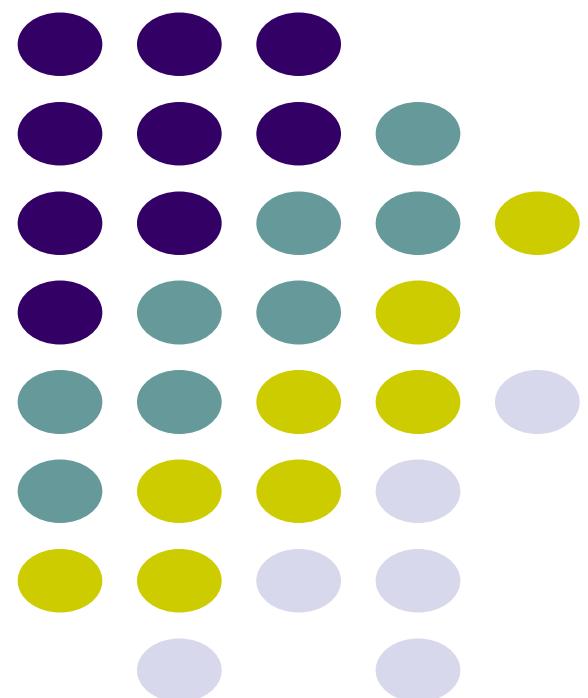


# Research Paper

- **Title 3 : Optimizing HCV Diagnosis and Hospital Resource Management using Machine Learning Techniques**
- **Publisher:** IEEE Delcon 2024

---

- **Title 4 : Siamese Neutral Networks & Computer Vision for Detecting Single-Shot Image**
- **Publisher:** International conference on Emerging Trends in Engineering and Medical Sciences (ICETEMS 2024) IEEE Conference SCOPUS



# Research Paper

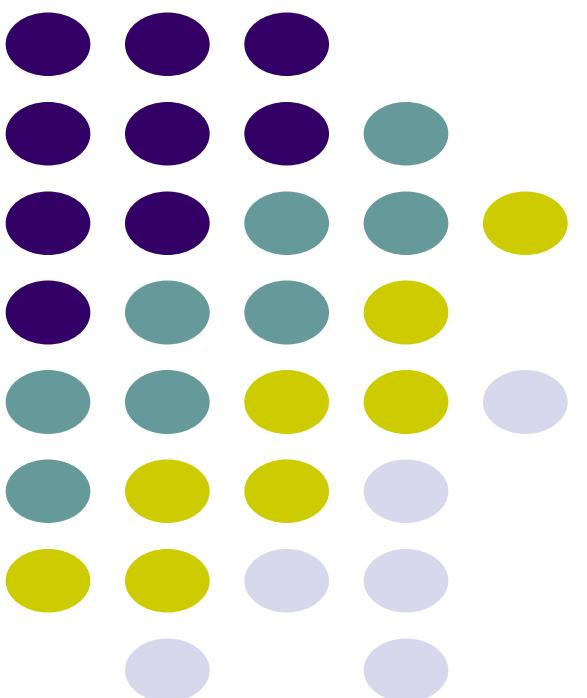
- **Title 5 : Emotion Sense : AI-Powered Emotional Intelligence and Stress Management Solutions**

**Publisher:** BioMed Journal

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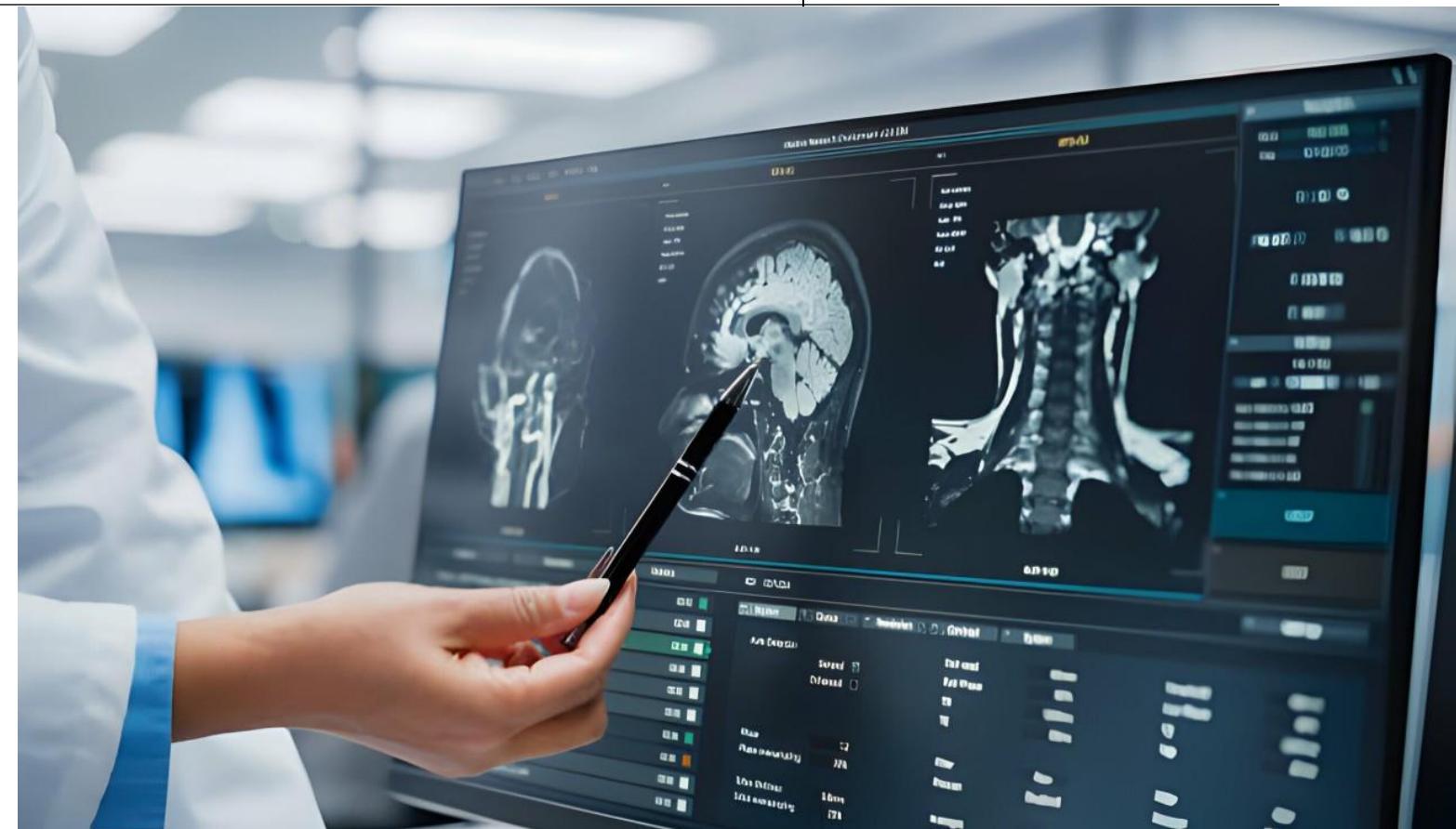
- **Title 6 : Feature Extraction and Classification of Atrial Fibrillation Arrhythmia Using Wavelet Transform**

**Publisher:** Biomedical Pharmacology Journal



# Research Paper

- Title 7 : The Future of Diagnostics : Artificial Intelligence in Medical Imaging
- Publisher : IEEE Scopus Indexed Conference

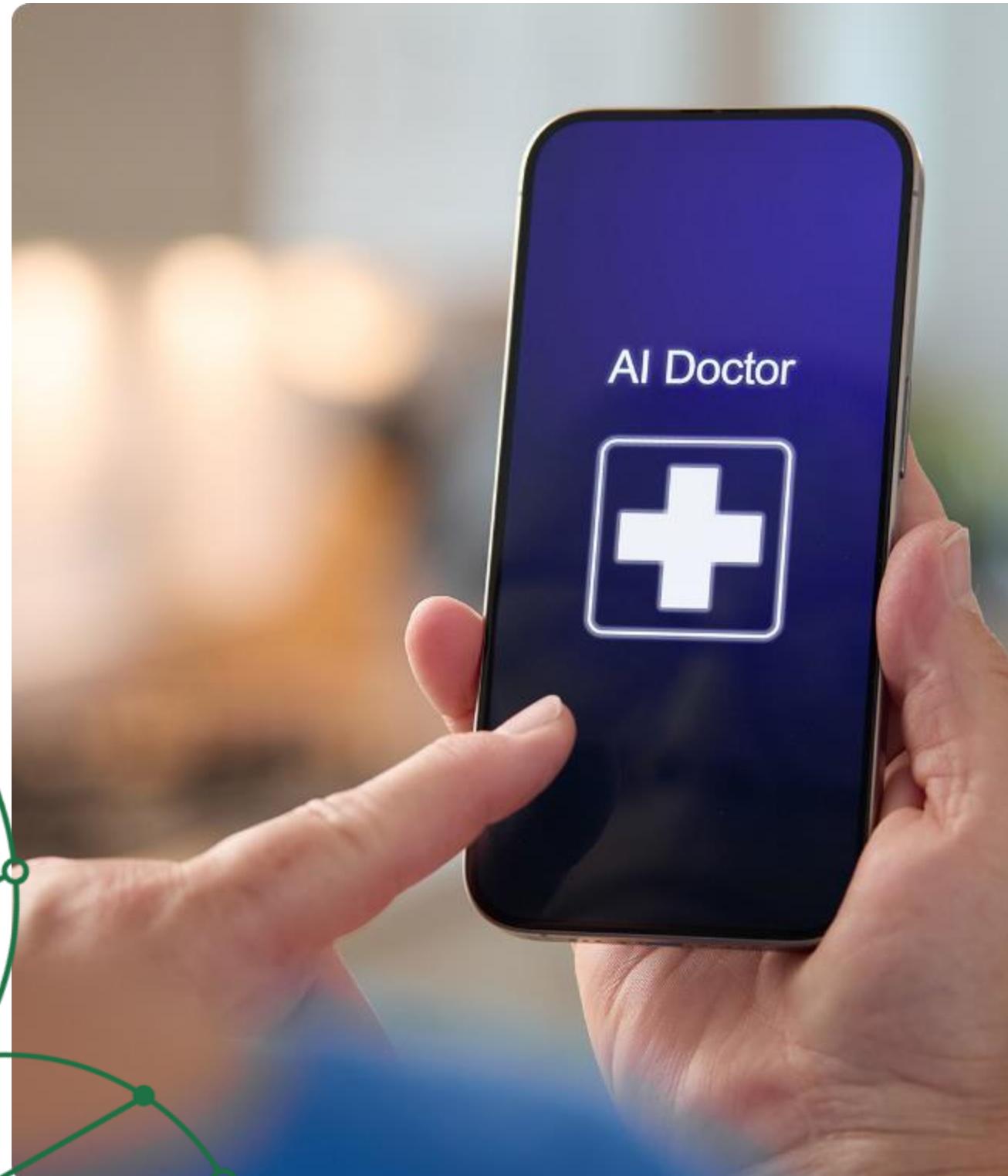




# Alphabetical Approach For AI in Healthcare

# ●A - Automation: AI and Robots in Healthcare

- Exploring the impact of AI on healthcare efficiency



- **Introduction to AI in Healthcare**

- AI is transforming healthcare accessibility.

- **Niramai's Innovation**

- Niramai uses thermal imaging for breast cancer screening.

- **AI in Government Hospitals**

- AI tools reduce misdiagnosis in public health.

# ● B - Big Data: Predicting Diseases

- How Data is Revolutionizing Health Predictions



## Data- dia-...

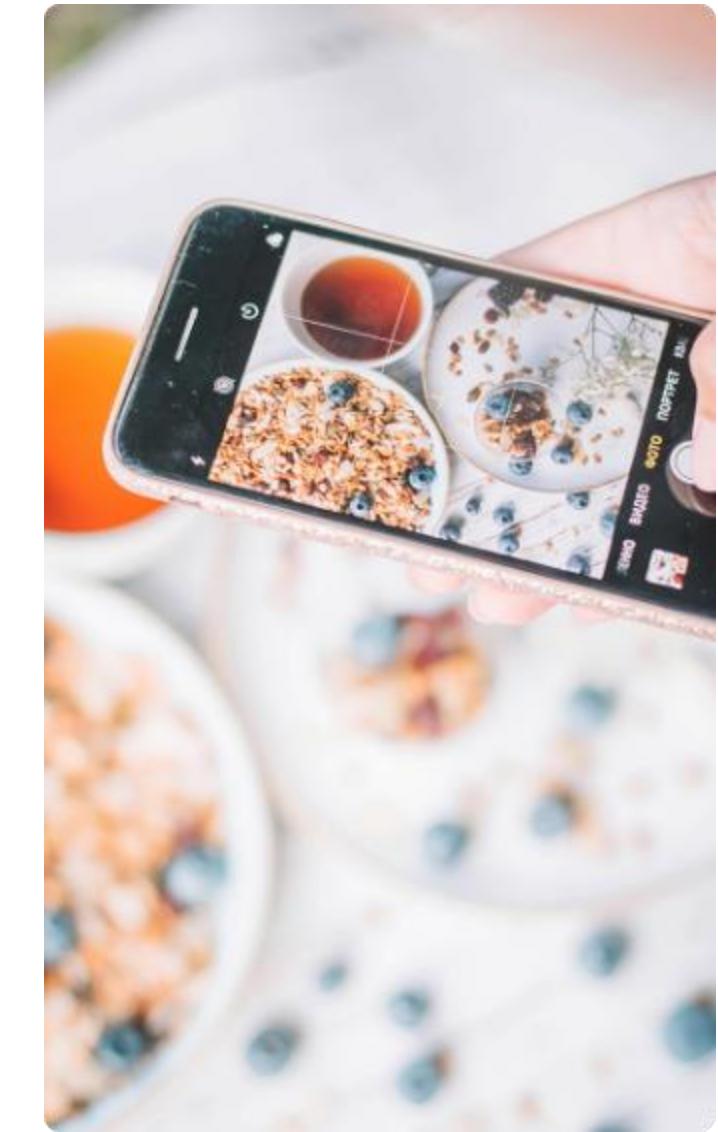
I on an old dataset from

☆ 0 Stars ⚓ 0 Forks

- Indians' love for data analysis
- Data analysis is ingrained in Indian culture.



- IDSP and early outbreak detection
- IDSP uses AI to foresee disease outbreaks.



- HealthifyMe and personalized diets
- Fitness apps analyze data for tailored diet plans.

# ●C - Connectivity: Telemedicine Revolution

- Transforming healthcare accessibility through technology



- Shift to Telemedicine

- Moving from lengthy in-person visits to online consultations.



- Successful e-Sanjeevani Platform

- Over 14 crore consultations have been



- Remote Access to Experts

- Consultations with top institutions like AIIMS and Apollo.



- Digital Health Records

- ABDM ensures easy access to health records everywhere.

# ● D - Data Security: Protecting Health Information

- Understanding the importance of securing health information



- Privacy of health data is crucial
- Health data should remain confidential, not



- Digital Personal Data Protection Act 2023
- This act aims to secure patient data effectively.



- Need for stronger cybersecurity
- Current measures may not be sufficient against threats.



- Cyberattacks on hospitals
- Increasing incidents highlight vulnerabilities.



- Patient data safety concerns
- Despite protections, data may still be at risk.



# ● E - Equity: Healthcare Accessibility

- Examining healthcare accessibility for all Indians

## ● Ayushman Bharat Scheme Impact

- Health insurance for over 50 crore Indians exists.

## ● National Telemedicine Network

- Connecting rural patients with doctors effectively.



## ● Disparity in Technology Access

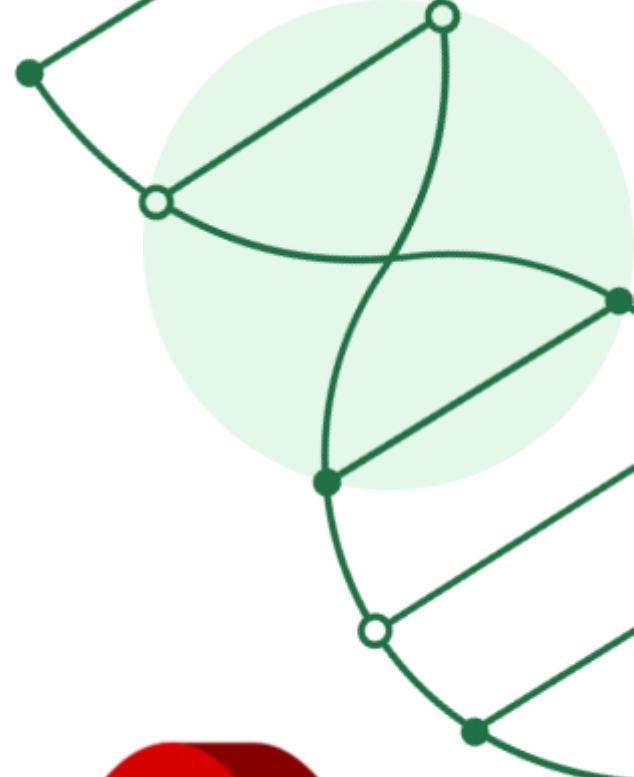
- Not everyone benefits from digital health solutions.

## ● Digital Benefits Awareness

- Many are unaware of how to access benefits digitally.

## ● Affordable Medical Advice

- Ensuring medical help isn't just for the wealthy.



# ● F - Future Readiness: Preparing for Pandemics

## ● Strategies to Enhance Global Health Resilience



### ● Climate Change and Health

- Climate change leads to more health issues needing strategies.

### ● AI in Healthcare Innovations

- AI helps predict outbreaks and develop medicines swiftly.

### ● India's Vaccine Manufacturing

- India emerged as a global leader in vaccine production.

### ● COVID-19's Valuable Lessons

- The pandemic showcased how quickly the world can change.



# ●Conclusion: Building a Healthier India

## ●A collaborative approach to public health challenges

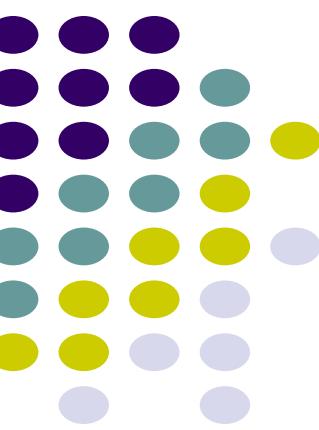
- **Technology is not a standalone solution.**
- Public health challenges need more than just tech.
- **Quality healthcare as a right.**
- Healthcare should be a right, not a privilege.

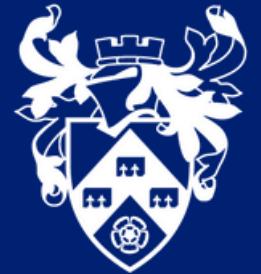
- **Leadership and policies are essential.**
- Effective health systems require strong leadership.
- **Technology for prevention and protection.**
- Focus on using technology to prevent health issues.

- **Collaboration is key.**
- Working together enhances health outcomes.
- **Empower through knowledge.**
- Educate communities for better health choices.

- **Align innovation with accessibility.**
- Innovation must be human-centric and accessible.
- **Stay updated.**
- Never underestimate the power of knowledge.

Thank  
you





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# Professor Andrea Manca

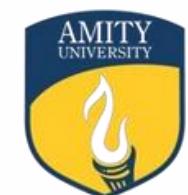
## Centre for Health Economics



**UKIERI**  
UK-India Education  
and Research Initiative

 **SPARC**  
Scheme for Promotion of Academic and Research Collaboration

Partnered with



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UNIVERSITY

# Assessing the Value of AI-based MedTech Products for use in Healthcare

**Cynthia P Iglesias Urrutia, MSc PhD**

Professor of Health Economics, Department of Health Sciences  
Associate Director, Institute of Mental Health Research at York  
Health Economics, Health Services Research and EDI Lead SAINTS CDT and Leeds BRC  
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Professor of Health Economics,  
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<https://www.york.ac.uk/che/people/andrea-manca/>

# The Need to Assess the Value of AI-based MedTech Products for Use in Healthcare



- Often require significant and sustained investment over time
- Some qualify as Medical Devices
- If so, for market access, they must meet regulatory standards
- Imply specific evidence-generation requirements to demonstrate
  - Safety
  - Quality of manufacturing
  - Performance / Efficacy
  - Effectiveness
- Are MedTech solutions worth investing in?
- Pre- and Post-Market Evaluation
- Multiple perspectives: value is in the eyes of the beholder
  - patients, healthcare providers, researchers, industry developers and investors
  - different methodologies, depending on data, perspective, regulatory requirements
- Health Technology Assessment (HTA) as a normative framework to answer such questions

# What is HTA?

## Multiple consistent definitions



“ ... multidisciplinary process that summarises information about the medical, social, economic and ethical issues related to the use of a health technology in a systematic, transparent, unbiased, robust manner ... It informs policy- and decision-making in specific political, economic and institutional contexts ... to be useful HTA has to be designed with processes and outputs that fit the relevant context.”

Source: Kristensen FB (2006). EUnetHTA and health policy-making in Europe. Eurohealth, 12(1):36–38

“ ... multidisciplinary field of policy analysis. It studies the medical, social, ethical and economic implications of development, diffusion, and use of health technology”

Source: International Network of Agencies for Health Technology Assessment (INAHTA) <http://www.inahta.org/>

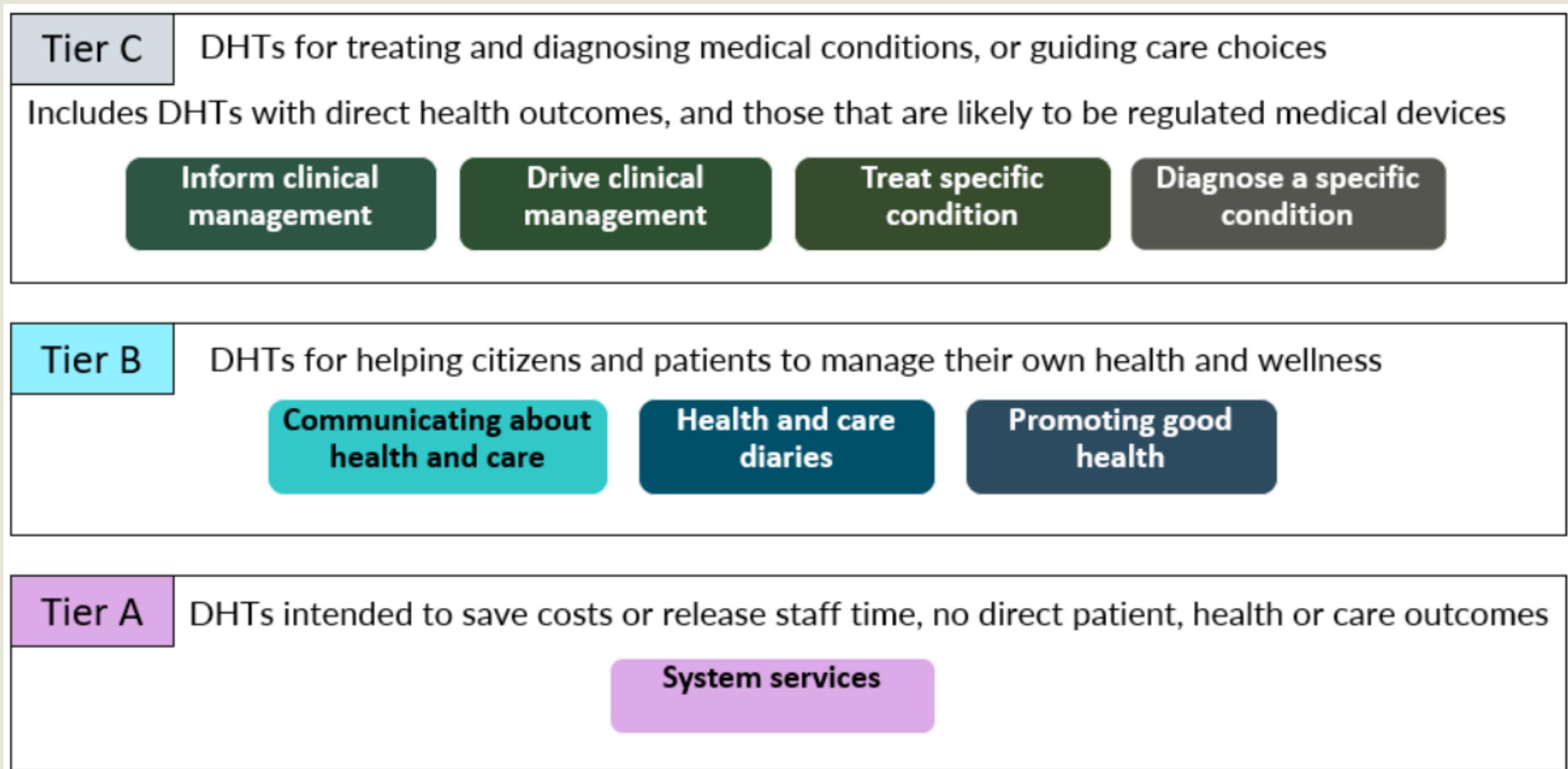
“ ...a method of evidence synthesis that considers evidence regarding clinical effectiveness, safety, cost-effectiveness and, when broadly applied, includes social, ethical, and legal aspects of the use of health technologies... A major use of HTA is in informing reimbursement and coverage decisions, in which case HTAs should include benefit-harm assessment and economic evaluation.”

