

QOL-04. Histology, treatment, and extent of pretreatment hydrocephalus are major determents of neurocognitive outcome for survivors of pediatric posterior fossa tumors - report from the German HIT-studies [Abstract]

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NEUROPSYCHOLOGY/QUALITY OF LIFE

QOL-01. INFLAMMATORY BIOMARKERS AND PSYCHOLOGICAL SEQUELA IN PEDIATRIC BRAIN TUMOR SURVIVORS

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BACKGROUND AND AIMS: Pediatric brain tumors are the second most common type of pediatric cancer, and these patients face the worst health related quality of life (HRQOL) outcomes. Adult studies show increased inflammation association with lower HRQOL in adult brain tumor survivors. This relationship has not been explored in pediatric brain tumor survivors (PBTS). We conducted a case-control study to explore the relationship between inflammatory biomarkers and psychological sequela (i.e., sleep disturbance, fatigue, pain, negative affect) in PBTS. **METHODS:** Survivors aged 7-14 years with a primary brain tumor diagnosis were recruited from UMMC (N=29) and UAB (N=4) between 2016-2019. A control group (N=12) was recruited from UMMC well-child appointments. Parents and children completed self-reported surveys of pain, sleep, fatigue, and mood. The primary aims were to: (1) examine levels of C-reactive protein (CRP) inflammation in PBTS compared to controls (2) examine if higher CRP and SOX2 (from tumor tissue) were associated with psychological sequela. Independent samples T-Tests and spearman correlations evaluated aims. **RESULTS:** The final sample included 33 PBTS: median age=12.42 years; sex=51.5% female; race=63.6% Caucasian, 33.3% African American; pathologic diagnoses=67% astrocytoma/glioma, 11% medulloblastoma, 6% ependymoma, 12% other. Twelve controls had a median age=11.98 years; sex=41.7% female; race=16.7% Caucasian, 83.8% African American. There were marginal elevations in CRP for PBTS (44%, n=13) compared to controls (13%, n=1) (p=0.06). In PBTS, higher CRP levels were associated with greater parent-reported fatigue (p=0.035), sleep-wake disorders (p=0.017), excessive somnolence (p=0.042) and longer pain duration (p=0.037). From 13 tumor samples, positive SOX2 (69% of samples) was associated with increased parent-reported sleep-wake disorders (p=0.016), excessive somnolence (p=0.036), and both child and parent-reported sleep disturbance (child: p=0.014; parent: p=0.034). **CONCLUSIONS:** Elevated inflammation in PBTS, up to 9 years post-treatment, is consistently associated with increased sleep disturbance and fatigue. These relationships warrant further investigation in PBTS.

QOL-02. PAEDIATRIC MEDICAL TRAUMATIC STRESS IN CHILDREN WITH CANCER AND THEIR PARENTS: DIFFERENCES IN LEVELS OF POSTTRAUMATIC STRESS SYMPTOMS

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Paediatric medical traumatic stress (PMTS) is a set of children's and their parents' psychological and physiological responses to pain, injury, serious illnesses, and other experiences with the medical environment. Paediatric cancer patients have the highest prevalence of PMTS as the illness involves a set of stressors that trigger many negative psychological reactions. Posttraumatic stress symptoms (PTSS) are one of the most common psychopathologies among cancer patients. We examined the incidence of PMTS in children with cancer and their parents due to coping with a serious illness and treatment complications. We analysed the following risk factors for PTSS: selected groups of individuals, medical interventions, complications, and treatment modalities. The study involved 183 parents of 133 children and 63 children and adolescents who were treated between 2009 and 2019 at Clinical Department of Paediatric Haematology and Oncology of Paediatric Clinic in Ljubljana. We collected the data using The Intensity of treatment rating scale 2.0 [IRT-2], PTSD checklist for Children/Parent [PCL-C/PR], The PTSD Checklist for DSM-5 [PCL-5] and The Child PTSD Symptoms Scale for DSM-5 [CPSS-5]. PMTS is frequently present in both, children and their parents, regardless of the cancer type, treatment duration, treatment outcome, and child's age. Mothers, patients with relapse, patients who were diagnosed after age 5, patients with more intensive treatment, and parents of the latter are at higher risk for PMTS occurrence. Additionally, we

found a decreasing trend of traumatic responses after five or more years post cancer diagnosis and that parents are more traumatized than children. Our findings will contribute to the systematic prevention of PMTS and medical trauma and to endeavour to use trauma-informed care.

