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## Neurocognitive impairment, neurobehavioral symptoms, fatigue, sleep disturbance, and depressive symptoms in patients with newly diagnosed glioblastoma

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### Abstract

**Background:** In addition to poor survival rates, individuals with glioblastoma (GBM) are at risk of neurocognitive impairment due to multiple factors. This study aimed to characterize neurocognitive impairment, neurobehavioral symptoms, fatigue, sleep disturbance, and depressive symptoms in newly diagnosed GBM patients; and to examine whether neurobehavioral symptoms, fatigue, sleep, and depressive symptoms influence neurocognitive performance.

**Methods:** This study was part of a prospective, inception cohort, single-arm exercise intervention in which GBM patients underwent a neuropsychological assessment shortly after diagnosis (median 4 weeks; ie, baseline) and 3, 6, 12, and 18 months later, or until tumor progression. Here, we present baseline data. Forty-five GBM patients (mean age = 55 years) completed objective neurocognitive tests, and self-report measures of neurobehavioral symptoms, fatigue, sleep disturbance, and depressive symptoms.

**Results:** Compared to normative samples, GBM patients scored significantly lower on all neurocognitive tests, with 34 (76%) patients exhibiting neurocognitive impairment. Specifically, 53% exhibited impairment in memory retention, 51% in executive function, 42% in immediate recall, 41% in verbal fluency, and 24% in attention. There were high rates of clinically elevated sleep disturbance (70%), fatigue (57%), depressive symptoms (16%), and neurobehavioral symptoms (27%). A multivariate regression analysis revealed that depressive symptoms are significantly associated with neurocognitive impairment.

**Conclusions:** GBM patients are vulnerable to adverse outcomes including neurocognitive impairment, neurobehavioral symptoms, fatigue, sleep disturbance, and depressive symptoms shortly after diagnosis, prior to completing chemoradiation. Those with increased depressive symptoms are more likely to demonstrate neurocognitive impairment, highlighting the need for early identification and treatment of depression in this population.

**Keywords:** brain tumor; depressive symptoms; fatigue; neurocognition; sleep.

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