Source: Luce BR, Drummond M, et al. EBM, HTA, and CER: clearing the confusion. Milbank Q. 2010 Jun;88(2):256-76

# Do HTA evidence requirements apply to all AI-based MedTech products?



## NICE's Evidence Standards Framework for Digital Health Technologies



# Our activities and contributions to research and policy-making in the AI for healthcare space



- Interdisciplinary collaborations and partnerships
  - NICE's MTAC Independent Committees, Digital Health Technology Pilot and Early Value Assessments
  - York Technology Specific Evaluation Teams - York TSET (DoHS, YHEC, CS, CHE)
    - Accelerated Access Collaborative, NHSx Artificial Intelligence (AI) in Health and Care Awards
- Examples of recent and ongoing AI-based MedTech HTA research
  - [HTx](#); [HEALTH FOUNDATION](#); [WEARABLE CLINIC](#); [VEYES](#), [PAIGE](#); [iFRAP](#); [TOGETHER 2](#); [KEEPCARING](#); [CAMHR](#)
- Capacity building
  - [Evaluation of Medical Devices for Product Development and Health Technology Assessment](#)
  - [Statistical Methods for Economic Evaluation in Health Technology Assessment](#)
  - [Advanced Methods of Economic Evaluation for Health Technology Assessment](#)
  - [UKRI AI Centre for Doctoral Training in Safe Artificial INtelligence Systems \(SAINTS\)](#)
  - [Leeds Biomedical Research Centre \(Leeds BRC\)](#)
  - [Centre for Addiction and Mental Health \(CAMHR\)](#)
- Inclusive research
  - Inclusion lead for Leeds BRC; SAINTS; CAMHR
  - Chair of UoY Women in Research Network

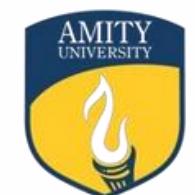


# Professor Zhihong Huang

## School of Physics, Engineering and Technology



Partnered with



AMITY  
UNIVERSITY

# High resolution Imaging for Diagnosis and Treatment Monitoring

Zhihong Huang

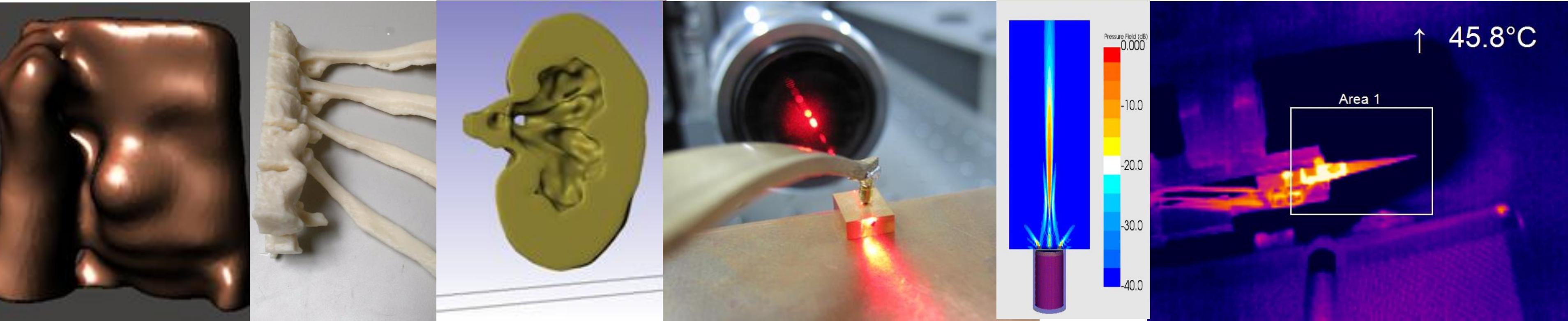
Chair of Healthcare Engineering

**Our research is focus on:**

- 1 – Imaging devices development**
- 2 – Digital Technology**
- 3 – Translation to Clinical Applications**

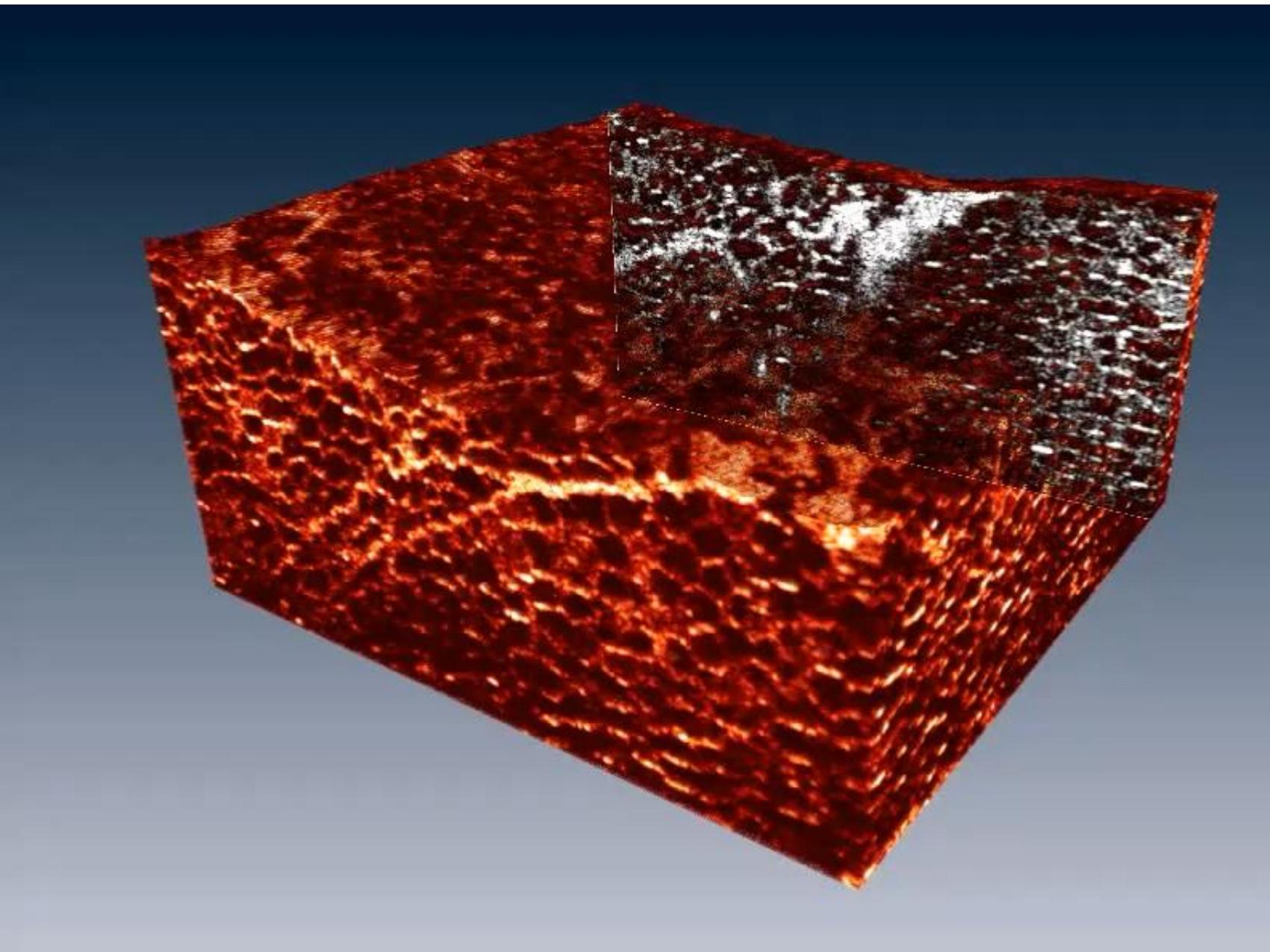
## **Clinical needs and opportunities**

Early and accurate detection of diseases  
Improving diagnostic accuracy  
Non-/minimally invasive procedures  
Disease and therapy response Monitoring



## Medical Ultrasound and Optics Imaging Research

- High-resolution functional imaging
- AI assisted imaging analysis
- Multi-modality imaging guided intervention
- Quantitative multimodality functional imaging
- Digital technology embedded in system development

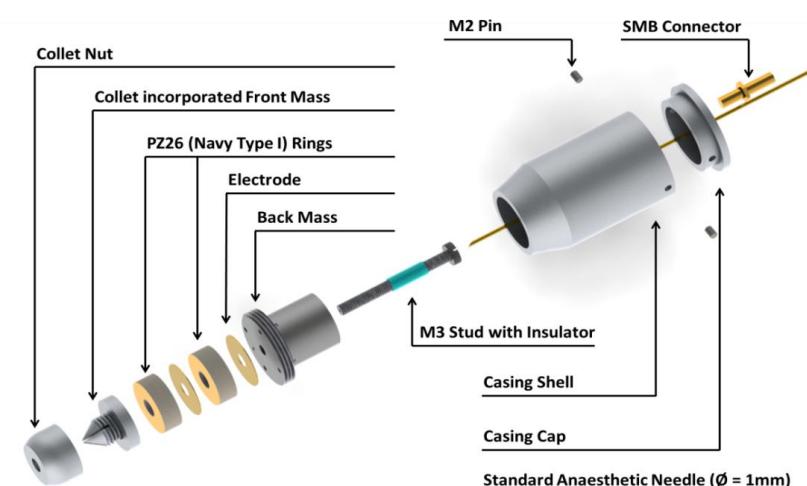
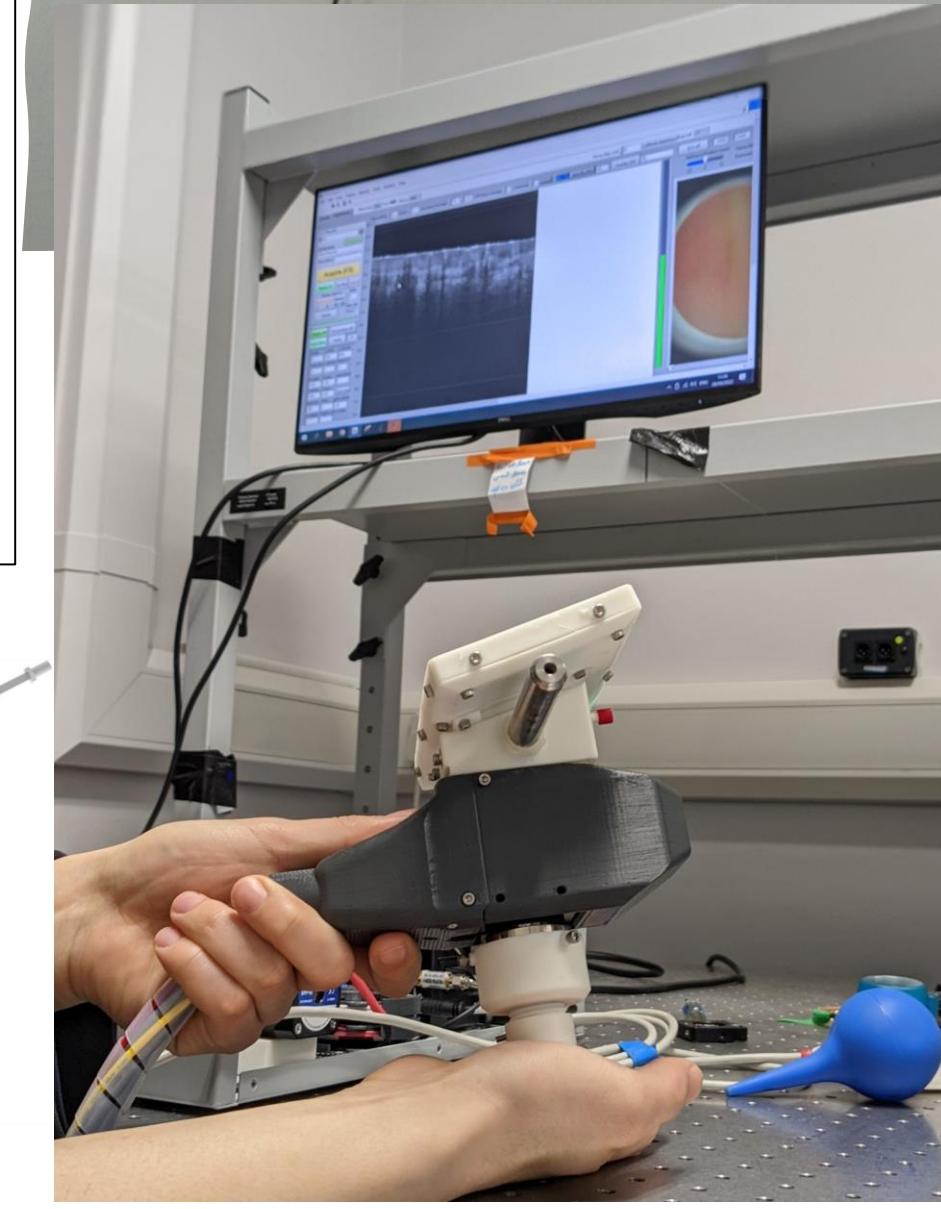
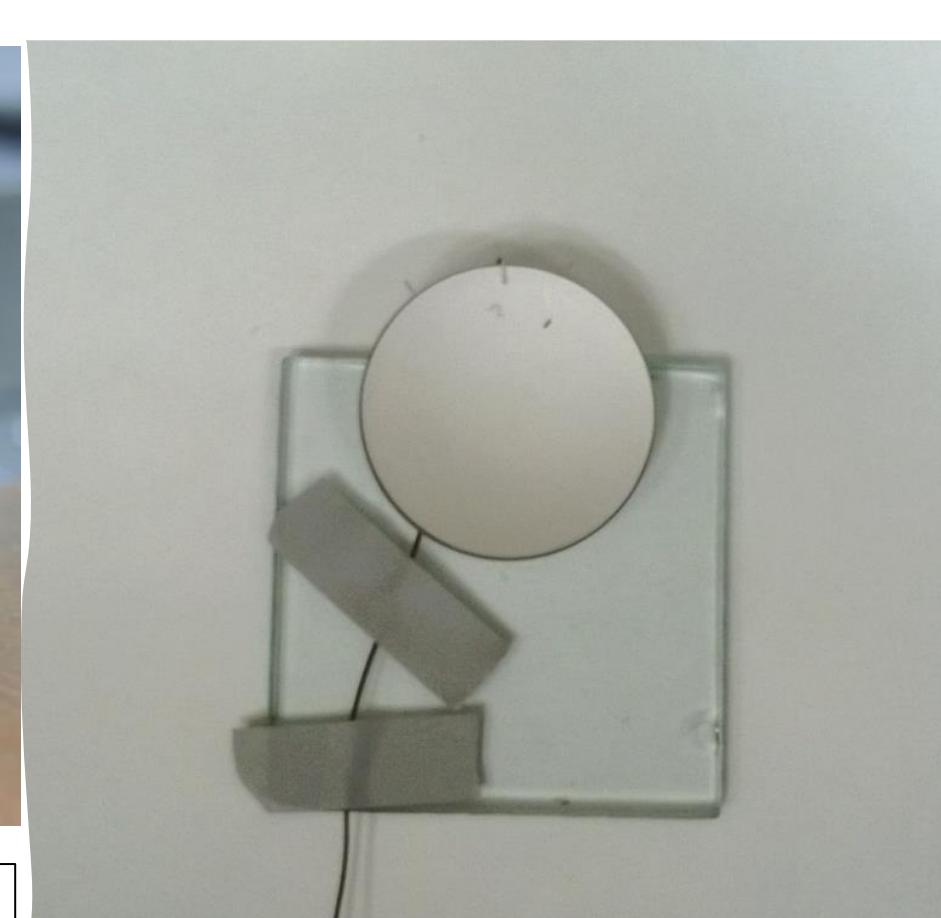
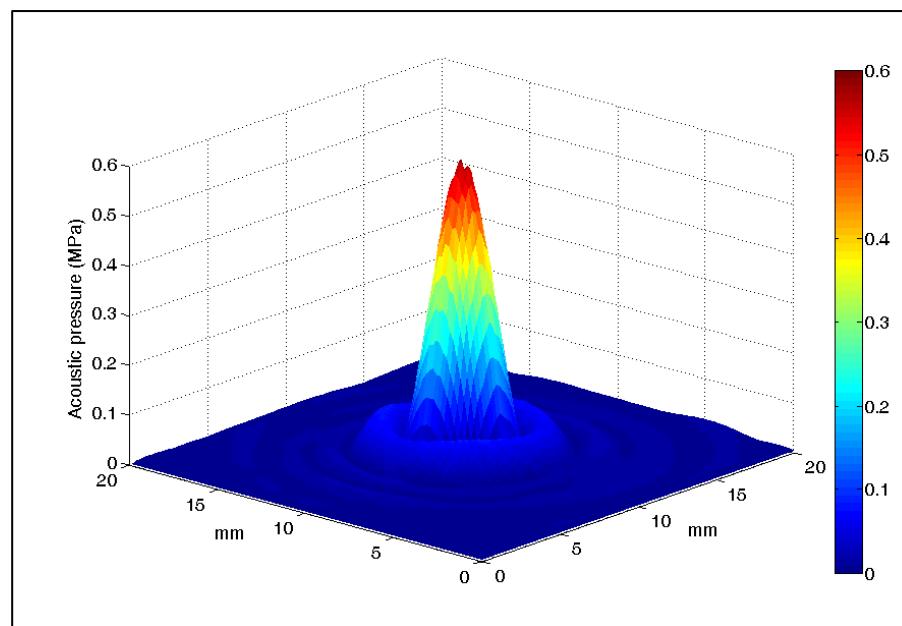
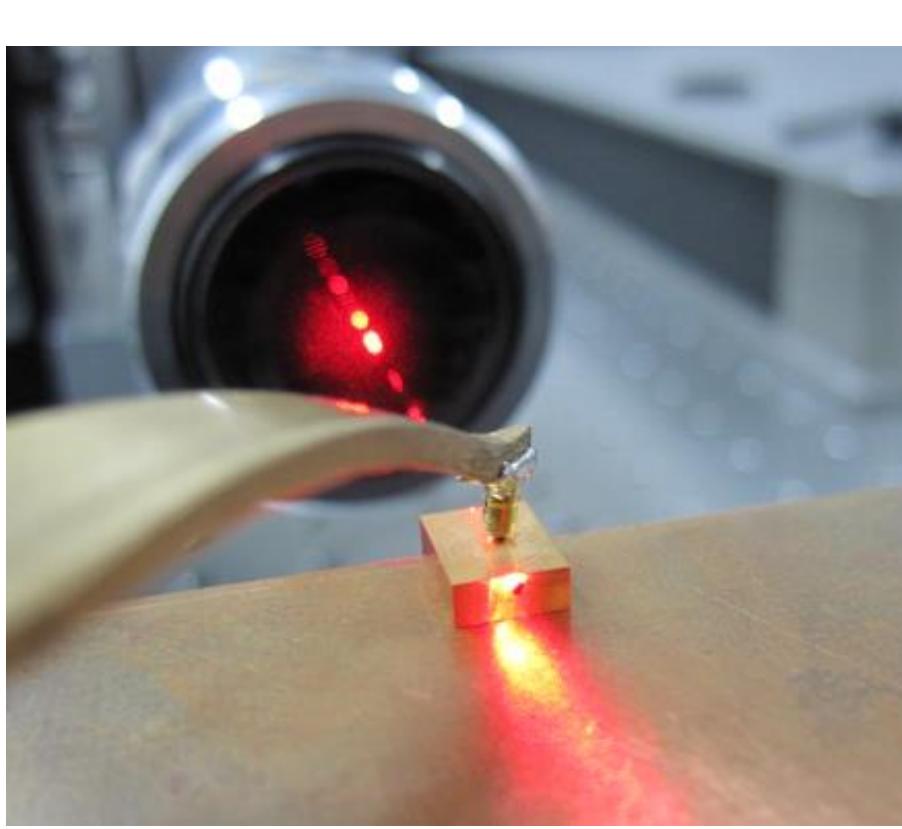


# Hardware Engineering Design and Testing

imaging and therapeutic devices  
design and simulation

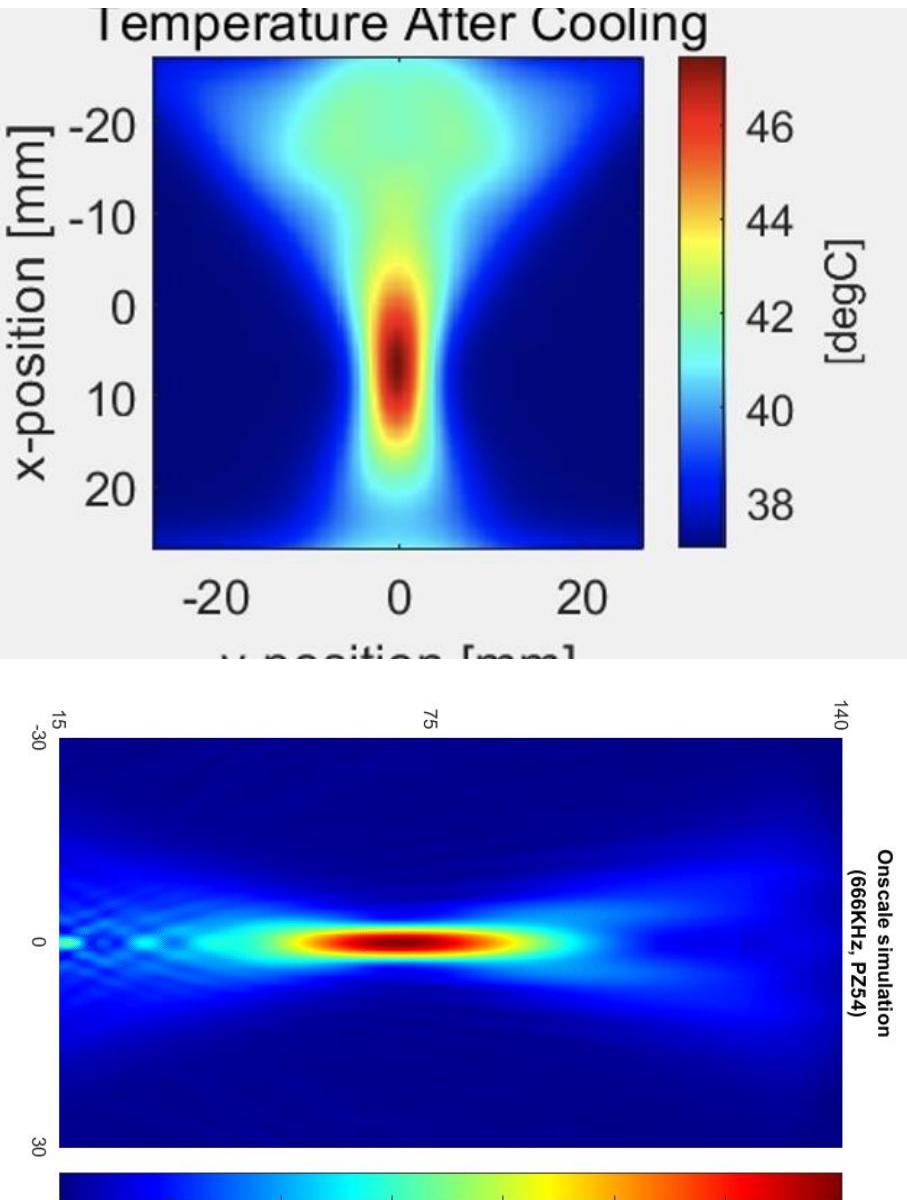
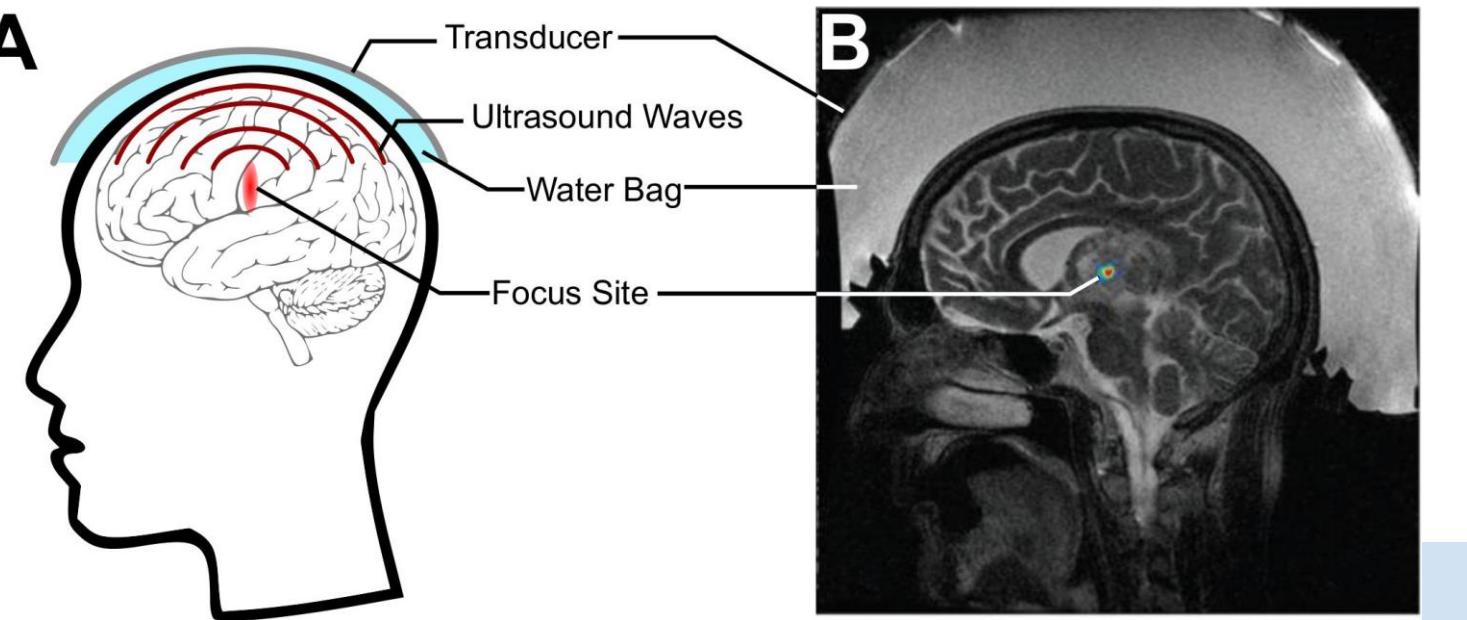
Device assembly and optimization

