GLIOBLASTOMAS ARE ASSOCIATED WITH HIGHER RMT ILL/HEALTHY HEMISPHERE RATIO THAN WHO GRADE II-III GLIOMAS IN nTMS
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Background

Preoperative mapping: critical for resection of brain tumors located on eloquent areas

Transcranial Magnetic Stimulation (TMS):
- well tolerated and safe;
- noninvasive;
- accurate;

8 studies showing that nTMS motor mapping:
- reduced the risk of postop new permanent motor deficit);
- increased the GTR rate;¹

Objective

To compare cortical excitability between WHO grade II-III gliomas and glioblastomas

Methods

ONGOING PROSPECTIVE STUDY - 16 patients with a single rolandic brain tumor,

Motor score and KPS: upper + lower extremity: preop, 5, 30 and 90-day postops.

TMS: simple and paired pulses on M1 one week before surgery.

Cortical Excitability parameters:
- Resting Motor Threshold (RMT),
- Motor Evoked Potential (MEP),
- Short-Interval Intracortical Inhibition (SIICI),
- Intracortical Facilitation (ICF).

Low x normal x high (normative values obtained by Cueva et al.)

Statistical analysis: Mann Whitney test was used to compare the two subgroups of patients (SPSS 24.0 - IBM Statistics, Armonk, NY, USA).

Results

Study Population
- 16 patients: 53.8% of males.
- 47.38 ± 14.15 years.
- Preoperative KPS: 83.13 ± 10.78

Histology
- 3 WHO Grade II
- 8 WHO Grade III
- 5 WHO Grade IV
GBMs presented abnormally higher RMT ill/healthy ratio when compared with grade II and III gliomas,

- 80% of GBMs with high RMT inter-hemispheric ratio vs 18% of gliomas?
- Fisher test: $p = 0.036$;
- Mann-Whitney test: $p = 0.006$.

Ill hemisphere RMT values were higher in patients with GBM ($p = 0.041$).
Results

GBMs’ ICF ill/healthy ratio are slightly higher grade II and III gliomas’ ratio,
- 60% of GBMs with high RMT inter-hemispheric ratio vs 36% of gliomas
- Likelihood ratio: $p=0.039$;
- Mann-Whitney test: $p=0.193$. 

![Box plot comparing ICF ratio of gliomas and glioblastomas](image)
Discussion

➢ Tumor’s growth rate influences the surrounding cortex adaptation.

➢ GBM
➢ rapidly infiltrates normal parenchyma giving less conditions for motor function recovery;
➢ may affect cortical excitability in a way closer to the changes seen in acute/subacute brain injuries.

➢ In his meta-analysis, McDonnel et al. has found RMT was already higher in affected hemispheres at the early phase after stroke.[1]

➢ High RMT ratio might sign motor function decline, even for those who do not have clinical manifestations.[2]

Summary points

In patients with brain tumors:

✓ Glioblastoma presents a different pattern of Cortical Excitability when compared with grade II and III gliomas.
✓ Tumor biological behavior may play a role in CE changes observed.

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