

the frequency (median 4.5, IQR 2.5) and burden (median 4.0, IQR 3.00) dimension and 21% of the patients were willing to undergo treatment for fatigue. Overall 35% of the patients were willing to undergo treatment for at least one symptom. Frequency and burden of symptoms correlated well (median Kendall's Tau of 0.84 with a range of correlations of 0.73–0.95). Frequency and willingness to undergo treatment correlated less (median Kendall's Tau of 0.35, range 0.24–0.57), as well as burden and willingness to undergo treatment (median Kendall's Tau, range 0.28–0.61). CONCLUSION: The top five symptoms most often reported by patients with diffuse glioma during stable disease were: fatigue, memory problems, reduced physical fitness, concentration problems and drowsiness. These symptoms may serve as a roadmap for future research on treatment strategies to alleviate these symptoms.

**SUPPORT/DISCLOSURE:** This project is funded by The Anita Veldman Foundation (CCA-2019-2-21).

#### P12.03 A DELPHI SURVEY TO INFORM CORE 'RED FLAG' SYMPTOMS FOR AN ELECTRONIC PATIENT REPORTED OUTCOME SYSTEM IN GLIOBLASTOMA FOLLOW UP

A. Luis<sup>1,2</sup>, F. Boele<sup>3,4</sup>, T. Booth<sup>2,5</sup> <sup>1</sup>National Hospital of Neurology and Neurosurgery, London, United Kingdom, <sup>2</sup>King's College London, London, United Kingdom, <sup>3</sup>Leeds Institute of Medical Research, Leeds, United Kingdom, <sup>4</sup>Leeds Institute of Health Sciences, Leeds, United Kingdom, <sup>5</sup>King's College Hospital NHS Foundation Trust, London, United Kingdom.

**BACKGROUND:** Glioblastoma is a common and aggressive primary malignant brain tumour in adults associated with a poor prognosis and considerable symptom burden. Clinical review and serial neuroimaging remain the primary monitoring tools to assess for disease status. However, the evidence base for the existing surveillance imaging schedule is yet to be established. New models of follow up care are needed to demonstrate better patient outcomes in this patient cohort. There are indications that patient-reported outcome measures (PROMs) can contribute to improved survival and maintaining an optimal quality of life in other oncology populations. **MATERIALS AND METHODS:** There are no standardised PROMs for the priority symptoms in glioblastoma patients, which can be used for evaluation in clinical care as a surrogate marker for disease progression. A broad set of symptoms were therefore initially identified in a targeted literature search and were further refined via Delphi methodology, with the aim to obtain consensus amongst a small expert panel involved in the care of glioblastoma patients. A three round Delphi email survey was conducted. Consensus was defined as 70% agreement. **RESULTS:** Symptom and function constructs were assessed for relevance, relationship to disease and treatment, sensitivity to change, psychometric properties and patient acceptability. Consensus was reached on the red flag symptoms and symptom clusters to monitor, as well as the minimum severity thresholds needed to trigger an alert on an electronic symptom reporting system, which has been developed to allow patient self-reporting of symptoms during treatment. **CONCLUSION:** The red flag symptoms to monitor, along with the symptom severity thresholds, informed an app-based symptom reporting system, which is currently being piloted in a feasibility study exploring triggered imaging using ePROMs. This has the potential to inform future clinical practice through development of patient reported biomarkers.

#### P12.04 BODY MASS INDEX: A POSSIBLE PICC-RELATED COMPLICATIONS RISK FACTOR IN NEURO ONCOLOGICAL PATIENTS

G. Simonetti, P. Gaviani, A. Botturi, V. Redaelli, E. Anghileri, A. Silvani Fondazione IRCCS Istituto Neurologico Carlo Besta, Milan, Italy.

