ChatGPT in glioma adjuvant therapy decision making: ready to assume the role of a doctor in the tumour board?

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ABSTRACT

Objective To evaluate ChatGPT’s performance in brain glioma adjuvant therapy decision-making.

Methods We randomly selected 10 patients with brain gliomas discussed at our institution’s central nervous system tumour board (CNS TB). Patients’ clinical status, surgical outcome, textual imaging information and immuno-pathology results were provided to ChatGPT V.3.5 and seven CNS tumour experts. The chatbot was asked to give the adjuvant treatment choice, and the regimen while considering the patient’s functional status. The experts rated the artificial intelligence-based recommendations from 0 (complete disagreement) to 10 (complete agreement). An intraclass correlation coefficient agreement (ICC) was used to measure the inter-rater agreement.

Results Eight patients (80%) met the criteria for glioblastoma and two (20%) were low-grade gliomas. The experts rated the quality of ChatGPT recommendations as poor for diagnosis (median 3, IQR 1–7.8, ICC 0.9, 95% CI 0.7 to 1.0), good for treatment recommendation (7, IQR 6–8, ICC 0.8, 95% CI 0.4 to 0.9), good for therapy regimen (7, IQR 4–8, ICC 0.8, 95% CI 0.5 to 0.9), moderate for functional status consideration (6, IQR 1–7, ICC 0.7, 95% CI 0.3 to 0.9) and moderate for overall agreement with the recommendations (5, IQR 3–7, ICC 0.7, 95% CI 0.3 to 0.9). No differences were observed between the glioblastomas and low-grade glioma ratings.

Conclusions ChatGPT performed poorly in classifying glioma types but was good for adjuvant treatment recommendations as evaluated by CNS TB experts. Even though the ChatGPT lacks the precision to replace expert opinion, it may serve as a promising supplemental tool within a human-in-the-loop approach.

INTRODUCTION

Artificial intelligence (AI) is attracting a lot of interest in the present era of personalised medicine. Since novel drug discovery, surgical robotics or complex interdisciplinary oncological therapy decisions are time-consuming and resource-demanding, innovative AI-based language models may enhance the performance of healthcare ecosystems. Recently, a novel general-purpose AI chatbot, called ChatGPT-3.5 (Generative Pretrained Transformer 3.5), was launched, spurring mixed reactions of curiosity and scepticism from the scientific community.

ChatGPT is an AI-powered chat interface which results in a language model that uses unsupervised learning and generates human-like text. It allows humans to satisfy their curiosity by engaging in a dialogue using various questions and prompts. Although
the chatbot was not designed to deliver medical knowledge, it allows one to chat on specific medical topics and provides answers with a tone of authority as one would interact with an expert. Nevertheless, chatGPT has some limitations such as the availability of online data until September 2021 and that it sometimes provides incorrect although plausible-sounding answers13 possibly limiting its use in medical settings.

Neuro-oncology has significantly evolved in parallel with new research advances.14 For instance, the treatment of high-grade gliomas has been extensively studied for the last 20 years to offer a longer survival rate for affected individuals.15,16 Furthermore, the consideration of the patient’s clinical status, age, and comorbidities have been included in novel trials to optimise treatment protocols.17 Low-grade gliomas which account for approximately 20% of all gliomas are even more heterogenous and adjuvant treatment is based on their complex molecular profile.18–20 In order to deliver the best treatment strategies for glioma patients, central nervous system (CNS) tumour boards (TB) arose implicating a multidisciplinary team composed of neurosurgeons, oncologists, neurologists, pathologists, radiation oncologists and neuroradiologists.21 TBs are, however, mobilising an extensive amount of resources, which might be challenging to apply in every scenario. In this regard, AI-assisted decision-making could prove helpful in delivering personalised treatment strategies.22

Given the promise of AI in using vast amounts of knowledge to synthesise information and provide recommendations, we investigated whether ChatGPT had a role to play in CNS TB regarding glioma patient adjuvant therapy decision-making. We hypothesised that ChatGPT would perform as well as CNS TB experts in providing glioma subtype diagnosis and adjuvant treatment strategy in line with the current guidelines.23

METHODS
Patients’ selection
We randomly selected 10 glioma cases from our institutional CNS TB registry from 2014 to 2022. During this period a total of 215 brain glioma cases were evaluated. Inclusion criteria were: (1) new onset or recurrent supratentorial glioma, (2) surgical treatment was performed (removal or biopsy), (3) CNS TB recommendation and (4) informed consent was available. Exclusion criteria were: (1) a presence of brain metastasis, (2) extra-axial tumours and (3) glioma involving the brainstem or the spinal cord.

Dialogue with ChatGPT
Electronic patients’ records were retrospectively reviewed. From 1 February to 14 February 2023, 10 case summaries were presented to ChatGPT (V.3.5, February 2023). A separate chat session was used for each case and was presented concisely with information on age, sex, medical history, symptoms, textual imaging results, surgical outcome, tumour resection extent, histopathological and molecular examination results. No diagnosis nor patient identification information was provided to ChatGPT. The questionnaire was modelled after a real-life TB panel discussion format. Two questions were asked to ChatGPT: (1) ‘what is the best adjuvant treatment?’, (2) ‘what would be the regimen of radiotherapy and chemotherapy for this patient?’. ChatGPT’s answers were collected. The same case information and a complete chat transcript were provided to the experts (online supplemental material 1). As a quality control measure, we asked the chatbot to provide the presumed diagnosis, which was consistent with its initial spontaneous response for each case.

CNS TB and experts’ selection
Our institutional CNS TB is composed of neuro-oncologists, radio-oncologists, radiologists, neurosurgeons, neuropathologists and neurologists. We considered our institutional CNS TB as a reference, as its decisions are evidence-based and are supported by a multidisciplinary consensus. Every patient with CNS oncological disease admitted to our institution is presented at this multidisciplinary meeting. For the purpose of this study, five experts from our CNS TB (two neuropathologists, one neurosurgeon, one radio-oncologist and one oncologist) and two external independent experts (two neurosurgeons from Europe and North America) evaluated ChatGPT’s output with regard to the formal decision of the CNS TB.

Studied parameters
The experts were asked to rank ChatGPT’s answers for each of the 10 cases. The CNS TB decisions were used as the gold standard. The experts were asked to evaluate the ChatGPT’s output on a scale between 0 and 10, where ‘0’ indicated complete disagreement, ‘10’ indicated complete agreement and ‘5’ a neutral answer (‘neither agreement nor disagreement’). The experts had to evaluate ChatGPT’s answers regarding the diagnosis, the proposed treatment, the consideration of the patient’s functional status to support adjuvant therapy, the proposed regimen of adjuvant therapy and the overall accuracy of ChatGPT with respect to its answers. Finally, the experts were asked to provide their opinion on the possible place of AI in interdisciplinary CNS tumour decision-making. The experts were provided with a questionnaire to rate ChatGPT’s performance in providing the diagnosis of specific glioma types, adjuvant treatment recommendations, adjuvant therapy regimen, how well the chatbot integrated the overall functional status of the patient into the decision-making and the overall quality of the recommendations provided. Figure 1 summarises the study workflow. Online supplemental material 2 presents the questions asked to the experts. Finally, the agreement between experts was evaluated.
Statistics
We used R V.3.6.1 for the statistical analysis. The randomisation process was performed using function floor(runif). Ordinal variables were presented as median with IQR and were compared using a Mann-Whitney U test when appropriate. Experts’ rating score between 0 and 3 was considered poor, 4 and 6 as moderate, 7 and 8 as good, and 9 and 10 as excellent. The intraclass correlation coefficient (ICC) was used to evaluate the agreement between the experts (two-way random effects, absolute agreement, multiple raters average, ICC (2,k))24. An ICC <0.5 was considered as poor, ≥0.5 and <0.75 as moderate, ≥0.75 and <0.9 as good and ≥0.9 as excellent agreement.24 Hypothesis testing was considered significant at p value <0.05 (two-sided).

