Project Name: AI-Powered Diagnostic Platform Integrating Tumor and CSF Sequencing for Precision Care in CNS Tumors

Principal Investigator: **Prof. Aya El Helali** (MB BCh BAO, MRCPI, PhD)

Technology

- Develop AI-aided multi-omics tumor–CSF paired diagnostic platform for high-grade glioma (WHO CNS5 Grade 3–4).
- Integrates:
  1. Single-cell / CITE-seq for tumor & immune ecosystem profiling
  2. Whole-genome sequencing for mutations, copy number & ecDNA detection
  3. CSF methylation profiling for minimally invasive & longitudinal residual disease monitoring
- Sequence on standard instruments (10x Genomics, Illumina) with automated QC and traceable logs.
- Designed for in-hospital access-control deployment with awareness on patient privacy.

Stage of Development

Year 1
- Finalize wet-lab SOPs for tumor and CSF processing and diagnostic algorithms for ecDNA and CSF methylation.
- Launch 50-patient pilot at HKU–QMH to assess diagnostic accuracy, tissue–CSF concordance, and tumaround time.

Year 2
- Expand testing to local hospitals to evaluate multi-site reproducibility and scalability.
- Establish quality assurance and documentation systems to support future regulatory review and key patent applications.

Year 3
- Complete large-scale clinical validation across GBA and internationally.
- Finalize CSF-based diagnostic kit and on-prem package for clinical use.
- Prepare regulatory submissions and launch as a specialized diagnostic service within HKUMed and partner hospitals.

Key Advantages

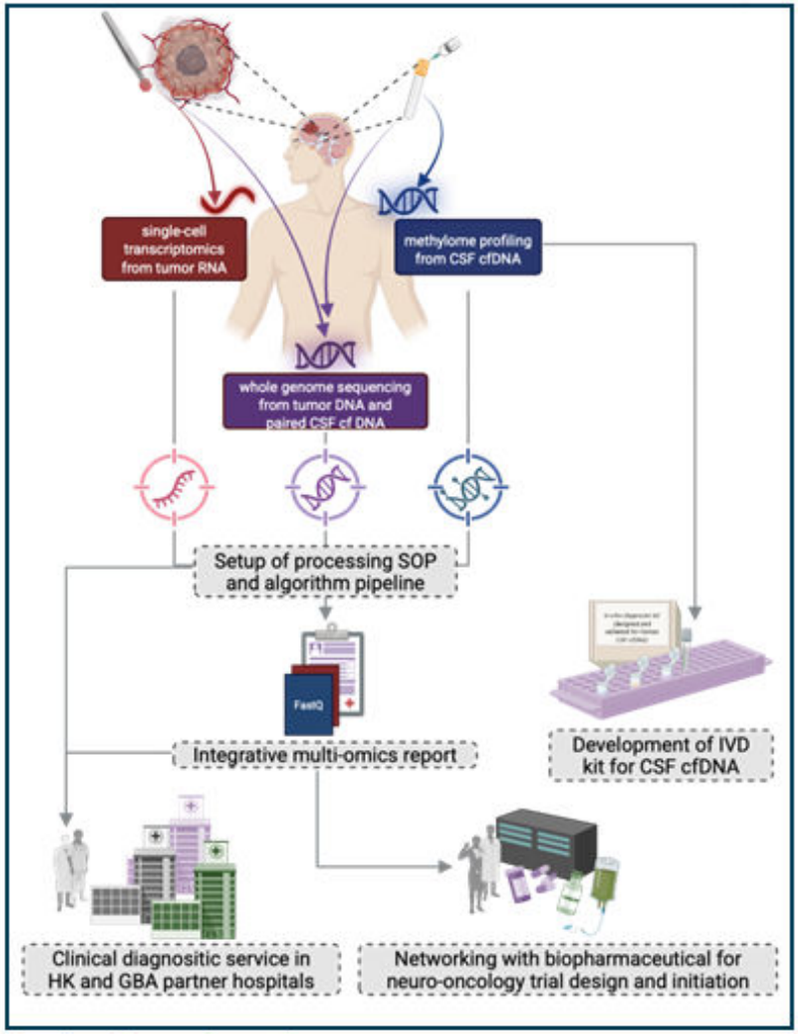
1. ecDNA + CSF methylome focus
   → detects tumor evolution & minimal residual disease beyond current standards
2. Rapid turnaround
   → is compatible with clinical timelines for decision-support within 2 weeks
3. Privacy-aware architecture
   → is governed for patient confidentiality
4. Translational capability
   → uses widely available sequencing platforms & established workflows for technology transfer and upscaling.

Opportunities

1. Clinical diagnostic service for HK & GBA hospitals,
   → enables precision patient care in neuro-oncology
2. Commercial contribution
   → develops CSF-focused IVD kits & clinical decision-support tools
3. Industry collaboration
   → Use platform readouts as biomarkers for clinical trial initiation, patient stratification, and treatment monitoring
4. Potential regional expansion and transfer to APAC

Intellectual Property

Patent filings planned for:
1. Paired tissue–CSF processing and analytical workflows
2. ecDNA and methylome integration algorithms
3. cell-free CSF reference panels and classifier models



Contact

Email: ahelali@hku.hk
Tel: 2255 4352
Fax: 2872 6426

LKS Faculty of Medicine
The University of Hong Kong
香港大學李嘉誠醫學院