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QUANTUM

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AI and Quantum Research Center (AIQRC), Asia University, Taiwan

Activity

Time/Place: Nov. 13-14, 2025, Asia University, Taichung

The International Symposium on Quantum AI and the Future of Life took place at Asia University on November 13–14. The event gathered leading domestic and international scholars and experts in artificial intelligence, quantum technology, biomedicine, and traditional Chinese medicine to explore the latest advances in Quantum AI (QAI) and its applications in medicine, life sciences, and longevity technologies.

Click here for more details

Quantum-Enhanced Machine Learning Accelerates Clinical Trials

Quantum Machine Learning (QML) is emerging as a transformative force in biomedical research, particularly in oncology. Recent work highlights how QML can optimize patient stratification and accelerate drug discovery by handling high-dimensional multi-omics and imaging data more efficiently than classical methods. For example, researchers demonstrated that quantum-enhanced algorithms could outperform traditional machine learning in identifying therapeutic compounds for cancer targets such as KRAS, a previously ‘undruggable’

oncogene, significantly reducing computational complexity and time-to-discovery in preclinical studies. Similarly, a systematic review emphasizes QML's potential to revolutionize precision medicine by enabling faster genomic analysis, personalized treatment planning, and adaptive clinical trial designs, though challenges like error correction and hardware scalability remain. As quantum hardware advances such as IBM's new 120-qubit Nighthawk processor designed for quantum advantage integrating QML into clinical workflows could become a cornerstone of next-generation cancer care.

Recent research highlights a significant push toward integrating Quantum Machine Learning (QML) and quantum optimization algorithms to revolutionize the design and execution of clinical trials. Traditional trial processes are often plagued by lengthy timelines, complex patient recruitment, and the challenge of accurately modeling drug efficacy and toxicity across diverse patient populations. QML, particularly through techniques like Quantum Neural Networks (QNNs) and Quantum Optimization Algorithms (QOAs), is being explored to process high-dimensional genomic and patient data with greater efficiency than classical methods. Collaborations between technology leaders, research institutes and pharmaceutical companies are focusing on using QML to enhance predictive models for Pharmacokinetics and Pharmacodynamics (PBPK/PD), which could drastically reduce the need for extensive in vivo testing by providing more accurate in silico simulations. By optimizing crucial steps like patient cohort selection and site selection, this quantum-enhanced approach promises to accelerate the delivery of new therapies and usher in an era of more precise and personalized medicine.

References:

1. Quantum computing makes waves in drug discovery – St. Jude Research (https://www.stjude.org/research/progress/2025/quantum-computing-makes-waves-in-drug-discovery.html)
2. Quantum computing revolution in healthcare – Springer (https://link.springer.com/article/10.1007/s10462-025-11381-w)
3. IBM Quantum Nighthawk announcement (https://newsroom.ibm.com/2025-11-12-ibm-delivers-new-quantum-processors,-software,-and-algorithm-breakthroughs-on-path-to-advantage-and-fault-tolerance)

AI-Driven Multi-Omics Integration for Cancer Biomarker Discovery

Cancer is a highly heterogeneous disease, and understanding its complexity requires integrating diverse molecular layers genomics, epigenomics, transcriptomics, and proteomics. Recent advances in AI-driven multi-omics analysis are enabling researchers to uncover novel biomarkers and therapeutic targets with unprecedented precision. Deep learning models now combine high-dimensional omics data with imaging and clinical records to predict drug sensitivity and resistance mechanisms, paving the way for adaptive treatment strategies. Reviews in Frontiers in Pharmacology and Discover Oncology highlight how these integrative approaches improve early detection, prognosis, and personalized therapy selection, while addressing challenges such as data harmonization and algorithmic transparency. These

innovations are critical for accelerating biomarker validation and reducing trial timelines, ultimately transforming precision oncology into a more predictive and preventive discipline.

References:

4. Advancing precision oncology with AI-powered genomic analysis – Frontiers (https://www.frontiersin.org/journals/pharmacology/articles/10.3389/fphar.2025.1591696/full)
5. AI-driven biomarker discovery – Springer (https://link.springer.com/article/10.1007/s12672-025-02064-7)
6. Deep learning–driven multi-omics analysis – Oxford Academic (https://academic.oup.com/bib/article/26/4/bbaf440/8242583)

Upcoming Conferences (2025):

7. SC25 – International Conference for High Performance Computing (https://www.tmcnet.com/usubmit/2025/11/10/10286806.htm)
8. Quantum + AI Conference (IQT) (https://iqtevent.com/quantumai/)
9. European Quantum Technologies Conference (EQTC 2025) (https://quantumcomputingreport.com/conferences/)
10. IBM Quantum Developer Conference (https://quantumcomputingreport.com/conferences/)
11. Q2B 2025 (Quantum Computing for Business) (https://iotworldmagazine.com/2024/12/17/2632/list-of-top-10-quantum-computing-conferences-in-2025-in-london-uk-europe-germany-usa-china-japan-india-and-dubai-uae)
12. AI in Healthcare Summit (https://themedicalpractice.com/career-resources/best-ai-healthcare-summits/)
13. IEEE EMBS BHI 2025 – Biomedical and Health Informatics (https://bhi.embs.org/2025/)
14. MICCAI 2025 – Medical Image Computing and Computer-Assisted Intervention (https://themedicalpractice.com/career-resources/best-ai-healthcare-summits/)

Organizations Working on Quantum Machine Learning in Healthcare:

15. IBM Quantum & Cleveland Clinic Discovery Accelerator (https://my.clevelandclinic.org/research/computational-life-sciences/quantum-computing/research)
16. Algorithmiq (https://www.aha.org/aha-center-health-innovation-market-scan/2024-05-14-3-companies-hope-advance-health-research-quantum-leap)
17. Health (https://www.aha.org/aha-center-health-innovation-market-scan/2024-05-14-3-companies-hope-advance-health-research-quantum-leap)
18. Qradle (https://www.aha.org/aha-center-health-innovation-market-scan/2024-05-14-3-companies-hope-advance-health-research-quantum-leap)
19. IBM Qiskit & Quantum Experience (https://healthcarereaders.com/insights/quantum-computing-companies-in-healthcare-industry)
20. AIQRC Backup Site https://ppiddi.wixsite.com/qphys

Prepared by
Dr. Venugopalareddy Mekala
Email: mekalavenugopalareddy.bioinfo@gmail.com
Phone: +1 (346)-563-5356
Postdoctoral Fellow, Nutrition Sciences Research,
Dr. Ritu Aneja Lab,
Room-314, 1675 University Blvd, Birmingham, AL 35233

UAB: https://scholars.uab.edu/20181-venugopalareddy-mekala/about
LinkedIn: www.linkedin.com/in/venugopalareddy-mekala-phd-56807658
GitHub: https://github.com/venu887
PhD Work as a Video for Asia University: https://shorturl.at/nZuiZ
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Edited by
Ka-Lok Ng [1,2]
[3]Vice Director, AIQRC
[4]Distinguish Professor, Department of Bioinformatics and Medical Engineering,
Asia University, Taiwan

AI and Quantum Research Center (AIQRC)

Room A110, Asia University, No. 500, LiuFeng Rd., WuFeng Dist., Taichung City 41354 Taiwan.

Email: qphys.qcomp@gmail.com Office: 04-23323456 ext. 6631

Web: https://quantum.asia.edu.tw/