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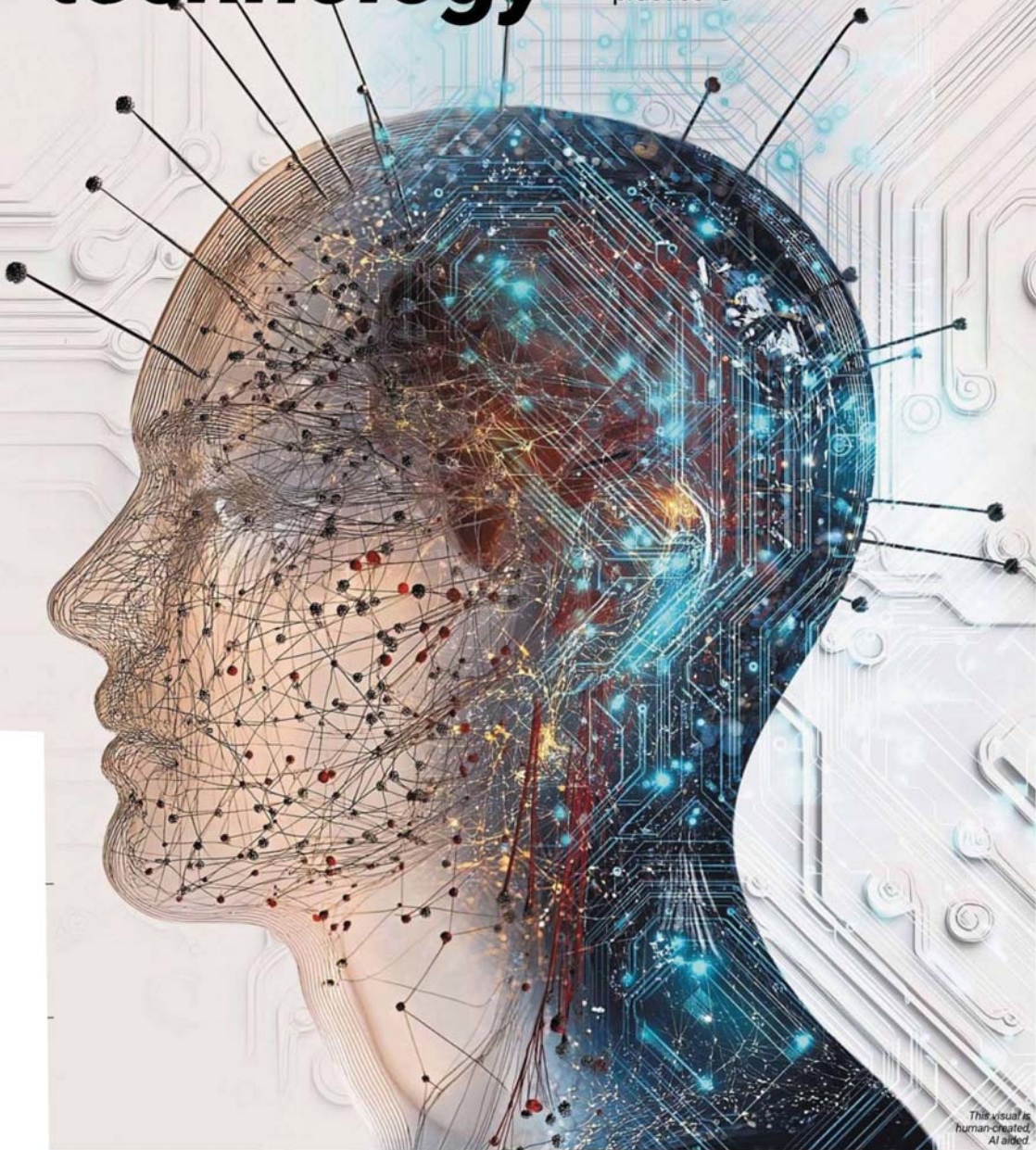
Integrating AI into TCM

The Star, Malaysia



# Bridging tradition and technology

Traditional Chinese medicine is undergoing a revolution with the increasing exploration of artificial intelligence to enhance its practice. 3



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By Asst Prof Dr TEO CHIAH SHEAN

IN THE last three decades, humanity has witnessed groundbreaking technological advancements.