AI embedded imaging system  
development

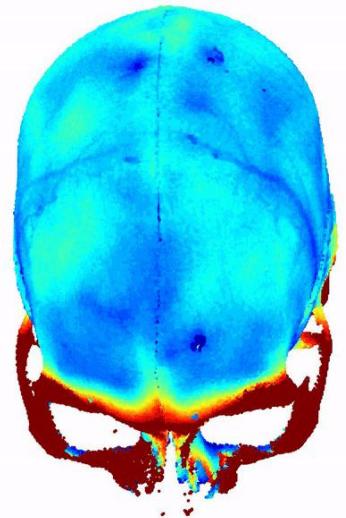


# Targeting Focused Ultrasound for Neuromodulation

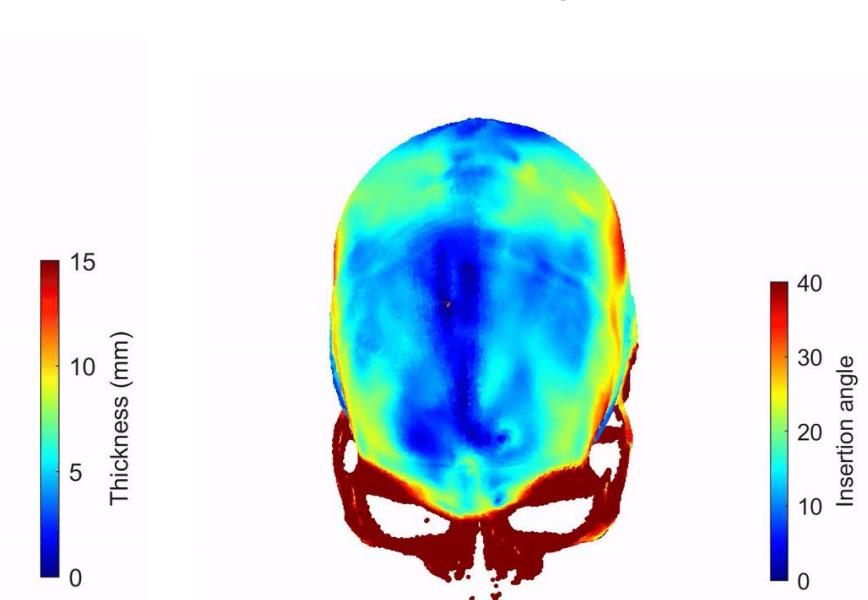
1. Transcranial Ultrasound transmission
2. Simulation incorporating skull properties
3. CT + deep learning model to generate pseudo-brain for target registration.
4. Representative brain target is at dorsal anterior cingulate cortex (dACC).
5. Target engagement validation



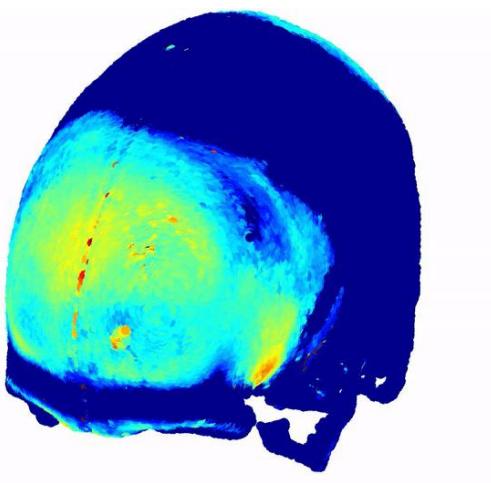
Thickness map



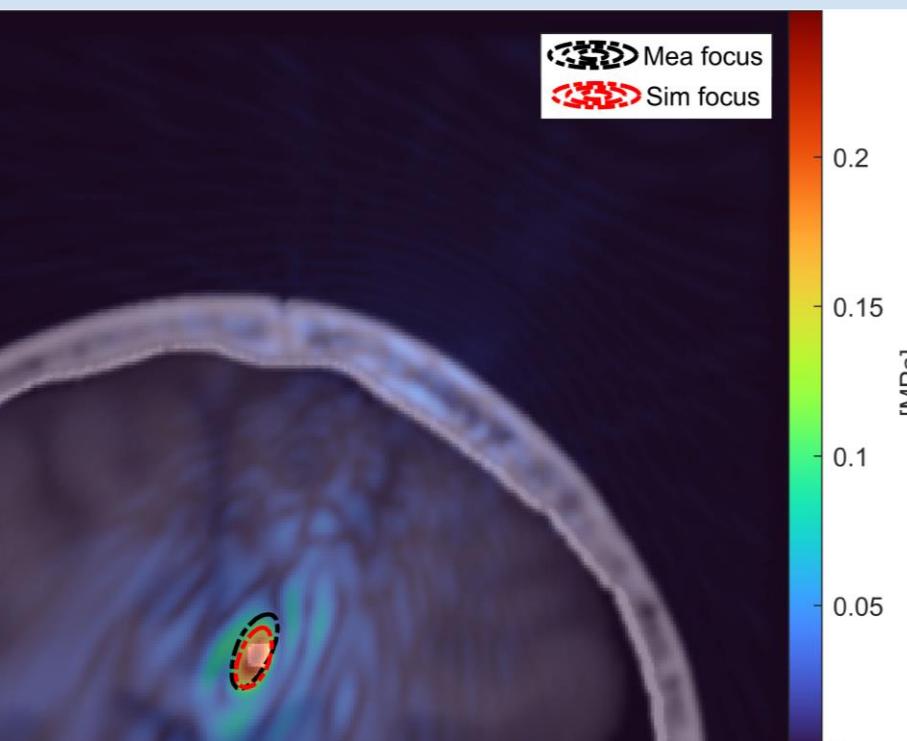
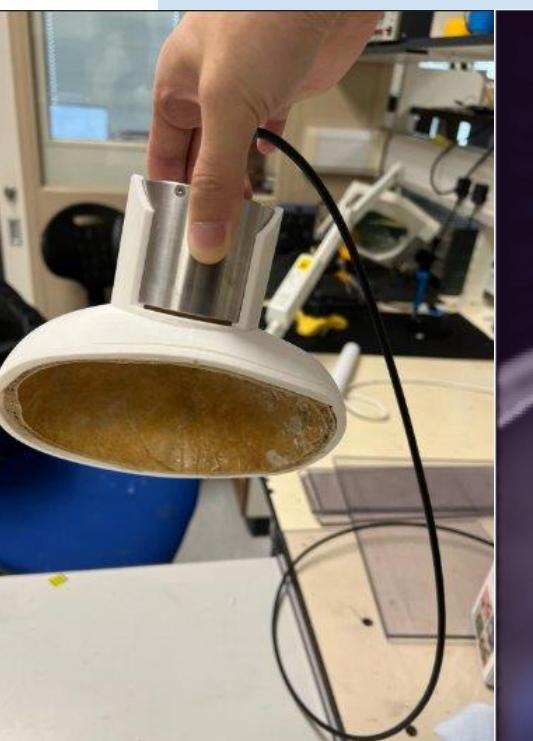
US Insertion angle map



US transmission efficiency



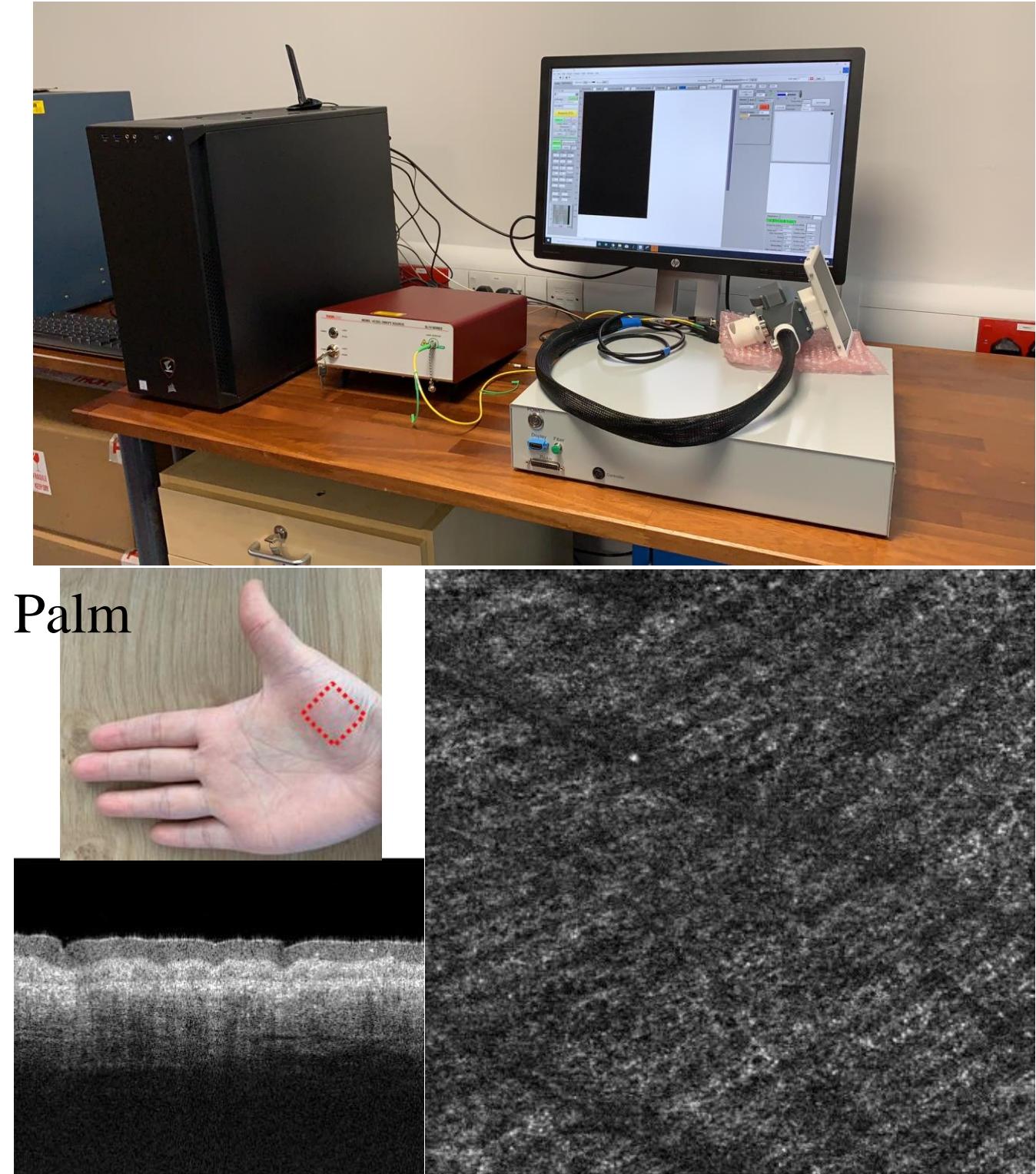
Transmission efficiency



# Optical Coherent Tomography – a lab built system development

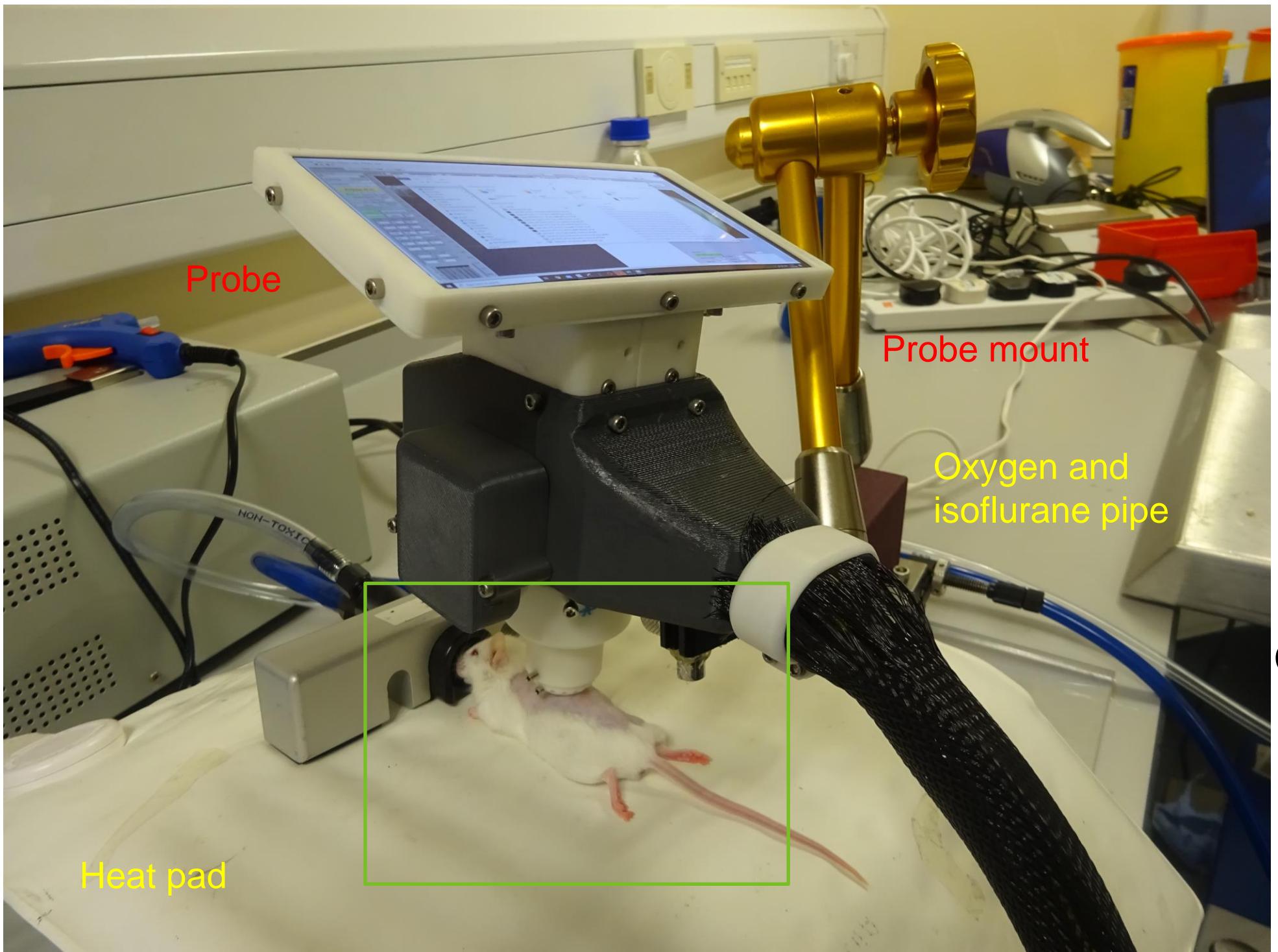
- High-resolution Optical Coherence Tomography (OCT)
- Quantitative Optical Coherence Elastography (OCE)
- Quantitative Optical Coherence Tomography Angiography (OCTA)

OCT type	Spectral-domain OCT	Swept source OCT	
<b>Light source</b>	Broadband light source	200 kHz swept laser source	400 kHz swept laser source
<b>Axial resolution</b>	8.9 $\mu$ m		
<b>Lateral resolution</b>	15.75 $\mu$ m		
<b>Typical field-of-view</b>	12mm x12 mm		
<b>Scanning rate per point</b>	Up to 91 kHz	200 kHz	400 kHz
<b>Scanning time</b>			
<b>2D structural mode</b>	5.4 ms	2.5 ms	1.25 ms
<b>2D elastography mode</b>	1.7 s	0.8 s	0.4 s
<b>3D structural mode</b>	1.7 s	0.8 s	0.4 s
<b>3D OCT-angiography mode</b>	6.9 s	3.2 s	1.6 s



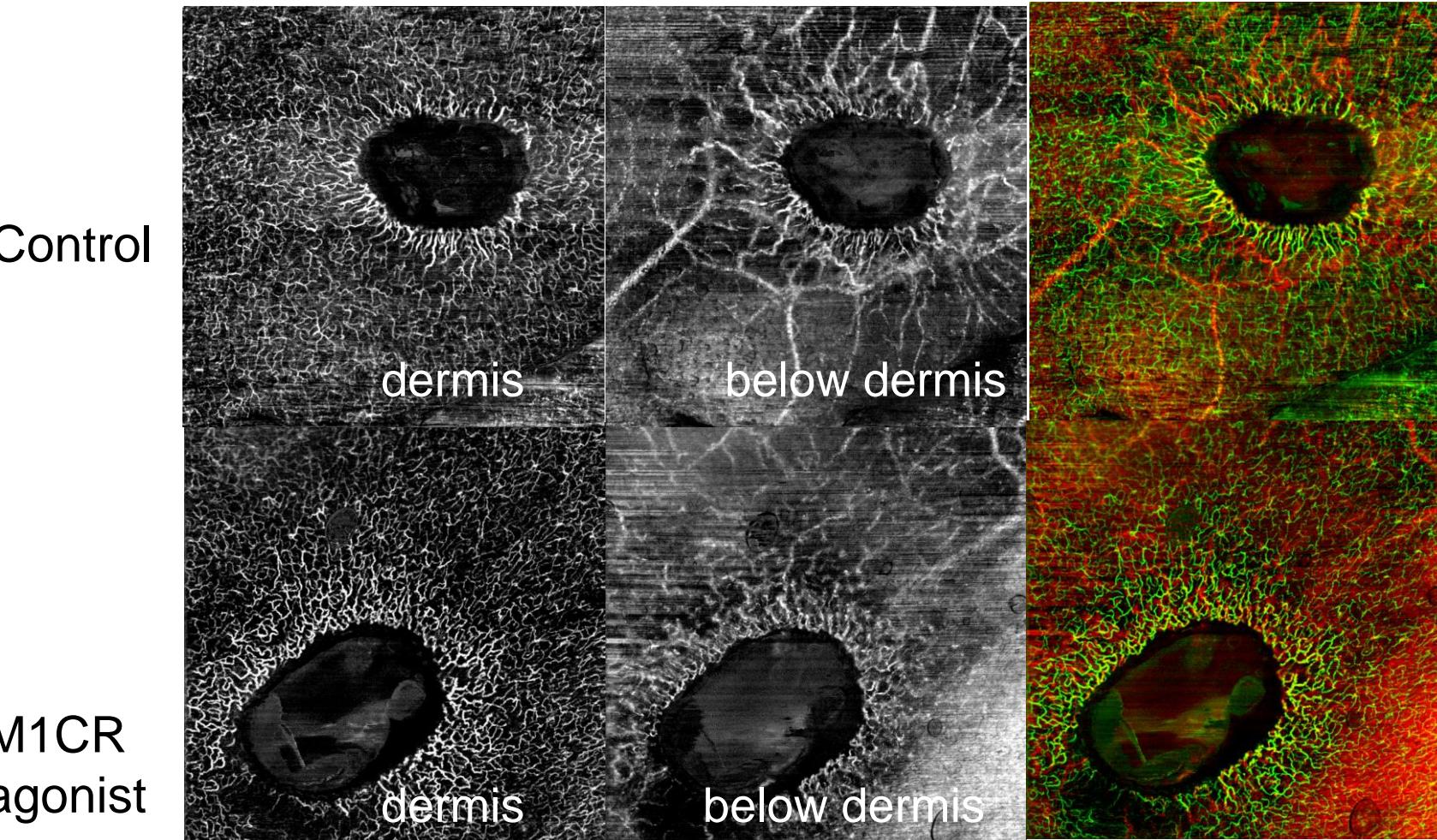
**Advantages:**  
**Micrometre resolutions; Non-invasive, non-contact; real time Imaging**

## Mouse wound healing trial

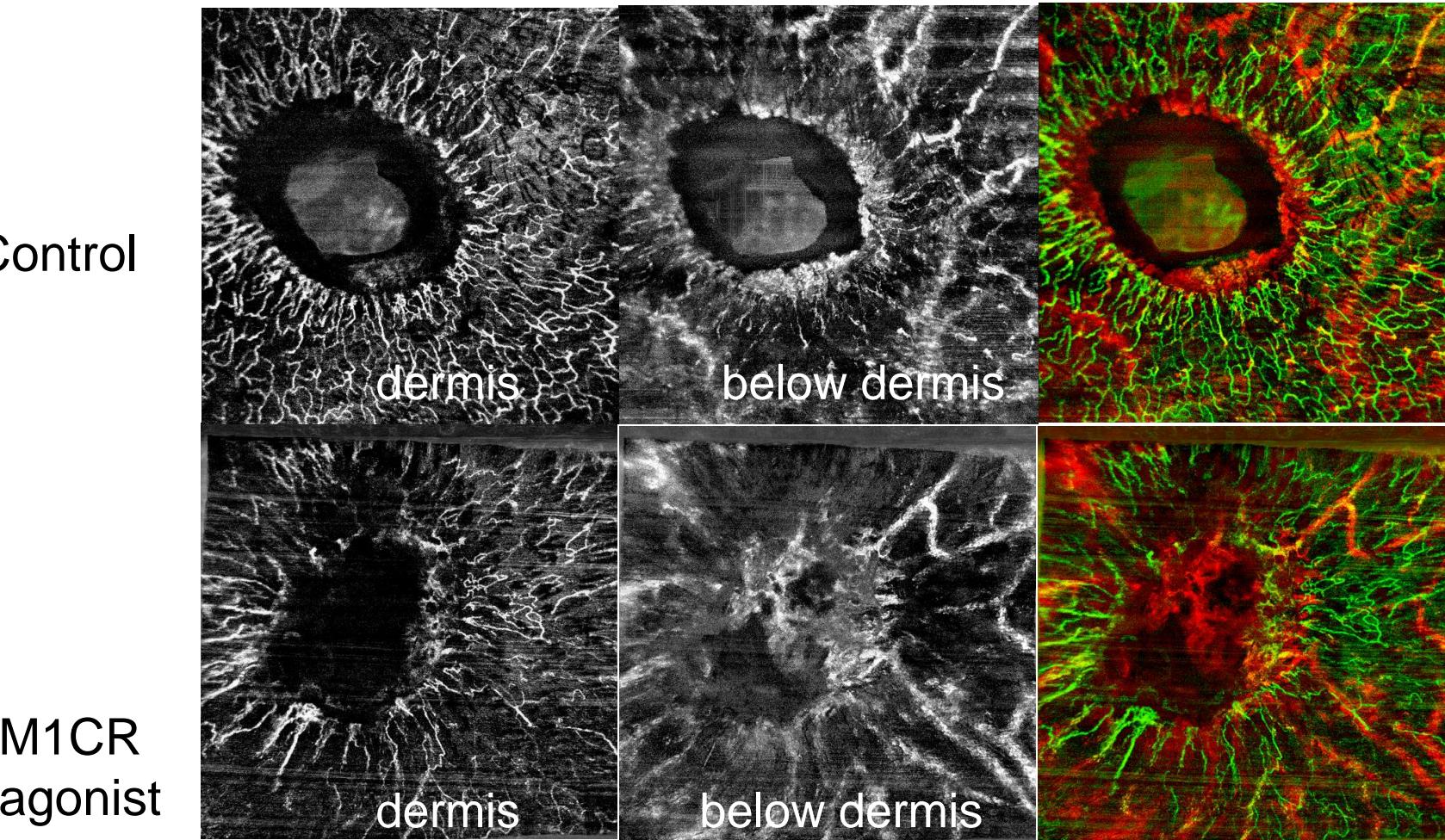


With this setup, it took about 15-20 minutes to scan three out of four wounds on each mouse.