RESULTS
ChatGPT’s output
ChatGPT provided the diagnosis for suspected glioma type, recommendations for adjuvant treatment plan, regimen for radiotherapy and chemotherapy, and consideration of functional status for all 10 cases. Regarding the first question ‘what is the best adjuvant treatment’, ChatGPT started the dialogue by giving its appreciation of the diagnosis. Based on the patient summary, it correctly recognised and classified the tumours as glioma in all cases and suggested the tumour type (eg, low-grade glioma, grade II or III astrocytoma, glioblastoma). Of note, no alternative diagnosis such as brain metastasis or extra-axial brain tumour was proposed. ChatGPT then recommended ‘the best adjuvant treatment […]’ or ‘the standard of care for glioblastoma […]’. Concerning the second question ‘what would be the regimen of radiotherapy and chemotherapy for this patient’, ChatGPT provided a recommendation for all cases. However, a complete regimen of radiotherapy (greys in fractions over weeks) was provided in 70% of the cases, and a complete regimen of chemotherapy (medication and doses) in 50% of cases.

For both questions, ChatGPT nuanced its answers for all cases by mentioning the need to adjust the treatment according to the patient’s individual preferences and functional status, although never specifying alternatives. Finally, ChatGPT mentioned the need to confirm
its treatment suggestion with a multidisciplinary team in 80% of the cases.

**Experts’ opinion and agreement**

Seven experts rated ChatGPT’s output regarding the diagnosis, recommendations for therapy and regimen, the consideration of the patient’s functional status and ChatGPT’s overall performance. Rater 6 only rated the diagnosis accuracy and treatment recommendations for case 2 and did not rate the output regarding the consideration of the functional status nor the regimen of adjuvant therapy (the expert preferred to remain in their scope of practice).

Figure 2 demonstrates the inter-rater agreement for each evaluated outcome. Concerning the diagnosis, ChatGPT’s output was evaluated as poor with a median score of 3 (IQR 1–7.8) with excellent agreement between the experts (ICC 0.9, 95% CI 0.7 to 1.0). For the adjuvant therapy, the ChatGPT recommendations were evaluated as good with a median score of 7 (IQR 6–8) and a good agreement (ICC 0.8, 95% CI 0.4 to 0.9). The adjuvant

![Figure 2](http://informatics.bmj.com/)
therapy regimen was evaluated as good with a median score of 7 (IQR 4–8) and good expert agreement (ICC 0.8, 95% CI 0.5 to 0.9). Regarding ChatGPT’s output on the consideration of the patient’s functional status, the experts rated the recommendations as moderate with a median score of 6 (IQR 1–7) and a moderate agreement (ICC 0.7, 95% CI 0.3 to 0.9). Finally, the global evaluation of ChatGPT’s output accuracy was moderate and scored 5 (IQR 3–5) with a moderate expert agreement (ICC 0.7, 95% CI 0.3 to 0.9). Six experts (86%) evaluated ChatGPT’s role in a CNS TB as useful if the AI-based system can evolve and learn. One rater (14%) evaluated ChatGPT’s role in a CNS TB as useful, but only in specific circumstances.

There was no significant difference between experts’ ratings in glioblastoma (8/10) and two low-grade glioma cases.

**DISCUSSION**

In this study, we assessed the performance of ChatGPT, an AI-based language model, in providing treatment recommendations for glioma patients. To the best of our knowledge, this is the first study aiming to evaluate this novel chatbot within the framework of CNS tumour multidisciplinary decision-making. While ChatGPT demonstrated proficiency in accurately identifying cases as gliomas, it displayed limited precision in identifying specific tumour subtypes. Furthermore, the tool’s recommendations regarding treatment strategy and regimen were rated as good, while the ability to incorporate functional status in its decision-making process as moderate.

**Rationale for CNS TB**

Oncological patients discussed in the multidisciplinary CNS TB are more likely to benefit from a preoperative and postoperative staging and are more likely to receive the optimal adjuvant treatment.25 26 Barbaro et al presented the foundations of neuro-oncology and the need for multidisciplinary expertise in order to embrace the multiple disease aspects in CNS tumour-affected patients.14 The authors highlighted the prerogatives and missions of a CNS TB: (1) neuro-oncology, neurosurgery, radiation oncology, neuropathology, neurology and radiology are specialties necessary to compose the CNS TB; (2) the expert consortium’s main goal is to propose a collaborative treatment plan; (3) the development of novel clinical trials. Furthermore, a single-centre prospective evaluation of a CNS TB showed that the experts’ consortium influences the clinical management of patients suffering from a brain tumour through high-impact decisions.27 However, the organisation of CNS TB is limited by economic costs, time expenditure, resource availability and the limited presence of TB across the geographic and socioeconomic strata.26 New AI-based tools with underlying deep learning, such as ChatGPT, might represent a valuable complement or at least offer some help to centres lacking expertise or resources.

**ChatGPT ready to assume the role of the doctor?**

Two questions were asked ChatGPT that corresponded to the main aim of a CNS TB discussion: ‘what is the best adjuvant treatment?’, and ‘what would be the regimen of radiotherapy and chemotherapy for this patient?’. ChatGPT scored well on both parameters, but its responses were less accurate on other parameters such as incorporating the functional status of the patient, and glioma subtype diagnostic accuracy. Regarding the latter, the output provided by the chatbot was often incorrect (ie, pleomorphic astrocytoma instead of glioblastoma in one case), or not detailed enough (ie, no distinction between grade II or III astrocytoma). On the other hand, the adjuvant treatment suggestion and its regimen were rated as good. In future studies, it may be worth exploring alternative questioning methods that align better with how chatbots process information. This approach could potentially lead to more accurate results.

