Neuro-Oncology

QUALITY OF LIFE/AFTERCARE

QL-001. IMPACT OF AGE AT DIAGNOSIS ON OBESITY IN PEDIATRIC BRAIN TUMOR SURVIVORS
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INTRODUCTION: Obesity is a long-term morbidity for children diagnosed with CNS tumors. BMI normally declines until the age of adipose rebound (AR), after which it increases. Tumor location, radiation therapy, or surgery near the hypothalamus increases the risk of obesity. We hypothesized involvement of the hypothalamus would result in a greater BMI, and diagnosis/treatment type of cancer would lead to the child lead to the

Retrospective cohort of brain tumor survivors diagnosed from 2001-2011 at Children’s Hospital of Wisconsin: chart review extracted BMI z score at diagnosis and two-year follow-up. Children were categorized into six groups, based on age at diagnosis and hypothalamic involvement (HI). Consistent with CDC growth curves, 11% were classified as “before AR” (p < 0.001 months), “during AR” (42-83.99 months) and “after AR” (84.00 - 120 months old). BMI z-scores were compared using Wilcoxon signed ranks tests. RESULTS: 116 children had two-year follow-up. BMI z score at diagnosis was similar across groups. Children pre-AR and post-AR with HI had higher BMI z scores at two-year follow up than at diagnosis (before AR 0.466 to 1.589 p = 0.004 N = 12, after AR 0.519 to 1.268 p = 0.001 N = 18). No group without HI had increased BMI z score at two year follow up (before AR 0.663 to 0.518 N = 24, during AR 0.279 to 0.278 N = 18, after AR 0.658 to 0.793 N = 24). The before AR and during AR cohort with HI had a higher BMI z score at two-year follow up than those without HI (p = 0.004 and 0.015). The after AR cohort did not significantly differ from those without HI at two year follow up. CONCLUSIONS: Except for after rebound, tumors survivors with HI have increased BMI compared to those without involvement. Diagnosis before AR is associated with a greater BMI than diagnosis at later age. Future studies can help elucidate endocrine causes of these changes.

QL-002. COMPARISON OF FATIGUE REPORTED BY CHILDREN WITH BRAIN TUMOR VERSUS NON-BRAIN TUMOR OTHER TYPE OF CANCER
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BACKGROUND: Fatigue is a common complaint for cancer patients. Few studies have addressed this issue in pediatric cancer survivors, especially the differences between children with brain tumors (BT) and those with other types of cancer (non-BT). This study aims to compare fatigue reported by BT and non-BT. METHODS: 515 patients (53% BT; 47% non-BT) aged 7-21 (mean 14 yrs) were treated within one year reported more general (p = 0.001), but general, sleep and PedsQL-fatigue (general, cognition, and sleep). Regression analysis was used to compare fatigue between cancer types adjusted by years since last treatment. RESULTS: There were no differences (p > 0.01) between BT and non-BT in physical, emotional, and school functioning; BT reported worse social functioning. BT reported more cognitive fatigue than non-BT (r = -4.11, p < .001) but not general (r = -0.68, p = 0.497) or sleep fatigue (r = -0.38, p = 0.706). Patients treated within one year reported more general (p < .01) and sleep fatigue (p < .01) than other two categories. No significant differences between groups were found in cognition fatigue. In regression, BT remained a significant predictor of cognition fatigue (p < .001) after adjusting for years since last treatment. Years since last treatment was only significant predictor (p < .001) of general and sleep fatigue. CONCLUSION: Children reported more severe general and sleep fatigue within one year post-treatment. However, for cognition fatigue, cancer type (BT/non-BT) was the primary predictor regardless of years since the last treatment. This may be due to similarities between cognition fatigue and self-reported cognition since cognition is known to be a primary concern for children with brain tumor. General and sleep fatigue are non-specific to cancer type and their impacts seemed to diminish after completion of treatment.

