

The relationship of the emotional-personal status with the life quality self-assessment on the brain tumor location

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Abstract

Introduction: It is well-known that brain lesions of tumor cause a variety of cognitive process disorders and changes in the psycho-emotional status. However, studies aimed at the psychometric comparison of the indicators of cognitive functions and emotional regulation of behavior depending on the tumor location has only been started quite recently. The interest in analyzing the role of neuroticism, a personality trait that reflects the level of individual emotional reactivity, is caused by the fact that it affects the subjective assessment of well-being, including among cancer patients. Given that the medial prefrontal or dorsolateral cortex is considered as a structural correlate of neuroticism, we assumed that brain tumor in those cortex areas should lead to the disassociation of neuroticism and self-evaluation of the quality of life.

Method: The study involved 62 patients of the neurosurgical clinic (52.1 ± 10.6 years, 37 women) (gr_P) and 40 healthy people (48.6 ± 10.9 years, 29 women) who formed the control group (gr_C). The age, education, and share of men and women in the groups did not differ. All participants of the study were right-handed. The criteria for including patients for psychometric testing were the absence of a gross neurologic deficit at the preoperative stage, compensation for somatic status, and tumor location: in the frontal or parietal divisions of the left (GR_LF and GR_LP) or right hemisphere (GR_PF and GR_PP). To elucidate the peculiarities of cognitive functions, we used the IQ-test H. Eysenck. The EPQ method was used to determine neuroticism (N) [Eysenck H. et al., 1991] and the SF 36 questionnaire was used to assess the quality of life.

Result: The general group of patients (gr_P) is characterized by significantly lower values of all parameters except for neuroticism (N), in comparison with the control group (gr_C) (Table 2). The results of the correlation analysis of N, IQ, and indicators of creativity with QoLphys and QoLpsy for each subgroup from gr_P indicate that there is positive relationship between QoLphys and IQ ($0.56 < r < 0.64$, $0.006 < p < 0.03$) and a negative one between QoLpsy and N ($r = -0.52$, $p < 0.05$). Examples of the latter two correlations for gr_RP are shown in Fig. 2A and 2B, respectively (Figure 1).

Conclusion: Brain lesion with a tumor result in a significant decrease in intelligence, as well as self-assessment of the health state compared with the control group, while the level of neuroticism does not change significantly. In contrast to the control group, in which the self-assessment of the health state largely depends on the extent of neuroticism, when the brain is damaged by a tumor, the integral indicators of physical and mental health are determined primarily by cognitive characteristics the IQ level. The ratio of self-assessment of health indicators and the cognitive-emotional status of patients in the pre-operative period depends on the lesion location: a higher level of the integral index of physical health corresponds to an increase in intelligence in groups of patients with tumor location in the posterior regions of the right hemisphere, while mental health corresponds to a better figurative fluency; in case of its anterior part lesion, a better figurative fluency corresponds to a better self-assessment of the mental component of health. An inverse correlation between neuroticism and the integral indicator of mental health is typical of only the tumor location in the parietal regions of the right hemisphere.

References

1. Campanella F., Shallice T. Ius T., Fabbro F., Skrap M. Impact of brain tumour location on emotion and personality: a voxel-based lesion–symptom mapping study on mentalization processes *Brain* 2014; 137; 2532–2545
2. Courneya, K. S., Bobick, T. M., Rhodes, R. E., Jones, L. W., Friedenreich, C. M., & Arthur, K. (2000). Personality correlates of patients' subjective well-being after surgery for colorectal cancer: An application of the five-factor model. *Journal of Psychosocial Oncology*, 18(4), 61-72
3. DeYoung C.G. Personality Neuroscience and the Biology of Traits // *Social and Personality Psychology Compass* 4/12 (2010): 1165–1180
4. Gehrke A. K., M. C. Baisley, A. L. B. Sonck, S. L. Wronski, and M. Feuerstein, “Neurocognitive deficits following primary brain tumor treatment: systematic review of a decade of comparative studies,” *Journal of Neuro-Oncology*, vol. 115, no. 2, pp. 135–142, 2013
5. Gomez V., Allemand M., Grob A. Neuroticism, extraversion, goals, and subjective well-being: Exploring the relations in young, middle-aged, and older adults *Journal of Research in Personality* 2012. 46 > 3 > 317-325
6. Haas Brian W., R. Todd Constable, Turhan Canli Stop the sadness: Neuroticism is associated with sustained medial prefrontal cortex response to emotional facial expressions *Neuroimage*. 2008 Aug 1; 42(1): 385–392.
7. Hendrix Philipp, Elisa Hans, Christoph J. Griessenauer, Andreas Simgen, Joachim Oertel, Julia Karbach Neurocognitive status in patients with newly-diagnosed brain tumors in good neurological condition: The impact of tumor type, volume, and location *Clinical Neurology and Neurosurgery* 156 (2017) 55–62