In this cohort, 80% of the included patients were diagnosed with glioblastoma (WHO grade IV). In the literature, the treatment of glioblastoma WHO IV has been extensively studied.15–17 19 23 28 AI models used by ChatGPT are trained on a large dataset of information found online including websites, journals and digitalised books. It is thus comprehensible that ChatGPT’s output regarding the adjuvant treatment and its regimen related to glioblastoma is of better quality because the underlying knowledge base is well-documented. To this extent, ChatGPT’s performance is mediocre regarding recommendations that are based on less extensive knowledge base. The consideration of patient functional status was rated as moderate, even though the clinical preoperative and postoperative state of the included cases was presented to ChatGPT. This consideration is much less documented in the literature as only a few clinical trials studied adjuvant therapy for glioblastoma in patients with impaired functional status or in older adults.17

**Strengths and limitations**

Our results provide valuable information on the potential of human-AI interfaces in medical decision-making. To test the chatbot’s performance, we have used glioma cases which represent a homogenous sample of tumour cases which allowed us to test the performance in this setting but limited the generalisability of our findings to other tumour types. Of note, ChatGPT’s recommendations were conscientiously mitigated with disclosure statements that it was not designed to provide medical advice, which presents another limitation in a medical setting. Notwithstanding, it might be seen as an opportunity if similar algorithms would be designed specifically for this purpose. Given this, at the moment we cannot appreciate the full potential of ChatGPT in CNS TB. Notwithstanding this limitation, one could imagine that AI chatbots, with pursued development in the medical field, could hold great promise to complement the classic CNS TB workflow. Another limitation lies in the fact that the chatbot’s knowledge relies on content from
the internet limited to 2021. Although information on more novel research developments in neuro-oncology were not accessible for the chatbot, this should not have impacted its recommendations for standard clinical care. If the chatbot had access to information on new clinical trials, it could greatly aid the therapeutic discussion and potentially lead to new development directions. Finally, ChatGPT recommendations cannot be taken at face value without specialist verification since it is not uncommon for the chatbot to provide erroneous information. In language models such as ChatGPT, a phenomenon known as 'hallucinations' frequently occurs and can span from rather benign, for example, providing plausible but non-existent scientific references, to very dangerous medical scenarios, such as recommending an ineffective or harmful treatment. Therefore, whether used to inform medical or other high-stake decisions, at this stage it is indispensable that the output is verified by a human professional. Finally, our study relied on textual neuroimaging information and did not involve a quantitative AI imaging analysis which could be a potential area of development.

Further developments

Six of the seven experts evaluated ChatGPT as useful if the system could learn and improve. This notion is supported by the medical community as AI is growing and holds immense promise in medicine. However, since its launch in November 2022, ChatGPT has raised scepticism in the scientific community regarding threats to the originality of scientific work. Another consideration is the risk that AI chatbots may be prone to bias or commit omissions and errors in the interpretation of medical information. Due to these shortcomings, AI-based systems in medicine should be used with a human-in-the-loop approach.

Even if our results suggest a reserved rating for ChatGPT’s performance on glioma subtype diagnosis and multi-modal information integration, AI-based chatbots may be a promising supplement in TB decision-making. Future studies could explore ways to refine ChatGPT’s functionality, such as incorporating more patient-specific data and refining its ability to provide nuanced recommendations based on the clinical context. Furthermore, future developments in the ChatGPT interface could introduce the ability to read medical imaging, such as preoperative and postoperative brain MRI, which could enormously improve its diagnostic ability and treatment recommendations.

Nonetheless, our results highlight the potential utility of ChatGPT in facilitating clinical decision-making. Chatbots could be used to quickly provide information related to a patient’s medical history, differential diagnosis, relevant diagnostic tests, experimental treatment options and potential side effects. Furthermore, we intentionally provided the chatbot with only one conversation log. Thus, it is possible that further interaction and additional discussion with the chatbot may have yielded increased performance.

However, ChatGPT’s ability to provide medical information was restricted as it did not have access to the latest clinical trial findings. This was because it lacks live internet access and access to research databases. Overcoming these barriers and facilitating AI access to the newest scientific information, could be a potential direction of future development as the novel clinical trials are a crucial part of a CNS TB discussion. AI-based chatbots could have the potential to integrate the newest trial and bench science information into multidisciplinary decision-making and help TB direct patients to potential applicable treatments.

AI language models are evolving at a tremendous speed, and by the time of the publication of this manuscript, a newer ChatGPT V.4.0 was introduced, offering a more versatile conversational tool. It is possible that future updates may include a neuro-imaging analysis tool, which would greatly enhance the complexity of AI tools available for the medical field.

CONCLUSION

We have evaluated the performance of the novel AI-based language generator ChatGPT in glioma-related treatment recommendations. ChatGPT correctly identified the cases as CNS tumours but lacked precision on tumour subtype. The treatment strategy and regimen recommendations were rated as good; however, it lacked the ability to nuance its recommendations when taking into consideration the functional status. Overall, our findings suggest that ChatGPT has potential as an adjunct to the multidisciplinary TB decision workflow within a human-in-the-loop approach, provided that further algorithmic advancements are made in the medical domain.

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Supplementary material 1: case description and ChatGPT’s output

Patient 1:

Description:
A patient in his/her early 30s without past medical history suffered from an inaugural epileptic seizure during a sport training session. An MRI was then performed and revealed a right frontal hyperintensity on the FLAIR sequence with a mass effect. The gadolinium injection showed a blurry contrast enhancement inside the lesion. A surgery was performed, achieving a gross-total resection. The patient woke up after the surgery with a transient hemiparesis and recovered completely after 2 weeks. The neuropathological exam showed a microvascular proliferation, atypical nucleocytoplasmic ratio, unmethylated MGMT promoter, no co-deletion of 1p19q, GFAP positive, no ATRX loss, IDH-1 mutated and MIB 40%. What is the best adjuvant treatment for the patient?

ChatGPT’s answer:
Based on the neuropathological exam, it appears that the patient has a grade II-III glioma, specifically an IDH-mutant oligodendroglioma. The best treatment choice for this type of glioma typically includes a combination of surgery, radiation therapy, and chemotherapy with Temozolomide. The patient's age, overall health, and functional status should also be taken into account when making a treatment plan. Close monitoring and regular imaging will be important to assess for disease progression and response to treatment. Additionally, the patient's tumors unmethylated MGMT promoter status may be a positive prognostic factor, which suggests a better response to chemotherapy, and it's important to take this into account when deciding on treatment options.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The standard treatment for IDH-mutant oligodendrogliomas typically includes surgery, radiation therapy and chemotherapy. The radiation therapy regime for this patient will typically include a course of external beam radiation therapy to the tumor bed and surrounding area, often with a total dose of 60-70 Gy in 1.8-2 Gy fractions given over 6-7 weeks, in combination with a concurrent temozolomide chemotherapy. For the chemotherapy, temozolomide is the most commonly used agent for IDH-mutant oligodendrogliomas. Temozolomide is typically given orally in a daily dose of 75-100 mg/m2 for 42-56 days during the course of radiation therapy, and it's often followed by 6-12 cycles of adjuvant temozolomide after radiation therapy completed.

It's important to note that the treatment plan should be tailored to the patient's individual needs, and that the patient's care team will adjust the treatment plan if necessary. Also, the patient should be closely monitored for any side effects and toxicity of the treatment and the treatment adjustments should be made accordingly.

Local CNS tumor board’s answer:
Oncological diagnostic:
Frontal lobe
Right side
Mutation IDH-1: mutated
MGMT promoter: unmethylated
ATRX loss: no
1p19q codeletion: no

**Past medical history:**
Unruptured 4mm MCA-bifurcation aneurysm

Preoperative clinical exam:
GCS 15, no focal deficit, only a mild weakness on the left arm.

