2) >1.59 & ≤ 3.66, 3) ≤1.59 & > 3.66, 4) &gt 1.59 & &gt 3.66. The diagnostic rates for A-III were 1) 61.1% (11/18), 2) 100% (7/7), 3) 100% (9/9), and 4) 100% (7/7). We found the contrast effects in only 7 cases (20.6%) of A-III, which were distributed in areas 2) to 4). Conclusion: A-IIs and A-IIIs distributed in area 1) were difficult to distinguish, and they need careful observation as a step before the transition to areas 2)-4). Meanwhile, A-IIIs reaching widespread distribution to areas 2)-4) because of their wide range of malignancies require clinically aggressive treatment. The method might be beneficial in grade analysis of IDH-mutant astrocytomas.

Key words: glioma | methionine PET | MRS

NI-7

DIFFUSION-WEIGHTED IMAGING FOR MONITORING ACUTE RESPONSE AND RECURRENCE AFTER PHOTODYNAMIC THERAPY IN MALIGNANT GLIOMAS

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Background: Photodynamic therapy (PDT) subsequent to surgical tumor removal is a novel light-activated localized treatment for malignant glioma. Although PDT provides effective local control, even PDT cannot completely suppress local recurrence of malignant glioma. We previously reported that the acute response of malignant glioma to PDT could be detected as linear hyperintense signals on diffusion-weighted imaging (DWI) and a decline in apparent diffusion coefficient (ADC) values that were asymptomatic and transient. However, their long-term clinical significance has not yet been examined. This study aimed to clarify the link between the hyperintense signal on DWI as an acute response and recurrence after PDT in malignant glioma. **Methods:** Thirty consecutive patients (16 men, 14 women; median age 60.5 years) underwent PDT for malignant glioma at our institution between 2017 and 2020. We analyzed signal changes on DWI after PDT and the link between these findings and the recurrence pattern. **Results:** In all patients, linear hyperintense signals of 5–7 mm on DWI were detected at the surface of the resected cavity from day 1 after PDT. These changes matched the PDT-irradiated area and disappeared in about 30 days without any neurological deterioration. Of the 30 patients, 19 (63%) exhibited recurrence: local recurrence in 10 (33%), distant recurrence in 1 (3%), and dissemination in 8 (27%). All local recurrences arose from areas that did not show a hyperintense signal on DWI obtained on day 1 after PDT. Patients with distant recurrence or dissemination tended to have uninterrupted hyperintense signal on DWI obtained on day 1 after PDT. **Conclusion:** The local recurrence in malignant glioma after PDT occurred in the areas without hyperintense signal on DWI as the acute response to PDT. This characteristic finding could aid in the monitoring of not only PDT-irradiated area but also local recurrence site after PDT.

Key words: Glioma | Photodynamic therapy | Diffusion-weighted imaging

NI-8

MOLECULAR DIAGNOSTIC PREDICTION COMBINING T2-FLAIR MISMATCH SIGN, CALCIFICATION, AND METHIONINE PET IN GRADE II AND III GLIOMAS

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Background: The 2016 WHO Classification classified grade II and III gliomas into three molecular subtypes depending on the presence of IDH mutation and 1p/19q codeletion. We combined T2-FLAIR mismatch sign, tumor calcification, and methionine PET uptake to examine whether molecular diagnosis could be predicted. Methods: 53 grade II and III glioma patients with preoperative MRI, CT, and MET-PET who underwent surgical resection or biopsy during 2000–2019 were included in this study. Out of the 53 cases, astrocytic tumors (A group: IDH-mutant, 1p19q non-codeleted) were 17, oligodendroglial tumors (O group: IDH-mutant, 1p19q codeleted) were 15, and IDH wild tumors (W group) were 21. MR and CT scans were evaluated by 3 independent reviewers to assess presence/absence of T2-FLAIR mismatch sign and calcification in the tumor, respectively. The tumor-to-normal (T/N) ratio of methionine uptake was calculated by dividing the maximum standardized uptake value (SUV) for the tumor by the mean SUV of the normal brain. Results: Out of the 53 cases, T2-FLAIR mismatch sign was present in 6 cases in group A and 9 cases in group W (p=0.008). Calcification in tumor was present in 2 cases in group A, 7 cases in group O, and 3 cases in group W (p=0.046). In the T2-FLAIR mismatch-positive cases, assuming MET-PET T/N>1.401 was group W and <1.401 was group A, sensitivity was 100% and specificity was 67%. In the T2-FLAIR mismatch-negative and calcification-positive cases, assuming those group O, the diagnostic predictive value was 70%. In the T2-FLAIR mismatch-negative and calcification-negative cases, assuming MET-PET T/N>2.349 was group W and <2.349 was group A or O, sensitivity was 60% and specificity was 94%. Conclusions: Combined diagnostic prediction of T2-FLAIR mismatch, calcification, and MET-PET T/N may be useful for preoperative molecular diagnosis of grade II and III gliomas.

