degradation. The K6-67/MIB-1 index decreased and the number of macrophages increased after chemotherapy. Moreover, the ratio of GSCs to total tumor cells increased after chemotherapy; GSCs and macrophages constitute the mechanism of resistance to and recurrence after alkylating agent chemotherapy in gliodendrogliomas.

Key words: 1p/19q | neovadivant chemotherapy | glioma stem cell

GENETICS/EPIGENETICS (GEN)

GEN-7 LIQUID BIOPSY IN BRAIN TUMOR PATIENTS -THE PRESENT AND FUTURE-
Manabu Natsumeda, Jyotaro Takeishi, Yohei Yamamoto, Natsumeda Hospital, Department of Neurosurgery, Niigata University

We have previously published liquid biopsy for the diagnosis of brain tumors including PCNSL [JCO Precision Oncology, 2019; Leukemia and Lymphoma, 2019] and diffuse mulline gliomas (DMG) (Diagnostics, 2021). We used the Maxwell RSC cDNA extraction kit to extract circu-

The world’s first clinical trial of boron neutron capture therapy (BNCT), which treats malignant brain tumors with a single dose of neutron irradiation using multiple boron drugs simultaneously, was performed at our institute, and its excellent results have stimulated BNCT research around the world. BNCT is a particle irradiation therapy that biologically targets cancer cells, and is expected to be a “new option for cancer treatment” because it can deliver a dose of radiation at the cellular level. In the case of BNCT using a combination of multiple drugs, a method to appropriately consider the biological effects of the combination in the dose calculation has not been established. At present, BNCT based on an accelerator-based irradiation system and a boron drug (BPA) based on essential amino acids has been approved by the regulatory approval for head and neck cancer and has shown good results in brain tumors. As basic research, we have continued to develop new boron drugs, which will be essential in the future, and have explored the interpretation of the biological effects of multiple boron drugs in combination and the optimal conditions required for drug development. The survival curve of BNCT in a rat brain tumor model showed that the effect of the new drug alone was equivalent to BPA, and the effect of the combination was improved, but the effect of the combination did not match the prediction of the combined biological effect derived from each drug. However, it has been found that the effect of the combination does not match the prediction based on the combination of biological effects derived from each drug. In other words, even if the equivalent X-ray equivalent dose (Gy-Eq) is calculated, the combined effect of some drugs exceeds the prediction, while the combined effect of other drugs is poor.

Key words: glioma | neutron capture therapy | biological effectiveness

EXPERIMENTAL THERAPEUTICS (ET)

ET-1 TRANSITIONAL RESEARCH PLATFORM FOR MALIGNANT BRAIN TUMORS
Kensuke Tateishi, Yohei Miyake, Taishi Nakamura, Jo Sasame, Takahiro Hayashi, Akito Oshima, Hirokuni Homma, Naoki Ikeda, Tetsuya Yamamoto, Department of Neurosurgery, Yokohama City University Hospital, Department of Neurosurgery, Yokohama, Japan

An individual therapeutic strategy based on the genetic characterization is important in gliomas. However, it has been difficult to obtain genetic features during surgery. In this study, we present an overview of intraoperative genetic analysis using modified real-time PCR method. The tumor specimen was crushed with liquid nitrogen, then extract DNA within 60 minutes. Results of real-time PCR for detecting IDH, TERT, and BRAF hot spot mutations were stocked and real-time PCR was performed after mixing the agents of real-time PCR for detecting IDH, TERT, and BRAF hot spot mutations during surgery. In this study, we present an overview of intraoperative genetic analysis for gliomas.

Key words: liquid biopsy | MYD88 | H3F3A K27M

ET-5 BIOLOGICAL EFFECTS OF SIMULTANEOUS USE OF MULTIPLE DRUGS IN NEUTRON CAPTURE THERAPY USING RAT BRAIN TUMOR MODEL
Shinji Kawabata, Hideki Kashiwagi, Kohei Yoshimura, Yusuke Fukuo, Ryo Hiramatsu, Naosuke Nonoguchi, Motoroma Furuse, Shin-Ichi Wabitsuchi, Masaaki Miyazaki, Department of Neurosurgery, Osaka Medical and Pharmaceutical University, Osaka, Japan "Kansai BNCT Medical Center, Osaka Medical College, Osaka, Japan

The world’s first clinical trial of boron neutron capture therapy (BNCT), which treats malignant brain tumors with a single dose of neutron irradiation using multiple boron drugs simultaneously, was performed at our institution, and its excellent results have stimulated BNCT research around the world. BNCT is a particle irradiation therapy that biologically targets cancer cells, and is expected to be a “new option for cancer treatment” because it can deliver a dose of radiation at the cellular level. In the case of BNCT using a combination of multiple drugs, a method to appropriately consider the biological effects of the combination in the dose calculation has not been established. At present, BNCT based on an accelerator-based irradiation system and a boron drug (BPA) based on essential amino acids has been approved by the regulatory approval for head and neck cancer and has shown good results in brain tumors. As basic research, we have continued to develop new boron drugs, which will be essential in the future, and have explored the interpretation of the biological effects of multiple boron drugs in combination and the optimal conditions required for drug development. The survival curve of BNCT in a rat brain tumor model showed that the effect of the new drug alone was equivalent to BPA, and the effect of the combination was improved, but the effect of the combination did not match the prediction of the combined biological effect derived from each drug. However, it has been found that the effect of the combination does not match the prediction based on the combination of biological effects derived from each drug. In other words, even if the equivalent X-ray equivalent dose (Gy-Eq) is calculated, the combined effect of some drugs exceeds the prediction, while the combined effect of other drugs is poor.

Key words: glioma | neutron capture therapy | biological effectiveness

ET-6 GEMCITABINE RADIOTHERAPIC PRIMES IRRADIATED MALIGNANT MENINGIOMA CELLS FOR SENOLYTIC ELIMINATION BY NAVITIOCLAX
Masahiro Yamamoto, Chihiro Kitakata, Department of Molecular Cancer Science, Yamagata University, Yamagata, Japan

BACKGROUND: Malignant meningioma is an aggressive tumor that requires adjuvant radiotherapy after surgery, yet there has been no standard systemic therapy established so far. We have demonstrated that malignant meningioma cells are exclusively sensitive to gemcitabine due to their increased expression of hENT1 and dCK, which play critical roles in the intracellular transport and activation of gemcitabine, respectively (Takeda et al. Oncotarget 8:90996, 2017; Yamamoto et al., Neuro-Oncol 23:945, 2021).

SIGNIFICANCE: In support of our findings, the efficacy and safety of gemcitabine have recently been documented in a small case series of patients with recurrent meningiomas, which has further led to a phase 2 clinical trial to evaluate the efficacy of gemcitabine in recurrent high-grade