Statistically Underpowered

A statistically underpowered study is one that does not include enough participants (sample size) to reliably detect a true effect or difference between groups, if it exists.

 Formal Definition:

A study is underpowered when the statistical power — the probability of detecting a true effect — is below the commonly accepted threshold (typically 80%). This means there's a high risk of Type II error (false negative), where real differences go undetected.

 Why It Matters in Neurosurgery:

Neurosurgical trials often deal with small cohorts, especially in glioma studies.

If a study is underpowered:

Survival benefits may appear by chance or be missed entirely.

Subgroup comparisons (e.g., Awake vs. Asleep, IDH-mut vs. wild-type) are statistically fragile.

Any conclusion drawn about superiority of technique, cognitive outcomes, or oncological advantage is likely unreliable.

 Example:

If only 20 patients underwent awake craniotomy and 20 underwent asleep craniotomy, and a "difference in survival" was found — it might just be random noise, not a reproducible finding.