**Oncological Medical History:**
A patient in his/her early 30s, no past medical history, presented a seizure in Portugal while he/she was training (works as a personal trainer), with visual auras. No loss of consciousness, no loss of urine or stool, tonic clonic movements on the left side followed by a postictal facial hemiparesis. No trauma. The patient also presented a double vision at this time. No nausea no vomiting in the postictal period. A second seizure appeared one month after when an MRI was performed. The patient reported headache evaluated at 4/10. Focal seizures are then reported with a weakness in the left arm. On the cognitive point of view, the patient reported no loss of concentration, no weight loss, and no loss of appetite. The patient was taking Keppra 500 mg twice a day since the second seizure.
No allergies
Habits: smokes marijuana, no alcohol
No antiplatelet, no anticoagulant

**Surgery and postoperative condition:**
Postoperative clinical status: GCS15, psychologic retardation, left hemiparesis with M4 at the hand, M1 at the level of the superior limb, M0 at the inferior limb (SMA syndrome). No sensitive impairment. Walking not testable.
Gross total resection (>90%)

**Proposed Treatment:**
Radiotherapy
Chemotherapy

**Discussion:**
Right frontal high-grade glioma with dural involvement. Subtotal resection, the CNS tumor board suggests an adjuvant treatment with radio- and chemotherapy according to STUPP schema.
Patient 2:

Description:
A right-handed patient in his/her late 40s presented headache and nausea since a couple of weeks. The patient had no past medical history. He/She consulted the emergency department where a cerebral CT scan and MRI were performed. A right temporoparietal lesion with contrast enhancement was observed. The patient was operated on his/her lesion. The surgery went well, and a gross total resection could be achieved. The pathological exam revealed an abnormal cerebral tumoral biopsy with necrosis, cellular proliferation, and rare microvascular proliferation. Tumoral cells are positive for GFAP, no ATRX loss, IDH-wild type, MIB1 20%.

What is the best adjuvant treatment?

ChatGPT's answer:
Based on the information provided, it appears that the patient was diagnosed with a brain tumor, and a gross total resection was achieved during surgery. The pathological examination revealed that the tumor cells were positive for GFAP, which is a marker for glial cells, and the tumor was also IDH-wild type and had a MIB1 proliferation index of 20%. These findings suggest that the tumor is likely a grade III or IV astrocytoma, which are malignant brain tumors that arise from astrocytes, a type of glial cell.
The best adjuvant treatment for a patient with a malignant brain tumor like this would likely involve a combination of radiation therapy and chemotherapy. The specific regimen will depend on the individual patient and the specifics of their case.
It is important to consult with a multidisciplinary team which include oncologist, radiation oncologist and neurosurgeon to decide on the best treatment plan for the patient. Additionally, regular follow-up imaging and monitoring for any recurrence is important.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT's answer:
The specific regimen of radiation therapy and chemotherapy for a patient with a grade III or IV astrocytoma, such as the one described in the case, will depend on a variety of factors, including the patient's overall health and medical history, the specifics of the tumor (such as its size, location, and grade), and the patient's preferences and goals of treatment.
That being said, the standard of care for patients with malignant brain tumors is typically a combination of radiation therapy and chemotherapy.
Radiation therapy may include external beam radiation therapy (EBRT) which uses high-energy x-rays to kill cancer cells, and/or stereotactic radiosurgery (SRS), which uses high-dose radiation to target the tumor with pinpoint accuracy.
Chemotherapy may include Temozolomide alone, which is an oral alkylating agent, or with radiation therapy in the form of concurrent chemoradiotherapy.
It's also important to note that the treatment plans are tailored to each individual patient, and might differ based on the patient's overall health, the location and size of the tumor, and the patient's goals of treatment.
It's very important to consult with an oncologist, radiation oncologist and neurosurgeon to decide on the best treatment plan for the patient.
**Local CNS tumor board’s answer:**
Diagnostic:
Glioblastoma WHO grad IV
Right parietal lobe
IDH-1 mutation: no, wild-type
ATRX loss: no
MGMT promoter: unmethylated

**Oncological Medical History:**
The patient is a right-handed 48-year-old without past medical history, who presented since weeks nausea and diarrhea. A cerebral CT scan was performed after the patient reported headache, psychological retardation and disbalance. The imagery revealed a right temporoparietal lesion, which motivated the brain MRI. The preoperative workout with neuropsychological evaluation as well as an ophthalmologic examination revealed a left inferior lateral homonym quadranopsia. A surgical removal was proposed.

**Proposed Treatment:**
Radiotherapy
Chemotherapy

**Discussion:**
Radiotherapy
Chemotherapy
Glioblastoma IDH1 wild-type for which the CNS tumor board encourages an adjuvant therapy with radio-chemotherapy with temozolomide, according to the standard schema.
Patient 3:

Description:
A 57-year-old patient without past medical history was admitted after presenting an inaugural tonico-clonic seizure. An MRI was performed and revealed a contrast enhancement at the temporo-occipital junction. This lesion was surgically removed with a gross total resection. The surgery went well, and the patient had no new deficit in the postoperative period. The pathological exam revealed cellular proliferation was cytonuclear atypical behavior, many mitoses, microvascular proliferation without focal necrosis. atypical cells are positive for GFAP, no ATRX loss, MGMT promoter unmethylated IDH-1 wild type, MIB1 5%. What is the best adjuvant treatment?

ChatGPT's answer:
Based on the information provided, it appears that the patient has a glioblastoma, which is a type of brain tumor that is characterized by aggressive growth and a high rate of recurrence. The best adjuvant treatment for this type of tumor typically includes a combination of radiation therapy and chemotherapy, specifically with temozolomide. This treatment regimen is considered the standard of care for glioblastoma and has been shown to improve patient outcomes. However, it is important to note that the patient's individual case should be discussed with a team of specialists, including a neuro-oncoligist, to determine the most appropriate course of treatment.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT's answer:
The standard regimen for radiotherapy and chemotherapy in glioblastoma is concurrent radiotherapy and temozolomide followed by adjuvant temozolomide. The concurrent radiotherapy and temozolomide is given daily for 6 weeks, with a total dose of 60 Gy delivered in 2 Gy fractions. During this time, the patient will also receive oral temozolomide at a dose of 75 mg/m2 per day. After the completion of concurrent therapy, the patient will receive adjuvant temozolomide for 6 cycles, given at a dose of 150-200 mg/m2 per day for 5 days, with 23 days of rest. It's important to note that this is a standard regimen, and the specifics of the treatment plan may be adjusted based on the individual patient's case and their response to treatment. Additionally, it's also important to manage side-effects and to consider the overall quality of life of the patient.

Local CNS tumor board's answer:
Oncological diagnostic:
Glioblastoma WHO Grad IV
Right temporal occipital lesion
Recurrence: no
IDH-1 mutation: no, wild-type
ATRX loss: no
MGMT promoter: unmethylated
Karnofsky: 100%
Oncological Medical History:
The patient was a 57-year-old male, without past medical history. He reported a generalized tonic clonic seizure while being at work. The postictal phase is characterized with a stupor. A first CT-scan is performed, revealing a right-sided nodular temporal parietal lesion avec mild contrast enhancement. The imagery was completed with a brain MRI and a FET-PET confirming the lesion, with the suspicion of a glioma. The surgical removal achieved a gross total resection. The pathological diagnosis was positive for a glioblastoma WHO Grad IV, IDH-1 wild-type. No new postoperative neurological deficit.

Surgery and postoperative condition:
Gross total resection
No new postoperative neurological deficit.

Proposed Treatment:
Radiotherapy
Chemotherapy

Discussion:
Regarding the diagnosis positive for a glioblastoma, which was macroscopically completely removed, the CNS tumor board advice an adjuvant therapy with radio-chemotherapy followed with chemotherapy alone with temozolomide.