**BACKGROUND:** The use of central venous catheter with peripheral insertion (PICC) has increased rapidly in recent years particularly in cancer patients because they represent a stable and safe vascular access to administer irritants or vesicants therapies. However, the benefit provided may occasionally be affected by severe complications. An observational study conducted at our Institute, showed a significant increase of thromboembolic risk in neuro-oncological patients compared to general cancer population (16.3% vs 6.7% respectively). For this reason, it is essential to identify independent risk factors in order to avoid preventable harm. **MATERIAL AND METHODS:** Neuro-oncological patients with PICC that developed a thromboembolic event were retrospectively analyzed. We evaluated clinical data, BMI, KPS, steroid therapies and anticoagulants at the time of positioning of the PICC and at the onset of the thrombotic event. **RESULTS:** A total of 90 neuro-oncological patients have been analyzed. The most common histology was represented by glioblastoma, followed by anaplastic astrocytoma, primary central nervous system lymphoma, grade II glioma. 17.6% of patients were at first diagnoses, 41.6% were at the first recurrence, and the remaining patients were at the second or third recurrence. The median KPS was 90 (range 80–100), and the median ECOG was 0 (range 0–2). Overall, 14% patients developed thromboembolic events within a median time of 34.5 days (range 5–146) after PICC implantation. Among these, 64% of patients was considered overweight. No patients were on anticoagu-

lant therapy but all were treated with a median dose of 5.5 mg of steroids (range 3.5–12), stable between PICC insertion and onset of adverse event. **CONCLUSION:** 64% of patients who developed a thromboembolic event had BMI >28 at the time of PICC insertion, suggesting a possible trend towards a risk of developing PICC related thrombosis in overweight/obese patients. Other independent risk factors for PICC associated complications seems to be amount of previous chemotherapies administered: 82% of patients who developed thrombotic complications had already undergone at least one line of chemotherapy before PICC placement, suggesting this condition as a possible risk factor for the onset of the event. Also failed positioning attempts could damage vascular endothelium, contributing to the onset of thrombotic complications. An accurate anamnesis and a physical evaluation with particular attention to the presence of malnutrition could help in the early identification of independent risk factors that could farther negatively influence the outcome of neuro-oncological patients.

#### P12.05 PULMONARY EMBOLISM IN NEURONCOLOGICAL PATIENTS: MONOINSTITUTIONAL EXPERIENCE

P. Gaviani, G. Simonetti, V. Redaelli, A. Botturi, E. Corsini, A. Silvani Fondazione IRCCS Istituto Neurologico Carlo Besta, Milan, Italy.

**BACKGROUND:** Venous thromboembolism (VTE) is a frequent and potentially fatal event in cancer patients. Patients with brain tumors in particular have one of the highest risk of developing VTE among cancer patients (25–39%), contributing significantly to mortality and morbidity. VTE is particularly high in the postoperative period, with almost half of the events occurring at that time, but it also persists in the first 12 months, with a risk ranging between 7–28%. Despite the high incidence of VTE in patients with brain tumors, to date there are no sufficient data to predict the real risk or to lead to a standardized approach in the management of these patients. We conducted a retrospective analysis to assess the prevalence of pulmonary embolism complication in patients with brain tumors treated by our Institution in the last 3 years. **MATERIAL AND METHODS:** Clinical data, treatment modalities, and patients outcome were analyzed and described. In particular, in particular, the dosages of D-dimer performed in the clinical suspicion of thromboembolic complication were reviewed, and the data of patients with pulmonary embolism confirmed by chest CT scan were recorded. **RESULTS:** Overall 372 patients were treated at our Institute in the last 3 years for brain tumors. 14 patients (3.7%) 9 males and 5 females, with a median age of 62 years and a median KPS of 80, affected by glioblastoma (69%), cerebral lymphoma (23%) and low-grade gliomas (8%) had pulmonary embolism during the course of treatment. None of the 14 patients was on prophylactic anticoagulant treatment. One patient developed the embolic event during radio and chemotherapy concomitant treatment, 5 patients during chemotherapy only (2 with PCV scheme and 3 with fotemustine scheme), 2 patients with primary nervous system lymphoma during methotrexate infusion. Six patients were not receiving any chemotherapy treatment at the onset of pulmonary embolism. At the time of pulmonary embolism diagnosis, more than half of the patients had clinical signs suggestive of deep venous thrombosis, confirmed by echocolor Doppler, 10/14 patients were treated with high-dose enoxaparin, the others with fondaparinux and calcium nadroparin. **CONCLUSION:** Despite the high incidence of VTE in patients with brain tumors, there is currently no gold standard in the prevention and treatment of this complication. In fact, many questions are still open, for example the efficacy of low molecular weight heparins vs oral anticoagulants as a prophylactic treatment, the timing of onset and the real risk of bleeding. Future prospective studies should be designed to identify parameters for optimize stratification of thrombotic / haemorrhagic risk in this group of patients. This could allow patients at high risk to undergo more aggressive prophylactic therapy or closer clinical-instrumental surveillance, without incurring the opposite risk of bleeding.