The Internet revolutionised our connectivity, smartphones reshaped our communication, and now, artificial intelligence (AI) is transforming how we think and innovate.

It is no different for healthcare, with digital health expanding rapidly across the globe.

Research papers and news highlight AI's potential to revolutionise healthcare by enhancing diagnosis, treatment and patient management, with its complexity and capability growing every year.

According to World Health Organization (WHO) Department of Digital Health and Innovation (DHI) AI and Digital Frontiers in Health Team lead Sameer Pujari, the framework of AI applications in healthcare can be put into four major categories:

### > Population health:

Surveillance and prediction, population risk prediction, and targeted interventions.

> Individual health: Care routing (triage and personal outreach) and care services (prevention, diagnosis, acute treatment and follow-ups).

> Health systems: Enhancing medical records, quality assurance, and coding and billing.

> Pharma and medical tech: Accelerating drug discovery, supporting clinical trials, and real-world evidence collection.

According to WHO's *Global Health Strategy on Digital Health 2020-2025*, digital transformation in healthcare will be disruptive and technologies such as the Internet of Things (IoT), AI, big data analytics and blockchain have the potential to enhance health outcomes by improving medical diagnosis, data-based treatment decisions and self-management of care.

The Global Initiative on AI for Health (GI-AI4H) was launched in July 2023 for governance (ethics, equity, regulations and policy development), as well as benchmarking and validation.

Its aim is to implement sustainable models of an AI ecosystem at the country level.

Malaysia's commitment to AI in healthcare is evident. Ranked 22nd globally in the Government AI Readiness Index 2023, the country is poised to lead in this field with the establishment of the National AI Office last December.

### Applying AI to traditional medicine

The WHO, in collaboration with the International Telecommunications Union, also established a Topic Group on AI for Traditional Medicine (TM) to coordinate benchmarking for assessing the quality of TM systems using standardised AI-based approaches.

It developed TM-based AI ecosystems to enable policymaking, facilitate resources and communities of practice, and implement AI in TM at the ground level.

The WHO's Global Traditional Medicine Centre (GTMC) and DHI launched a global technical meeting on AI in TM in September 2024 with 60 participants from 15 countries across all six WHO regions, to exchange experiences and enhance understanding of how AI can advance traditional medicine.

On the national level, the Health Ministry's Traditional and Complementary Medicine (T&CM) Division hosted the 10th International Conference on Traditional and Complementary Medicine (Intracom) in November 2024, themed "T&CM in the Digital Age".

Experts from around the world gathered at the National Institutes of Health in Setia Alam, Selangor, to discuss integrating AI with T&CM practices.

### Updating TCM

Traditional Chinese medicine (TCM), rooted in millennia of traditional wisdom, is experiencing a renaissance with AI integration.

As early as the 1970s, TCM experts and scholars began initial attempts to introduce AI technology into TCM, although the results were relatively limited.

After years of innovation, new-generation AI technologies have gradually matured.

Now, with AI's exceptional capabilities in data mining and collection, data processing and analysis, and deep learning, it can facilitate the structured and scientific representation of vast volumes of ancient texts and clinical diagnostic experiences.

This helps establish objective standards and evaluation systems for TCM diagnostics and treatment, and broadens the application of TCM in this evidence-based medicine era.

Emerging technologies of AI in TCM are reshaping TCM diagnostics, traditionally reliant on human perception through four diagnostic methods, i.e. inspection, auscultation, inquiry and pulse-taking.

For instance, intelligent TCM diagnostic tools now analyse facial features, tongue images and pulse data with precision, analysing clinical data and comparing it with disease-specific datasets on backend database platforms.

AI-enabled devices such as "smart TCM diagnosis mirrors" provide quantified health assessments in minutes, integrating TCM theory with real-time data analysis, and generating objective and systematic TCM health status evaluation reports.

The AI-facilitated TCM online and offline resources in a centralised approach, leveraging AI technologies to reform TCM pharmaceutical services.

By establishing a comprehensive



TCM has traditionally been reliant on human perception for diagnosis, including pulse-taking, but now, AI-powered tools can potentially analyse facial features, tongue images and pulse data to help practitioners in making a diagnosis. — Filepic

sive information traceability system that covers the entire process from storage, dispensing and decoction to packaging and distribution, AI analyses and compares data based on TCM herbal samples.