Key words: T2-FLAIR mismatch | methionine PET | glioma

NI-10

RECLASSIFICATION OF DIFFUSE GLIOMAS BASED ON MOLECULAR DIAGNOSIS -EVALUATION OF METHIONINE UPTAKE AND TREATMENT OUTCOME-

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Object: The revised 2016 WHO Classification of Tumours of the Central Nervous System incorporates genetic alterations into the classification system, with the goal of creating more homogenous disease categories with greater prognostic value. In this study, we reclassified diffuse gliomas with molecular diagnosis and examined for 11C-methionine uptake and prognosis. Methods. 182 diffuse glioma patients (Grade II in 42 patients, Grade III in 61 patients, Grade IV in 77 patients) treated at Tokyo Medical and Dental University Hospital from 2000 to 2018 were included in this study. The IDH1/2, ATRX and 1p19q status were analyzed using tumor samples. The tumor-to-normal ratio (T/N) of 11 C-methionine uptake was calculated by dividing the mean standardized uptake value (SUV) for the tumor by the mean SUV of the normal brain. Result. By molecular diagnosis, 11 diffuse astrocytomas and 17 anaplastic astrocytomas were diagnosed as “IDH-mutant”, while 14 diffuse astrocytomas and 29 anaplastic astrocytomas were diagnosed as “IDH-wild”. 5 out of 77 grade IV tumors had IDH mutation. 4 tumors were diagnosed as “Diffuse midline glioma, H3 K27M-mutant”. In the 32 oligodendroglial tumors, 12 oligodendrogliomas and 9 anaplastic oligodendrogliomas were diagnosed as “IDH-mutant and 1p/19q-codeleted”. The median T/N ratios in oligodendroglial tumors with “IDH-mutant and 1p/19q-codeleted” were significantly higher than those in astrocytic tumors with “IDH-mutant”. On the other hand, in tumors with the same genetic background, higher grade tumor has significant higher T/N ratio. Kaplan-Meier survival analysis revealed that oligodendroglial tumors with “IDH-mutant and 1p/19q-codeleted” had significantly better outcomes regardless of WHO grade. Overall survival was 90.9% at 5 years and 77.9% at 10 years in oligodendroglial tumors with “IDH-mutant and 1p/19q-codeleted”. IDH wild tumors had significantly worse outcomes.Conclusions. The results indicated that diffuse glioma categories reclassified with molecular classification correlate with the T/N ratio of methionine and the prognosis.

Key words: glioma | methionine-PET | molecular diagnosis

NI-11

USEFULNESS OF THE MAGNETIC RESONANCE IMAGING ARTERIAL SPIN LABELING METHOD FOR DIAGNOSING POSTERIOR FOSSA HEMANGIOBLASTOMA

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Purpose: It is sometimes challenging to diagnose hemangioblastoma by MRI when the tumor is a solid mass in the posterior fossa. We therefore evaluated perfusion images and diffusion-weighted images to diagnose hemangioblastoma in order to obtain the most useful quantitative features. Methods: Thirty-one posterior fossa tumors whose pathological diagnosis was confirmed by surgery were included in groups A (12 hemangioblastomas) and B (non-hemangioblastoma 19 cases: metastatic tumor 6 cases, pilocytic astrocytoma 3 cases, malignant lymphoma 3 cases, glioblastoma 2 cases, medulloblastoma 2 cases, and other 3 cases). All cases were imaged by 3.0-Tesla MRI, with the apparent diffusion coefficient (ADC) on diffusion-weighted imaging as the parameter, arterial spin labeling (ASL) as the relative value from the CBF map to the region of interest (ROI) in the contralateral hemisphere as perfusion image, dynamic susceptibility contrast (DSC) as rCBF, rCBV, corrected CBV, and K2. The ROI was set to match the contrast-enhanced part, and the two groups were compared and examined. Results: The relative ASL value of group A and the