Study:
GAPVAC
Patient 4:

Description:
A 62-year-old male, left-handed, was presented to our department for a ideomotor apraxia and dizziness. An MRI was performed and revealed a contrast uptake with a necrotic center involving the left parietal lobule. The patient was operated without complication. The postoperative MRI showed a small rest with contrast uptake significant for a tumoral rest. The patient presented postoperatively an incomplete Gerstmann syndrome. The pathological exam showed proliferative glial cells with high density. Mitoses and necrosis are seen in the biopsy. The immunohistochemistry revealed cells expressing GFAP, IDH1-wild type, no ATRX loss and MGMT promoter without methylation. the MIB1 is evaluated at 20%. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the information provided, it sounds like the patient has been diagnosed with a glioma, a type of brain tumor. The pathological exam and immunohistochemistry results suggest that the tumor is a grade II or III astrocytoma. The MIB1 index of 20% suggests a moderate level of cell proliferation. The best adjuvant treatment for this type of tumor would likely be a combination of radiation therapy and chemotherapy. Specific treatment recommendations would depend on the patient’s overall health and treatment goals, as well as the specific characteristics of the tumor. It’s important to consult with a neuro-oncologist and multidisciplinary team to discuss the best treatment options for this patient.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The specific regimen of radiotherapy and chemotherapy for a patient with a grade II or III astrocytoma would depend on various factors, including the patient’s overall health and treatment goals, as well as the specific characteristics of the tumor. However, some common treatment options for this type of tumor include:

- Radiotherapy: The standard treatment for astrocytomas is external beam radiation therapy (EBRT). The radiation beams are delivered to the brain from a machine outside the body. The standard treatment for low-grade astrocytomas is typically around 60 Gy in 30 fractions.
- Chemotherapy: Temozolomide (TMZ) is a chemotherapy drug that is commonly used to treat astrocytomas. It is usually given in combination with radiotherapy. The standard regimen for low-grade astrocytomas is typically 5 days a week for six weeks during radiation therapy, followed by six cycles of TMZ given once daily for five days every 28 days.

It’s worth noting that this is a general information, and the treatment plan would be tailored to the patient’s specific case, taking into account the size, location, and grade of the tumor, as well as the patient’s overall health and treatment goals. It’s important to consult with a neuro-oncologist and multidisciplinary team to determine the best treatment plan for this patient.
Local CNS tumor board’s answer:

**Diagnosis:**
- Glioblastoma WHO Grad IV
- Left parietal lobe
- IDH-1 mutation: no, wild-type
- ATRX loss: no
- MGMT promoter: unmethylated
- Recurrence: no
- Karnofsky: 80%

**Oncological Medical History:**
The patient was a 62-year-old patient, left-handed, without past medical history. He presented for the first time disbalance for ideomotor apraxia. According to his family, the patient also presented a psychological retardation. The imagery performed at the emergency unit showed a left intra-axial mass inside the parietal lobe, with the suspicion of a high-grade glioma. A treatment of dexamethasone was initiated, and the surgery was planned.

**Surgery and postoperative condition:**
Neuropsychological impairment, in terms of:
- Moderate acalculia
- Moderate agraphia
- Mild ideomotor apraxia
- Right hemineglect
- Special agnosia
- Memory disturbance
Gerstmann syndrome
Subtotal resection (>90%), postoperative radiological contrast enhancement: yes.

**Proposed Treatment:**
- Radiotherapy
- Chemotherapy

**Discussion:**
Glioblastoma for which the CNS tumor board advises an adjuvant therapy according to the STUPP schema.
Patient 5:

Description:
A 38-year-old female, without past medical history, was admitted to our intermediate care unit after presenting successive inaugural seizures. She developed a status epilepticus and was treated with anti-epileptic drugs. After stabilization of her condition, an MRI was performed and revealed a large right frontal hyperintensity on the T2 and FLAIR sequences. Contrast uptake was observed on the center of the lesion. The lesion involved all the cortical area until the precentral gyrus. The right frontal lesion could be partially removed because of the midline crossing of the lesion and the vicinity of the SLF III tractus. Postoperatively, the patient developed a SMA syndrome resulting in a left hemiplegia and psychomotor retardation. The pathology showed tumoral glial cells, with minigemistocytes, gemistocytes and an oligoid phenotype. The cellular density is moderated, and the atypical cells are moderated. A few mitoses were observed (brisk mitotic activity). The exam revealed no necrosis, no microvascular proliferation. The immunohistochemistry showed tumoral cells expression an ATRX loss, an IDH1 mutated, MGMT methylated and a MIB1 at 5%. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the information provided, it sounds like the patient has been diagnosed with a glioma, a type of brain tumor that originates from glial cells. The pathology report suggests that the tumor is likely an oligodendroglioma, which is a subtype of glioma that typically has a better prognosis than other types of gliomas. The presence of an IDH1 mutation and ATRX loss are also indicators of a better prognosis. The best adjuvant treatment for this patient would likely be a combination of chemotherapy and radiation therapy. The specific regimen would depend on the patient’s overall health and the specific characteristics of the tumor. It is important that the patient is closely monitored by a team of specialists, including a neuro-oncologist, to determine the best treatment plan.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The specific regimen of radiotherapy and chemotherapy for a patient with an oligodendroglioma would depend on various factors such as the grade of the tumor, the patient’s overall health, and the patient’s preferences. However, some common regimens for oligodendroglioma include:

- Temozolomide (TMZ) with concurrent radiation therapy: This regimen involves giving the patient the chemotherapy drug temozolomide together with radiation therapy for 6 weeks. This regimen is considered standard of care for oligodendroglioma.
- Procarbazine, lomustine, and vincristine (PCV) chemotherapy: This is a combination of three chemotherapy drugs that is given for six cycles. This regimen is considered standard of care for anaplastic oligodendrogliomas.
- PCV with concurrent radiation therapy: This regimen is similar to the one above but given in combination with radiation therapy.
It is important to note that these regimens are not the only options available, and the patient's neuro-oncologist will consider other factors such as the patient's overall health, the patient's preferences and the tumor characteristics when deciding on the best treatment plan.

**Local CNS tumor board’s answer:**

*Diagnostic:*
- Right frontal lesion
- IDH-1: mutated
- ATRX loss: yes
- MGMT promoter: methylated
- Diffuse astrocytoma WHO Grad II with anaplasia

*Oncological Medical History:*
A 38-year-old female, without past medical history, was admitted after presenting a tonic clonic seizure attributed to a right frontal and diffuse lesion. On the MRI, the lesion was suggestive for a low-grade glioma. After controlling the epileptic seizure, the patient benefitted from a preoperative neuropsychological assessment. The surgery is planned after discharge.

*Surgery:*
Subtotal resection (>90%) with residual hyperintensity on the FLAIR sequence. A postoperative CT scan showed a central pulmonary embolism. Postoperative hemiparesis with SMA syndrome.

