AP29-1

ASNO 2026 · Kanazawa, Japan · June 12–14, 2026

Longitudinal Circulating Tumor Cell Monitoring in Cerebrospinal Fluid and Blood in High-grade Glioma

Yu-Chung Juan[1,2,3], Xian-Xiu Chen[1,2], Ju-Yu Tseng[4] , Hui-Ju Lin[5] , Cheng-Hao Hung[5], Po-Ren Hsueh[5,6], Jung-Ju Lin[7], Der-Yang Cho[1], Chun-Chung Chen[1,2,8]

1.Department of Neurosurgery, China Medical University Hospital, Taichung 2. Neuroscience and Brain Disease Center, China Medical University, Taichung 3. Graduate Institute of Biomedical Sciences, China Medical University, Taichung, Taiwan 4. MiCareo Taiwan Co., Ltd, Taipei 5. Department of Laboratory Medicine, China Medical University and Hospital, Taichung 6. Department of Infectious Diseases, Department of Internal Medicine, China Medical University Hospital, China Medical University, Taichung 7. Sleep Medicine Center, China Medical University Hospital, Taichung 8. Graduate Institute of Acupuncture Science, China Medical University, Taichung, Taiwan

BACKGROUND

Monitoring disease progression in high-grade gliomas remains challenging[1]:

- **Conventional MRI is limited** — pseudoprogression is common
- Treatment response assessment may lag true biological changes
- **Minimally invasive**, **dynamic biomarkers** are urgently needed

Hypothesis

Serial CTC monitoring in CSF and blood may reflect real-time tumor dynamics and predict disease progression earlier than conventional MRI.

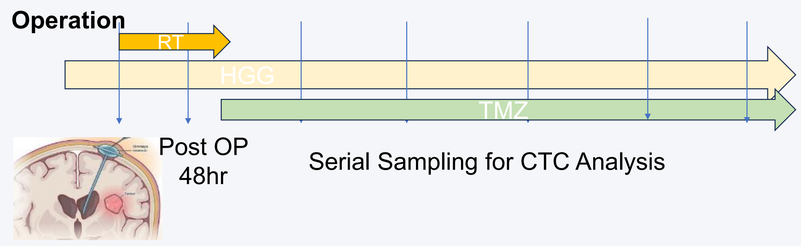
We performed a longitudinal analysis to evaluate dynamic CTC patterns during extended follow-up in high-grade gliomas patients.

METHODS

Study design: Prospective longitudinal monitoring CTC from CSF and blood of 8 patients after surgical treatments

Inclusion Criteria & Sampling Protocol

- Histologically confirmed high-grade glioma (WHO grade IV) with available Ommaya reservoir or accessible CSF sampling route
- **Serial paired sampling** of CSF and peripheral blood at 2–5 timepoints per patient; follow-up up to ~24 months
- **CSF**: 8 mL collected via Ommaya reservoir at each timepoint
- **Blood**: 8 mL peripheral blood collected simultaneously when clinically feasible
- Disease status assessed by **RANO criteria** on concurrent MRI imaging; clinical correlation performed by attending neuro-oncologist



RESULTS

Figure 1. Workflow of Brain Tumor CTC Analysis [2]

