antimitotic effects of TTFields discerned the possible combinatorial potential of TTFields with other agents targeting the division process. Subsequent to elucidation of antimitotic effects, other downstream effects of TTFields in chondrosarcoma influenced the microenvironment, up-regulation of autophagy and cell death, thus driving immunogenic cell death. Indeed, in several preclinical models, combining TTFields with immunotherapeutics demonstrated enhanced efficacy. Recently, additional novel effects of TTFields were characterized, including inhibition of DNA damage repair responses and induction of transient and reversible permeabilization of the blood brain barrier (BBB). These new findings offer potentially innovative means to optimize treatment outcomes by combining TTFields with radiation therapy and DNA damaging agents, as well as improved delivery of immunomodulatory agents across the BBB. These scientific findings were instrumental in advancing the clinical pipeline of TTFields, which includes conduct of ongoing trials combining TTFields with a variety of modalities, in approved indications and in other solid malignant tumor types. The aim of this talk is to describe TTFields’ preclinical research activities and tools, and to specify how these study outcomes have defined and advanced the clinical pipeline.

MS-1
SURGICAL STRATEGY FOR BRAIN TUMOR BASED ON MOLECULAR AND FUNCTIONAL CONNECTOMICS PROFILES
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It is reported that the development of new perioperative motor deficits was associated with decreased overall survival despite similar extent of resection and adjuvant therapy. The maximum safe resection without any neurological deficits is required to improve overall survival in patients with brain tumor. Surgery is performed with various modalities, such as neuro-monitoring, photodynamic diagnosis, awake craniotomy, intraoperative MRI, and so on. Above all, awake craniotomy technique is now the standard procedure to achieve the maximum safe resection in patients with brain tumor. It is well known that before any treatment, gliomas generate globally (and not only focally) altered functional connectomics profiles, with various patterns of neural reorganization allowing different levels of cognitive compensation. Therefore, peroperative cortical mapping and elucidation of functional network, neuroplasticity and reorganization are important for brain tumor surgery. On the other hand, recent studies have proposed several gene signatures as biomarkers for different grades of gliomas from various perspectives. Then, we aimed to identify these biomarkers in pre-operative and/or intra-operative periods, using liquid biopsy, immunostaining and various PCR methods including rapid genotyping assay. In this presentation, we would like to demonstrate our surgical strategy based on molecular and functional connectomics profiles.

MS-2
MINIMALLY INVASIVE GLIOMA SURGERY WITH NAVIGATION SYSTEM AND TUBULAR RETRACTOR
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Navigation systems are reliable and safe for neurological surgery. Navigation is an attractive and innovative therapeutic option. Recently, endoscopy and robotic surgeries have been gradually increasing in neurosurgery. We are currently trying to use 4K and 8K systems to improve the accuracy and safety of our surgical procedures. Surgeries for deep-seated tumors are challenging because of the difficulty in creating a corridor and observing the interface between lesions and the normal area. In total, 315 patients underwent surgery at Okayama University between 2017 and 2019. Among them, we experienced 92 glioma surgeries using navigation systems. Preopera-