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Early metabolic responses in temozolomide treated low-grade glioma patients.

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Amino acid transport and protein synthesis are important steps of tumor growth. We investigated the time course of tumor metabolism in low-grade gliomas (LGG) during temozolomide chemotherapy, and compared metabolic responses as measured with positron emission tomography (PET) with volume responses as revealed by magnetic resonance imaging (MR). A homogeneous population of 11 patients with progressive non-enhancing LGG was prospectively studied. Imaging was done at 6-months intervals starting six months, and in a second series starting three months after treatment initiation. F-18 fluoro-ethyl-L-tyrosine (FET) uptake was quantified with PET as metabolically active tumor volume, and was compared with the tumor volume on MR. Response was defined as $\geq 10\%$ reduction of the initial tumor volume. Eight patients showed metabolic responses. Already 3 months after start of chemotherapy the active FET volumes decreased in 2 patients to a mean of 44% from baseline. First MR volume responses were noted at 6 months. Responders showed a volume reduction to $31 \pm 23\%$ (mean \pm SD) from baseline for FET, and to $73 \pm 26\%$ for MR. The time to maximal volume reduction was 8.0 ± 4.4 months for FET, and 15.0 ± 3.0 months for MR. The initial metabolic response correlated with the best volume response on MR (Spearman Rank $P = 0.011$). Deactivation of amino acid transport represents an early indicator of chemotherapy response in LGG. Response assessment based on MR only has to be reconsidered. The time window obtained from PET may assist for individual treatment decisions in LGG patients.

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