

S5 Summary Report

Bioinformatics and AI Applications in TCM

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14

abstracts

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biomedical discovery topics

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clinical meta-analysis

2026

UC

NO-5-1

Spatial omics / UC

Ulcerative colitis · Spatial transcriptomics · Indigo naturalis

SUMMARY REPORT

Spatially defined fibroblast–macrophage niches sustain ulcer-associated inflammation and respond to indigo therapy

Jiang, Xu, Luo et al. · Hong Kong Baptist University / collaborators

OBJECTIVE

Define the cellular architecture of UC ulcer lesions and test whether Indigo targets pathogenic stromal–immune niches.

METHODS

DSS colitis mouse model; integrated snRNA-seq, Stereo-seq spatial transcriptomics, cell deconvolution, regionalization and CellChat communication analysis.

KEY FINDINGS

Ulcer central zones were dominated by Fibroblast_4 and Macrophage_3, forming an ECM-centric inflammatory hub via collagen/tenascin signaling. Indigo reduced these subsets, weakened pathological ECM crosstalk and restored epithelial integrity.

TAKEAWAY

Localized fibroblast–macrophage niches are actionable targets for deep mucosal healing in ulcerative colitis.

AI

NO-5-2

AI adoption

AI · Chinese Medicine · Practitioner survey

SUMMARY REPORT

Practitioner-based survey study for AI adoption among Chinese Medicine practitioners in Asia

Ng, Kon, Goh & Zhong · Nanyang Technological University

OBJECTIVE

Assess CM practitioners' beliefs, perceived risk, acceptance and trust toward AI across clinical scenarios.

METHODS

Structured Asia-wide practitioner survey; 400 valid responses; PCA, subgroup analyses, violin plots and OLS regression models.

KEY FINDINGS

Familiarity and prior AI use were linked to higher belief, acceptance and trust. AI was less trusted for CM-specific intervention decisions. Belief strongly predicted acceptance; acceptance strongly predicted trust; perceived risk had minimal influence.

TAKEAWAY

AI implementation in CM should prioritize structured education and positive experiential training to build acceptance and trust.

Syn

NO-5-3

Herbal synergy

Herbal synergy · Bioinformatics · Machine learning

SUMMARY REPORT

Mapping bioinformatics and AI approaches for investigating herbal synergy in Traditional Chinese Medicine

Zhou, Kapini, Munir, Li & Chang · Western Sydney University / collaborators

OBJECTIVE

Map how bioinformatics and AI methods are being used to study synergistic interactions in Chinese herbal medicines.

METHODS

Scoping review of PubMed, Embase, Web of Science, Scopus, MEDLINE and CNKI; 2004–Feb 2026; 170 included studies from 4,526 records.

KEY FINDINGS

Machine learning, graph embeddings, response surface modeling and AI classification are increasingly used to prioritize herb pairs and multi-component mixtures, but many studies remain statistical and lack mechanistic validation.

TAKEAWAY

Computational prediction should be integrated with pharmacological and clinical validation to advance evidence-based herbal synergy research.

LLM

NO-5-5

RAG / LLM

TCM prescription · RAG · Fracture care · GPU acceleration

SUMMARY REPORT

Comparative analysis of retrieval-enhanced large language models for formulating TCM prescriptions

Liu, Chen & Chang · NCKU / CMUH / CMU

OBJECTIVE

Compare LLM performance in generating personalized TCM recommendations for fracture management using a RAG framework.

METHODS

Retrospective dataset of 50 fracture cases; domain-specific knowledge graph; benchmarked Llama3.1, LLaVA Llama3 and Llama2 models on RTX 5090 GPU; expert MOS and quantitative metrics.

KEY FINDINGS

Llama3.1 8B achieved the best performance (F1 92.3%, precision 94.1%, recall 90.6%). Hardware acceleration improved computational efficiency for complex medical tasks.

TAKEAWAY

Modern LLMs plus RAG can support TCM clinical decision systems, but domain knowledge grounding remains essential.

DHI

NO-5-10

Clinical safety CDSS

Drug-herb interaction · CDSS · Patient safety

Cloud-based clinical decision support system for drug-herb interaction monitoring in a medical center

Lin, Tsai & Tu · CMUH / CMU Children's Hospital / Pharmacy

OBJECTIVE

Develop and evaluate a real-time CDSS for drug-herb interaction screening in a dual-medicine healthcare environment.