*Proposed Treatment:*
- Radiotherapy
- Chemotherapy

*Discussion:*
Subtotal resection of a right frontal diffuse astrocytoma. The CNS tumor board advises an adjuvant treatment with radio- and chemotherapy. The regimen will be determined after the results of the molecular pathological results.
Patient 6:

Description:
A 77-year-old female was admitted after presenting behavioral disorders in term of aggressivity and disorientation. An imagery with MRI was performed, revealing a multifocal frontal bilateral contrast uptake lesion, suggesting for a primary tumor. The tumoral lesion was involving the corpus callosum. A navigated needle biopsy was performed on the right frontal side. The surgery went well but the patient was not able to improve after surgery, even if corticoids were given. She had a diminished quality of life and was not able to go back home. The pathological exam showed a pleomorphological tumoral cells, the phenotype was congruent with astrocytes and the density of tumoral cells was high. Mitoses and microvascular proliferations were seen. No necrosis was described. The immunohistochemistry showed an unmethylated MGMT promotor, IDH-1 wild type and no loss of ATRX. No mutation of TERT. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the information provided, it sounds like the patient has been diagnosed with a brain tumor, specifically a glioblastoma. The pathological exam revealed that the tumor cells are astrocytic in nature, have a high density and have features consistent with an aggressive tumor (such as mitosis and microvascular proliferation). The absence of necrosis is also a poor prognostic factor. The immunohistochemistry results further suggest that the tumor is likely to be resistant to certain treatments.

The standard of care for glioblastoma is typically a combination of surgery, radiation therapy, and temozolomide, a chemotherapy drug. In addition, other treatment options that may be considered include targeted therapy, immunotherapy, and participation in clinical trials. However, it’s important to note that the best adjuvant treatment plan for this patient would depend on her overall health and medical history, as well as the specific characteristics of the tumor. It is recommended that the patient and her family consult with a team of specialists including a neuro-oncologist, radiation oncologist, and medical oncologist to determine the most appropriate treatment plan.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The standard of care for glioblastoma is typically a combination of surgery, radiation therapy, and chemotherapy.

For radiation therapy, the standard regimen is typically a course of external beam radiation therapy delivered over 6 weeks, along with concurrent temozolomide, a chemotherapy drug. The total dose of radiation is typically 60 Gy in 30 fractions.

For the chemotherapy, the standard regimen is temozolomide given concurrently with radiation therapy, and then as a maintenance therapy for 6 cycles after radiation therapy is completed. The recommended dose of temozolomide is 75 mg/m2 per day for 42 days, followed by a 7-day break.

However, it’s important to note that the specific treatment plan for this patient would depend on her overall health and medical history, as well as the specific characteristics of the tumor. It is recommended that the patient and her family consult with a team of specialists including...
a neuro-oncologist, radiation oncologist, and medical oncologist to determine the most appropriate treatment plan.

**Local CNS tumor board’s answer:**

*Diagnosis:*
- Glioblastoma (WHO Grade IV)
- Frontal Lobe bilateral
- Recurrence: No
- Mutation IDH-1: Absent
- MGMT status: unmethylated
- 1p/19q Status: unknown

**Oncological Medical History:**

77-year-old patient, who has been presenting behavioral problems for two weeks with confusion, aggressiveness, and disorientation. The patient’s family decided to bring her to the emergency room. The radiological investigations were able to specify the size and location of the lesions. The cerebral MRI showed a typical multifocal “butterfly glioblastoma” imaging involving both frontal lobes and high suggestive of high-grade glioma-like features. The PET-CT confirms the absence of peripheral lesions and the cerebral nature of these masses. The state of consciousness is good, with only a temporospatial confusion present, without sensitive or motor deficits. On the other hand, at the level of neuropsychological assessment, important behavioral disorders predominate (weak collaboration, use behavior, anosognosia) with a speech at times very incoherent and an irritability. These disorders are associated with temporospatial disorientation and important memory disorders. A neuronavigation aided biopsy was performed. Neurological state is unchanged since the intervention.

**Karnofsky:** 60%

**Current oncological evaluation:**

The imaging evokes primarily a multifocal “butterfly glioblastoma” centered in the corpus callosum and the 2 frontal lobes with ependymal extension on both sides with an important mass effect.

Two hypermetabolic frontal bilateral lesions (refer to dedicated MRI) with SUVmx measuring up to 20.5 evoking in the first instance a glioblastoma of high grade. Thyroid of large size, heterogenic with disseminated calcifications, with limited analysis in the exam which is non-dedicated, to be completed by an echography dedicated.

**Proposed Treatment:**

Chemotherapy
Radiotherapy
Surveillance

**Discussion:**

In this patient, with a reduced general health state, with a diagnosis of a very voluminous “butterfly” glioblastoma WHO Grade IV, the panel recommends, after clinical evaluation by
the radio-oncologist and oncologist, and discussion with the entourage of the patient, either
treatment with hypofractionated radiotherapy alone or chemotherapy alone with
temozolomide, or a therapeutic abstention attitude with the implementation of comfort
care.
Patient 7:

**Description:**
A 56-year-old female was admitted after presenting a sudden aphasia and a partial hemiparesis on the right side. She was known for a factor V Leiden. An MRI was performed and revealed a left precentral lesion with contrast enhancement with perifocal edema. A partial resection was performed without any new deficit. The pathological exam revealed a tumoral glial proliferation. Pleomorphic astroglial cells were observable. Necrosis foci were observed. Many mitotic features were seen. Microvascular proliferation. The immunohistochemistry showed tumoral cells are expressing GFAP, IDH-1 wild type, MIB 20%, MGMT unmethylated. What is the best adjuvant treatment?

**ChatGPT's answer:**
Based on the description provided, it appears that the patient has a glioma, which is a type of brain tumor that originates from glial cells. The pathological exam revealed that the tumor is a pleomorphic astrocytoma, which is a type of glioma that is characterized by a diverse array of cell types and the presence of mitotic features. The immunohistochemistry results indicate that the tumor cells are expressing GFAP (a marker of astrocytes) and that the tumor is IDH-1 wild type, which is a genetic marker that has prognostic significance in gliomas. The tumor is also MIB-1 positive, which is a marker of cell proliferation and MGMT is unmethylated. The best adjuvant treatment for this patient would be determined by several factors, including the patient's age, overall health, and the specific grade and location of the tumor. Typically, the treatment options for a pleomorphic astrocytoma include surgery, radiation therapy, and chemotherapy. For a patient with IDH-1 wild type and MGMT unmethylated, the standard of care is radiotherapy with Temozolomide, a chemotherapy agent. In some cases, immunotherapy and/or targeted therapy may also be considered. It is also important to note that the patient also has Factor V Leiden, which is a genetic blood clotting disorder. This should be closely monitored during the treatment and may affect the treatment options available. Overall, the patient should have a multidisciplinary approach including a neurologist, a neurosurgeon, a radiation oncologist, and a medical oncologist to evaluate the most appropriate treatment plan.

**What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:**
The standard of care for a patient with a pleomorphic astrocytoma that is IDH-1 wild type and MGMT unmethylated is typically radiation therapy with concurrent temozolomide chemotherapy. The radiotherapy regimen would typically involve daily radiation therapy, Monday through Friday, for six weeks. The total dose of radiation would be around 60 Gy (Gray), which is a unit of radiation absorbed by the tissue. The temozolomide chemotherapy would be given daily, concurrent with the radiation therapy, at a dose of 75 mg/m^2. The treatment would last for 6 weeks. After the completion of radiotherapy, the patient would continue to receive temozolomide for six cycles, with each
cycle lasting 28 days. The dose of temozolomide for these cycles is 200 mg/m^2 for five consecutive days.

