Evaluation of glioma proliferation by 99mTc-Tetrofosmin

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Department of Neurosurgery (G.A.A., K.S.P.), Department of Nuclear Medicine (S.T., A.P., A.D.F.), Department of Pathology (A.G.), and Department of Neurology (A.P.K.), University of Ioannina School of Medicine, Ioannina, Greece

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The proliferation potential of gliomas is an indicator of their aggressiveness with significant implications in patient management and prognosis, but its assessment requires tissue sampling.[1] We evaluated the relationship between glioma proliferation (as expressed by the Ki-67 index) and the uptake of the tumor-seeking radiotracer technetium-99m Tetrofosmin (^{99m}Tc-TF). Fourteen patients with a space-occupying lesion suspicious for glioma on structural brain imaging were prospectively enrolled. Scintitomographic (SPECT) imaging was performed and within a week the lesion was removed surgically; Ki-67 was assessed in the excised specimens by MIB-1 immunostaining. Three patients were excluded from the study because their lesions were proven metastatic. In the 11 patients eligible for analysis (7 males, 4 females; mean age 49.5 ± 7.5 years), the diagnosis was glioblastoma multiforme (6 cases), anaplastic astrocytoma (1), anaplastic oligodendroglioma (2), low-grade oligodendroglioma (1), and low-grade astrocytoma (1). We found a significant positive linear correlation between ^{99m}Tc-TF uptake and Ki-67 expression ($r = 0.95$, $p = 0.001$ [Spearman rank analysis]; Fig. 1–3). No significant correlation was observed between tracer uptake and tumor grade ($r = 0.27$, $p = 0.420$). The preliminary results of this pilot study, although deriving from a limited patient sample, propose that this tracer may hold a potential role as a noninvasive marker of glioma proliferative activity.

References

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Address correspondence to George Alexiou, PO Box 103, Neohoropoulo Ioannina, 455 00, Greece (alexiougrg@yahoo.gr; me01929@cc.uoi.gr).

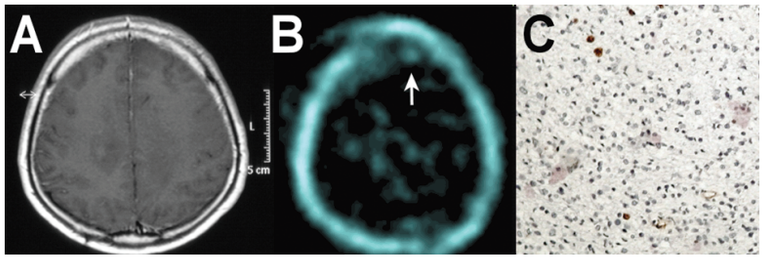

Figure 1. T1-weighted, gadolinium-enchanced MRI (A) in a low-grade oligodendroglioma of the left frontal lobe. Faint ^{99m}Tc-Tetrofosmin uptake (B, arrow) correlated with Ki-67 approx. 2% (C; MIB-1 ×100).

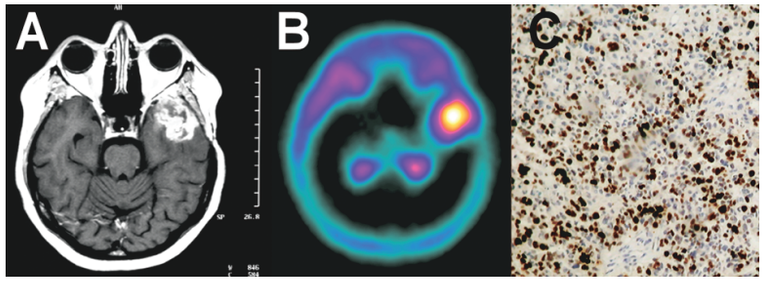

Figure 2. T1-weighted, gadolinium-enchanced MRI (A) in an anaplastic oligodendroglioma of the left temporal lobe. Profound tracer uptake (B) correlated with intense proliferation (C; Ki-67 approx. 40%, MIB-1 ×100).

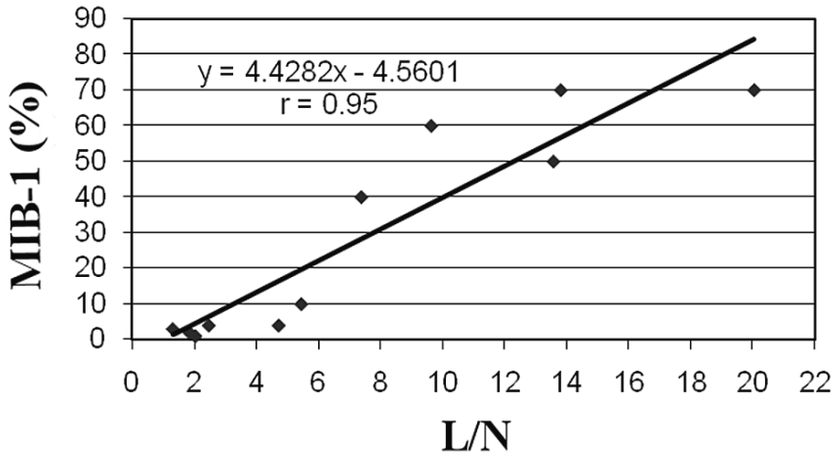

Figure 3. Correlation between ^{99m}Tc-Tetrofosmin uptake (expressed as lesion-to-normal [L/N] uptake ratio) and cellular proliferation rate (MIB-1) in the studied gliomas.