QOL-03. BEYOND SURVIVAL: CLINICAL REHABILITATION AND FUNCTIONAL OPTIMIZATION PEARLS FOR THE NEURO-ONCOLOGIST

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Over the past decades, major advances in treatment for pediatric brain tumors have led to higher survival rates. Management including surgical resection, chemotherapy and radiation have led to prolonged survival though each comes with potential deleterious impact upon a child's level of function. While function-sparing treatments continue to be developed and utilized each year, the standard of care for many conditions leaves our patients with the potential for worsening function. The areas of mobility, activities of daily living, cognition, communication and swallow are all potentially impacted. Rehabilitation medicine specialists focus on detecting impairments, addressing them with practical interventions and improving the function our shared patients. Unfortunately, there is a worldwide scarcity of rehabilitation medicine physicians and the role of improving function often falls into the hands of the neuro-oncologist. A number of practical clinical assessments and interventions utilized by rehabilitation medicine specialists can be translated to the toolbox of the neuro-oncologist. The aim of this presentation is to provide the neuro-oncologist with further abilities to enhance function with interventions that typically require low time investment. Topics covered will include the following: 1. What is spasticity, when is it necessary to treat and how is it treated? 2. Leg braces -- who needs them, who doesn't and what are the goals? 3. What physical exam signs can be utilized to detect peripheral neuropathy early and inform further treatment decisions with agents such as Vincristine. 4. What aspects of a gait assessment are high yield in detecting concern for clinical progression? The goal of this talk is high yield and low time investment.. It is unfortunately not applicable for a poster presentation. A minimum amount of time would be 15 minutes. If less time is available for the this presentation, a photo/video-based, rapid-fire format (similar to Tik-Tok content) could be utilized.

QOL-04. HISTOLOGY, TREATMENT, AND EXTENT OF PRETREATMENT HYDROCEPHALUS ARE MAJOR DETERMINANTS OF NEUROCOGNITIVE OUTCOME FOR SURVIVORS OF PEDIATRIC POSTERIOR FOSSA TUMORS - REPORT FROM THE GERMAN HIT-STUDIES

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BACKGROUND: Cognitive impairments following pediatric brain tumors are generally attributed to tumor site, surgical intervention, complications as well as to nonsurgical treatment. We investigated impairments for patients with medulloblastoma (MB), ependymoma (EP) and low-grade glioma (LGG) of the cerebellum treated within the German pediatric brain tumor network to compare and rank major determinants. **PATIENTS+METHODS:** Following protocol treatment, 245 patients with MB (n=106), EP (n=32), and cerebellar LGG (n=107, surgery only) were examined 2 + 5 years after diagnosis using the German "Neuropsychological-Basic-Diagnostic" (NBD) tool based on the Cattell-Horn-Carroll model for intelligence. Within this retrospective study, multiple linear regression models were applied. **RESULTS:** The MB+EP vs. LGG-cohort differed slightly in median age at diagnosis (8.7/6.1 years) and location (cerebellar hemispheres: 8% MB+EP/49.5% LGG), while sex-ratio, grade of resection, extent of pre-operative hydrocephalus were comparable. With smaller median tumor-volume in the MB+EP vs. LGG-cohort (34.1/44.1cm³), ranges broadly overlapped. Median scores of age-appropriate tests were in the lower normal range

for all patients for fluid and crystallized intelligence, selective attention, visual-spatial processing (VSP) and verbal short-term memory (median=93-103), but distinctly below for processing speed (PS), and psychomotor speed abilities (PMS) (median=65-84). Higher doses of craniospinal irradiation (>23.4Gy/23.4Gy) resulted in lower scores for most domains for MB-patients compared to LGG-patients (e.g., PS-estimate: >23.4Gy:-27.71, $p=0.026/23.4Gy:-9.93$, $p=0.286$). EP-patients (surgery+54Gy local radiation) scored better than LGG-patients except for PS (estimate:-15.65, $p=0.111$). Impairments were accentuated with higher degrees of hydrocephalus (estimate:-7.64, $p=0.103$) in patients with incomplete resection (estimate:12.23, $p=0.006$) for PMS both hands. **CONCLUSION:** Following age-adapted comprehensive treatment, survivors of a cerebellar tumor show significant impairments of PMS abilities in our trials. Our data suggest that slow growing LGG impair neurocognitive development more than local radiotherapy for ependymoma, while craniospinal irradiation compromises VSP and PS in MB. Initial symptomatic intracranial pressure remains a strong predictor for general neuropsychological impairment.