#### P12.06 UNMET NEEDS AND WISH FOR SUPPORT OF INFORMAL CAREGIVERS OF PRIMARY BRAIN TUMOUR PATIENTS

L. Pointon<sup>1</sup>, R. Grant<sup>2</sup>, S. Peoples<sup>2</sup>, S. Erridge<sup>2</sup>, P. Sherwood<sup>3</sup>, M. Klein<sup>4</sup>, F. Boele<sup>1</sup> <sup>1</sup>University of Leeds, Leeds, United Kingdom, <sup>2</sup>Edinburgh Centre for Neuro-Oncology, Edinburgh, United Kingdom, <sup>3</sup>University of Pittsburgh, Pittsburgh, PA, United States, <sup>4</sup>Amsterdam University Medical Centers, Amsterdam, Netherlands.

**BACKGROUND:** Most primary brain tumour patients rely on informal caregivers (i.e. family members or friends) for practical and emotional support. While caregiving can be rewarding, it also commonly leads to significant burden. In developing support for caregivers, it is vital to distinguish between caregivers' unmet needs, and their actual wish for support to resolve unmet needs. We aimed to 1) identify the presence and magnitude of unmet needs; 2) examine associations between unmet needs and desire for support; 3) evaluate perceived usefulness of caregiver needs screening in clinical practice. **MATERIAL AND METHODS:** Family caregivers of patients with primary brain tumours were recruited and asked to complete an adapted version of the Caregiver Needs Screen (CNS). This covered the level of distress resulting from 33 common issues in neuro-oncology caregiving (scale 0–10), and wish for information or support for any issue (yes/no). In addition, par-

Participants were asked to rank (0–7) their experience of using the CNS based on items covering ‘ease of use’, ‘usefulness’ and ‘satisfaction’. Descriptive and correlational analyses were applied. RESULTS: Caregivers (N=79) reported between 1–33 unmet needs (M=17.20, sd=7.98) but did not always wish for support for each need (range 0–28, M=4.71, sd=6.63). Most distressing items were patient’s fatigue (M=5.58), recognising signs of disease progression (M=5.23), changes in patients’ thinking or behaviour (M=5.04), patient distress or sadness (M=4.68), and changes in caregivers’ own emotional health (M=4.44). A weak correlation was found between the total number of unmet needs and the desire for support ( $r=0.296$ ,  $p=0.014$ ). Caregivers most often desired support with recognising disease progression (N=24), managing medications and side-effects (N=18), and least often with managing spiritual issues (N=0), communication with (grand)children (N=2) and communication with family members and friends (N=3). Caregivers evaluated the CNS tool positively (mean item scores ranging 4.19–6.21 out of 7). CONCLUSION: Family caregivers of brain tumour patients experience distress resulting from many neuro-oncology specific needs, but this is not directly related to a wish for support or information. Caregiver needs screening could be useful to tailor support or information to suit caregivers’ preferences in clinical practice.

#### P12.07 THE POTENTIAL OF CANNABINOIDS TO IMPROVE QUALITY OF LIFE IN GLIOMA PATIENTS: A META-ANALYSIS IN PATIENTS WITH NEUROLOGICAL AND ONCOLOGICAL DISEASE

V. Belgers<sup>1,2</sup>, J. G. Röttgering<sup>1,3</sup>, L. Douw<sup>1,4</sup>, M. Klein<sup>1,3</sup>, P. M. van de Ven<sup>5</sup>, J. C. F. Ket<sup>6</sup>, K. Bacher Svendsen<sup>7</sup>, M. Weber<sup>8</sup>, J. Lopez-Sendon<sup>9</sup>, M. G. Olde Rikkert<sup>10</sup>, M. H. N. Chagas<sup>11</sup>, M. E. van Linde<sup>1,12</sup>, M. C. M. Kouwenhoven<sup>1,2</sup>, P. C. de Witt Hamer<sup>1,13</sup>  
<sup>1</sup>Brain Tumor Center Amsterdam, Cancer Center Amsterdam, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>2</sup>Department of Neurology, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>3</sup>Department of Medical Psychology, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>4</sup>Department of Anatomy and Neurosciences, Amsterdam Neuroscience, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>5</sup>Department of Epidemiology and Data Science, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>6</sup>Medical Library, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>7</sup>Department of Clinical Medicine, Aarhus University, Aarhus, Denmark, <sup>8</sup>Neuromuscular Diseases Center/ALS Clinic, Kantonsspital St. Gallen, St. Gallen, Switzerland, <sup>9</sup>Department of Neurology, Hospital Ramón y Cajal (IRYCIS), Madrid, Spain, <sup>10</sup>Departments of Geriatric Medicine/Radboudumc Alzheimer Centre, Radboud University Medical Center, Nijmegen, Netherlands, <sup>11</sup>Department of Gerontology, Universidade Federal de São Carlos, São Paul Carlos, Brazil, <sup>12</sup>Department of Medical Oncology, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands, <sup>13</sup>Department of Neurosurgery, Amsterdam UMC, Vrije Universiteit Amsterdam, Amsterdam, Netherlands.