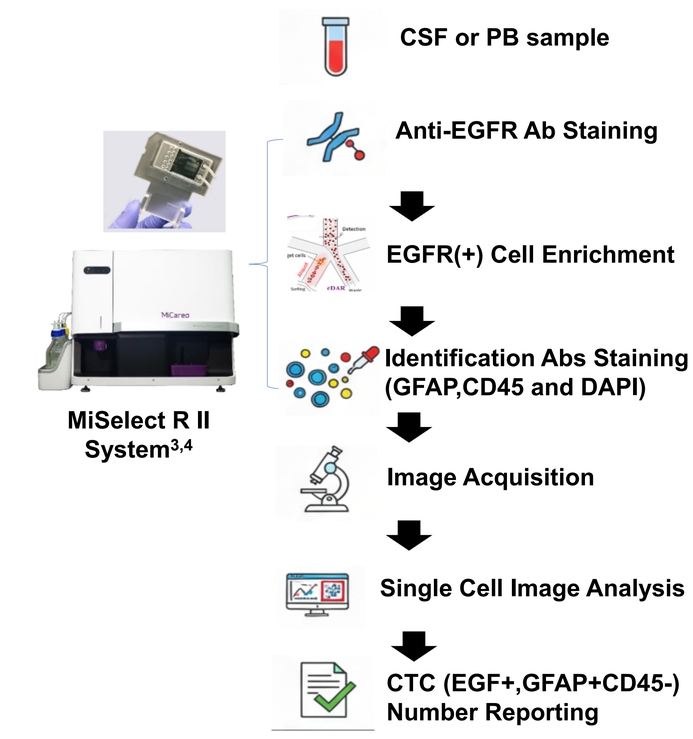


Table 1. PATIENT CHARACTERISTICS

Variable	Value
Age, years	
Median (Range)	54 (37–70)
Sex, n (%)	
Male	5 (62.5%)
Female	3 (37.5%)
Pathology	
GBM, IDH wildtype	8 (100%)
Tumor Location, n	
Temporal lobe	2
Parietal lobe	2
Parieto-occipital lobe	1
Frontal lobe	1
Occipital lobe	1
Multifocal	1
Baseline CTC Count	
CSF, Median (Range)	9 (3–52)
Blood, Median (Range)	2 (0–9)