It’s important to note that this is a general treatment plan and the specific regimen may vary depending on the patient's individual circumstances and the discretion of the treating physicians. Additionally, if the patient's Factor V Leiden is clinically significant, the treatment plan would have to be adjusted accordingly and close monitoring of clotting disorders will be necessary during the treatment.

**Local CNS tumor board’s answer:**
**Oncological Diagnosis:**
Glioblastoma (WHO Grade IV)
Left frontal Lobe
Recurrence: No
Mutation IDH-1: Absent
MGMT status: unmethylated

**Oncological Medical History:**
A 56-year-old female patient, in complete remission for a Stage IB FIGO endometrial stromal sarcoma operated and irradiated in 2011, who is referred to the emergency room following the sudden onset of aphasia associated with a partial right motor hemisyndrome. The MRI performed in this context shows the presence of a left precentral lesion, measuring 27.6 x 27.6 mm, with peripheral gadolinium enhancement, with significant perilesional edema, and two other left parietal lesions, centimetric, with the same characteristic as the first. Clinically, the patient is awake, anxious, with complete motor and probably parietal sensory aphasia, with major dyspraxia, and a right FBC M4/5 syndrome. The patient was put on dexamethasone with a favorable neurological evolution. She underwent a left fronto-temporo-parietal craniotomy with resection of the most voluminous component of the left frontal lesion. The histopathology diagnosis came back for glioblastoma grade IV, IDH1 not mutated. The postoperative evolution is significant for aphasia and a right hemi-syndrome improvement with a motor grade currently assessed at M4.

**Karnofsky: 80%**

**Oncological medical history:**
Low grade sarcoma of the endometrial stroma FIGO IB, status post-total hysterectomy the 25.03.2011

**Important previous medical history and comorbidities of note:**
Heterozygous Factor V Leiden mutation
Right superior lobe segmental pulmonary embolism
DVT of the posterior tibia
Allergy to low molecular weight heparin, iodine, latex, and topical cortisone

**Current postoperative status:**
Left fronto-temporo-parietal with resection of the left frontal lesion
Type of intervention: Resection subtotal (<90%)
Radiological residue: Yes
Proposed Treatment:
Chemotherapy
Radiotherapy

Discussion:
With regards to a partially resected glioblastoma, the panel retains the indication for standard complementary treatment by radio-chemotherapy with temozolomide followed by temozolomide only.
Patient 8:

Description:
A 45-year-old male, known for a low-grade glioma right fronto-insular for 11 years, did not follow the observational schema with MRI as proposed. 11 years after, a new MRI was performed showing a tumoral growth with contrast uptake. The patient presented at this time partial seizure in term of sensory deficit. A surgery was performed, and no rest was observed postoperatively in term of contrast enhancement. A residual low-grade part was observable at the bottom of the resection cavity. The pathological exam revealed tumoral proliferation with a moderate density, astroglial phenotype. Moderate atypical cytonuclear morphology with low mitosis. Inside the tumor, hypercellular areas with mitosis, pathological microvascular proliferation but no necrosis. The immunohistochemistry revealed GFAP positive cells, IDH-1 mutated and ATRX loss. Tumoral cells expressed weakly p53. MIB between 1 and 5%. No loss of 1p19q. MGMT methylated. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the patient’s pathology results, it appears that the tumor is a low-grade astrocytoma with IDH-1 mutation and ATRX loss. The presence of these genetic markers may indicate a better prognosis for the patient. Adjuvant treatment options for low-grade astrocytomas can include radiation therapy and/or chemotherapy. The patient may also be considered for clinical trials of newer treatment options. It is best to consult with a neuro-oncologist and a multidisciplinary team to determine the best course of treatment for this individual patient.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The specific regimen for radiotherapy and chemotherapy for this patient would depend on various factors such as the size and location of the tumor, the patient's overall health and treatment goals, and the availability of clinical trials.
In general, low-grade astrocytomas are often treated with radiation therapy alone or in combination with surgery. The standard radiation therapy regimen for low-grade astrocytomas is typically around 60-70Gy in 1.8-2Gy fractions over 6-7 weeks. Chemotherapy is typically not used as a primary treatment for low-grade astrocytomas but some studies have shown a benefit for the use of Temozolomide, a methylating agent, as an adjuvant treatment after surgery and radiotherapy.
Again, it is important to consult with a neuro-oncologist and a multidisciplinary team to determine the best course of treatment for this individual patient. The treatment plan should be tailored to the patient’s specific needs and should take into account the patient’s overall health, the tumor’s characteristics, and the patient’s preferences.

Local CNS tumor board’s answer:
Oncological Diagnosis:
Glioblastoma (WHO Grade IV)
Right temporal Lobe
Recurrence: No
Mutation IDH-1: Present
ATRX loss: no.

**Oncological Medical History:**
45-year-old patient, known since 2005 for a right low-grade temporal glioma discovered incidentally in the workup after a car accident. The patient chose not to undergo the advised surgical treatment and was followed until April 2013, when he moved to Ukraine. In April 2016, a new cerebral MRI for surveillance was undertaken showing significant growth insular frontotemporal parietal lesion, showing signs of high-grade progression. In the anamnesis, he presents since 2007 partial simple sensory (auditory) seizures that have increased in frequency in addition to auras. Given this context, the patient was proposed surgical management. He had a right fronto-temporal craniotomy and resection of the lesion under 5-ALA fluorescence and neuromonitoring of MEP/SEP, without complication. DAP found a mutated IDH1 high grade glioma, ARTX not preserved.

*Karnofsky: 80%*

**Current oncological evaluation:**
Status-post resection of the known right tumor lesion without enhancing residue, but probable a residue of low-grade medial and posterior to the cavity of resection. No significant reduction in the edema mass effect with right subfalcral and uncal herniation.

**Current postoperative Status:**
GSC 15, left homonymous hemianopsia, no lateralization. Increased liver enzymes
Type of intervention: Resection subtotal (>=90%)
Radiological residue: Yes

**Proposed Treatment:**
Radiotherapy
Chemotherapy

**Discussion:**
The lesion is highly likely to be a secondary glioblastoma, with indication of a standard treatment by radio-chemotherapy with Temozolomide.
Patient 9:

Description:
An 83-year-old male known for a MGUS, for a polymyalgia rhumatica as well as for chronic kidney failure, presented a central facial paresis on the left side. An MRI was performed and showed a right precentral lesion with contrast enhancement with perifocal edema. Despite the limited condition of the patient and his age, a gross total resection was performed. Unfortunately, the patient developed a postoperative hemorrhage at the surgical location. He woke up hemiplegic. The Karnofsky index was evaluated at 40%. The pathological exam revealed tumoral proliferative cerebral cells, astrocyte phenotype. Mitoses were seen as well as apoptotic cells. Presence of necrotic areas described as pseudopalisade. The immunohistochemistry showed tumoral cells with GFAP positive, IDH-1 wild type, MGMT unmethylated. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the information provided, it appears that the patient has a malignant brain tumor known as an astrocytoma. These tumors are typically treated with a combination of surgery, radiation therapy, and chemotherapy. The specific adjuvant treatment plan will depend on the patient’s overall health and condition, as well as the specific characteristics of the tumor (such as its grade and location). In general, radiation therapy is often recommended after surgery to help reduce the risk of tumor recurrence. Chemotherapy may also be used, particularly if the tumor is found to be aggressive or has a high grade. The specific chemotherapy regimen will depend on the patient’s overall health and the specific characteristics of the tumor. If the patient’s condition is limited, the treatment will have to be palliative.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The specific regimen for radiation therapy and chemotherapy for this patient would depend on a variety of factors such as the patient’s overall health, the grade of the tumor, and the location of the tumor. However, for an astrocytoma, typical treatment options may include: Radiation therapy: External beam radiation therapy (EBRT) is the most common type of radiation therapy used to treat brain tumors. EBRT is delivered using a machine called a linear accelerator, which directs high-energy beams at the tumor. The typical radiation therapy regimen is usually given 5 days a week for several weeks. Chemotherapy: Temozolomide is the most commonly used chemotherapy drug for brain tumors. It is usually given orally, once a day for five days, followed by a break of 23 days. The treatment is repeated every 28 days. It is also important to note that the treatment plan should be tailored to the specific patient and their condition, and the patient should work with their oncologist to determine the best course of treatment for them.