QOL-05. CARDIORESPIRATORY FITNESS AND HEALTH-RELATED QUALITY OF LIFE AMONGST SURVIVORS OF CHILDHOOD CENTRAL NERVOUS SYSTEM TUMOURS.

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INTRODUCTION: Due to recent advancements in surgical techniques, imaging and adjuvant therapies, survival rates for children with central nervous system (CNS) tumours have improved. Research priorities have now shifted to focus on late-effects and quality of survivorship amongst childhood CNS tumour survivors. Our study aimed to assess levels of cardiorespiratory fitness and health-related quality of life (HRQoL) amongst survivors of childhood CNS tumours. A secondary aim was to investigate potential relationships between cardiorespiratory fitness and HRQoL. **METHODS:** Participants were recruited from the National Children's Cancer Service in CHI Crumlin. Inclusion criteria included: diagnosis of a primary CNS tumour, aged between 6-17 years, between 3 months and 5 years post completion of oncology treatment, independent mobility, deemed clinically appropriate to participate by treating oncologist. Cardiorespiratory fitness was assessed using the six-minute walk test. HRQoL was assessed with the PedsQL Generic Core Scales, Version 4.0, both self-report and parent proxy report forms were used. **RESULTS:** 20 participants (n=9 male) were recruited with a mean age of 12.34 (SD = 3.46) years. Mean time since completion of oncology treatment was 2.31 (SD = 1.38) years. Mean 6-minute walk distance (6MWD) was 482.75 (SD = 50.04) metres, equating to the 5.55th (SD = 6.83th) percentile overall. 6MWD was significantly reduced compared to predicted 6MWD ($t = -12.52$, $p < 0.001$, 95% CI [-163.52, -116.68]). Parent proxy-reported HRQoL was significantly reduced compared to healthy population norms ($t = -5.82$, $p < 0.001$, 95% CI [-25.76, -12.17]). A strong positive correlation exists between 6MWD and both parent-proxy (Pearson's $r = 0.533$, $p = 0.015$) and child-reported HRQoL ($r = 0.580$, $p = 0.007$). **CONCLUSION:** Survivors of childhood CNS tumours present with impaired levels of cardiorespiratory fitness and HRQoL compared to healthy population norms. Higher levels of cardiorespiratory fitness are associated with higher levels of HRQoL.

QOL-06. WHAT IMPACT DOES A POSTERIOR FOSSA TUMOR IN CHILDHOOD HAVE ON MOTOR PROCEDURAL LEARNING? GROUP PERFORMANCE DEPENDING ON RADIOTHERAPY STATUS AND INDIVIDUAL DIFFERENCES ON A PERCEPTIVO-MOTOR SEQUENCE LEARNING TASK AND A MOTOR ADAPTATIVE TASK (IMPALA PROSPECTIVE STUDY)

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INTRODUCTION: Procedural memory (PM) is a skill learning system that allows, through training, the automatization of procedures and progressive improvement of performances. The aim of this work was to explore the impact of a posterior fossa tumor (PFT) on PM. We hypothesized that motor adaptation, depending on cortico-cerebellar system, was impaired in PFT survivors treated with and without radiotherapy, and motor sequence learning, depending on cortico-striatal system, was only impaired in PFT treated with radiotherapy. **METHODS:** We investigated PM in 60 participants from the IMPALA study (NCT04324450) divided into three groups: 39 cured from a