Figure 2. CTC Detection in CSF and Blood

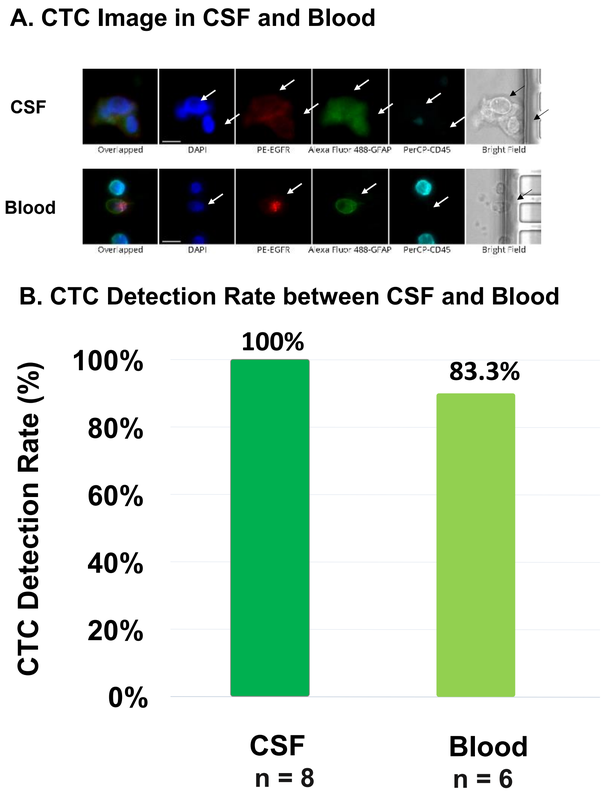


Figure 3. CSF CTC Elevation Precedes MRI-Defined Progression

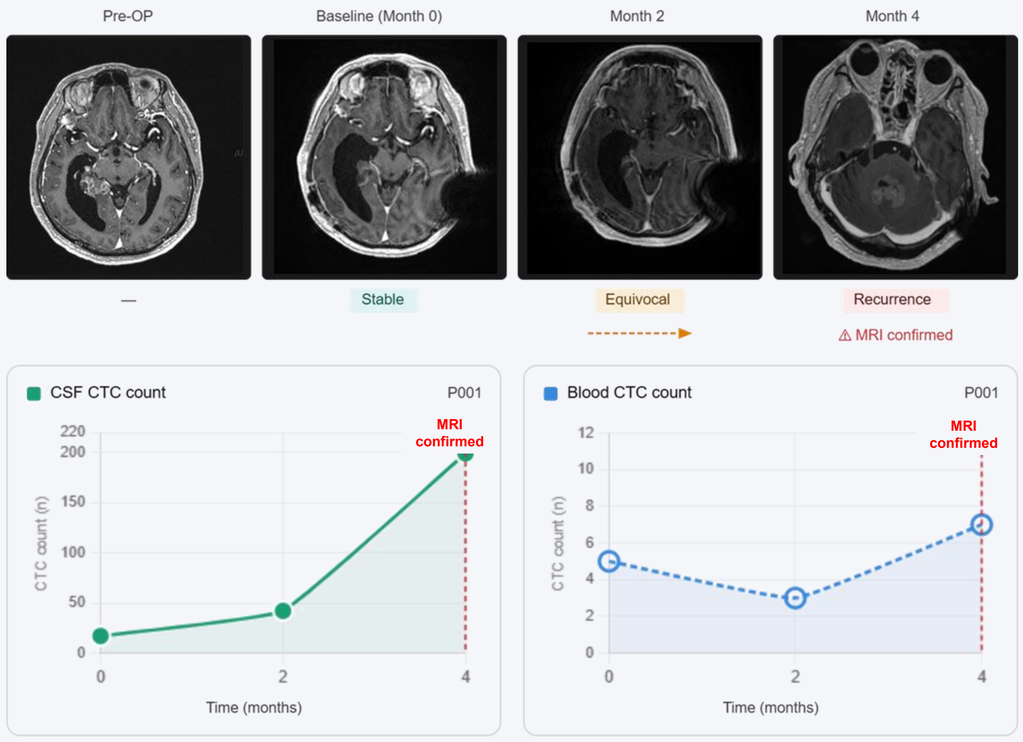
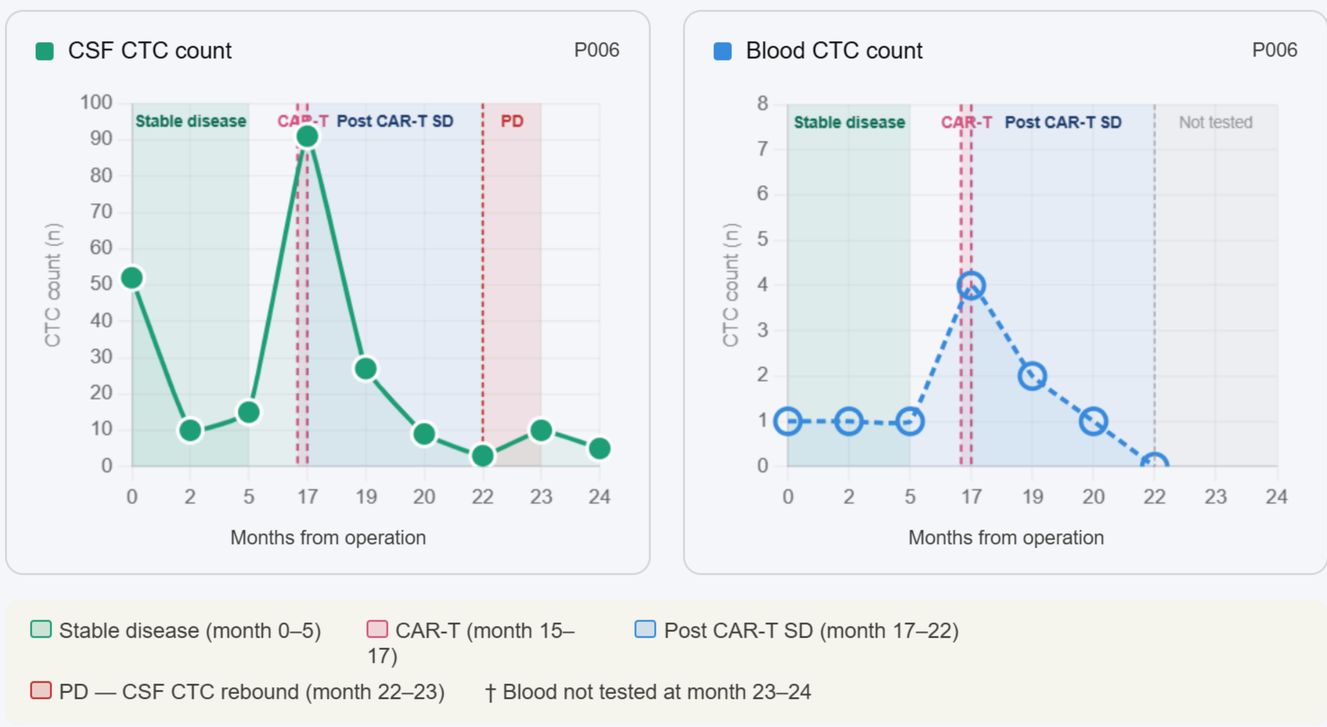


Figure 4. CSF CTC Dynamics During CAR-T Therapy



CONCLUSIONS

- Longitudinal CSF CTC monitoring reflects real-time tumor dynamics in high grade glioma
- CSF CTCs demonstrate wider dynamic ranges and higher sensitivity compared to blood CTCs
- CSF CTCs may precede MRI-defined progression, supporting earlier disease detection
- CAR-T therapy produces pronounced, trackable CSF CTC dynamics during extended follow-up
- CTCs warrant further validation as dynamic liquid biopsy biomarkers in neuro-oncology

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CONTACT INFORMATION

Chun-Chung Chen MD
Department of Neurosurgery,
China Medical University Hospital
Email: cck36701@gmail.com