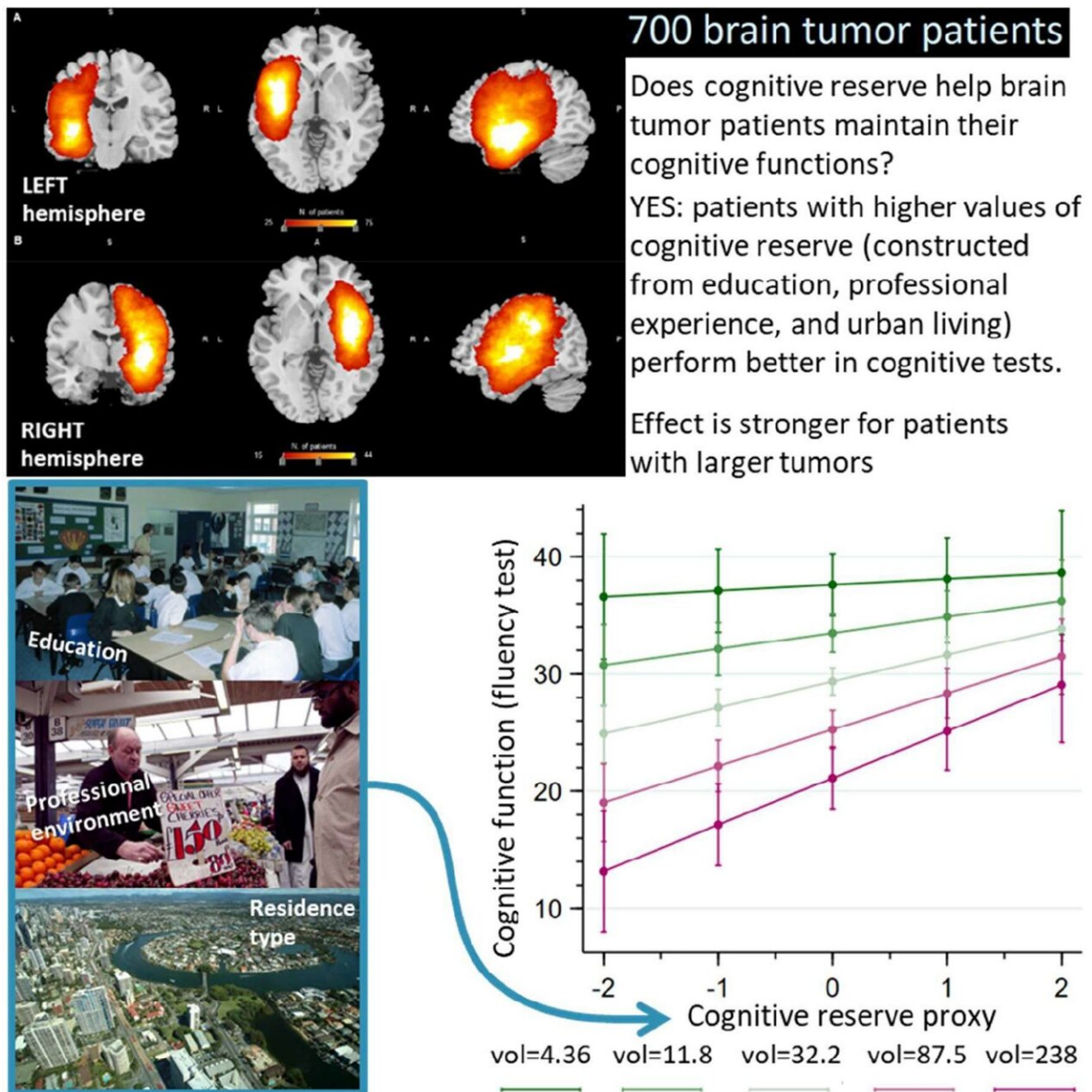


Brain tumors: The positive effect of the cognitive reserve

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Graphical Abstract. Credit: *Brain Communications* (2023). DOI: 10.1093/braincomms/fcad198

Cognitive reserve—the term given to the capacity to maximize cognitive performance through differential engagement of cerebral networks or alternative cognitive strategies—protects the cognitive functions of brain tumor patients.

These are the findings of a recently published study in the journal *Brain Communications*. The project was a collaboration between researchers at IRCCS Medea, neurosurgeons and radiologists at the Azienda Sanitaria Universitaria Friuli Centrale in Udine and two professors from SISSA in Trieste and the School of Economics at the University of Nottingham.

"The growth of a brain tumor can lead to a reduction in [cognitive abilities](#) such as memory, language, attention span and visual-spatial processing," explains Barbara Tomasino, researcher at the Friuli center of Medea and the first author of the study. "Yet it is possible to identify discrepancies in patients between the severity of the illness and its cognitive manifestations: together with our colleagues, we were interested in looking into the causes of these differences."

The study included a wide sample of 700 patients with brain tumor diagnoses. The patients were given brain MRI scans along with a litany of tests designed to assess their cognitive capabilities before neurosurgery.

The researchers measured the patients' cognitive reserve using indirect metrics such as [education level](#), occupation and their [home environment](#). These metrics are seen to be important as they expose the cognitive system to ongoing stimulation from its surroundings. The [statistical](#)

[analysis](#) took careful measurements of the type, side, location and dimensions of the tumor, the IQ, age and sex of the patient, in order to measure the effect of the cognitive reserve in each of the tests.

In addition to confirming the expected effects of the clinical variables on cognitive functions, the results also demonstrated that the cognitive reserve has a positive effect on neuropsychological performance: patients with higher levels of education, a cognitively stimulating occupation and who live in [urban environments](#) received higher scores on the neuropsychological tests. The negative effect of the increase in the size of the tumor on patients' performance was less acute in patients with a higher cognitive reserve.

"The idea of a cognitive reserve has been used to explain [individual differences](#) in both normal and pathological aging. Our study also demonstrates that plasticity that can be ascribed to cognitive reserve enables individuals to contend with damage to brain function even in extreme circumstances such as brain tumors. Further research is necessary to identify the neural mechanisms at the heart of neuroplasticity," says professor Raffaella Rumiati of SISSA.

"In contributing to an explanation of the role of the [cognitive reserve](#) in tackling brain tumors as well as the neurological variations identified, our study can help to develop prevention strategies and individual rehabilitative interventions," adds Dr. Tomasino.

More information: Barbara Tomasino et al, Cognitive reserve and individual differences in brain tumor patients, *Brain Communications* (2023). [DOI: 10.1093/braincomms/fcad198](https://doi.org/10.1093/braincomms/fcad198)

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