

## ABSTRACT

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Is there any additional benefit of (68)Ga-PSMA PET on Radiotherapy Target Volume Definition in Patients with Glioblastoma?

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**OBJECTIVES:** To investigate the contribution of 68Gallium (68Ga)-PSMA (Prostate Specific Membrane Antigen) Positron Emission Tomography (PET) in defining radiotherapy (RT) target volume for glioblastoma and to compare the target volumes defined by Magnetic Resonance Imaging (MRI).

**METHODS:** RT planning Computed Tomography (CT) images were fused separately with preoperative MRI and PET/MRI images of 10 glioblastoma patients, retrospectively. The contrast-enhanced area in T1-weighted MRI was contoured as gross tumor volume (GTV) and clinical target volume (CTV1) was obtained by including the cavity and T2/FLAIR hyperintense areas after giving a margin of 2 cm to the GTV. 68Ga-PSMA uptake area was contoured as biological tumor volume (BTV) and CTV2 was obtained with a margin of 2 cm to BTV. Planning target volumes (PTVs) were created with the 3 mm added to the CTVs. Conformity Index (CI), Dice Similarity Coefficient (DSC) and Overlap Volume (OV) were calculated by obtaining the intersection and union volumes. Volumetric comparison, similarity and overlap analyzes were performed statistically by Wilcoxon signed rank and One sample t-test.

**RESULTS:** The median GTV was 21,96 cc (1,04 - 82,04) and BTV was 25,58 cc (2,43 - 99,47). BTV was on average 47% larger than GTV which was statistically significant ( $p = 0.03$ ). For GTV-BTV, CTV1-CTV2 and PTV1-PTV2; mean values of CI were 0,56, 0,76 and 0,76; DSC were 0,70, 0,86 and 0,86; OV were 0,88, 0,94 and 0,94, respectively. There was no significant difference on size and spatial similarity between CTV1 and CTV2, PTV1 and PTV2.

**CONCLUSIONS:** Although BTV was larger than GTV, this significance was lost while we gave the same CTV margin including the peripheral edema. It seems that it may help to improve defining non-enhancing tumor part and also recurrent tumor volume.

**ADVANCES IN KNOWLEDGE:** Recent studies have focused on the role of 68Ga-PSMA PET in imaging of glial tumors. It has been observed that 68Ga-PSMA PET can clearly define the tumor borders and it can be beneficial in target volume delineation, especially in reirradiation of recurrent tumors.

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