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MULTIMODAL IMAGING OF AN ASTROCYTOMA AFFECTING THE AMYGDALAR REGION

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Introduction: Regional alterations of serotonergic neurotransmission and functional activation in the amygdalar region of patients with major depression are underpinning its important role in affective disorders. In this study we used fMRI and PET to describe functional and molecular alterations associated with an astrocytoma in the left amygdalar region in a patient with organic depressive disorder compared to control subjects.

Methods: The serotonin-1A (5-HT_{1A}) receptor binding (BP_{ND}) was quantified with PET (30 frames, 90min, 4.4mm FWHM) in 36 subjects using the radioligand [carbonyl-¹¹C]WAY-100635, and a reference tissue model (MRTM2). In fMRI (3T, EPI inplane resolution 1.6*2.7mm, 10 AC-PC orientated slices, ST=3mm, TE/TR=31/1000ms), 32 participants performed emotion discrimination and sensorimotor control tasks. Statistical analysis with SPM5 and unpaired t-tests were performed on molecular and functional data separately.

Results: The astrocytoma was delineated in the serotonin-1A receptor distribution showing ($p < 0.01$, uncorrected) regional BP_{ND} decrease. The ipsilateral thalamus and bilateral habenula regions displayed ($p < 0.001$; uncorrected) BP_{ND} increase. The fMRI data showed significantly ($p < 0.05$; uncorrected) reduced activation in the affected amygdalar region, ipsilateral fusiform gyrus, bilateral orbitofrontal cortex and temporal regions and increased activation in the contralateral temporal pole.

Conclusions: Lower serotonin-1A receptor binding in the left amygdala region reflects the glial provenance of the tumor. The increased receptor binding in the habenulae might be associated with altered monoaminergic neurotransmission and depressive symptoms according to the influence of the habenulae on monoaminergic nuclei. The functional data demonstrate neuroplastic changes beyond affected areas and might indicate compensatory mechanisms.