PFT in childhood (22 irradiated (PFT+RT group) and 17 non-irradiated (PFT group)) and 21 healthy volunteers (Control group) matched on age, sex and handedness with the PFT+RT group. We used a visuo-motor learning test, the Serial Reaction Time task (SRTT) and a motor adaptation task (MAT) of backwards handwriting. ANOVA and mixed models were used for statistical analysis. **RESULTS:** SRTT performance analysis showed an effect of Block in specific sequence learning ($F(1)48.70$, $p < 0.001$) with a preserved specific learning in the three groups. However individual differences were observed with 7/22 patients in PFT+RT group and 4/17 in PFT group who did not have specific learning. MAT performance analysis showed an effect of interaction between Orientation (forward or backward) and Group for speed ($F(2)15.58$, $p < 0.001$), linearity ($F(2)8.39$, $p < 0.001$) and amplitude standard deviation ($F(2)15.70$, $p < 0.001$) traducing an impairment both in PFT+RT and PFT groups, more marked in the PFT+RT group. **CONCLUSION:** We showed impairment, predominantly on motor adaptation but also, at individual level, in motor sequence learning whose origin requires additional work. This study brings new insights on the long-term impact of a PFT in childhood on a rarely investigated part of memory that is PM.

QOL-07. THE IMPORTANCE OF AN ONCO-FERTILITY PROGRAM FOR PEDIATRIC NEURO-ONCOLOGY PATIENTS

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INTRODUCTION: In the Netherlands pediatric oncology care is centralized in one hospital since 2018. 600 new patients a year are seen with 100-120 new neuro-oncology (NO) patients. Of the NO patients 20-25% classify as high risk for infertility (HR) such as patients with medulloblastoma, ependymoma, ATRT and germinoma. An onco-fertility program was started navigated by a nurse-practitioner. The program runs with intense collaboration between the different specialties. All new patients are identified according to the international guidelines on fertility care. The fertility-risk is based on the CED score (cyclophosphamide equivalent dose) and radiotherapy dose. Since 2018 awareness was created by teaching sessions among colleagues, nursing staff, and parent association organizations. **METHODS:** All HR children are informed by the nurse-practitioner and can be referred for counseling to gynaecology for OTC (ovarian tissue cryopreservation) or urology for sperm cryopreservation or testicular biopsy. Monthly the onco-fertility working-group members discuss cases and research in the field. **RESULTS:** In 2019, 19% NO cases and in 2020 18% of cases were HR for infertility. In both years 36% of these cases had fertility preservation performed. In 2021, 22% cases HR were identified and in 55% preservation was performed. Reasons for not preserving fertility were diverse, varying from poor prognosis, or too ill to be included. **CONCLUSION:** Awareness of the fertility risk in NO patients who are HR is necessary. These patients need to be informed, and stratified for counseling and offered fertility preservation before start of their treatment. An active onco-fertility program helps to offer the best option for future fertility for these patients

QOL-08. VISUAL MEMORY AND POTENTIAL CLINICAL RISK FACTORS IN LONG-TERM SURVIVORS OF A CHILDHOOD BRAIN TUMOR

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A brain tumor treatment has previously been associated with long-term neurocognitive sequelae. However, clinical profiles differ between certain patient subgroups. We investigated the impact of tumor location, radiotherapy (RT), and age at diagnosis in childhood brain tumor survivors on long-term cognitive outcomes. Adult survivors (n=32) of pediatric brain tumors (n=11 infratentorial, n=21 supratentorial; 14 astrocytomas, 3 craniopharyngiomas, 2 ependymomas, 2 germinomas, 1 hemangioblastomas, 4 medulloblastomas, 6 nervus opticus gliomas) participated in this neuropsychological study (n=11 RT) (16.8-35.1 years old, >2years after treatment, mean age at diagnosis = 9.2 years, 50% male). An extensive neurocognitive test battery was used to assess intelligence scales (n=5), verbal and visual memory (n=2), and language (n=3). In order to investigate the effects of tumor location (infra- versus supratentorial), RT (yes vs. no), and age at diagnosis on the cognitive scores, a multivariate ANCOVA model was tested including the main effects and interaction between age and RT. Of all included scales, only visual memory was significantly associated with the risk factors. More specifically, patients who received RT ($F=10.3$, $p=.004$) and were younger at diagnosis ($F=6.9$, $p=.014$) scored worse on this task. Furthermore, the interaction effect between these factors was also significant ($F=8.8$, $p=.006$). These findings suggest that younger patients could be more vulnerable to the radiotoxic effects to visual memory outcomes. Tumor location (supra- vs. infratentorial) was not significantly associated with any outcome. In this study, only visual memory appeared to be associated with the risk factors of interest. Both radiotherapy and