BACKGROUND: Gliomas are primary brain tumors with a dismal prognosis. Reducing symptoms and maintaining quality of life (QoL) are main treatment aims in glioma patients. Mental well-being is an important subdomain of QoL. Cannabinoids have been suggested to alleviate frequently experienced symptoms of reduced mental well-being such as anxiety or depression. Glioma patients frequently report unprescribed cannabinoid use for these reasons. We performed a meta-analysis of the current evidence on cannabinoid efficacy on QoL and mental well-being to identify its added value in treatment of glioma patients. MATERIAL AND METHODS: We performed a systematic PubMed, Embase and Web of Science search according to the PRISMA guidelines on September 22<sup>nd</sup> and 23<sup>rd</sup>, 2020. The effects of any dose of tetrahydrocannabinol (THC) or cannabidiol (CBD) on both general QoL and mental well-being were evaluated. The intervention had to be given for at least a week to establish a steady-state concentration. Effect size was calculated using Hedges *g*. Risk of bias of included studies was assessed using Cochrane’s Risk of Bias tool 2.0. RESULTS: We retrieved no publications on cannabinoid use and QoL in glioma and, therefore, we expanded the search to cannabinoid use in other cancer types and chronic central nervous system (CNS) diseases. Sixteen studies were identified: four in cancer and twelve in CNS disease. Meta-analysis showed no effect of cannabinoids on general QoL (twelve studies in 1,740 patients;  $g = -0.02$ , 95% CI -0.11 to 0.07,  $p = 0.65$ ) and mental well-being (twelve studies in 1,587 patients;  $g = -0.00$ , 95% CI -0.15 to 0.14,  $p = 0.96$ ). Risk of bias was low in five studies, raised some concern in one study and was high in ten studies, mainly due to possible unblinding of patients after psychoactive adverse effects. CONCLUSION: No studies on the effects of cannabinoids on QoL in glioma patients have been reported. A pooled analysis of studies in oncological patients and patients with CNS disease showed no effect of cannabinoids on QoL or mental well-being. However, studies were clinically heterogeneous and only one small study investigated monotherapy CBD with undecided results. As many glioma patients currently use cannabinoids, and monotherapy CBD has not been sufficiently investigated, future studies are necessary to evaluate its value in this specific population.

SUPPORT/DISCLOSURE: This meta-analysis has been funded by The Anita Veldman Foundation (CCA-2019-2-21).

#### P12.08 EFFICACY OF TRAZODONE SLOW RELEASE IN INSOMNIA ASSOCIATED WITH HIGH-DOSE STEROID THERAPY IN NEURO-ONCOLOGICAL PATIENTS

A. Botturi<sup>1</sup>, P. Gaviani<sup>1</sup>, V. Redaelli<sup>1</sup>, G. Simonetti<sup>1</sup>, C. Lucchiari<sup>2</sup>, A. Silvani<sup>1</sup> <sup>1</sup>Fondazione IRCCS Fondazione I.R.C.C.S. Istituto Neurologico Carlo Besta, Milan, Italy, <sup>2</sup>Department of Philosophy, Università degli Studi di Milano, 20122 Milan, Italy., Milan, Italy.