METHODS

Rule-based safety platform integrated with physician order entry and NHI PharmaCloud; alert logs archived to analyze clinical decisions.

KEY FINDINGS

The system recorded 27,611 overridden alerts. Antithrombotics were the dominant interaction category, especially aspirin-Danshen. NHI PharmaCloud linkage expanded screening across institutions since 2017.

TAKEAWAY

Integrated DHI alerts can strengthen patient safety while preserving clinicians' professional flexibility.

SR

NO-5-14

Clinical evidence

HER2-positive breast cancer · CHM · Meta-analysis

SUMMARY REPORT

Integrative Chinese herbal medicine in HER2-positive breast cancer: systematic review and meta-analysis

Lu & Chen · Chang Gung Memorial Hospital / Chang Gung University

OBJECTIVE

Evaluate whether CHM plus standard therapy improves tumor response and reduces toxicity in HER2-positive breast cancer.

METHODS

Systematic review of five databases, 2015–2024; 17 randomized controlled trials; outcomes included CR, ORR, DCR, side effects and tumor markers; trial sequential analysis.

KEY FINDINGS

CHM integration improved CR, ORR and DCR, reduced treatment-related side effects, and lowered CA15-3/CA-125. Longer treatment duration was associated with better DCR.

TAKEAWAY

Integrative CHM shows promise as supportive care, but stronger high-quality trials are needed for confirmation.

E2C

NO-5-17

Evidence-to-CDSS

TCM safety · Medication safety · CDSS

SUMMARY REPORT

Integrating evidence-based data into a clinical decision support system for Traditional Chinese Medicine

Huang, Tsai, Tu, Wu, Chiu & Lin · CMUH / CMU Children's Hospital

OBJECTIVE

Build a medical-center system translating evidence-based TCM medication safety topics into actionable CDSS alerts and recommendations.

METHODS

Multidisciplinary physician–pharmacist panel; quarterly consensus meetings; topics sourced from ADR reports, clinical studies and classical TCM literature.

KEY FINDINGS

Since 2023, 12 expert meetings reviewed 27 topics, producing monitoring protocols, revised drug information and pharmacogenomic testing guidance such as HLA-B*35:01 and Polygonum multiflorum.

TAKEAWAY

Expert governance can convert evidence into real-time TCM safety support embedded in clinical workflow.

Ann

NO-5-19

Annotation / LLM

TCM case records · LLM · Pre-annotation

SUMMARY REPORT

Evaluating the efficiency of LLM-assisted pre-annotation in fine-grained annotation of TCM case records

Wu, Chen, Hsu, Tsai & Chang · CMU / NYCU / CMUH

OBJECTIVE

Evaluate whether LLM pre-annotation can reduce the workload of fine-grained TCM case record annotation.

METHODS

Five annotated gold-standard cases used to build guidelines; ten additional cases were annotated manually and via LLM pre-annotation followed by human revision.

KEY FINDINGS

LLM-assisted workflow reduced annotation time from 34 to 19 minutes (44.1%). Acceptance rate was 53%; no full re-annotation was needed. Performance was strongest for medication and weakest for symptom/sign labels.

TAKEAWAY

LLM pre-annotation is feasible for TCM corpus construction, but expert revision remains necessary.

Edu

NO-5-21

AI education

Generative AI · TCM education · Chatbot

SUMMARY REPORT

Developing a generative AI chatbot for Chinese herbal medicine education: student perceptions and learning outcomes

Ko & Yen · China Medical University / CMUH

OBJECTIVE

Develop a CHM-specific AI chatbot and assess its influence on student learning, knowledge calibration, expectations and ethics.

METHODS

Quasi-experimental non-equivalent pretest–posttest design; 28 TCM students; AI group used customized GPT-4.1 mini chatbot for one semester.

KEY FINDINGS

Exam scores did not differ significantly, but AI users showed better alignment between perceived and actual knowledge, more realistic expectations of AI, and a moderate improvement signal in ethical reasoning.

TAKEAWAY

AI in TCM education may be most valuable for calibration, boundaries and ethics—not only test performance.

Met

NO-5-23

Metabolomics

Bletilla formosana · Untargeted metabolomics · Annotation

SUMMARY REPORT

Integrated untargeted metabolomics improves metabolite annotation and reveals phytochemical diversity in Bletilla species

Nguyen & Lu · Taipei Medical University / NRICM / NYCU

OBJECTIVE

Compare phytochemical diversity between *B. formosana* and commercial Bletillae Rhizoma products and improve metabolite annotation.

