



Evaluating the Long-Term Impact of Radiotherapy on Brain Cancer Survivors' Quality of Life

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BACKGROUND

- Brain tumor survival has improved, creating a growing population of survivors.
- Cranial radiotherapy can cause long-term **cognitive, emotional and physical** effects.
- Long-term data on **VMAT** are limited: prior studies had small samples, short follow-up or no standardized QoL tools.

OBJECTIVE

To evaluate the **long-term effects of VMAT radiotherapy** on cognitive, emotional, physical and social quality of life (QoL) in brain cancer survivors.

METHODS

- Design:** prospective, single-center cohort.
- Patients:** 104 brain tumor patients, age 25–70 years.
- Treatment:** VMAT only, 50–60 Gy in 25–30 fractions; 8 of 24 GBM patients also received concurrent temozolomide.
- Follow-up:** median 48 months (baseline, 6 and 12 months, then annually).
- QoL tools:** EORTC QLQ-C30, EORTC BN20 and MoCA (cognitive screening).
- Statistics:** multivariable linear regression and mixed-effects models; $p < 0.05$.

TABLE 1. COHORT CHARACTERISTICS

Characteristic	Value
Patients	n = 104
Age, years	52 ± 10 (25–70)
Low-grade glioma	70 (67%)
Glioblastoma (GBM)	24 (23%)
Meningioma	10 (10%)
GBM + temozolomide	8 of 24

RESULTS

- Global QoL fell by **12 ± 4 points** over 48 months.
- Largest decline in the **cognitive** domain (-15 ± 5), then emotional (-10 ± 3), physical (-8 ± 2) and social (-7 ± 2).

Figure 1. Mean decline by QoL domain (± SD).

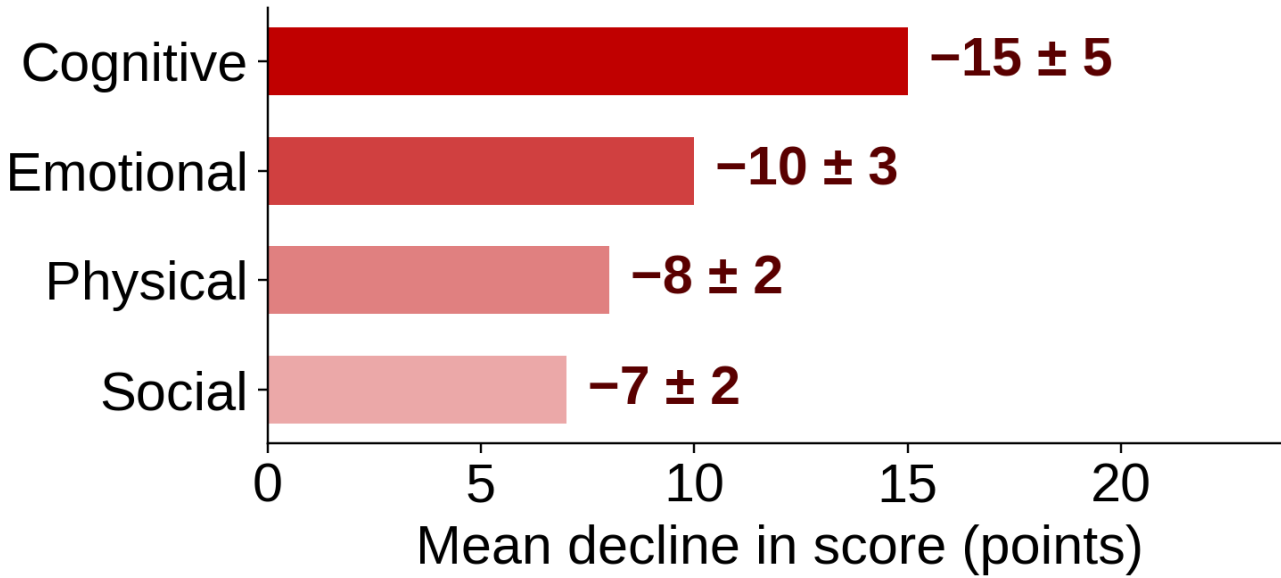


TABLE 2. DECLINE PREDICTORS

Variable	HR	95% CI	p
Age > 60 years	1.5	1.1–2.0	0.01
GBM diagnosis	1.8	1.3–2.4	<0.001
VMAT	1.4	1.1–1.7	0.03
Temozolomide	1.2	0.9–1.6	0.15

HR = hazard ratio. Temozolomide had no significant effect on long-term QoL in GBM.

CONCLUSION

- Brain cancer survivors treated with VMAT show a **significant long-term QoL decline**, mainly cognitive and emotional.
- Age > 60 years** and **GBM** were key predictors of decline.
- Personalized planning, neurocognitive monitoring and psychosocial support are needed in survivorship care.
- Future work:** multicenter studies, biomarkers and cognitive rehabilitation trials.

Limitations: single center, no control group, small meningioma cohort, possible selection bias.