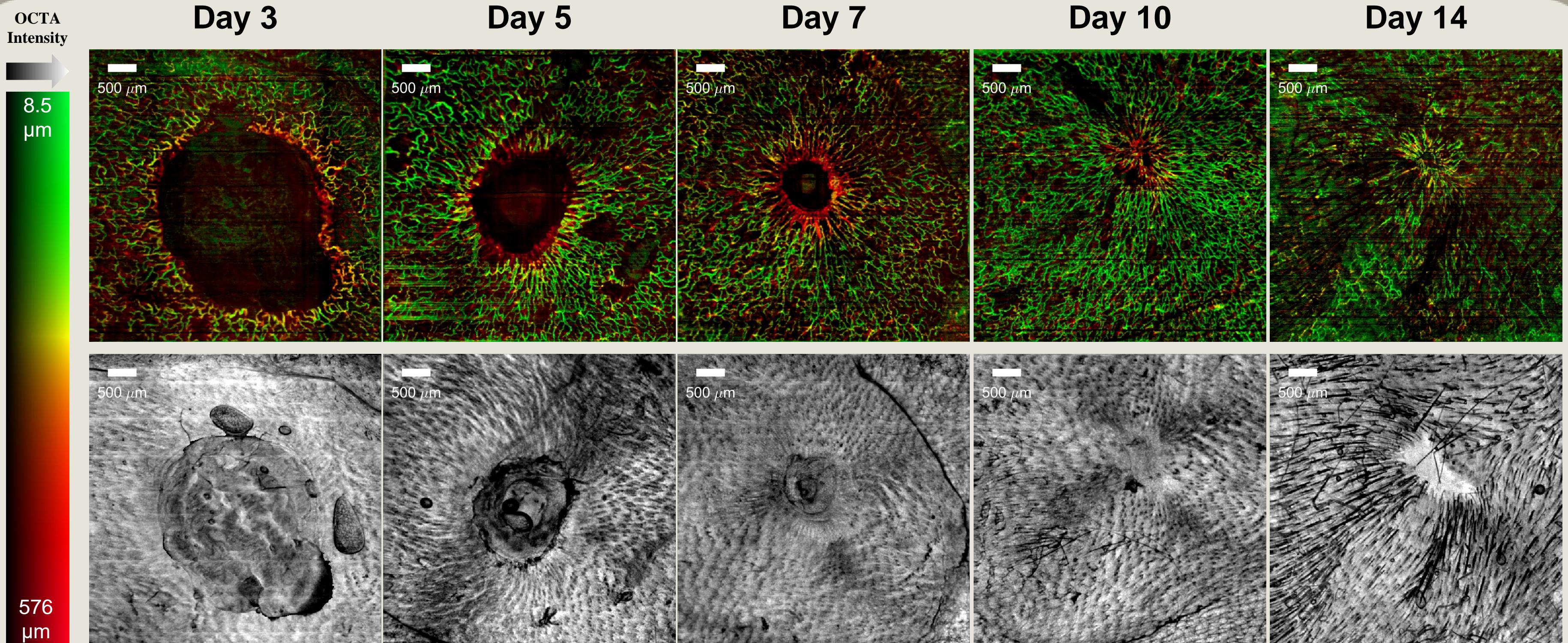
## Day 3 - Control vs M1CR agonist



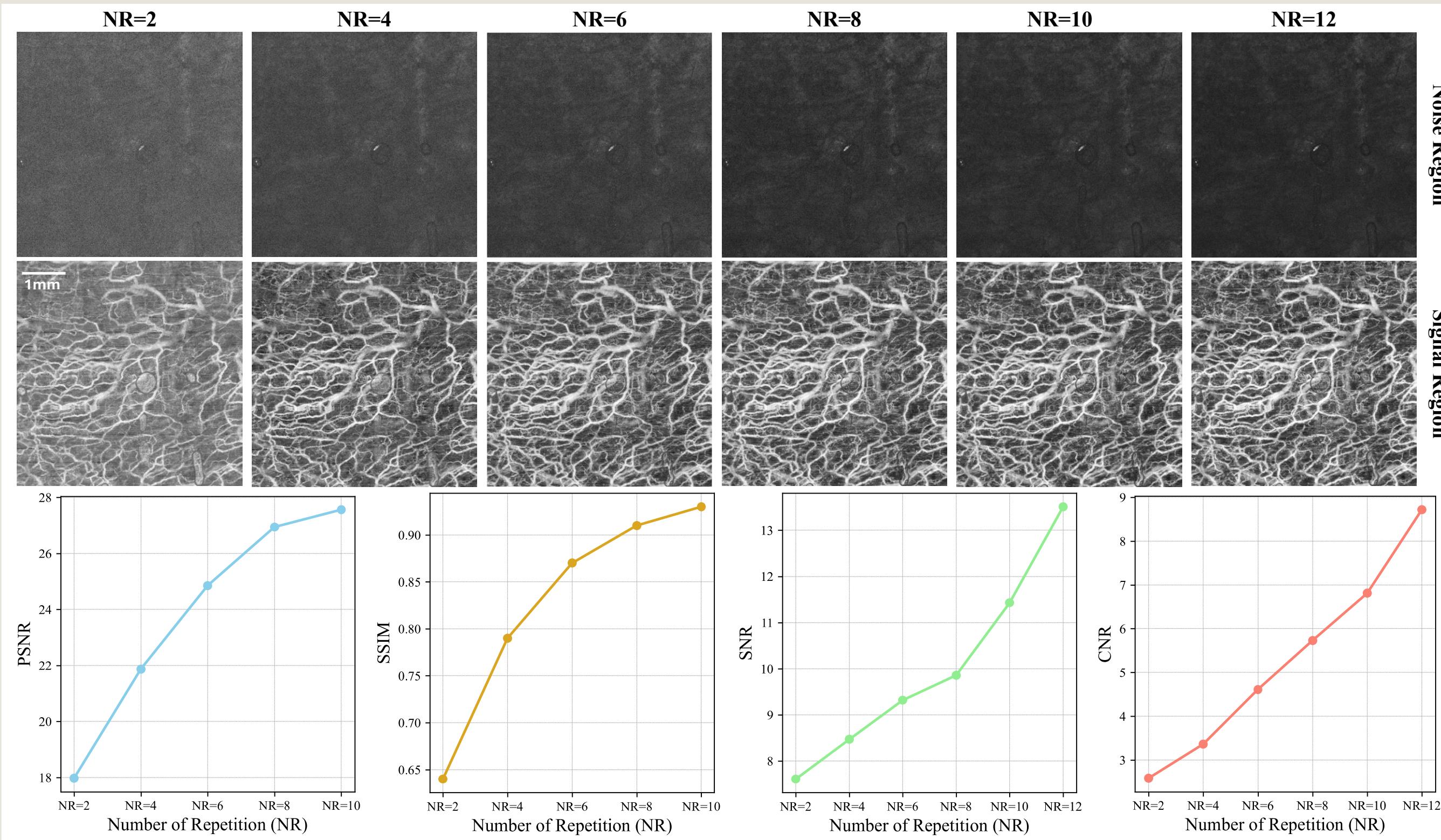
## Day 5 - Control vs M1CR agonist



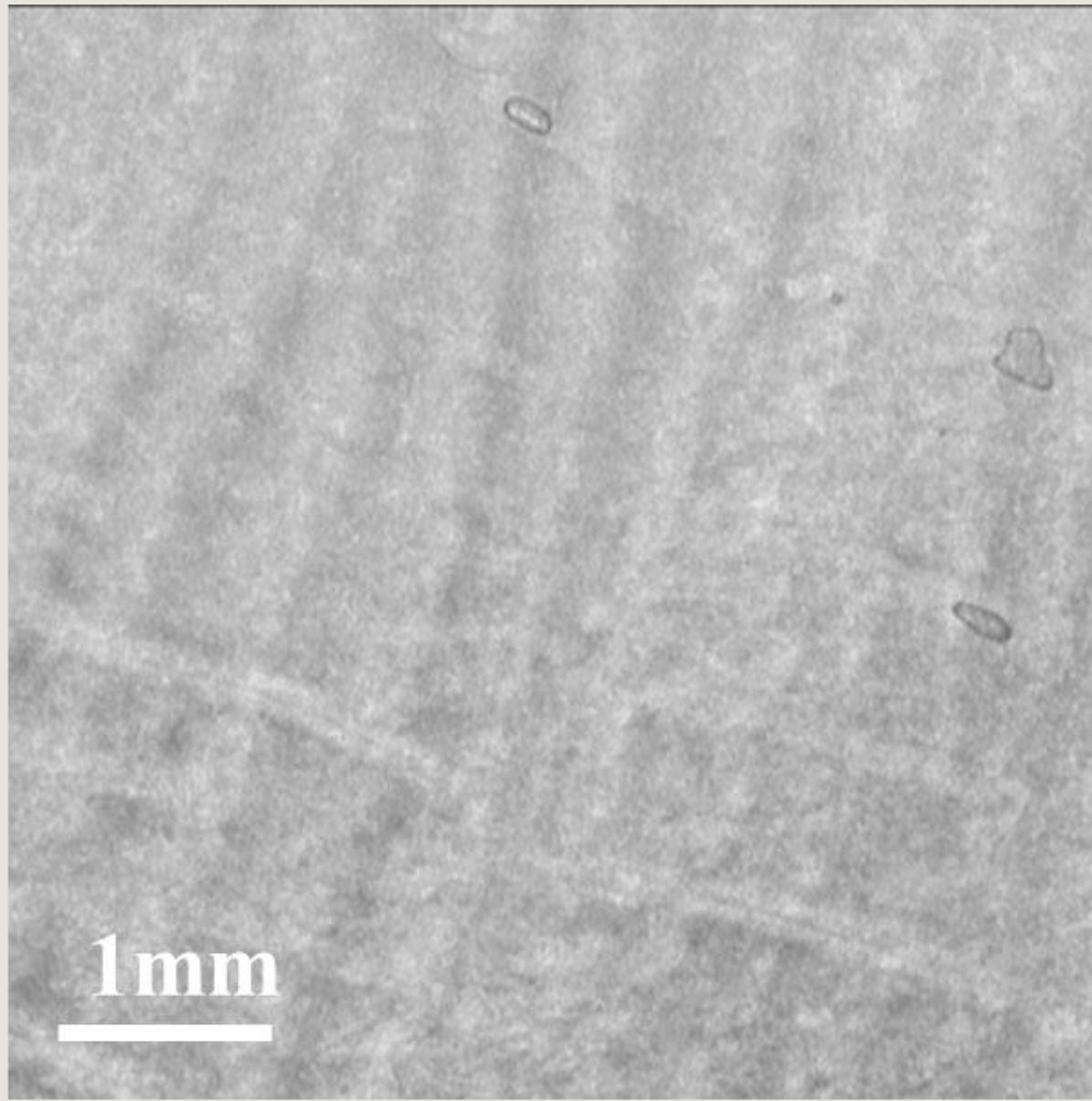
# Wound Healing Monitoring on *in vivo* Mice



# Example of Limitation: Trade-off between Quality and Repetition



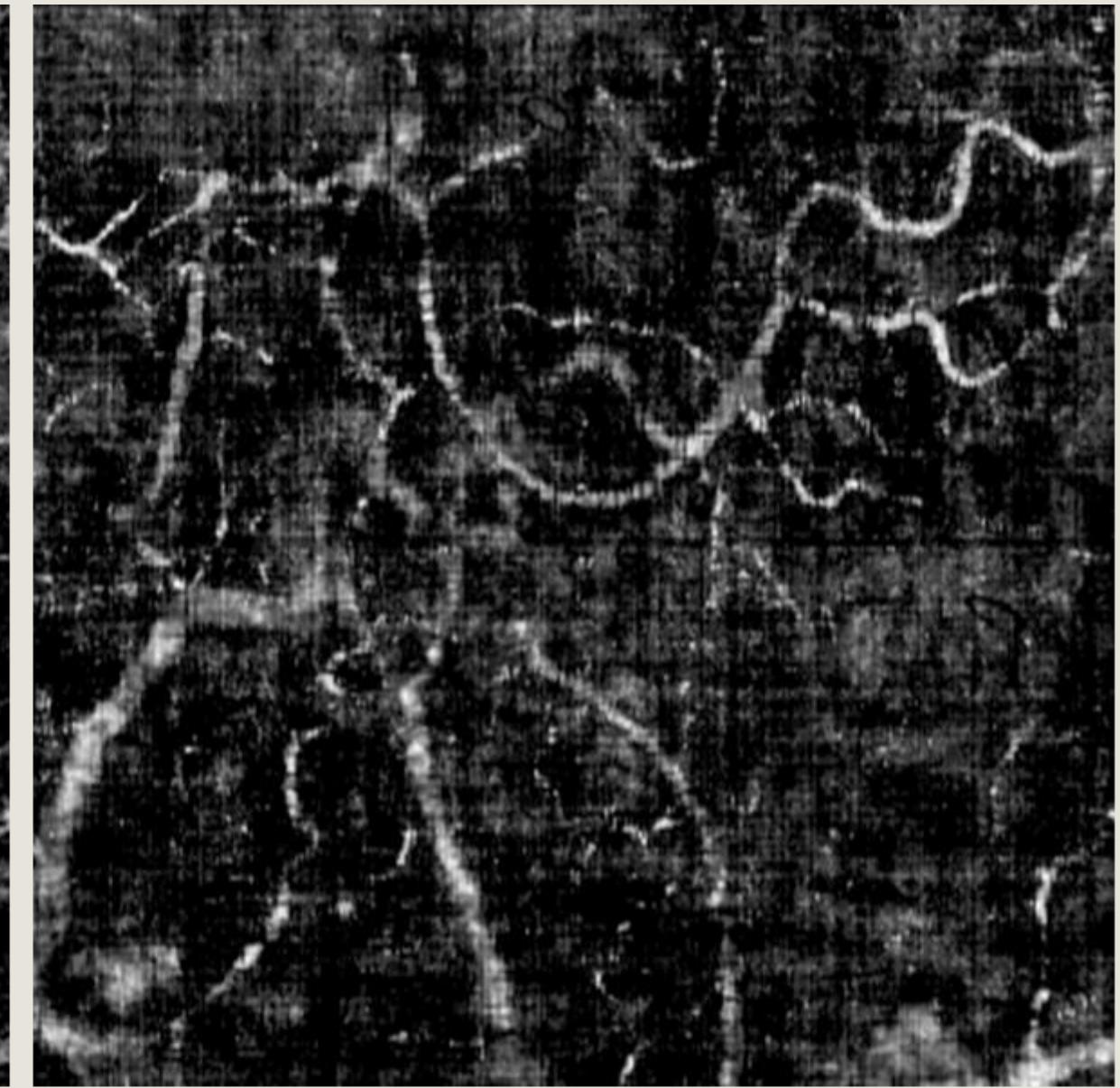
# One-repeated OCTA Image



(A) Input - Structural Image  
(SSIM: 0.061; PSNR: 11.429)

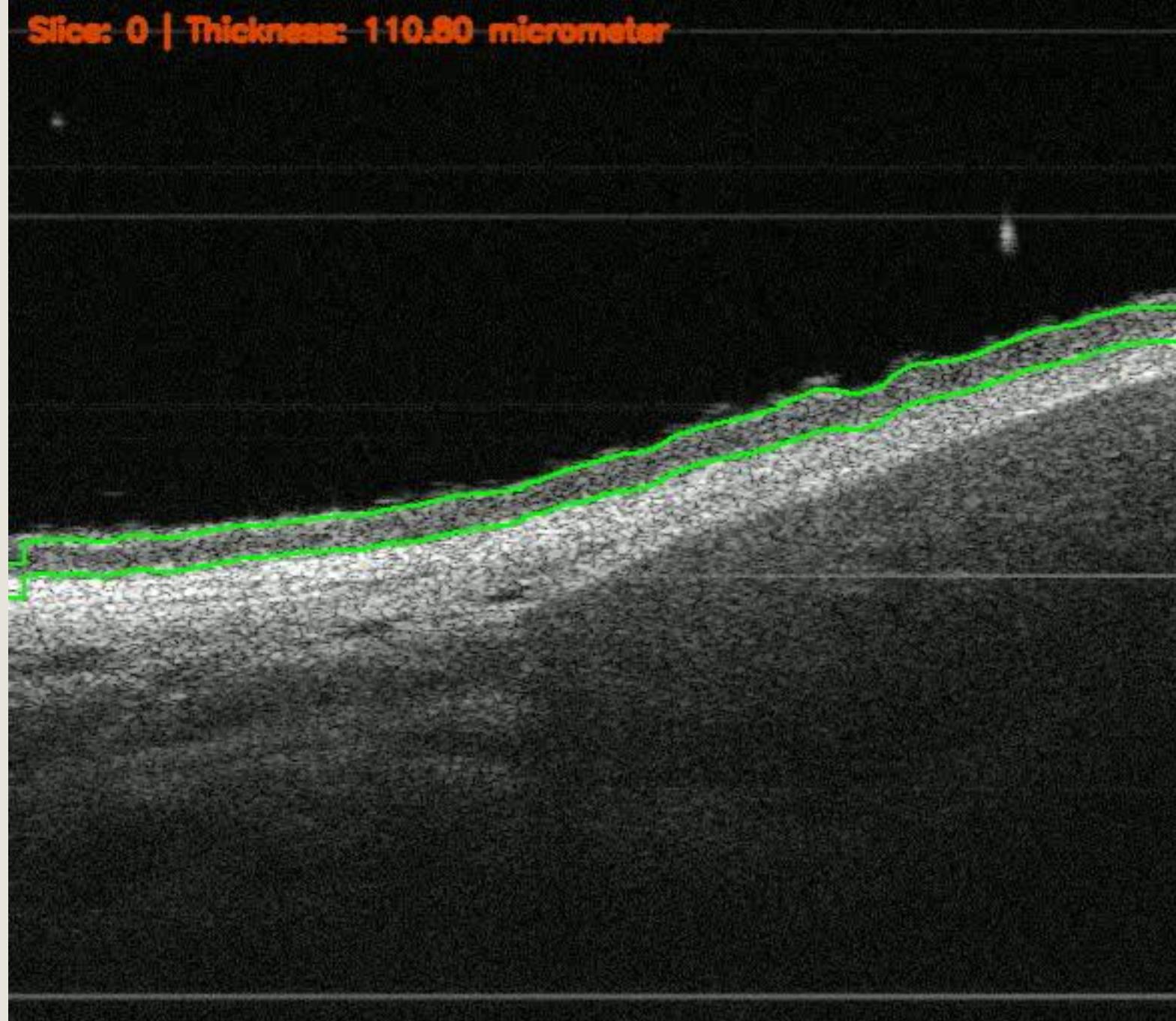


(B) Ground-Truth  
(SSIM: 1.00; PSNR: Inf)

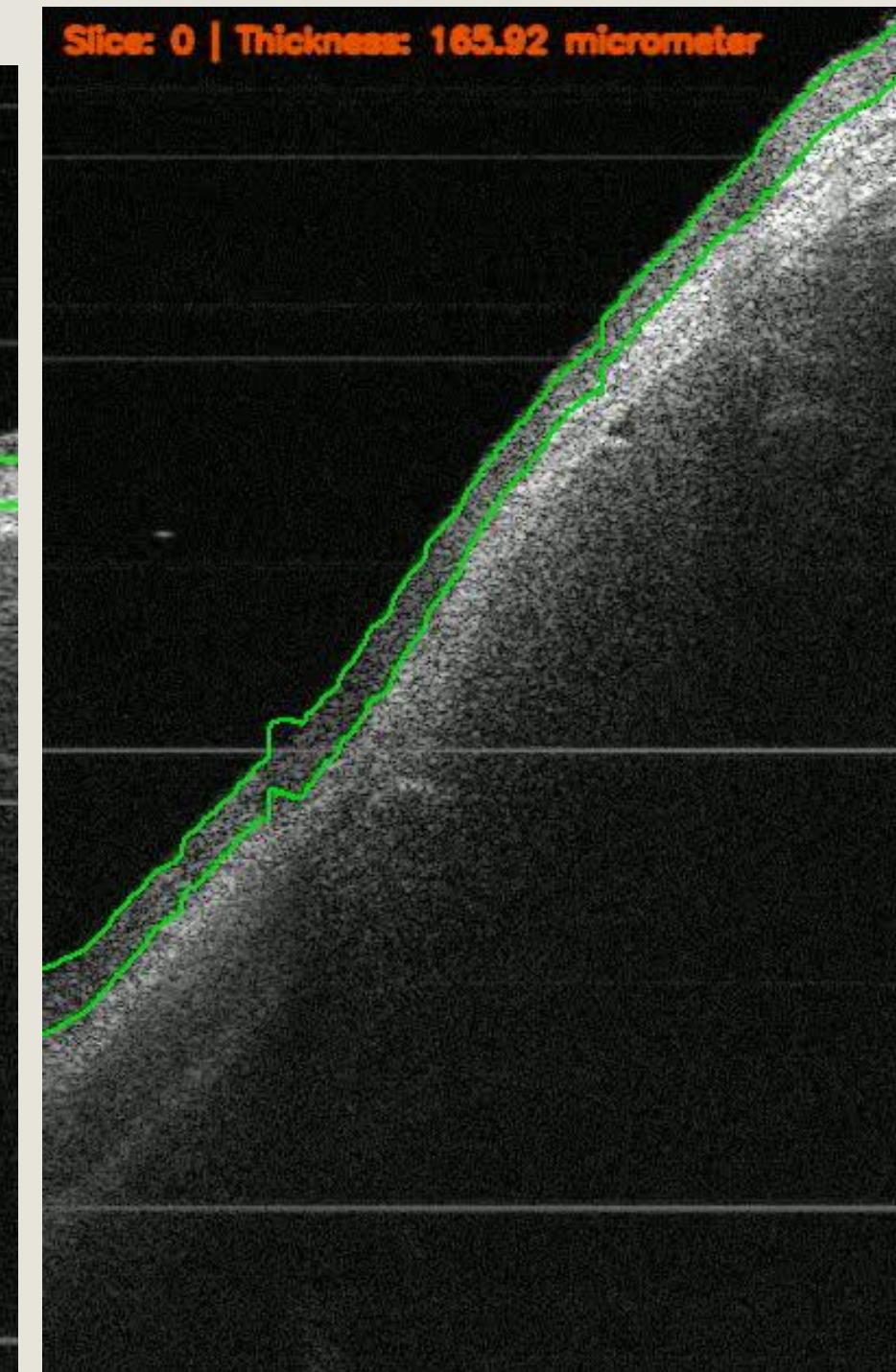


(C) VET (model outputs)  
(SSIM: 0.342; PSNR: 15.132)

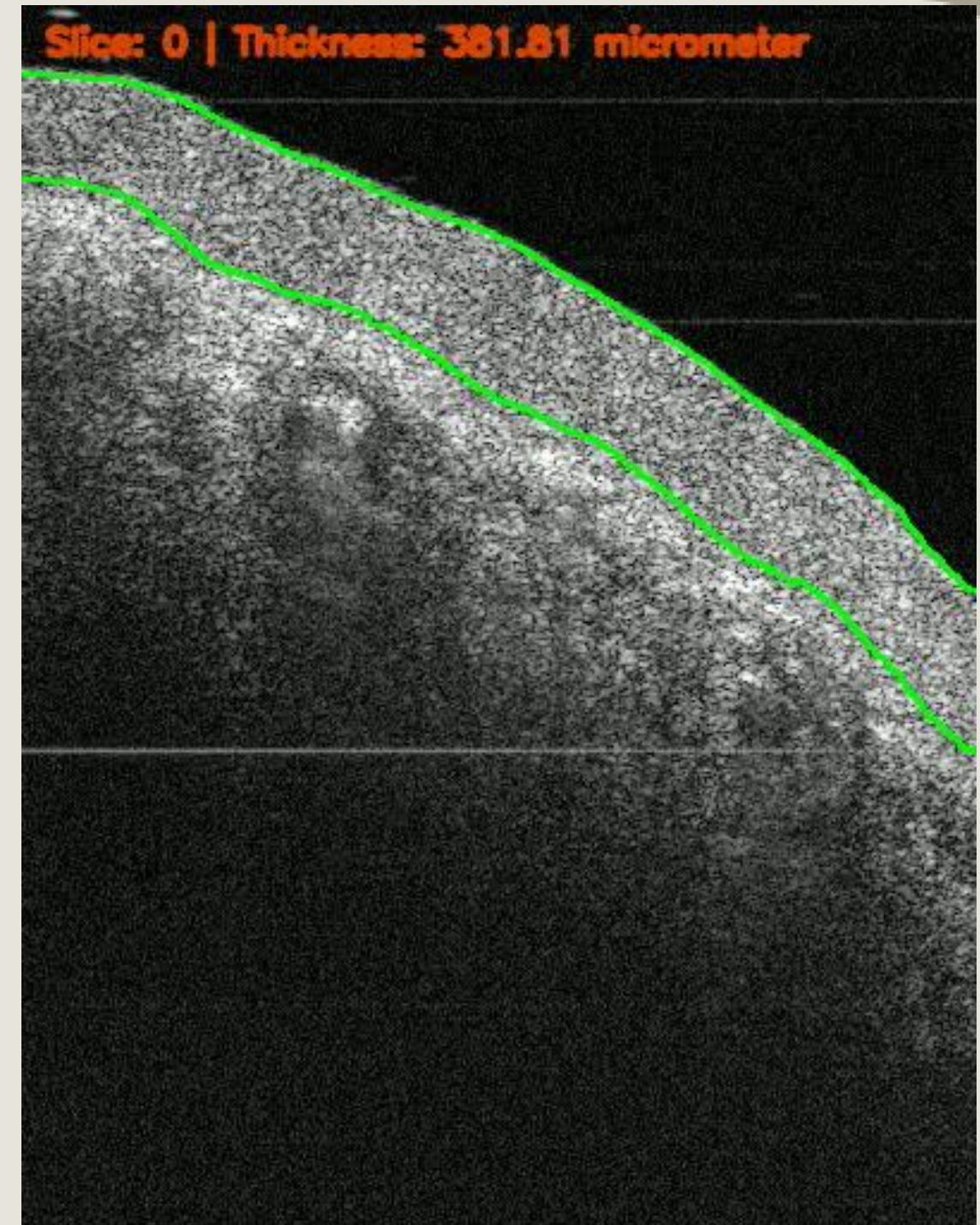
# OCT-based Layer Segmentation



Oral Floor (Upper)

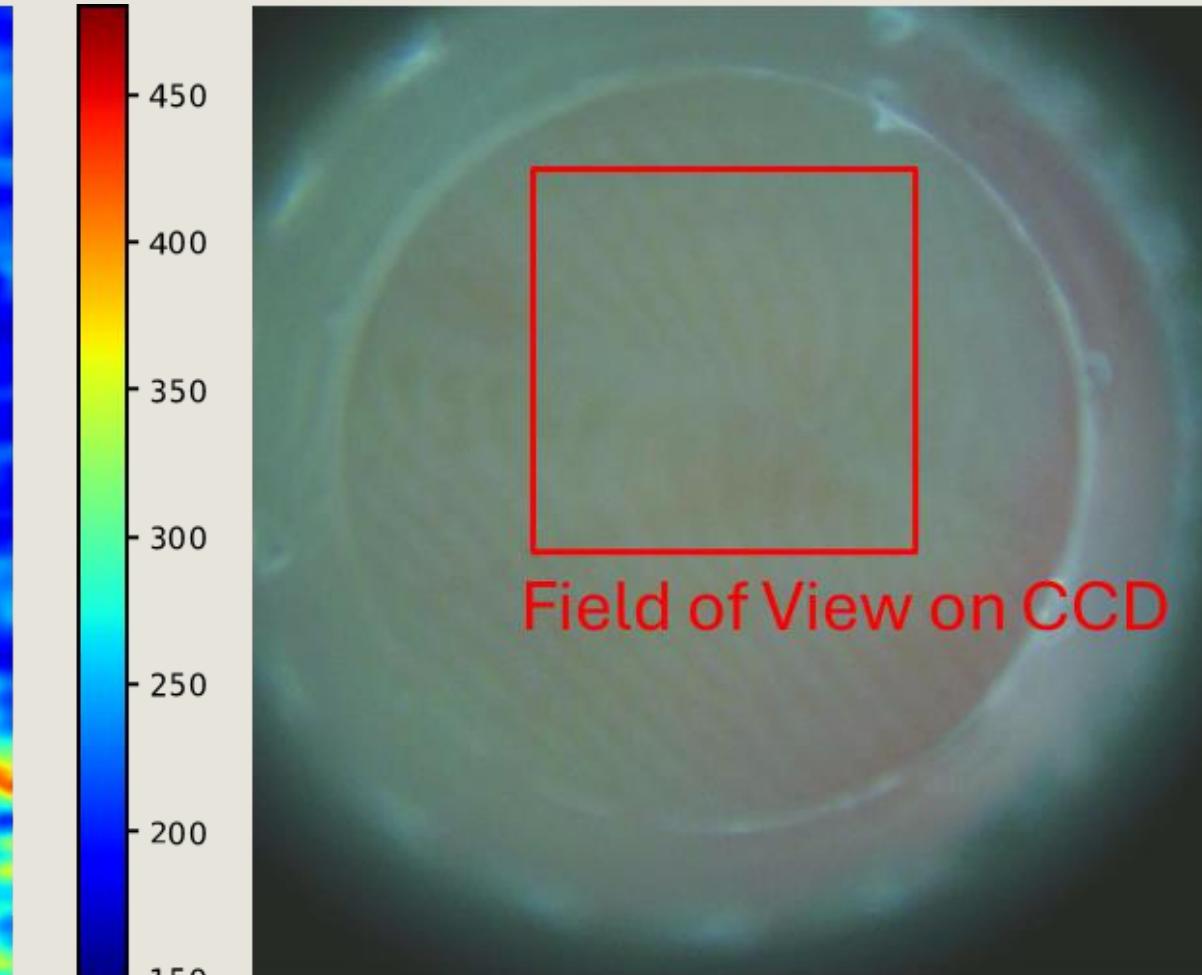
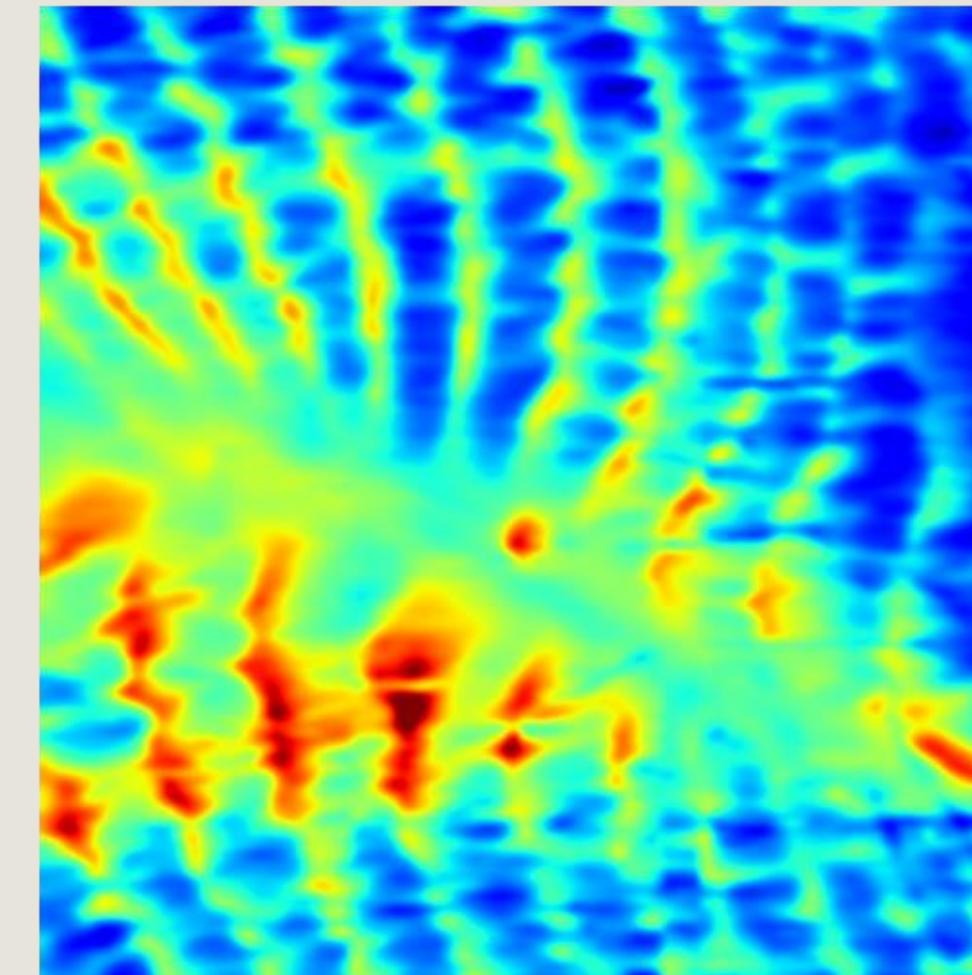
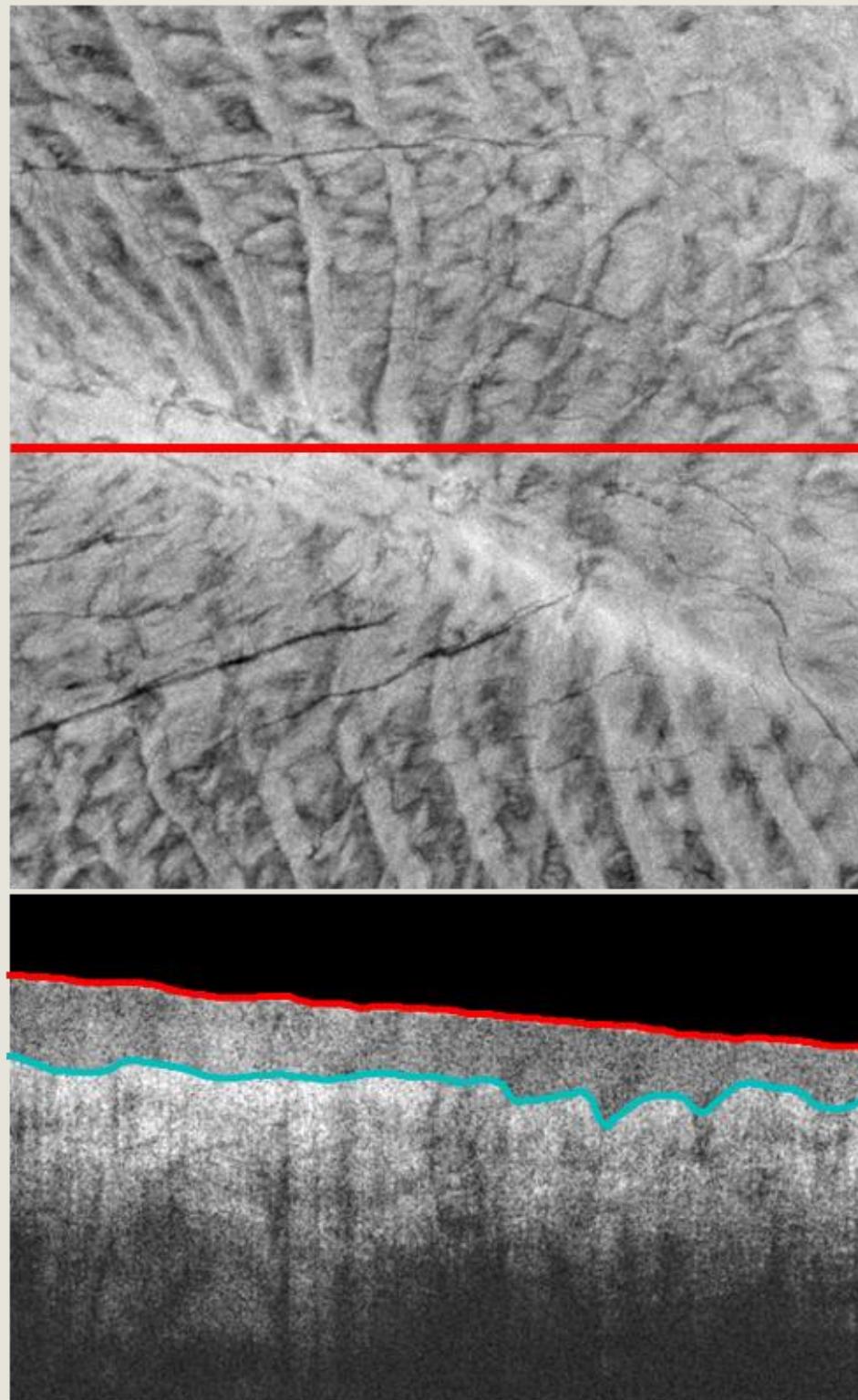


Oral Bottom



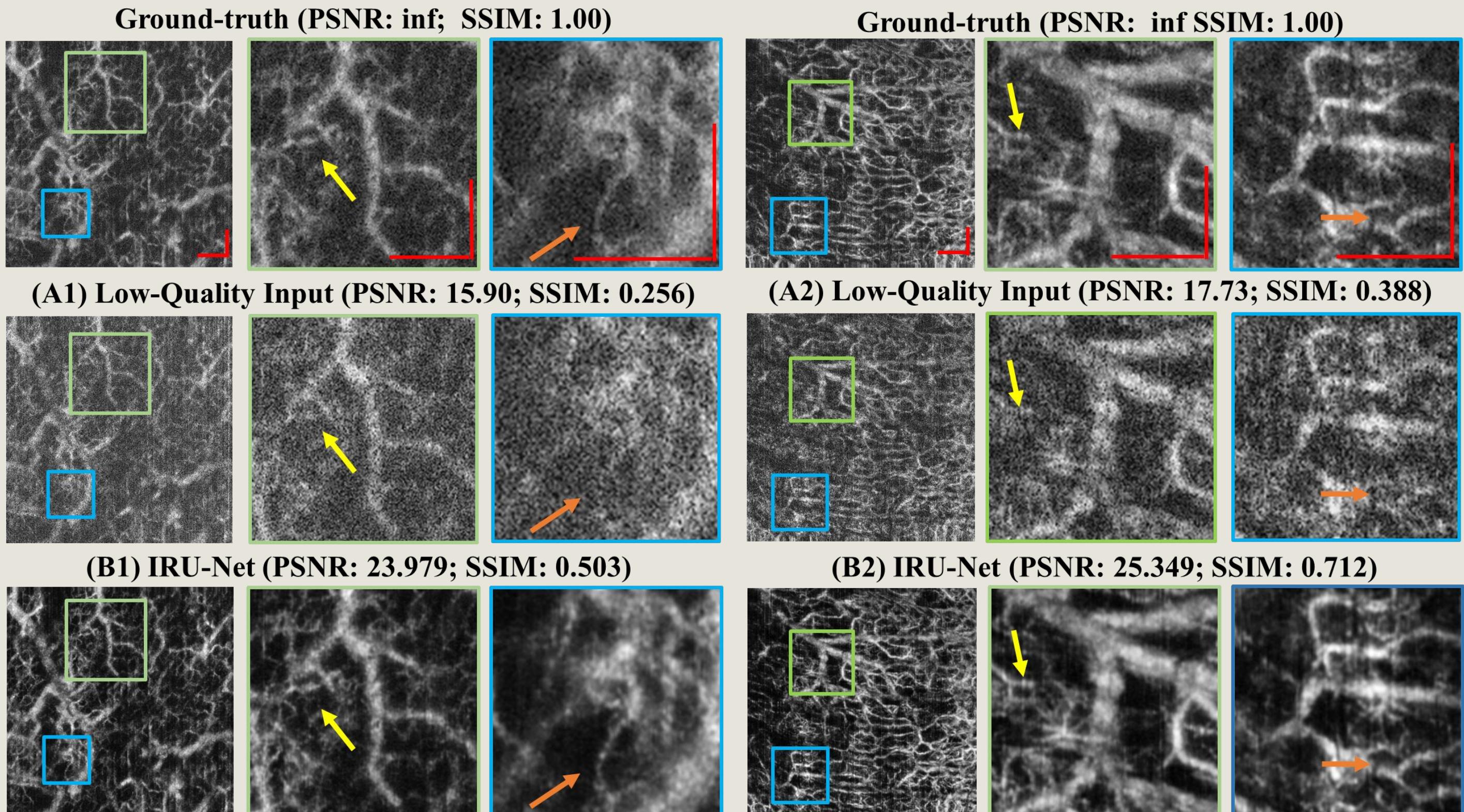
Oral Lip (Upper)

# Epidermis thickness evaluation on abnormal case

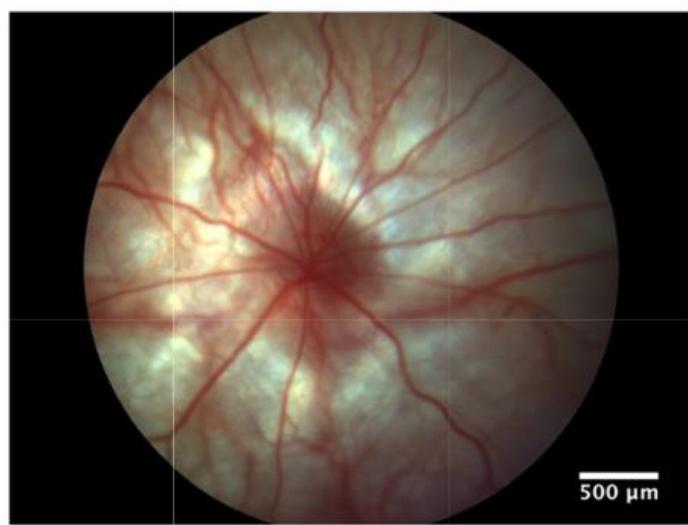


Frame: 300;  
Mean Epidermal Thickness 290.72  $\mu\text{m}$

# AI-based Fast OCTA imaging

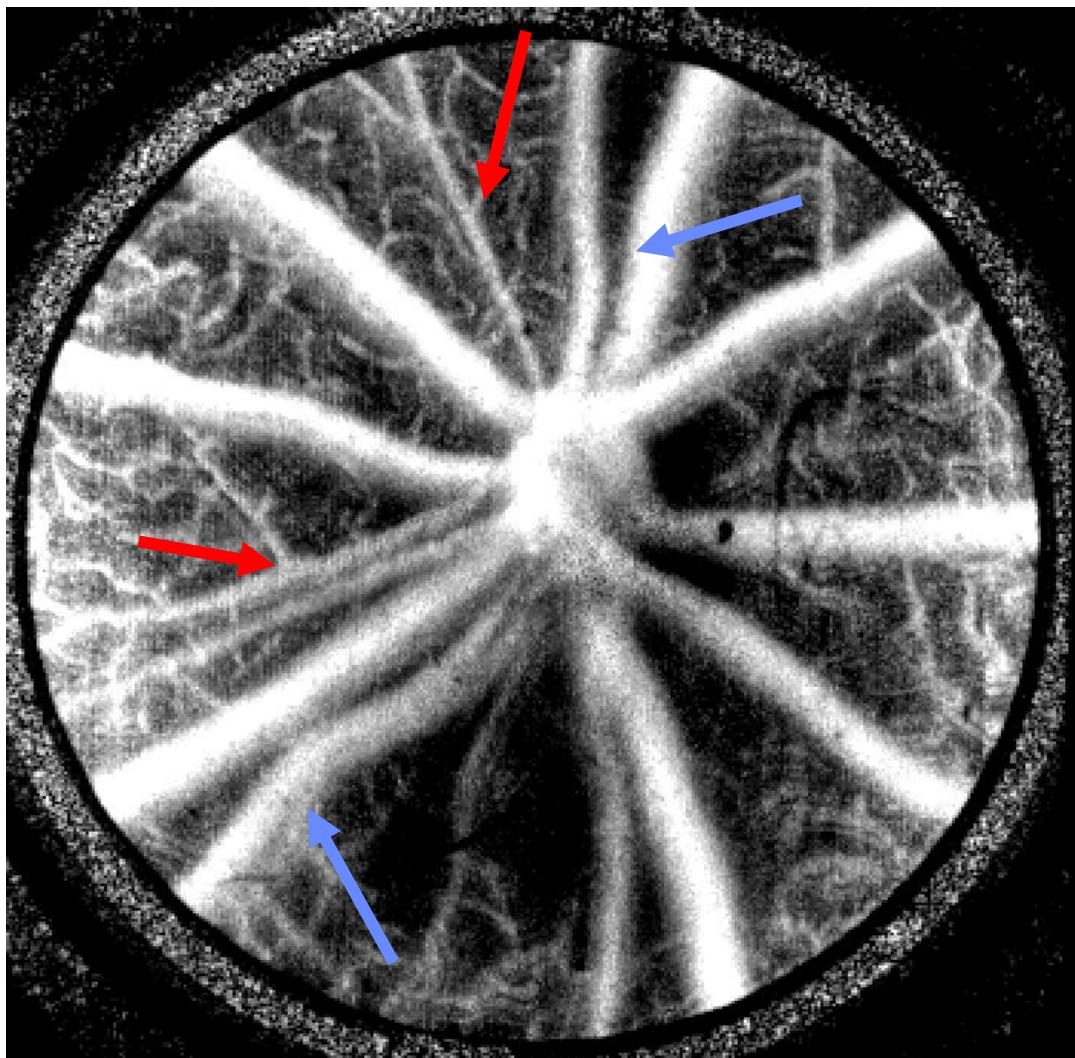


## OCTA En-face projection of hypertension model

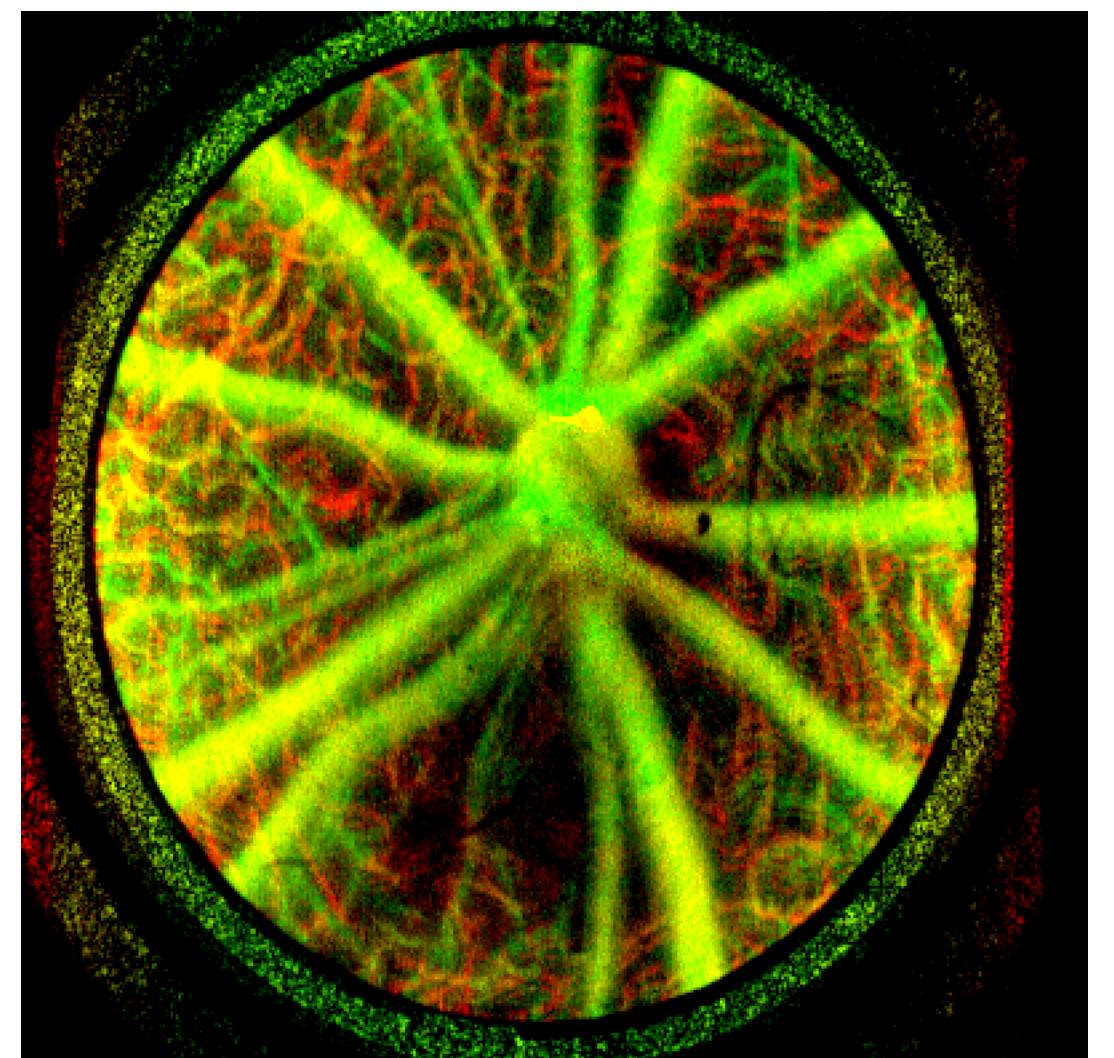
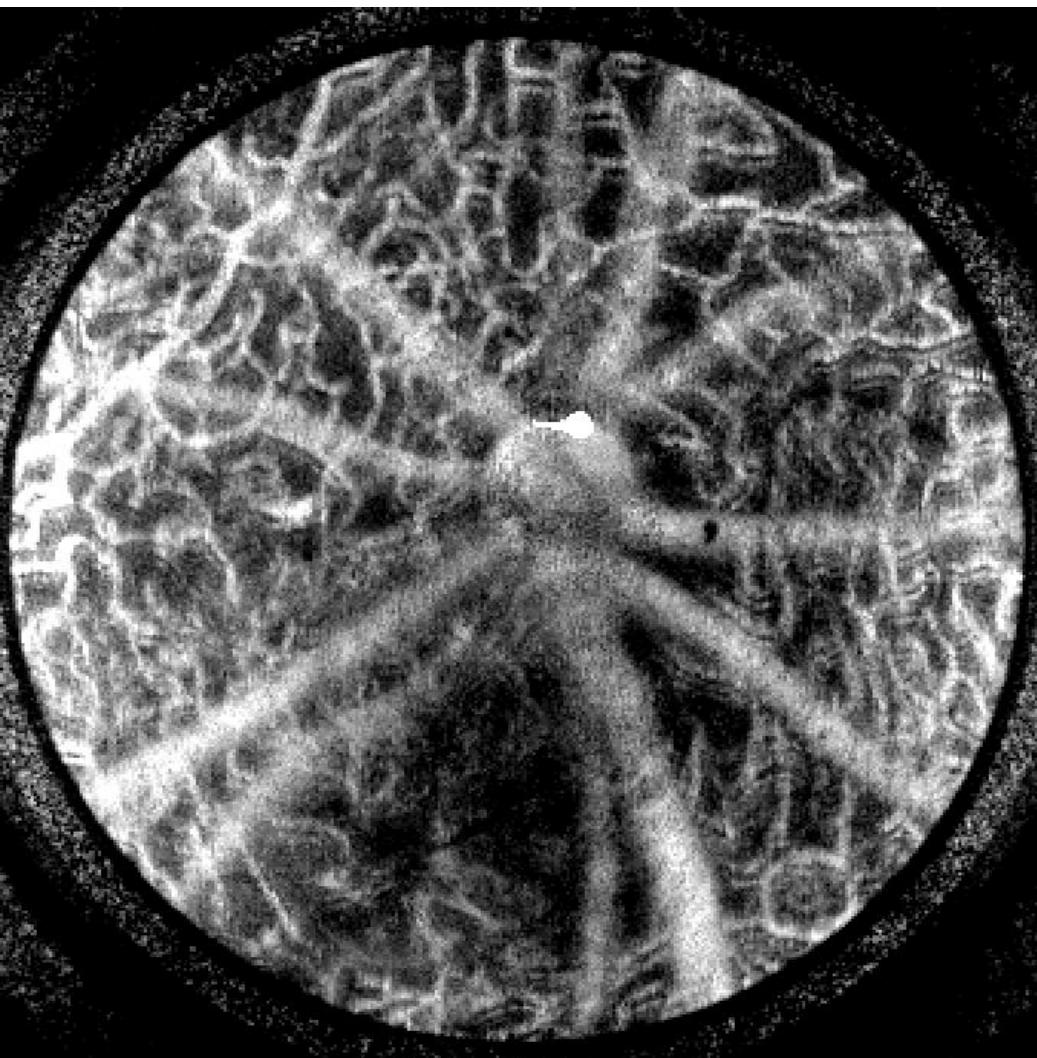


SHR 40 weeks  
Fundus photography (Li et al., 2020)

Superficial layer angiogram



Deep layer angiogram



High tortuous (blue arrows) and narrow (Red arrows) vessel diameters in hypertension.

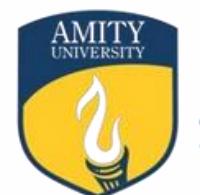


# INDUSTRY PERSPECTIVE ON THE USE AND BARRIERS TO AI AND HEALTHCARE

Graham Walsh, Head of Medicine, Health Innovation Yorkshire & Humber



Partnered with





**Health Innovation**  
Yorkshire & Humber

Transforming Lives  
Through Innovation

# Barriers to AI in Healthcare

**Mr Graham Walsh**

**Consultant Knee Surgeon, Calderdale and Huddersfield Foundation Trust**

**Medical Director, Health Innovation Yorkshire & Humber**

**Clinical Chair Circle Health Group**



# Our purpose and vision



## Purpose

Transform lives through innovation

## Vision

To improve the health and prosperity of our region by  
unlocking the potential of new ideas

# Tackling the big challenges



Supporting the healthcare system recovery



Advocating for levelling up and economic renewal



Addressing health inequalities



Improving equality, diversity and inclusion



Acting against climate change

# A connected 'Network of Networks'-

*The Innovation arm of the  
NHS*



# In our footprint

- **5.5m** citizens
- **£12bn** annual health and social care investment
- **3** Integrated Care Systems
- **22** Acute Trusts of which
- **6** are also Teaching Hospitals
- **5** Mental Health Trusts
- **770** GP Practices
- **1,450** care homes
- **12** Universities
- **677** Life science companies
- Also an in house UK and International Innovation Accelerator

**West  
Yorkshire**

**Humber and  
North Yorkshire**

**South  
Yorkshire**

# MAP OF LOCAL INNOVATION INFRASTRUCTURE

## NETWORKS & CO-OPERATIVES

- 01. Bradford and Craven Innovation Hub, Bradford Teaching Hospitals NHS Foundation Trust
- 02. Healthcare Gateway - Faculty of Medicine, Dentistry and Health
- 03. Humber and North Yorkshire Cancer Alliance
- 04. Leeds Academic Health Partnership (LAHP)
- 05. Medilink North of England
- 06. Medipex
- 07. National Pathology Imaging Co-operative (NPIC)
- 08. Nexus at the University of Leeds
- 09. NIHR Applied Research Collaboration Yorkshire and Humber (ARC)
- 10. NIHR Children and Young People MedTech Co-operative
- 11. NIHR Clinical Research Network Yorkshire and Humber
- 12. NIHR Devices for Dignity MedTech Co-operative
- 13. NIHR Leeds In Vitro Diagnostic Co-operative
- 14. NIHR Surgical MedTech Co-operative
- 15. South Yorkshire and Bassetlaw Cancer Alliance
- 16. South Yorkshire Innovation Hub
- 17. Technology Innovation Transforming Child Health Network (TITCH)
- 18. West Yorkshire and Harrogate Cancer Alliance
- 19. West Yorkshire Association of Acute Trusts (WYATT)
- 20. West Yorkshire Innovation Hub
- 21. Yorkshire and Humber Care Record (YHCR)
- 22. Yorkshire Cancer Research
- 23. Yorkshire Universities

## HEALTH TECH & LIFE SCIENCES INDUSTRY

- 01. Advanced Digital Innovation Ltd (ADI)
- 02. B.Braun Medical Ltd
- 03. BJSS
- 04. Brandon Medical
- 05. DePuy Synthes
- 06. EMIS Health
- 07. JRI Orthopaedics Ltd
- 08. Labcorp Clinical Research Unit Ltd
- 09. Labcorp Early Development Laboratories Ltd
- 10. Paxman Coolers Ltd
- 11. Reckitt Benckiser Science and Innovation Centre
- 12. Smith & Nephew Wound Management
- 13. Steeper
- 14. Teva UK Ltd
- 15. Thornton & Ross
- 16. TPP

## ACADEMIC RESEARCH

- 01. Advanced Wellbeing Research Centre (AWRC)
- 02. Advanced Manufacturing Research Centre (AMRC) and Medical AMRC
- 03. Aura Innovation Centre
- 04. Bradford Institute for Health Research
- 05. Centre for Augmented Intelligence Learning & Technology Integration in Emergency Care (CAILTEC)
- 06. DATA-CAN
- 07. Gene Therapy Innovation and Manufacturing Centre
- 08. Improvement Academy
- 09. Leeds Beckett University
- 10. Leeds Centre for Personalised Medicine and Health
- 11. Leeds Institute for Data Analytics (LIDA)
- 12. Leeds Trinity University
- 13. National Centre for Sport and Exercise Medicine (NCSEM)
- 14. NIHR Leeds Biomedical Research Centre (BRC)
- 15. NIHR Leeds Clinical Research Facility (CRF)
- 16. NIHR Research Design Service Yorkshire and Humber
- 17. NIHR Sheffield Biomedical Research Centre (BRC)
- 18. NIHR Sheffield Clinical Research Facility (CRF)
- 19. School of Health and Related Research (SCHARR)
- 20. Sheffield Hallam University
- 21. Sheffield Institute for Translational Neuroscience (SITraN)
- 22. Sheffield Olympic Legacy Park
- 23. University of Bradford
- 24. University of Huddersfield
- 25. University of Hull
- 26. University of Leeds
- 27. University of Sheffield
- 28. University of York
- 29. Wolfson Centre for Applied Health Research
- 30. York Health Economics Consortium (YHEC)
- 31. York St John University

## SUPPORT ORGANISATIONS

- 01. 3M Buckley Innovation Centre
- 02. Barclays Eagle Labs
- 03. Centres for Digital Innovation (C4DI)
- 04. Digital Health Enterprise Zone (DHEZ)
- 05. Digital Media Centre (DMC)
- 06. Innovation Pop Up, Leeds Teaching Hospitals NHS Foundation Trust
- 07. Thrive by Design

## OTHER

- 01. Humber Local Enterprise Partnership (LEP)
- 02. Leeds City Region Enterprise Partnership (LEP)
- 03. Sheffield City Region Local Enterprise Partnership (LEP)
- 04. South Yorkshire Mayoral Combined Authority
- 05. West Yorkshire Combined Authority
- 06. York and North Yorkshire Local Enterprise Partnership (LEP)

06  
NORTHALLERTON

22 09  
HARROGATE

28 30 31  
YORK

04 08 23 29  
01 09 01 04  
BRADFORD

05 06 09 10 11 12 14 15 26  
04 06 07 08 13 14 19 23  
03 04 05 06 08 13 16  
02 06 07 02 05  
LEEDS

West Yorkshire Health and Care Partnership

01 24 10 15  
HUDDERSFIELD

05  
BARNESLEY

01 02 07 13 16 17  
18 19 20 21 22 27  
02 05 10 11 12 15 16 17  
02 07 03 04  
SHEFFIELD

South Yorkshire Integrated Care System

Humber and North Yorkshire Health and Care Partnership

03 25 03 21  
11 12 03 01  
HULL



Health Innovation  
Yorkshire & Humber

## RELATIONSHIPS

- Co-funded activity
- Formal partnership
- Strategic relationship
- Ad hoc collaboration
- Informal engagement

# AI Themes in healthcare

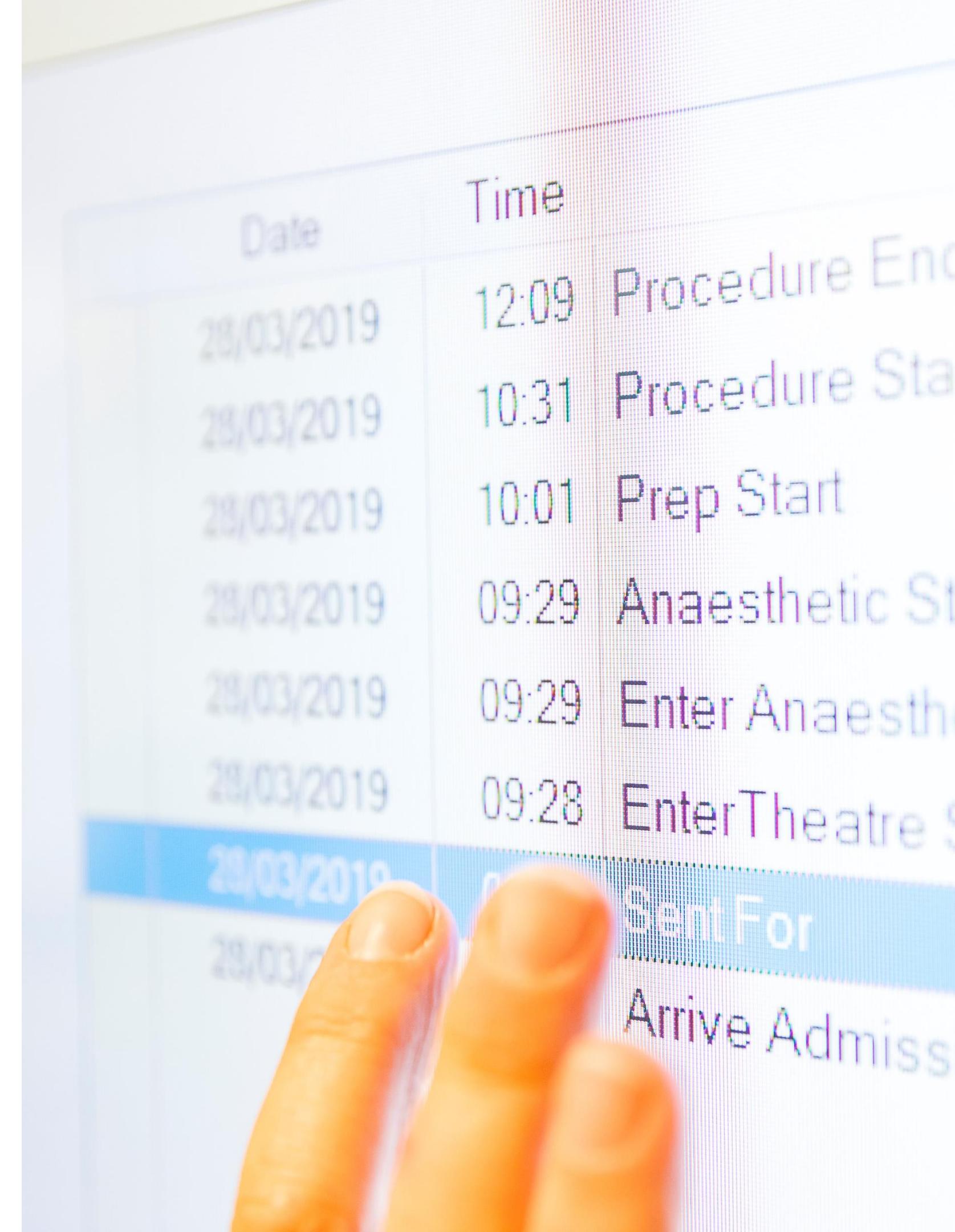
AI is at the heart of the government's plan to kickstart an era of economic growth, transform how we deliver public services, and boost living standards for working people across the country

*Secretary of State for Science, Innovation and Technology*

- At our recent Strategic Advisory Board at the Data Science, Artificial Intelligence and Modelling (DAIM) department at the University of Hull the emergent themes that arose;
  - **Barriers to AI Adoption:** Key challenges include fragmented digital infrastructure, ensuring safety and effectiveness, and gaining the confidence of clinicians and patients.
  - **Ethical Considerations:** importance of addressing privacy, consent, accountability, and bias in AI systems to protect patient safety and equity.
  - **Future Directions:** The need for a national AI health and care strategy, upskilling staff, and creating a vision for AI-enabled personalized care are highlighted as essential steps for successful AI integration in healthcare.

# Workforce barriers

- Education and understanding
  - Recent study showed 73% of workforce have never used AI at work with less than 1 in 4 feeling confident.
  - Start the education journey early- AI could be as important to future clinicians as the stethoscope is today.
  - Creating a culture of Innovation
- Job displacement and loss fears
  - Specialties based on pattern recognition such as Radiology, Pathology, Cytology, Microbiology, and Dermatology could be lost.
  - Admin roles could be replaced.
  - Doctors that use AI will be replace those that don't
- Need user centred technology to enhance adoption
- Skills must be maintained
- Important that solutions address problem statements to make a real impact to clinicians and patients.



# Ethics and Governance

- Hippocratic Oath for AI: a modern equivalent of the Hippocratic Oath for AI practitioners to ensure ethical decision-making and protect fundamental human rights.
- Ethical Pathway
  - Proposals include developing a robust control system for AI, embedding ethical principles in AI algorithms, and establishing ethics committees to ensure AI remains beneficial to humanity.
  - Regional and local AI strategies and governance committees.
- There is a need for clear governance of AI implementation in healthcare that clarifies the role of all stakeholders in data ownership and use
  - Further develop DTAC, DPIA, DCBs, NHSE AI Lab
- Data quality, accuracy, and dataset size
- Interoperability and usability of data
- Central NHSE/ DHSC support



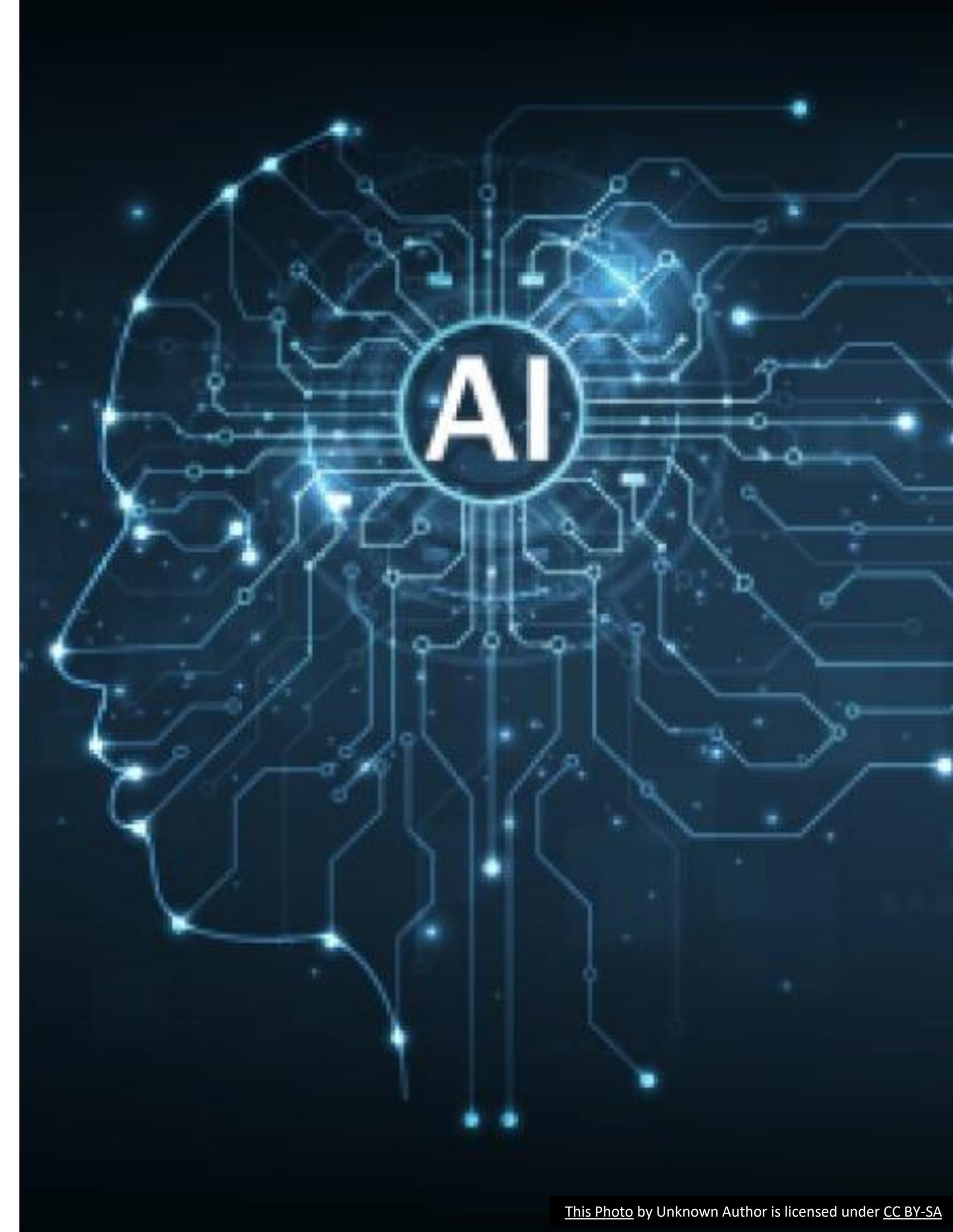
# Patient safety concerns

- Distributional shift
  - Clinicians are used to working in difficult environments with limited or poor data.
  - In an AI model if encounters during deployment differs from the data it was trained on. This mismatch can lead to decreased accuracy and reliability of the model's predictions.
- Automation bias
  - Risk that clinicians will become complacent
- AI in healthcare may attempt to 'game the system' – The wolf and dog analogy.
- AI systems need to constantly assess their own confidence risk, acceptance is much less from digital systems.
- Concerns around the data used and the learning the algorithm gains from it.



# Data issues

- AI systems use specific algorithms that need large datasets to improve their accuracy (specificity/sensitivity)
  - Data accuracy, FDP, clinicians and informatics responsibility with coding
- Data bias
  - During the collection of the data, intentionally or unintentionally, certain minorities, races, ethnicities, or genders may be significantly misrepresented.
  - Companies need social responsibility with Equity of access eg Robotics and learning.
- Data poisoning and danger of data manipulation- ‘fake news’, cyber attacks
- Patient Privacy
  - AI systems rely on vast amounts of data, raising concerns about how patient information is collected, stored, and used.



# Healthcare uses of AI

- Analysing medical images and pathology
- Data mining for research
- Drug development
- Reviewing patient records to help with prevention, helping manage long-term conditions by checking data from patient apps and wearables,
- Assisting in hospital admin and logistics such as waiting list evaluation and stratification
- Ambient listening
- Super AI
  - Decision making and potential for robotics to replace humans
- Digital Twins



# Questions for AI innovators

Is it really unique?

Where is something similar already working?

What staff training and engagement is required?

What is the evidence base?

Are the regs in order?

What does the system really need?

What will work in practice?

What is the local capacity?



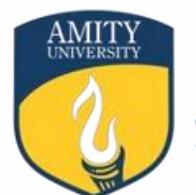


# INDUSTRY PERSPECTIVE ON THE USE AND BARRIERS TO AI AND HEALTHCARE

Neeraj Adsul - Head of AI, Abingdon Health Plc



Partnered with





# Opportunity for AI in Healthcare

By Abingdon Health Group

Presenter: Neeraj Adsul  
Head of AI & Innovation



<https://www.abingdonhealth.com>

# Agenda

1. Who are we?
2. AI in IVD and Medical Devices
3. Safety and Security
4. Abingdon Health's Strategy for Adopting AI
5. Conclusions

# Trusted Lateral Flow Expert: UK, Europe & US

## Best In Class

Our technical insight, scientific expertise, a quality-focused culture, world-class development & manufacturing facilities, and process excellence fully supports the path to commercialisation and beyond.



Lateral flow is powerful, rapid, flexible, on-site diagnostic technology



### Our Lateral Flow Expertise Covers:

- Single biomarker or multiplex capability
- Qualitative or quantitative
- Competitive or sandwich assay format
- Gold, latex, carbon, latex, fluorescent labels
- Dipstick or cassette style device
- Reader technology
- Sustainable Housings
- Full product lifecycle support



### Our Sector Expertise Covers:

- ✓ Clinical Self-Test
- ✓ Clinical Point of Care
- ✓ Animal Health
- ✓ Food Testing
- ✓ Plant Testing
- ✓ Environmental
- ✓ LAMP / Lateral Flow

# Introduction

## WHO WE ARE

- Mission: Improving life by making rapid tests accessible to all
- Founded in 2008, headquartered in York, UK
- LSE (AIM) market listed
- Dedicated lateral flow CRO & CDMO
- 120 group employees



York Biotech  
Campus, UK



University  
Research Park,  
Madison,  
Wisconsin USA

## ABOUT ME



Neeraj Adsul  
Head of AI and Innovation

- Ph.D. Nanoscience, University of Basel.
- 10+ yrs hands-on experience engineering IVDs
- Responsible for software, AI, and LFDRs
- Background in CNN for OD, Classifiers
- Enjoy cycling, Alpine hiking, and hardware hacking

## WHAT WE DO

- Dedicated lateral flow CRO & CDMO; scale-up experts
- Partnering customers throughout product lifecycle: from “idea to commercial success”
- Full regulatory service offering across IVD and medical device market
- Commercial service: supporting LFT self-test sales and distribution



# Meeting your complete CRO & CDMO Service Needs

We have the in-house capabilities to take a lateral flow project *from idea to commercial success.*



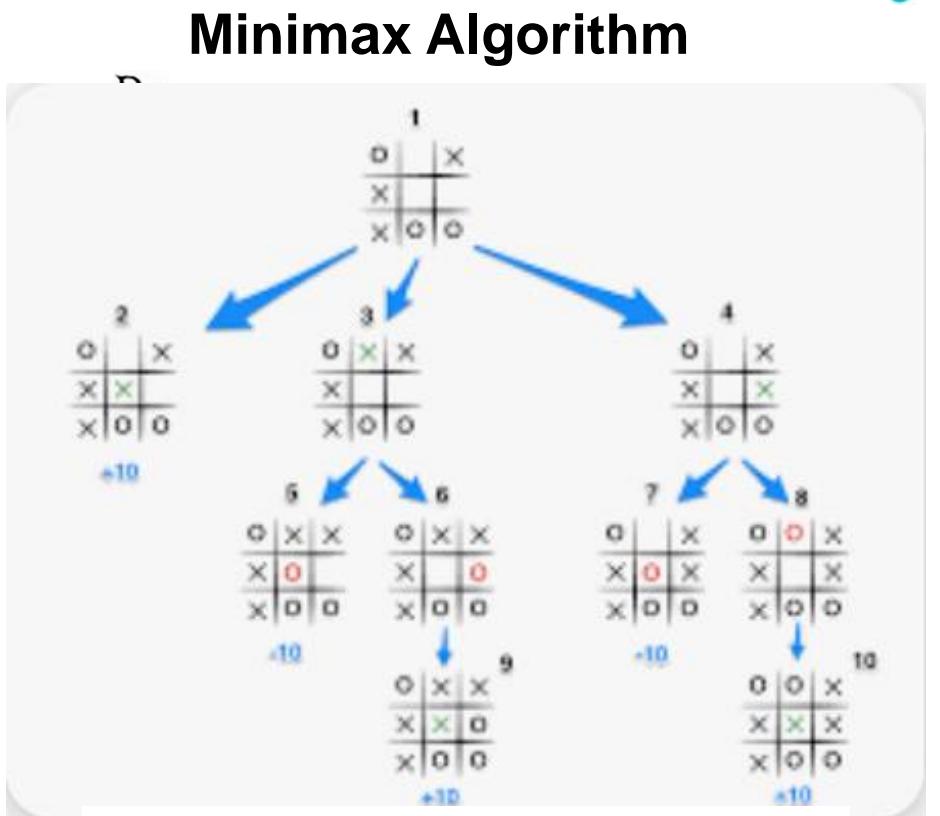
ABINGDON  
HEALTH

Contract Development	Scale Up & Technical Transfer	Contract Manufacturing	Packaging	Regulatory & Performance Eval.	IVDiology	Compliance Solutions (Life Sciences) Ltd
Design for Manufacture	Transfer of processes from bench to routine manufacture	Reagent preparation	Packaging design	Regulatory GAP analysis	Regulatory GAP analysis	Regulatory GAP analysis
Reagent Assessment	QC methodology	Spraying	Packaging sourcing	Technical file build	Technical file build	Technical file build
Materials Evaluation	Supply Chain	Lamination	Management of supply chain	Performance Evaluation	Performance Evaluation	Performance Evaluation
Prototype Development	Pilot batch manufacture	Assembly into housings – manual or automated	Packaging service	Analytical Studies	Analytical Studies	Analytical Studies
<b>Proof of concept</b>	3 Technical Transfer Batches	Foiling		Clinical trial design and implementation	Clinical trial design and implementation	Clinical trial design and implementation
Develop Key Methods	Formal SOPs	QC – both in-process and <b>final batch release</b>		Regulatory submissions	Regulatory submissions	Regulatory submissions
Optimisation				QMS	QMS	QMS
<b>Design Freeze</b>	<b>Final Output Review</b>			UKRP, PRRC, Legal Manufacturer	UKRP, PRRC, Legal Manufacturer	UKRP, PRRC, Legal Manufacturer

# AI in IVD and Medical Devices

# AI for IVD / Medical Devices

- AI : an algorithm that learns or encodes intricate patterns, complex relationships, and rules within known data or mechanism and can output prediction on similar unseen input data.
- **Gigantic and varied data sources in healthcare**
  - Time-series: ECG, EEG, real time monitoring in ICU
  - Images and Videos : Imaging scans, 1D, 2D, 3D
  - Consultation and diagnostics text
  - Tabular data e.g. blood tests, Fitness apps data
  - Traceability: Good lineage and provenance.
- Quality of data matters more than quantity after certain point
- Busy and overloaded healthcare systems: Routine Tasks delegated to reliable autonomous or human-in-loop systems.



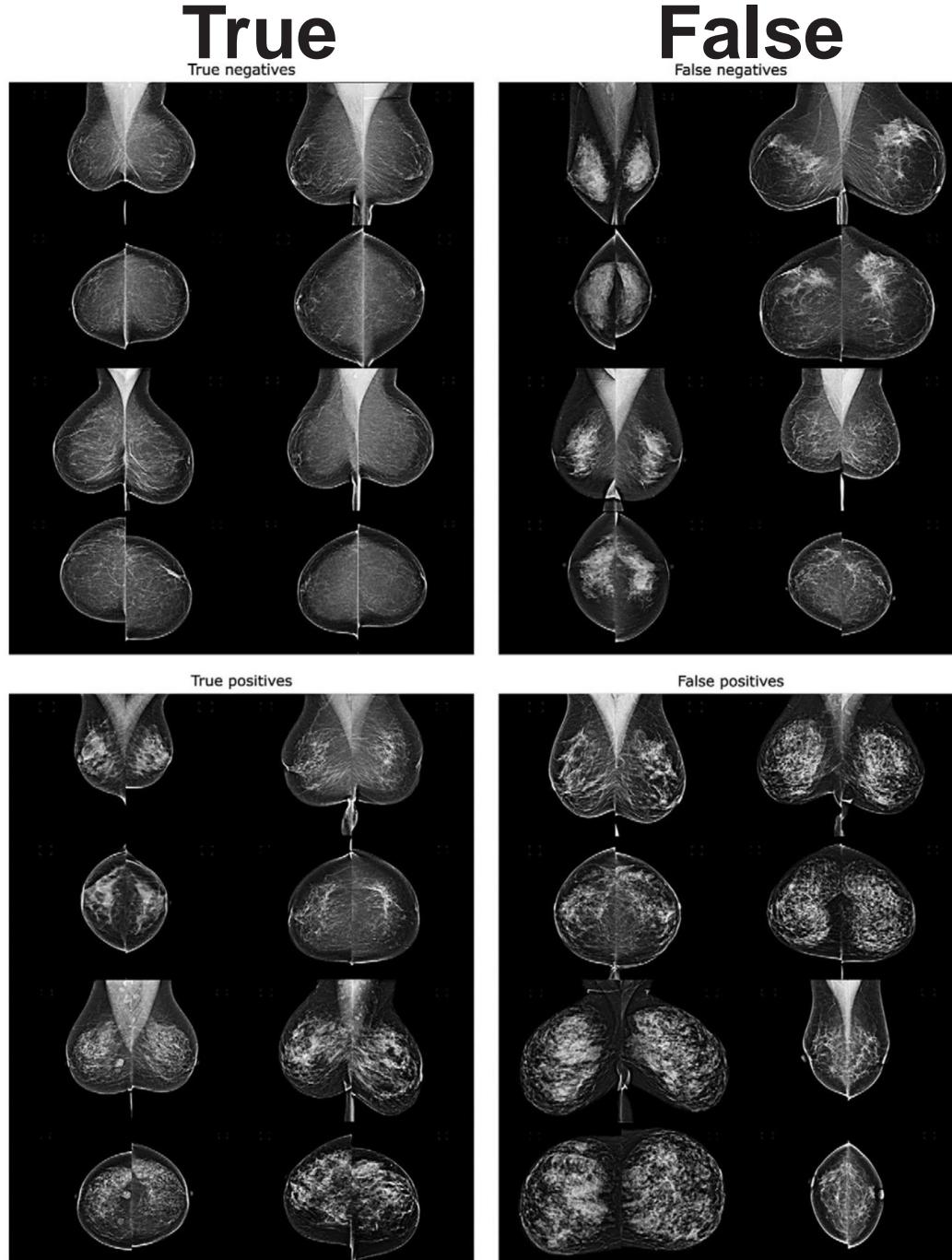
**A\* greedy search algorithm**



# AI for Diagnosis

- Breast Cancer Screening

-Negative

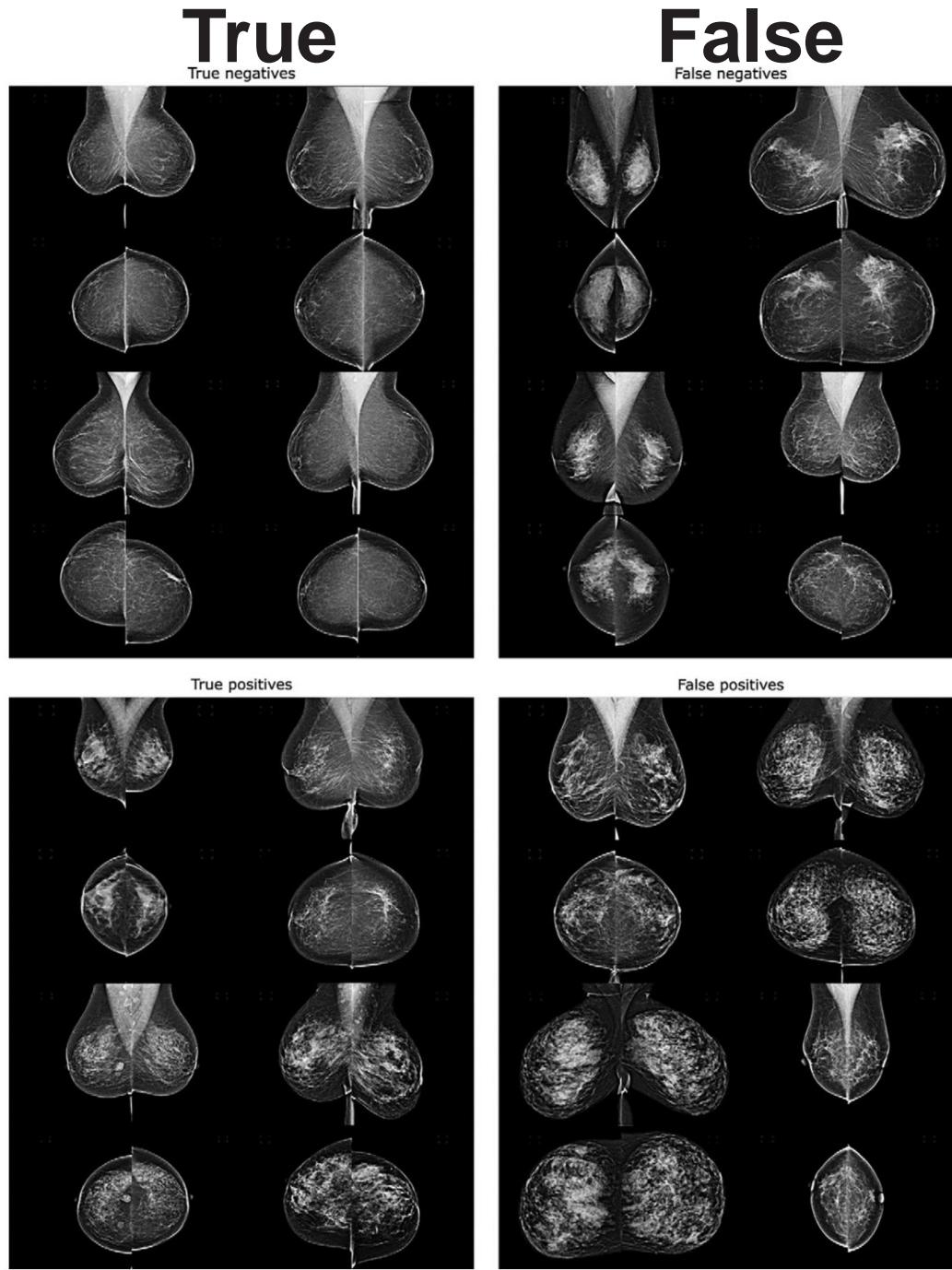


- Representative example of an entire class of diagnostics systems
- Image Classifier - Deep-Learning based on OPTIMAP Mammography Dataset
- On the hold-out test set, the AI model achieved an overall AUC of 0.70 (95% CI: 0.69, 0.72)
- Deep Learning for Breast Cancer Risk Prediction: Application to a Large Representative UK Screening Cohort.  
Radiology: Artificial Intelligence 2024; 6(4):e230431  
<https://doi.org/10.1148/ryai.230431>

# AI for Diagnosis

- Breast Cancer Screening

+Positive

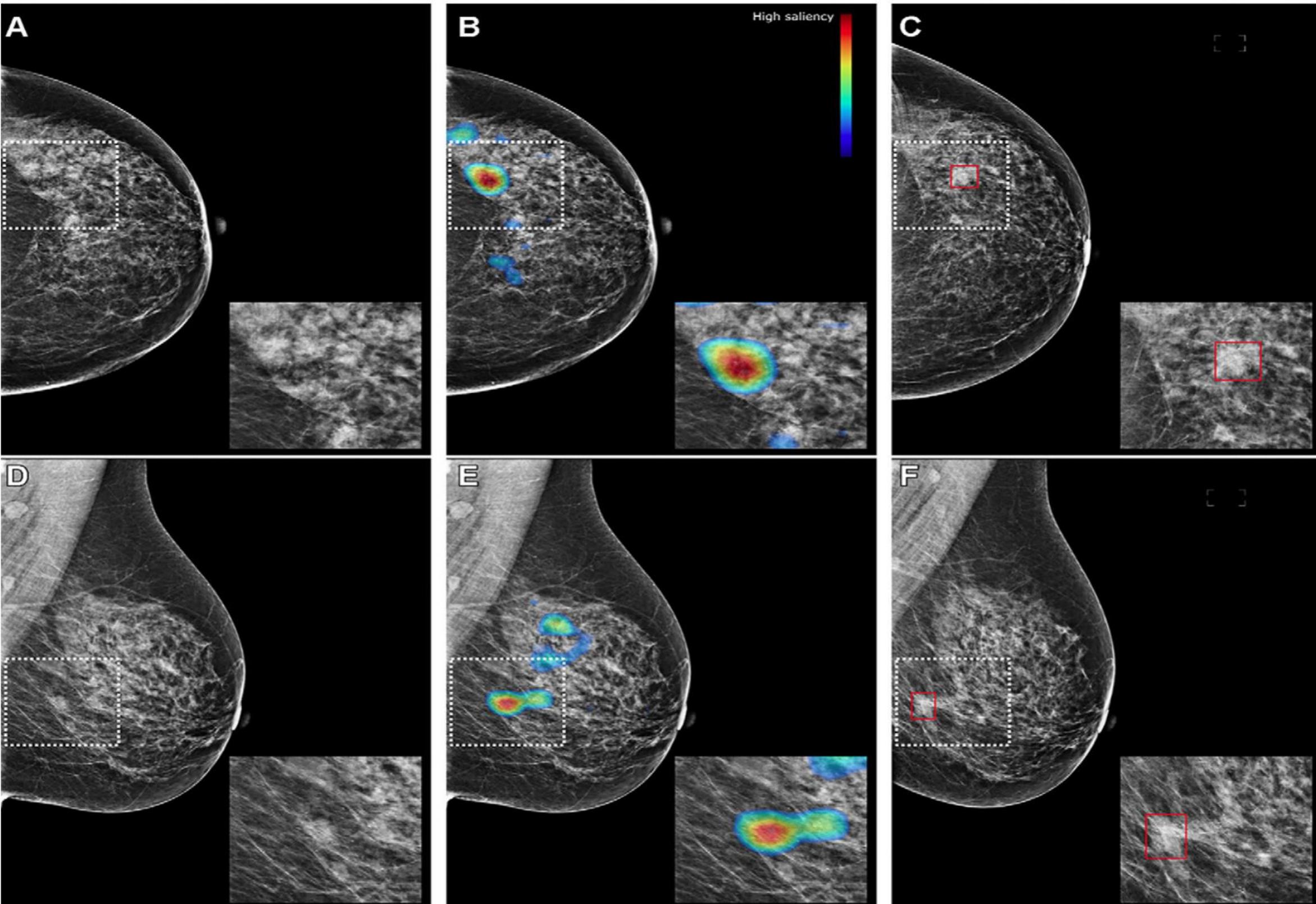


-Negative

Normal baseline screening examination

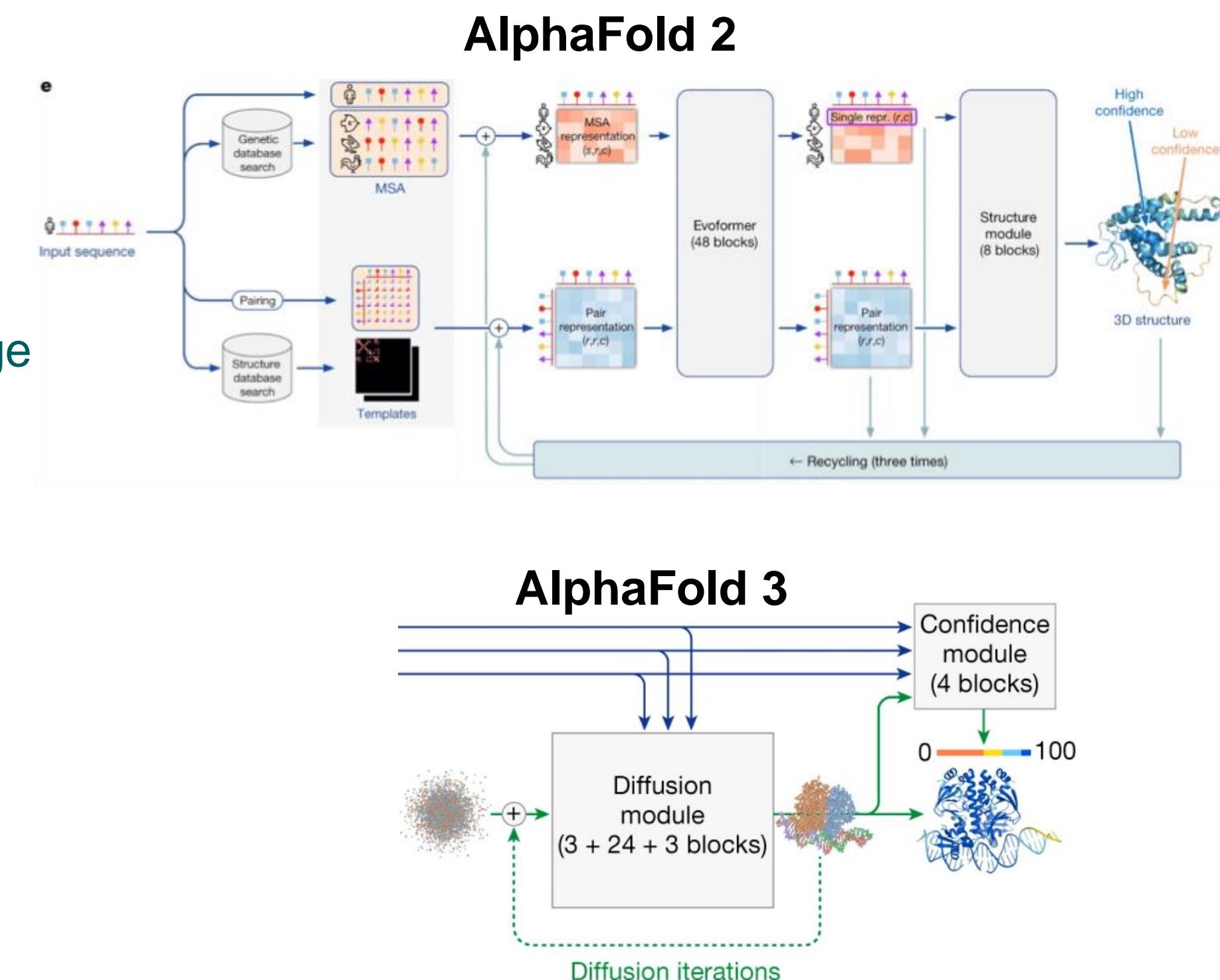
Baseline examination with saliency map

Follow-up screening examination - malignancy detected



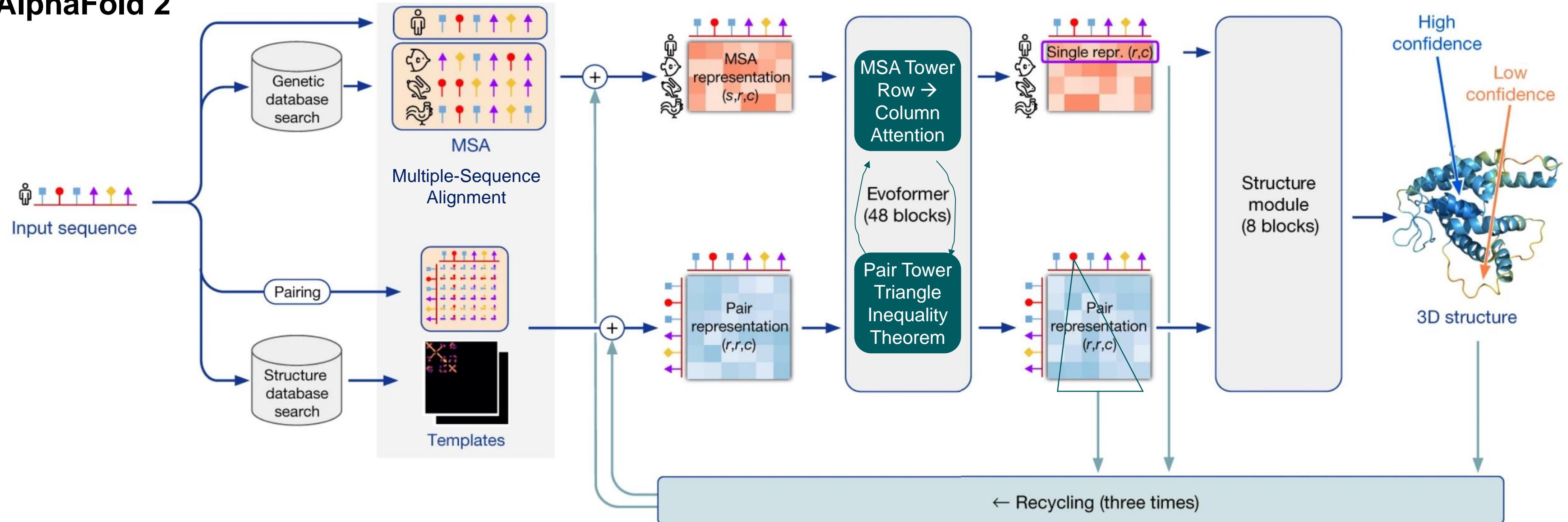
# AlphaFold

- Protein structure prediction with AlphaFold, *Nature*  
**AF2:** <https://www.nature.com/articles/s41586-021-03819-2>  
**AF3:** <https://www.nature.com/articles/s41586-024-07487-w>
- A gradual progress towards a clear definition and understanding of the problem
- Building upon decades of techniques, data and knowledge
- Iterative AI architecture cross-domain application of transformers and reinforcement learning
- Limitations
  - Static structures, Stereochemistry
  - hallucinations in disordered regions
  - No antibody–antigen interaction



