The future of health: where AI meets medicine

By PROFESSOR WEI XIANG AND PROFESSOR DASWIN DE SILVA

8:00am February 25, 2025

Artificial intelligence is rapidly transforming the healthcare sector, changing how we diagnose disease, develop treatments and personalise care.

The 2024 Nobel prize in Chemistry, awarded for breakthroughs in predicting and designing the structure of proteins, highlights the crucial role AI will play in the future of health and biology.

AI for medical innovation today is what penicillin was for medicine in the 1910s. The era of digital penicillin has arrived.

At La Trobe University, we are embracing an AI-first approach, positioning ourselves at the forefront of this revolution.

Our recently launched Australian Centre for AI in Medical Innovation (ACAMI), funded by the Victorian government with a $10 million investment and supported by a further $9.3 million from La Trobe, is a testament to our commitment.

ACAMI is the world-first university innovation centre dedicated to harnessing AI for breakthrough medical advances, from personalised cancer treatment to accelerated drug discovery.

Supported by our industry partner Nvidia, the centre's computing platform is powered by Australia's first Nvidia DGX H200 supercomputer and the Nvidia Clara suite.

This supercomputing infrastructure accelerates our work on digital twin technology for creating virtual replicas of tumours, allowing us to simulate treatment responses, predict side-effects, and tailor therapies.

In collaboration with research and industry partners, these digital twins promise to refine clinical decision-making in oncology and to improve outcomes.

Using advanced machine learning techniques, our research team is designing ultra-rapid vaccine platforms that can precisely target the unique genetic mutations of each patient's tumour.

During the launch of the Stargate Project at the White House, Oracle chairman Larry Ellison highlighted the potential of AI to create personalised cancer vaccines within 48 hours. ACAMI will add to this international effort by pushing the boundaries of treatment speed and precision.

Our work aims to revolutionise cancer care by enabling tailored immunotherapies that significantly shorten development timelines and improve patient outcomes.

Beyond personalised treatments, AI is accelerating drug discovery. Traditional drug development is lengthy and resource intensive, requiring typically 10 to 15 years and more than $US1 billion ($1.6bn) to reach market. Despite this complexity, more than 90 per cent of new drugs fail clinical tests.

By applying AI-driven models to vast chemical datasets, we can predict drug-target interactions, optimise molecular structures and streamline preclinical trials.

AI is primarily used in two phases of the drug discovery process; firstly, in identifying the therapeutic target at the molecular level and secondly the more effective work of drug design, where Gen AI-type tools are used to "create" molecules that could bind to those therapeutic targets.

This leap in efficiency allows promising treatments to more swiftly move from the lab to the clinic, heralding a new era in precision medicine.

It is critical that the next generation of healthcare professionals is equipped with advanced AI skills embedded in innovative curricula across medical, biotech and biomedical disciplines and this is the third pillar of workforce development at ACAMI. As Australia's AI sector rapidly expands, this investment in human capital is essential for maintaining global competitiveness and driving long-term innovation.

The convergence of AI and medicine is unfolding before our eyes, steadily moving us towards a future where personalised cancer treatments, rapid drug discovery and precision diagnostics become the norm.

La Trobe's commitment towards AI-supported medical research is clear and our work today is shaping a healthier tomorrow for all.

Professor Wei Xiang is Cisco research chair of AI and the internet of Things and director and chief scientist of the Australian Centre for AI in Medical Innovation at La Trobe University.

Professor Daswin de Silva is professor of AI and analytics at La Trobe University.

TRENDING

'End to war': Iran, Israel agree to 12-hour ceasefire, says Trump

Donald Trump says Tehran and Jerusalem will start a ceasefire at 2pm AEST and when the ceasefire finishes, the 12-day war will come to an end.

By JOE KELLY, YONI BASHAN, LIAM MENDES

PM's confusion, passivity and weakness has made us irrelevant

We live on the capital of the goodwill of our past and the continued relevance of our geography. But Australia would be just as relevant strategically if it were a colony of penguins.

By GREG SHERIDAN

Victoria backs down on sweeping gas bans

The Victorian government has softened changes aimed at electrifying the state and reducing the use of gas following an outcry.
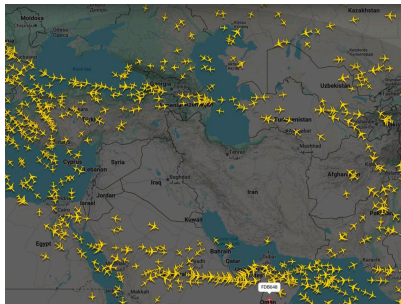
By PERRY WILLIAMS

Albanese welcomes ceasefire push; Wong condemns Iran strike

Anthony Albanese calls for de-escalation as the Foreign Minister cautions against the devastating consequences of a 'full-scale war in the Middle East'.

By BEN PACKHAM, SARAH ISON, NOAH YIM

Qantas flights turned around as Iran conflict causes aviation chaos

Qantas has turned back a flight to Europe and diverted another after Qatar closed, and then reopened its airspace in response to the Iranian attack.

By ROBYN IRONSIDE

Inside Al Udeid: the importance of this Qatar base to US military

Al Udeid Air Base in Qatar is the biggest US military facility in the Middle East, with links to Donald Trump.

By AGENCIES

The mental load is leaving us exhausted

Dr on avoiding stress-related hair loss