METHODS

Untargeted LC-MS/MS, molecular networking and multi-database annotation workflow applied to Bletilla species and products.

KEY FINDINGS

About 60% of detected features were shared; *B. formosana* showed 108 unique features and several putatively unreported structures. The workflow improved annotation efficiency by 44% and reached 97% annotation coverage for shared candidates.

TAKEAWAY

***B. formosana* may be a chemically diverse alternative resource for functional food and nutraceutical research.**

DNA

NO-5-25

DNA barcode / AI

DNA barcoding · Medicinal materials · AI curation

SUMMARY REPORT

Medicinal Materials DNA Barcode Database 2.0

Chan & Shaw · The Chinese University of Hong Kong

OBJECTIVE

Redevelop MMDBD to improve DNA-based authentication through AI-driven curation and expanded verified sequence coverage.

METHODS

Machine learning curation pipeline detects sequence anomalies, mis-annotations and low-quality entries; AI-driven GenBank screening before incorporation; voucher-authenticated sequences added.

KEY FINDINGS

MMDBD 2.0 improved data reliability, reduced false positives while maintaining recall, broadened taxonomic coverage and added an automated quality gate for future submissions.

TAKEAWAY

AI-supported DNA barcoding can strengthen medicinal material authenticity, traceability and quality assurance.

Tong

NO-5-28

Mobile tongue AI

Tongue diagnosis · Object detection · Mobile AI

SUMMARY REPORT

Deploying deep learning object detection on low-end mobile phones for real-time tongue feature localization

Chang, Lo & Chang · CMU / CMUH

OBJECTIVE

Develop an AI system that localizes clinically relevant tongue features directly on a mobile phone.

METHODS

764 tongue photographs annotated for fissures, tooth marks, thick coatings and yellow coatings; YOLO models trained and converted for Android deployment.

KEY FINDINGS

Models achieved mAPs of 51.6% for fissures, 59.1% tooth marks, 73.4% thick coatings and 59.3% yellow coatings. Real-time detection ran on a low-end realme narzo 50A smartphone.

TAKEAWAY

Low-cost mobile deployment can make tongue diagnosis tools more intuitive and clinically feasible.

DR

NO-5-31

AI drug development

GC01 · Diabetic retinopathy · AI-enabled Chinese medicine

SUMMARY REPORT

AI-driven development of GC01 as an oral Chinese medicine candidate for diabetic retinopathy

Cheng & Feng · The University of Hong Kong

OBJECTIVE

Summarize the translational rationale for GC01, an oral AI-optimized Chinese medicine candidate for diabetic retinopathy.

METHODS

Integrated AI formula optimization, CMC development, preclinical DR models, toxicity studies, in situ high-content RNA sequencing and pilot clinical observation.

KEY FINDINGS

GC01 improved retinal pathology in diabetic models with no obvious toxicity in acute and sub-chronic tests. Mechanistic data suggest vascular protection and neural regeneration. Two China patents were granted; pilot clinical effective rate was about 75%.

TAKEAWAY

GC01 is a promising oral DR candidate, requiring regulated trials and quality standardization for registration.

Multi-person VR Acupuncture Metaverse

One-page summary report based on CGCM2026 abstract

China Medical University

VR · TCM · OSCE · Remote collaboration

Need & Objective

Education gap

Traditional acupuncture training has difficulty visualizing deep anatomy and coordinating multi-user practice.

Core aim

Build an immersive “Acupuncture Metaverse” to improve acupoint localization and realistic clinical simulation for remote learning.

Platform breakthroughs

3D anatomical
visualization

Seven clinical
positions

Immersive
Acupuncture
Metaverse

platform concept

Interactive tools
3D pen · ruler

Multi-user networking
recording · playback

Educational Impact

Superior anatomical clarity compared with physical models

OSCE-ready simulations including case reading, virtual patient interview, and needle insertion

Standardized feedback through procedural recording, playback, and data-driven review

Key Takeaway

Bridges theory and clinical practice as a scalable platform for remote interaction, assessment, and future professional certification.

Keywords: Virtual Reality · Acupuncture Education · TCM · OSCE · Multi-user Connectivity · 3D Anatomical Visualization

Source: abstract provided in uploaded DOXX

Thanks for your attention !