BACKGROUND: Insomnia linked to therapeutic intake of intravenous (IV) megadoses of steroid (Mgds, 8–16 mg) is a common side effect in neuro-oncology patients. Hypno-inducing drugs (IP) and Benzodiazepines (BDZ) can provoke drug interference and daytime sedation. Trazodone (Trz) is an atypical antidepressant with poor liver metabolism; it has moderate histamine-1 (H1) receptor antagonism and possesses some anxiolytic and hypnotic properties. We tested the use of the Trz retard (RP) formulation as a hypnotic drug in patients undergoing a therapeutic regimen with IV Mgds. To evaluate anxiety and side effects. MATERIAL AND METHODS: 10 patients (6 females and 4 males) admitted to the Neuro-oncology Department of the Neurological Institute ‘Carlo Besta’ treated with Mgds IV. The average age was 55 years and the mean HAM-A score was 25. Instruments included the Hamilton Anxiety Scale (HAM-A), the Clinical Global Impression (CGI), and the Pittsburgh Sleep Quality Index (PSQI). Trz RP was administered at a dosage of 25-50-75 mg/day in the evening. RESULTS: All 10 patients reported improved hypnotic profiles within the third day of Trz RP administration. Four patients improved on the first day. Reduction of the HAM-A score was found on the third day. No adverse events (epilepsy, daytime sedation, incontinence) were observed in 3 weeks. CONCLUSIONS: Trz RP proved to have a swift beneficial effect on sleep and anxiety without side effects in the short term. Trz may be preferred to IP and BDZ in patients receiving IV Mgds, considering the lack of daytime sedation and the reduced pharmacological inference. Larger samples will enable future research to better describe the characteristics and the indication of Trz.

#### P12.09 CLINICAL FEATURES AND MANAGEMENT OF NORMAL PRESSURE HYDROCEPHALUS ASSOCIATED WITH NON-OBSTRUCTIVE VESTIBULAR SCHWANNOMA

V. Redaelli, P. Gaviani, G. Simonetti, A. G. Botturi, M. Marchetti, M. A. Broggi, A. Silvani IRCCS Carlo Besta of Milan, Milan, Italy.

BACKGROUND: Some (elderly) patients present a communicating (normal pressure) hydrocephalus (NPH) in association with or secondary to vestibular schwannoma (VS). We aim to investigate the usefulness ventriculo-peritoneal shunt (VPS) without tumor removal. MATERIALS AND METHODS: 8 patients aged from 50 to 78 years received both diagnosis of VS (mean maximum diameter 21 mm, range 13–28 mm) and NPH. None presented the classical Hakim’s triad. They presented isolated ataxia with gait impairment and loss of equilibrium. It was hard to distinguish if these symptoms were due to NPH or to VIII cranial nerve compression. They underwent TAP test, through a lumbar puncture with a very slow withdrawal of at least 30 ml of cerebrospinal fluid (CSF). RESULTS: None of the 8 patients presented improvement after lumbar puncture. Despite this, we decided to proceed with VPS in 4 patients because of a high risk of falls... All these 4 patients showed clinical improvement after VPS.. The VS were treated as follows: 4 surgery, 2 radiosurgery, 2 observation. CONCLUSIONS: Although some authors indicate VS removal as the best option to improve also NPH symptoms, some patients present high risk of falls in the presence of a small VS. These clinical features are more likely to be related to NPH instead of VS.. VPS carries lower postoperative risks compared to VS removal. For this reason, VPS has to be considered, even without a positive response to a TAP test, as a good alternative to improve quality of life in patient affected by NPH associated with VS.

### P13 PRECLINICAL NEURO-ONCOLOGY

#### P13.01 NEURONAL ACTIVITY DRIVES DISTINCT INVASION MODES OF GLIOMA CELLS

Y. Yang<sup>1,2</sup>, V. Venkataramani<sup>1,3</sup>, M. Schubert<sup>3</sup>, C. Beretta<sup>3,4</sup>, M. Botz<sup>3</sup>, L. Fankhauser<sup>1,2</sup>, W. Wick<sup>1,2</sup>, T. Kuner<sup>3</sup>, F. Winkler<sup>1,2</sup> <sup>1</sup>Neurology Clinic and National Center for Tumor Diseases, University Hospital Heidelberg, Heidelberg, Germany, <sup>2</sup>Clinical Cooperation Unit Neurooncology, German Cancer Consortium (DKTK), German Cancer Research Center (DKFZ), Heidelberg, Germany, <sup>3</sup>Department of Functional Neuroanatomy, Institute