This enables effective identification of authenticity, traceability of origins, and quality prediction of TCM herbs, replacing the traditional methods of visual inspection, smelling, touching and tasting.

Patients can even access information about the processing and preparation of their medications through online self-service platforms.

### Master guidance

An example of AI application in TCM clinical decision support is Meridian AI Medics, a tech company in China.

This tech company has integrated a "hybrid AI model" that combines knowledge-driven and data-driven models, underpinned by 30 years of TCM research supported by Chinese government-funded IT projects.

Meridian AI Medics has developed a TCM AI Brain (hybrid AI model) that mirrors the functions of the human brain.

Just as the human left brain handles logic and reasoning (smart data), and the right brain deals with intuition and imaging (real-world data), this hybrid model incorporates a baseline knowledge database.

This database includes ancient TCM texts and modern clinical research findings, calibrated using machine-learning techniques with data from 136 National TCM Master case studies.

By inputting real patient data, the TCM AI Brain can recommend herbal prescriptions, acupuncture points, diet therapies and lifestyle changes, assisting TCM practitioners in clinical decision-making.

It also facilitates follow-ups and provides feedback to practitioners, offering a learning experience

akin to having a National TCM Master guiding them step-by-step.

The TCM AI Brain collects clinical data through observation, inquiry, pulse analysis and tongue diagnosis, analysing these symptoms collectively via a Bayesian network to generate a TCM diagnosis and suggest precise prescription recommendations.

After patients consume the recommended herbal prescriptions, the system gathers feedback, reinforcing the practitioner's learning process.

One unique aspect of this personalised precision medicine is its differentiation at five levels: the same disease may manifest in different TCM patterns; the same TCM pattern may require different prescriptions; and prescriptions may vary in ingredients; quantities; and preparation methods.

These complexities are addressed by the AI model, which bases its recommendations on the smart and real-world data mentioned above.

### Challenges and future directions

While AI offers immense promise for TCM, challenges persist from different perspectives:

> **Government** – lack of specific regulations for AI applications in TCM and lack of nationwide digital infrastructure to support AI-based solutions.

> **Industry** – resistance from TCM practitioners to adopt AI tools, fearing they may replace traditional diagnostic methods, and concern about the lack of accuracy and clinical validation of AI models in TCM.

> **Academic** – shortage of interdisciplinary experts trained in both AI and TCM, and difficulty in securing high-quality, large-scale clinical datasets for AI model training due to fragmented research efforts and limited digitisation of historical TCM clinical records.

> **Training providers** – skill gaps

persist, as there are no accredited training programmes that integrate AI knowledge with TCM practice.

To overcome these hurdles, TCM practitioners and AI developers must collaborate closely. Universities and research centres can play a pivotal role by fostering interdisciplinary education and training programmes, equipping the next generation of TCM professionals with the skills needed to bridge these fields.

As AI continues to empower TCM, it holds the potential to:

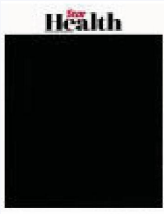
- > Broaden access to TCM services globally.
- > Enhance diagnostic accuracy and treatment personalisation.
- > Establish clinical Big Data platforms for continuous improvement and innovation.
- > Foster international collaborations to address global health challenges through TCM.

The "AI+TCM" synergy promises to revolutionise TCM, ensuring its relevance and accessibility in the digital age.

By harmonising traditional wisdom with modern technology, TCM can address contemporary healthcare challenges while preserving its cultural heritage.

The journey ahead is both exciting and transformative, paving the way for a new era of integrative medicine.

Assistant Professor Dr Teo Chiah Shean is trained in both Western and traditional Chinese medicine, and is UCSI University's Traditional and Complementary Medicine School head. For more information, email [starhealth@thestar.com.my](mailto:starhealth@thestar.com.my). The information provided is for educational and communication purposes only, and should not be considered as medical advice. The Star does not give any warranty on accuracy, completeness, functionality, usefulness or other assurances as to the content appearing in this article. The Star disclaims all responsibility for any losses, damage to property or personal injury suffered directly or indirectly from reliance on such information.



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### SUMMARIES

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