P16.15. DEVELOPING ROLE OF ADVANCED MRI TECHNIQUES FOR DIAGNOSIS OF HIGH-GRADE GLIOMA RELAPSE AFTER COMPLEX ONCOLOGY TREATMENT

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PURPOSE/OBJECTIVES: High-grade gliomas (HGGs) are the most common primary brain tumors of adults. Despite a multidisciplinary approach, HGGs frequently recur as a new gadolinium-enhanced MRI lesion at or near the site of the original tumor; thus, at the site of high-dose target volume for radiotherapy. An early differentiation between HGG relapse and changes in connection with oncology treatment (pseudoprogression or radionecrosis) is still problematic by commonly used diagnostic imaging techniques. The goal of our project is to verify whether a combination of diffusion-weighted MR imaging (DWI) and proton magnetic resonance spectroscopy (MRS) increase specificity of the conventional structural MRI with gadolinium for early non-invasive differentiation between HGG relapse and pseudoprogression or radionecrosis.

MATERIALS/METHODS: Patients (n= 26) with HGG and structural progression on MRI after neurosurgical resection and radiotherapy with concurrent administration of temozolomide underwent DWI expressed as ADC map and MRS focused on concentration of N-acetylaspartate (NAA), choline (Cho), creatine (Cr), lactate (Lac), and lipids (Lip). An etiology of the lesion was then established by a finding on a subsequent MRI or by a biopsy and correlated with results of the investigated MR techniques.

RESULTS: Compared to the pseudoprogression or radionecrosis, the relapse of HGG was characterized by significantly lower ADC values, lower NAA concentration, appearance of Lac+Lip spectra, as well as by non-significant increase in Cho. We found very high sensitivity and specificity of ADC median value (≤1220 × 10^{-6} mm²/sec) and Cho/NAA ratio (≥1.7) to designate the MRI lesion with gadolinium uptake as the HGG relapse.

CONCLUSION: It can be concluded that DWI (ADC value) and MRS (mainly Cho/NAA ratio) have the ability for early non-invasive differentiation of the HGG relapse from the pseudoprogression or radionecrosis after the oncology treatment. The project is supported by grants IGA MZC R NT/14120 and NT/14600 and the European Regional Development Fund Project FNUSA-IC RC (No. CZ.1.05/1.1.00/02.0123).