# AlphaFold – Protein Folding

## AlphaFold 2

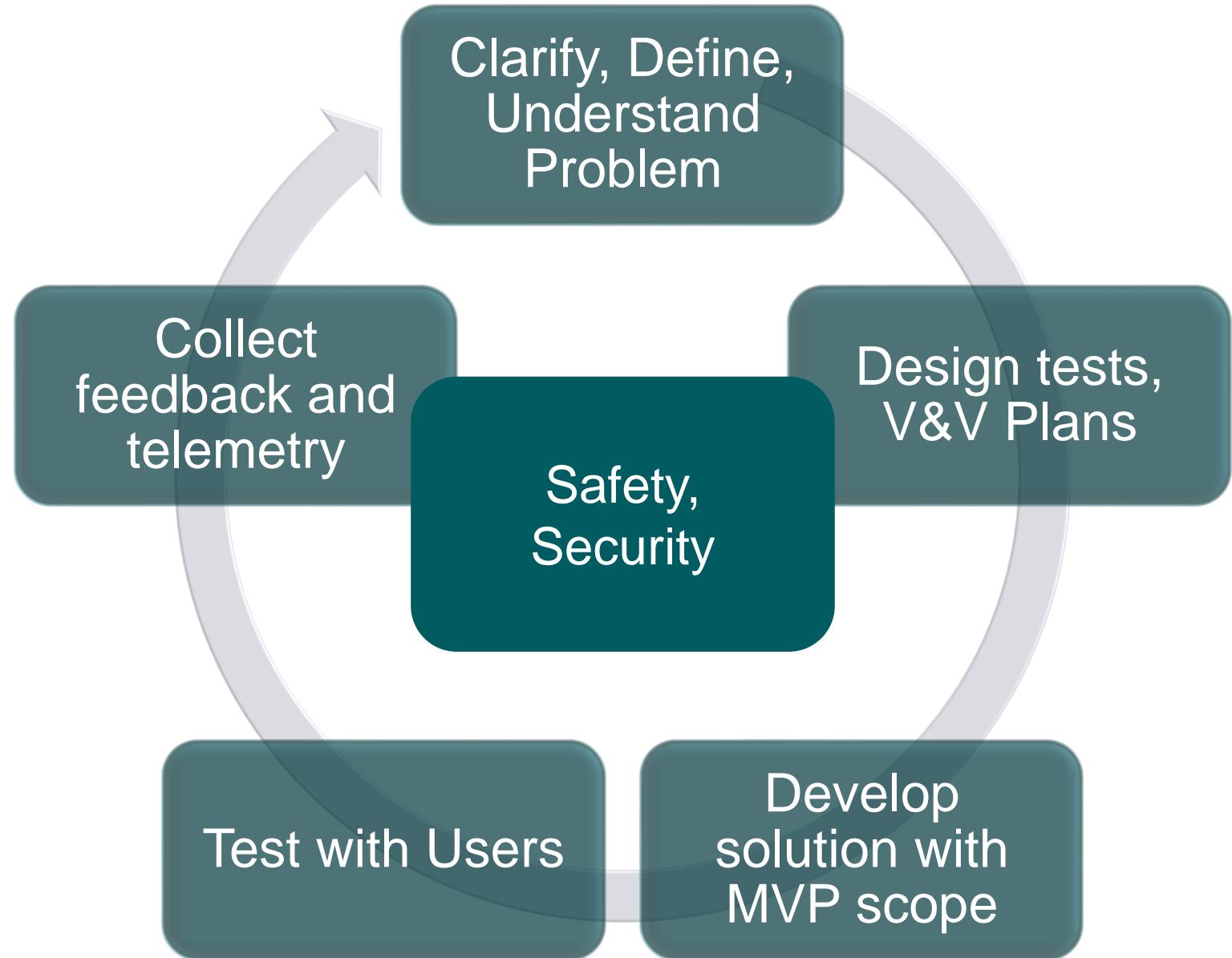


Good Editorial Video To Understand AF2: <https://www.youtube.com/watch?v=7q8Uw3rmXyE>

New England Journal of Medicine is a companion to the article "A Holy Grail — The Prediction of Protein Structure"

# AI Context of IVD / Medical Devices

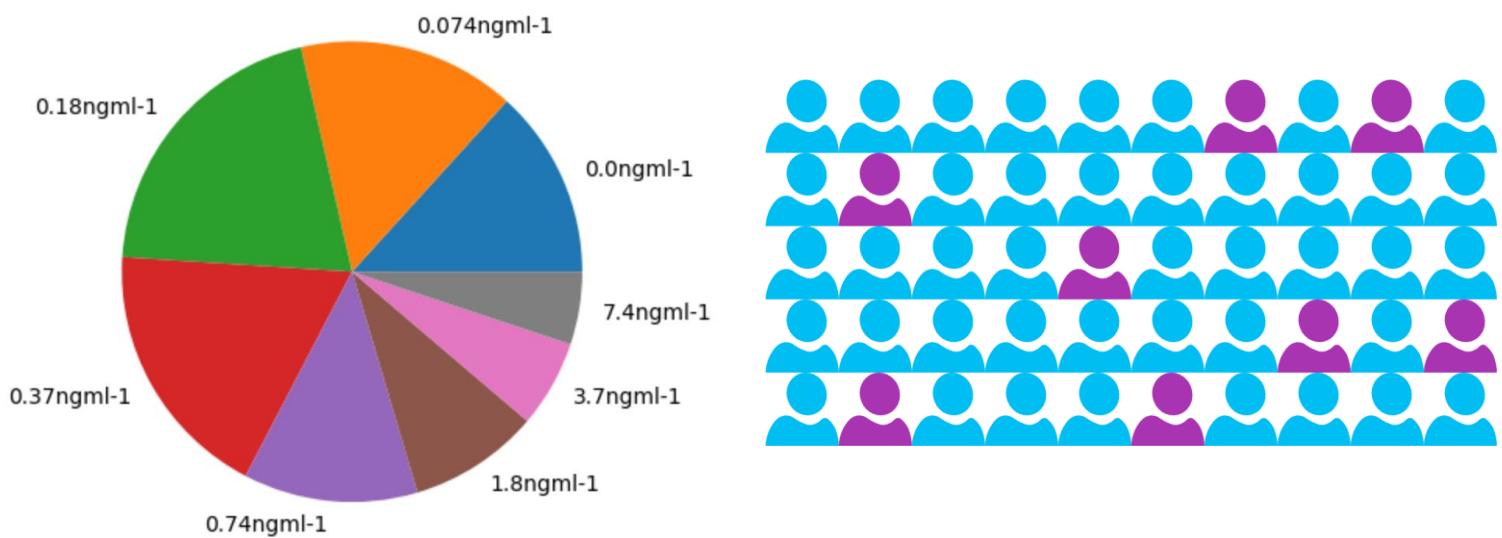
- **Key Takeaways from Successful AI Systems**
  - Always understand the problem or challenge first, don't try to fit AI somewhere and somehow.
  - "a problem well defined is half solved" Charles Kettering GM
  - After defining a problem, do I need AI / ML for this? Why?
- Most real solution involve software engineering combined with AI predictions
- Fuzzy Predictions based on Fuzzy Inputs
- Validation & Verification strategies
- Users and actual use case at the heart of attention
- **Why Deep-Learning AI systems?**
  - Higher throughput at same or better accuracy
  - Quicker to reliable technical solution
  - Make people available for addressing real-needs
  - Example: nurses follow-up calls with thousands of customers, time of in person checks - Hippocratic AI



# AI in Healthcare Safety and Security

## Key Points of Failure for IVD and Diagnostic

- **Biases in training data and process**
  - Specific group bias is extremely common – race, gender, economic status
  - Class imbalance
  - Mitigation → model and training design
  - Lack of awareness and effect
- **Ethical Failures**
  - Data Privacy
  - Negligence: data collection prioritised over welfare
  - Small print for limitations of the system
- **Why safety matters more in context of healthcare?**
  - High throughput and wide deployment → **Amplifying impact** of AI based software
  - Potential to cause harm - direct or indirect
  - Reputation damages for technology → hindered adoption
- **Opportunity: Awareness is key, Using risk analysis to innovate and make a better product.**
- **E.g. testing with deliberately biased or lower/higher quality data to establish robustness boundaries**



## Examples: Key Points of Failure for IVD and Diagnostic

- Measurement, quality and environment of input data
  - AI can not make a bad sensor provide better measurements.
  - If we provide bad data, it will predict inaccurate outcome.
  - Example: diabetic retinopathy scanning system by Google health in Thailand
- Insufficient understanding of capabilities
  - Overstatement or overestimation of capabilities
    - Without real data or V&V
    - IBM's Watson Health
    - Connect all data together and somehow AI will predict, forecast and solve all problems.

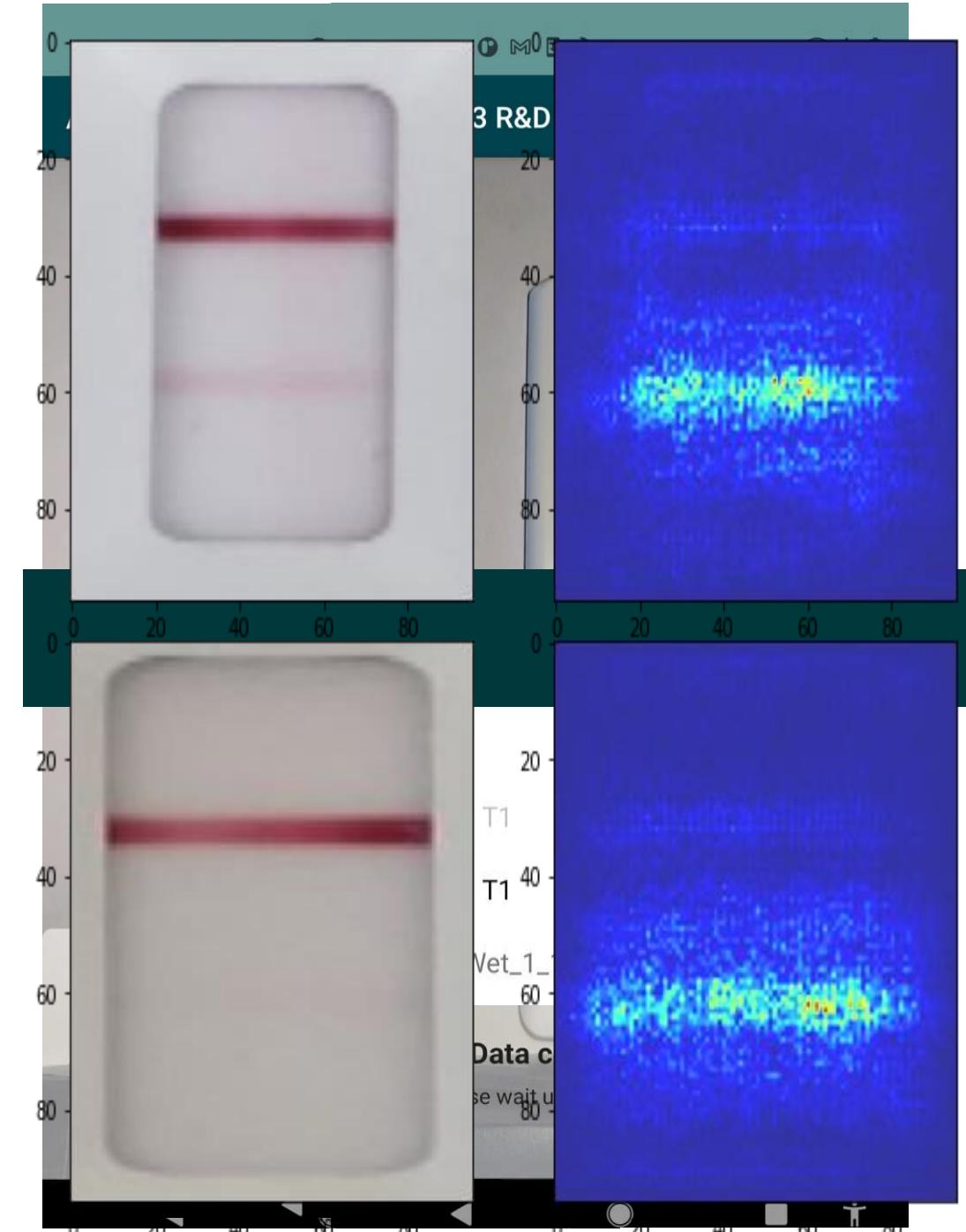


- Broadly like software and hardware security
  - Cybersecurity – attacks, exploits, malware
  - Access Controls
- **Opportunity:** Excellent tool as **Blue-Team Red-Team / Ethical Hacking** for researchers, industry alike.
- **Technological innovation such as AI Review Agents (Vulnerability Scans), AI Assisted Cybersecurity (Super CAPTCHA)**
- **Intentional Breach**
- Data Attacks or Sabotage on LLM based systems connected to real data sources
  - Public Access
  - During usage: Prompt Engineering injection attacks to include special instructions to override system prompts
  - Data leak attacks
    - Gain unauthorized access
- **Misuse of AI**
- **Effect:** bad, unexpected, undesirable output
- **Unintentional Breach**
- Training Data Quality to Unexpected Outcome
  - Example-1: AI tools during Covid
    - trained with mixture of adults and paediatric data, lead to adult vs children classifier instead of Covid vs normal
  - Example-2:
    - AI based Chat Bot for depression support
    - Large amount of text containing harmful data
    - Unimaginable suggestion including instructions to harm

# Abingdon Health's Strategy for Adopting AI

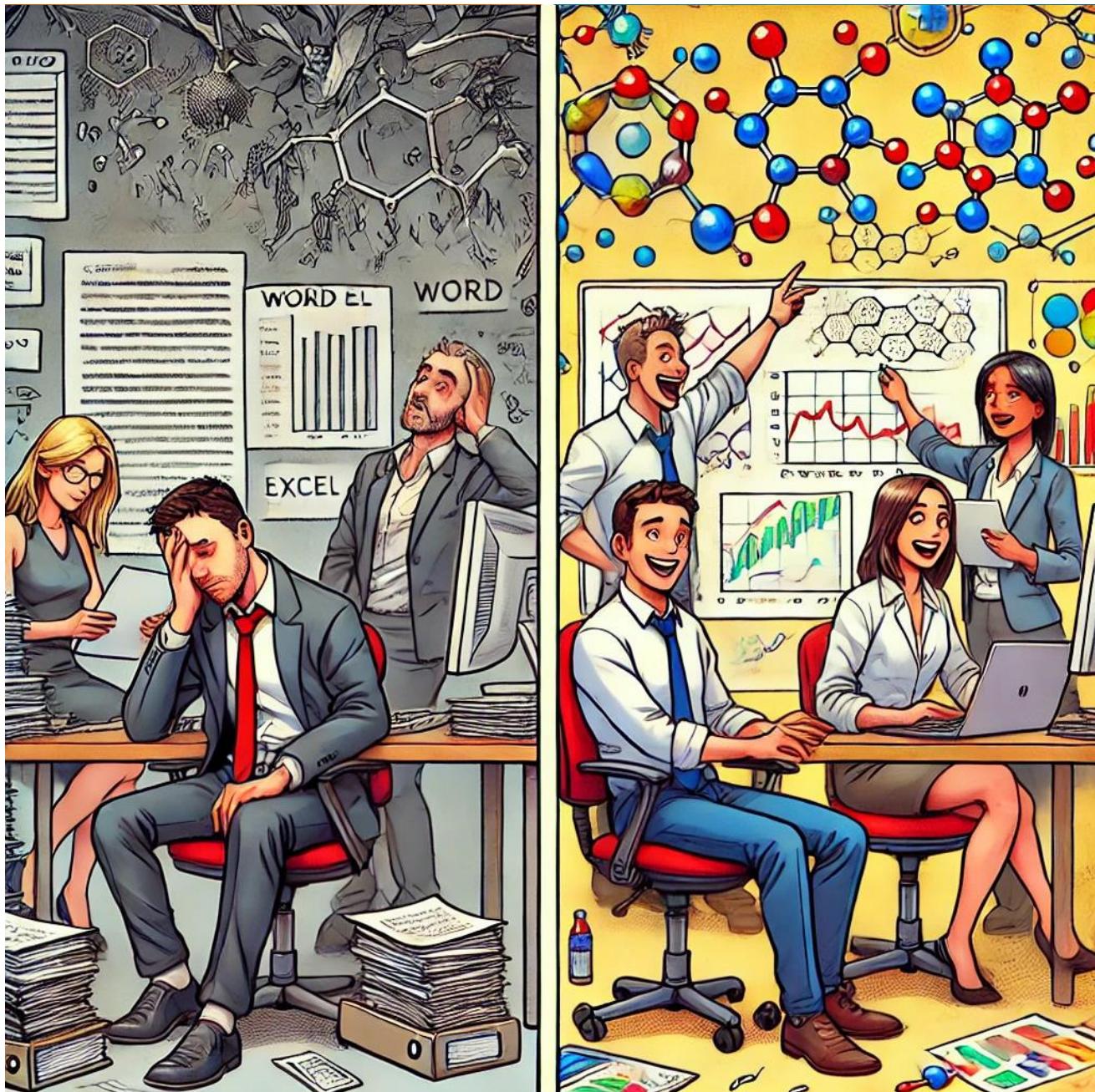
# AppDx® Lateral-flow reader

- AI assisted Smartphone Lateral-Flow reader : AppDx®
  - Data driven – quality as well as quantity
  - Challenges of environmental and smartphone variability
  - Better generalization to account for such a variation
- Match human level performance → in simple tests
  - Human Eyes – highest sensitivity photonic device
  - Positive / Negative / Invalid
- For multiplexed and advanced tests → outperform humans
  - Multiple test lines, complex result logic
  - Semi-quantitative tests
- Successful in a controlled setting for qualitative-usage
- Current Limitation:
  - Quantitative results matching with a benchtop reader



# Enable Creativity and Ingenuity

- **Documentation heavy industry**
  - Deterrent for many to enter health and diagnostics industry
  - A lot of human effort is invested to get it right,
    - totally justified but we are not too good at it, especially at pace
- **Vast amount of interdisciplinary knowledge**
  - Distillation is hard but AI can assist
  - Humans are good at application of knowledge
- **Leveraging LLMs + Software Engineering**
  - Enable people to focus on creative and impactful work by relinquishing machine-oriented tasks to a well engineered system → first review, draft documents, workflows.
  - Software engineering assisted by Code Assistants
- Essentially, we want to be on **happy** side of the cartoon



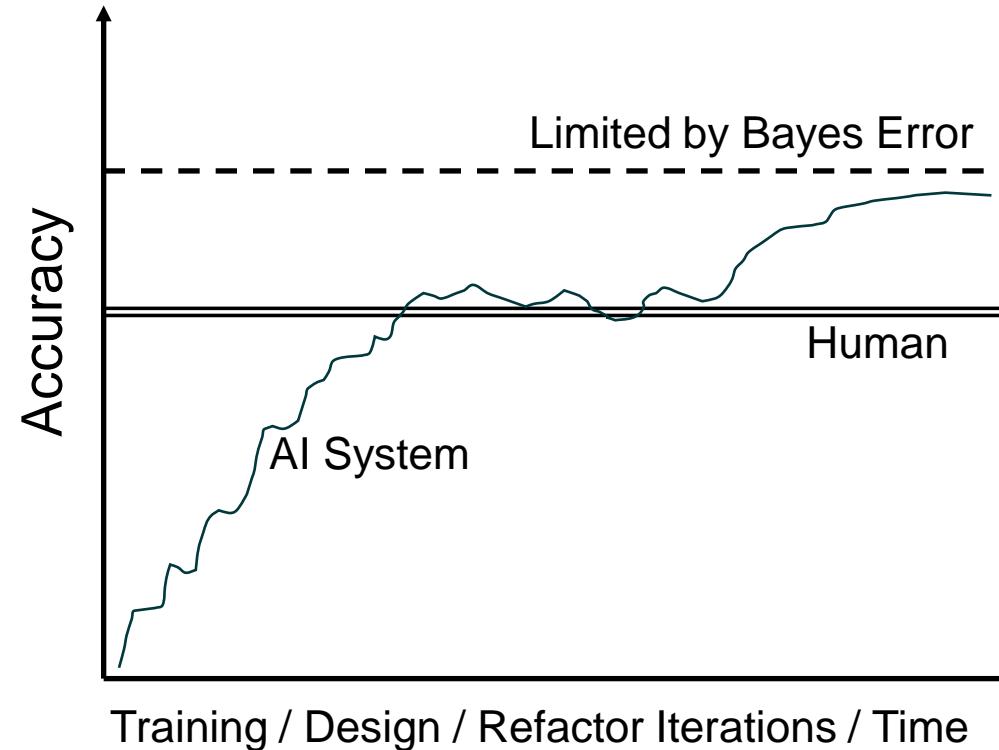
# Gradual Adoption : Risk Mitigation

- **What?**
- Mitigate risks about safety and security
- Gradually introduce AI based system into business and technical workflows
  
- **Why?**
- Our Business is hard-tech,
  - We are developing, manufacturing and deploying diagnostics too in the hands of user
  - Diagnostics tests have direct impact on human lives,  
E.g. Drugs-of-Abuse, Pregnancy, Iron Deficiency
  - Other domains have indirect impact
    - Plant and animal health tests
    - Mycotoxins, antibiotics in food tests



# Risk Mitigation – How?

- **Clear benchmarks and targets**



- **Human-in-loop Vs Autonomous**



- **Design for Fuzzy input and fuzzy output:**

- Clear and thorough validation: narrow specifications
- Point-of-care Systems:
  - Samples and tests from real environments
- Treat same as any Medical device
  - Extra caution
  - Extra variability
- Wider output tolerance

- **Multi-agent Systems vs Monolithic do-it-all-AI**

- Extension of Modular Design
- Dedicated Agent for a specific task
  - UNIX Philosophy: Do one thing and do it right
- Easier to V&V, Debug
- Support gradual autonomy

# Conclusions



1. Opportunity for interdisciplinary AI applications in IVD and Medical Devices.
2. **Iterate** gradually towards larger **scope** by **clearly** defining the challenge and solving it
  - AlphaFold has truly demonstrated these two points.
3. Safety and Security as an **opportunity** rather than hindrance.
4. Understand the limitation and performance of the system

# Thank you!

1. Miró-Padilla, A., Bueichekú, E., Ventura-Campos, N. et al. Long-term brain effects of N-back training: an fMRI study. *Brain Imaging and Behavior* 13, 1115–1127 (2019). <https://doi.org/10.1007/s11682-018-9925-x>
2. Environ. Sci. Technol. 2022, 56, 17, 12210–12217, <https://doi.org/10.1021/acs.est.2c02339>
3. Google's Veriliy Health – Diabetic Retinopathy System <https://dl.acm.org/doi/abs/10.1145/3313831.3376718>
4. <https://theconversation.com/from-a-deranged-provocateur-to-ibms-failed-ai-superproject-the-controversial-story-of-how-data-has-transformed-healthcare-189362>
5. Gender imbalance in medical imaging datasets produces biased classifiers for computer- aided diagnosis. <https://www.pnas.org/doi/pdf/10.1073/pnas.1919012117>



<https://www.abingdonhealth.com>



# An App for Cognitive Health Test

- ❖ A quick, hypothetical idea exercise



- **Test memory, reasoning and response-time**
  - An audio-visual test delivered through iPad
  - Maximum Test Time 10mins
- Collaboration with NHS or Research Team
- Conversational question-answer type
  - Do we need AI? Speech synthesis and recognition.
- We can use existing APIs or models
- How do create baseline for a test?
  - User specific or population basis
  - May be start with monitoring tool?
- But need to V&V with
  - Target population, environments, languages
- Protect user privacy:
  - Clarify whether we store data, how long?
  - How will we use user data?
  - Develop and release test app
  - Participation study, Feedback analysis

- ❖ Based on a real ongoing study: <https://www.protectstudy.org.uk/>

# Our Mission

TO IMPROVE LIFE BY MAKING RAPID TESTING ACCESSIBLE TO ALL

**We achieve this by supporting our customers  
in bringing their products to market**



# PANEL DISCUSSION

**Chair: Phil Baty, Chief Global Affairs Officer, Times Higher Education**

**Professor (Dr) Gurinder Singh, Group Vice Chancellor, Amity Universities**

**Professor Zhihong Huang, Professor of Healthcare Engineering**

**Professor Ibrahim Habli - Department of Computer Science**

**Graham Walsh, Head of Medicine - Health Innovation Yorkshire & Humber**

# CLOSING REMARKS

**Professor (Dr) Anupama Rajesh, Amity University**

**Professor Kiran Trehan, Pro-Vice-Chancellor Partnerships, Engagement  
and Enterprise, University of York**