Table 1. Clinical variables in the group of brain tumor

Variables/Groups	gr_LF	gr_LP	gr_RF	gr_RP
Location	Left_Frontal	Left_Parietal	Right_Frontal	Right_Parietal
n	16	17	14	15
Volume of brain tumor, sm ³	34.83	27.71	40.97	30.97
Histology				
Meningiomas	7	4	7	4
Low Grade Gliomas	5	6	3	4
High Grade Gliomas	3	5	4	3
Metastases	1	2	0	4

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Table 2. Mean±SD

Variable/Group	Control gr_C	Tumor gr_P	Left_Front gr_LF	Left_Pariet gr_LP	Right_Front gr_RF	Right_Pariet gr_RP
N	12.3±4.9	13.4±4.9	12.1±5.7	14.1±5.2	13.3±4.6	14.1±3.9
IQ	119.0±16	95.0±8.3**	92.5±6.9#	94.7±8.3	94.9±7.2	98.2±10.3#
QoL phys	81.5±11.9	53.2±17.4**	53.6±21.3	50.7±13.7	51.9±13.7	57.0±20.4
QoL psy	77.1±11.6	50.6±19.6**	48.5±20.8	48.7±15.9	49.1±23.7	56.6±18.7

* $p < 0.05$, ** - $p < 0.01$ between gr_C and gr_P; #- $p < 0.1$, ## - $p < 0.05$ between subgroups of gr_P

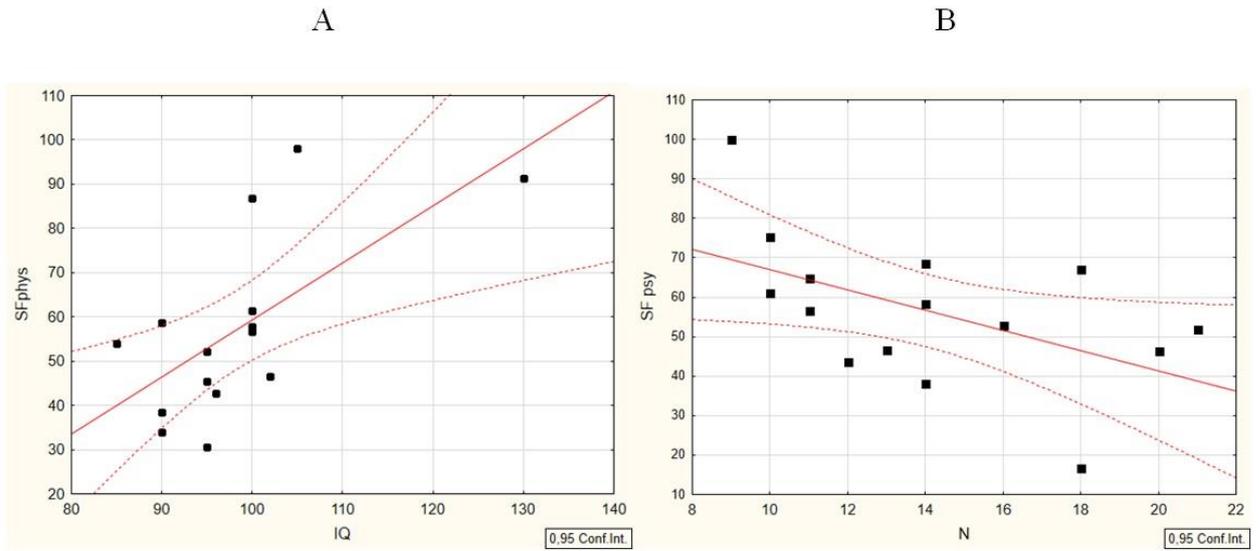


Fig.1 Relationships between SFphys and IQ (A) and between SFpsy and N (B)