

## **Volumetric and MGMT parameters in glioblastoma patients: survival analysis.**

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### **Source**

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### **Abstract**

#### **BACKGROUND:**

In this study several tumor-related volumes were assessed by means of a computer-based application and a survival analysis was conducted to evaluate the prognostic significance of pre- and postoperative volumetric data in patients harboring glioblastomas. In addition, MGMT (O6-methylguanine methyltransferase) related parameters were compared with those of volumetry in order to observe possible relevance of this molecule in tumor development.

#### **METHODS:**

We prospectively analyzed 65 patients suffering from glioblastoma (GBM) who underwent radiotherapy with concomitant adjuvant temozolomide. For the purpose of volumetry T1 and T2-weighted magnetic resonance (MR) sequences were used, acquired both pre- and postoperatively (pre-radiochemotherapy). The volumes measured on preoperative MR images were necrosis, enhancing tumor and edema (including the tumor) and on postoperative ones, net-enhancing tumor. Age, sex, performance status (PS) and type of operation were also included in the multivariate analysis. MGMT was assessed for promoter methylation with Multiplex Ligation-dependent Probe Amplification (MLPA), for RNA expression with real time PCR, and for protein expression with immunohistochemistry in a total of 44 cases with available histologic material.

#### **RESULTS:**

In the multivariate analysis a negative impact was shown for pre-radiochemotherapy net-enhancing tumor on the overall survival (OS) ( $p = 0.023$ ) and for preoperative necrosis on progression-free survival (PFS) ( $p = 0.030$ ). Furthermore, the multivariate analysis confirmed the importance of PS in PFS and OS of patients. MGMT promoter methylation was observed in 13/23 (43.5%) evaluable tumors; complete methylation was observed in 3/13 methylated tumors only. High rate of MGMT protein positivity ( $> 20\%$  positive neoplastic nuclei) was inversely associated with pre-operative tumor necrosis ( $p = 0.021$ ).

#### **CONCLUSIONS:**

Our findings implicate that volumetric parameters may have a significant role in the prognosis of GBM patients. Furthermore, volumetry could help not only to improve the prediction of outcome but also the outcome itself by identifying patients at high risk of treatment failure and, thus, seek alternative treatment for these patients. In this small series, MGMT protein was associated with less aggressive tumor characteristics.