Local CNS tumor board’s answer:
Oncological Diagnosis:
Glioblastoma (WHO Grade IV)
Right frontal Lobe  
Position: Right  
Recurrence: No  
Mutation IDH-1: Absent  
Status MGMT: unmethylated  
Status 1p/19q: Unknown

**Oncological Medical History:**
Patient of 83 years that is known for a MGUS, polymyalgia rheumatica treated with 10 mg of prednisone, and moderate chronic renal failure, presents a numbness of the left hemiface, accompanied by early onset left central facial paralysis. The cerebral MRI describes a contrast enhancing lesion, strongly suspected to be a glioblastoma. Despite his age, in view of his remarkable general condition, a resection was performed, which unfortunately was complicated by a venous hemorrhagic infarction in the anterior aspect of the cavity of surgical resection, with edema and mass effect that translated clinically into a proportional left hemiplegia. DAP on the surgical specimen confirmed the presence of a WHO GBM grade IV, min1 to 20% with non-mutated IDH status.

**Karnofsky:** 40%

Current oncological evaluation:  
No other lesions.

**Important previous medical history and comorbidities of note:**  
MGUS  
Polymyalgia Rheumatica

**Current postoperative status:**  
GSC 15, Left hemiplegia  
Type of intervention: Resection subtotale (>=90%)  
Radiological residue: Yes  

**Proposed Treatment:**  
Surveillance.

**Discussion:**  
Given the age of the patient and the postoperative complications, the panel recommend a clinical and radiological surveillance in 2 months in addition to the neurorehabilitation already on its way.

**Research Studies:** None
Patient 10:

Description:

A 60-year-old female, right-handed, showed progressive psychomotor retardation and speech disturbance. She was presented to our emergency unit where an MRI was performed. A left fronto-temporal lesion with contrast enhancement was observed, with a suspicion for a primary tumor. A surgical removal with a temporal polectomy was performed, leading to a gross total resection with, however, a rest with contrast enhancement at the border of the cavity. The postoperative time was without complication. She could benefit from neurorehabilitation. The pathological exam revealed small tumoral cells, invading the cortex. They showed an astrocytoglial phenotype, many mitoses and necrosis as well as microvascular proliferation. The immunohistochemistry showed tumoral cells expressing GFAP, IDH-1 wild type and no loss of ATRX. MGMT unmethylated. What is the best adjuvant treatment?

ChatGPT’s answer:
Based on the pathological exam findings, the patient likely has a grade III or IV astrocytoma. The best adjuvant treatment for this type of tumor would likely be a combination of radiation therapy and chemotherapy with temozolomide, as this has been shown to improve survival in patients with malignant astrocytomas. It's also important to note that the patient has IDH-1 wild type, which is associated with poor outcome and less response to chemotherapy and radiation therapy. Therefore, other treatments such as immunotherapy and targeted therapies should be considered as well, such as the combination of radiation and temozolomide with an IDH-1 inhibitor. However, the final decision should be made by a multidisciplinary team after a thorough discussion of the patient’s specific case and treatment options.

What would be the regimen of radiotherapy and chemotherapy for this patient? ChatGPT’s answer:
The standard regimen for radiotherapy for a grade III or IV astrocytoma is typically 60 Gy in 30 fractions given over a 6-week period. This is often given concurrently with temozolomide, a chemotherapy drug, at a dose of 75 mg/m2 daily during the 6 weeks of radiation therapy. After completion of radiation therapy, temozolomide is continued at the same dose for an additional 6 cycles. This is known as the Stupp protocol, and has been shown to improve survival in patients with malignant astrocytomas. However, it's important to note that the exact regimen may vary depending on the patient’s specific case and the decision of the treating physicians. It is also important to consider other treatments such as immunotherapy and targeted therapies in addition to radiation and temozolomide, based on the patient’s specific characteristics and molecular profile.

Local CNS tumor board’s answer:
Oncological Diagnosis:
Glioblastoma WHO Grad IV
Left temporal Lobe
Recurrence: No
Mutation IDH-1: Absent
MGMT promoter: unmethylated
ATRX loss: no

Oncological Medical History:
The patient is a 60-year-old right-handed patient in good general health, known for the recent discovery of a large left frontotemporal lesion. The patient presented with memory problems with fluctuating loss of words. The patient was hospitalized in our department in order to have all complementary exams necessary for planning the surgery.

On May 25, the patient presented to the ER with her daughter because she was increasingly lethargic, she had difficulty speaking (production aphasia, she was searching for words) and her memory problems were increasingly important. A cerebral CT was performed in the emergency room showing a worsening of the perilesional edema. The patient was already on dexamethasone 4 mg 3 x daily. She was hospitalized in the intermediate care neurosurgical unit. She underwent a craniotomy for a temporal polectomy for the left temporal lesion on the May 26. Post-operatively, she showed an improvement of her production aphasia which however remains pathologic. In order to continue her neurorehabilitation, she will soon be transferred to rehabilitation.

Current Postoperative Status:
GSC 15
Pupils iso-iso
Barré held (Absence of arm elevation/pronation)
No focal neurological deficit in the 4 limbs
The wound is calm and proper
Type of intervention: Resection subtotale (>=90%)
Radiological residue: Yes
Volume: Tumor residues enhancing the edges of the cavity at the inferior, medial and superior and anterior levels

Proposed Treatment:
Radiotherapy
Chemotherapy

Discussion:
Glioblastoma for which the panel retains an indication for a commentary treatment with the STUPP protocol.
Supplementary material 2: questionnaire provided to the experts. One per included patients according to the supplementary material 1:

For the following questions please give a response from 0 to 10 where “0” indicates complete disagreement and 10 indicates complete agreement. 5 means “neutral”.

Patient X:

**Concerning the question “what is the best treatment for this patient?”, according to you:**

1) What is the precision of the ChatGPT response regarding the diagnosis provided by the Tumor Board:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

2) What is the precision of the ChatGPT response with regards to the treatment proposal in comparison to the proposition of the Tumor Board:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

3) What is the precision of the ChatGPT response when considering the clinical situation of the patients in comparison to the proposition of the Tumor Board:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Concerning the question “What would be the regimen of radiotherapy and chemotherapy for this patient?”, according to you:**

1) How accurate is the proposal of the adjuvant treatment regimen given by ChatGPT for the cited patient, with regards to:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

**Regarding the application of artificial intelligence by “ChatGPT” to the Tumor Board:**

1) What is the overall accuracy of the answers given:

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |