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Predicting the outcome of grade II glioma treated with temozolomide using proton magnetic resonance spectroscopy.

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Abstract

Methods:This prospective study included adult patients with progressive LGG that was confirmed by magnetic resonance imaging (MRI). Temozolomide was administered at every 28 days. Response to TMZ was evaluated by monthly MRI examinations that included MRI with volumetric calculations and (1)H-MRS for assessing Cho/Cr and Cho/NAA ratios. Univariate, multivariate and receiver-operating characteristic statistical analyses were performed on the results.**Results:**A total of 21 LGGs from 31 patients were included in the study, and followed for at least n=14 months during treatment. A total of 18 (86%) patients experienced a decrease in tumour volume with a greater decrease of metabolic ratios. Subsequently, five (28%) of these tumours resumed growth despite the continuation of TMZ administration with an earlier increase of metabolic ratios of 2 months. Three (14%) patients did not show any volume or metabolic change. The evolutions of the metabolic ratios, mean(Cho/Cr)(n) and mean(Cho/NAA)(n), were significantly correlated over time (Spearman $\rho=+0.95$) and followed a logarithmic regression ($P>0.001$). The evolutions over time of metabolic ratios, mean(Cho/Cr)(n) and mean(Cho/NAA)(n), were significantly correlated with the evolution of the mean relative decrease of tumour volume, mean($\Delta V(n)/V(o)$), according to a linear regression ($P<0.001$) in the 'response/no relapse' patient group, and with the evolution of the mean tumour volume (meanV(n)), according to an exponential regression ($P<0.001$) in the 'response/relapse' patient group. The mean relative decrease of metabolic ratio, mean($\Delta(\text{Cho/Cr})(n)/(\text{Cho/Cr})(o)$), at n=3 months was predictive of tumour response over the 14 months of follow-up. The mean relative change between metabolic ratios, mean($(\text{Cho/NAA})(n)-(\text{Cho/Cr})(n)/(\text{Cho/NAA})(n)$), at n=4 months was predictive of tumour relapse with a significant cutoff of 0.046, a sensitivity of 60% and a specificity of 100% ($P=0.004$).**Conclusions:**The (1)H-MRS profile changes more widely and rapidly than tumour volume during the response and relapse phases, and represents an early predictive factor of outcome over 14 months of follow-up. Thus, (1)H-MRS may be a promising, non-invasive tool for predicting and monitoring the clinical response to TMZ.*British Journal of Cancer advance online publication, 24 May 2011; doi:10.1038/bjc.2011.174 www.bjcancer.com.*

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