QL-003. THE MECHANISM OF HOW CYTOCHROME P450 INHIBITOR INCREASES THE RISK OF VINCRISTINE NEUROTOXICITY
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Neurotoxicity of vincristine is common during the treatment of pediatric tumors, such as medulloblastoma, neuroblastoma, childhood leukemia and so on. We report on the progress of research on the neurotoxicity of vincristine. In the latest research, we have found that vincristine is metabolized efficiently by cytochrome P450. All the factors which may inhibit the cytochrome P450 enzyme will influence the side effects of vincristine, such as azole antifungal drugs. We will discuss the mechanisms of how the cytochrome P450 enzyme inhibitor increases the risk of vincristine neurotoxicity.

QL-004. A RANDOMIZED CONTROLLED TRIAL TO EVALUATE THE EFFICACY OF A GROUP SOCIAL SKILLS INTERVENTION FOR CHILDREN WITH BRAIN TUMOURS
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BACKGROUND: Children with (treated for) brain tumours are at risk for impaired social competence and reduced quality of life (QOL). Intervention programs targeting the social competence deficits of these children have received little empirical attention. OBJECTIVE: To determine if pediatric brain tumour (PBT) patients receiving a manualized group social skills training intervention program exhibited improvements in standardized measures of social competence and QOL. METHODS: This study employed a multi-site randomized controlled trial (RCT) design with repeated measures. INCLUSION CRITERIA: PBT patients ages 8 to 16 years, in stable condition and attending school regularly. Both groups underwent 8 two-hour weekly group sessions and three assessments (pre, post, 6 month follow-up). In the EG, sessions consisted of manualized social skills training through games and crafts; CG sessions focused on socialization through games and crafts without skill training. Outcome measures included parent and self-reported social skills (Social Skills Rating System) and QOL (PedsQL4.0). Outcomes were compared using repeated-measures ANOVAs. RESULTS: Preliminary analyses were based on 42 PBT patients (21 per group) having completed all three assessments. Self Report: Group differences suggested improved cooperation in the EG (q2 = 0.11) and greater empathy in EG than in CG (q2 = 0.09), and positive changes in PedsQL feelings in the EG over time (q2 = 0.14). Parent Report: A group by time interaction suggested improved social functioning in the EG over time (q2 = 0.12). Finally, cooperation and emotional functioning improved over time across both groups (q2 = 0.26 & q2 = 0.31). CONCLUSION: Preliminary findings suggest SISP as a promising means to improve social competence and QOL of children with PBT based on parent and self-report. This RCT represents a major advancement in validating evidence-based psychosocial treatments for this population.

QL-005. CHILDREN WITH CENTRAL NERVOUS SYSTEM (CNS) TUMOURS AND INTELLECTUAL DISABILITIES (ID): DID WE SPARE TREATMENT? A MONOINSTITUTIONAL EXPERIENCE AT FONDAZIONE IRCCS ISTITUTO NAZIONALE TUMORI Elisabetta Schiavello, Veronica Bissonom, Cristina Meazza, Marta Poddia, and Maura Massimino; Department of Pediatrics, Fondazione IRCCS Istituto Nazionale dei Tumori, Milan, Italy

BACKGROUND. The incidence of cancer, particularly of CNS tumours, in children with ID is poorly documented in literature (5-18%); anywhere it is rising as the lifespan of this population. METHOD. We report our experience (1999-2013) in treating children/adolescents affected by CNS tumors and having ID. Neurofibromatosis 1/2 were excluded from the present series. We treated 12 patents, 8/12 were 8-12 years age 4 years

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QL-006. NEUROLOGICAL SEQUELAE IN BRAIN TUMOR SURVIVORS IN THE CHILDHOOD CANCER SURVIVOR STUDY (CCSS)

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INTRODUCTION: Survivors of childhood brain tumors experience a high rate of treatment-related morbidity; however longitudinal changes in the prevalence of neurologic sequelae have not been well described.

METHODS: In the CCSS cohort, neurologic adverse events were evaluated longitudinally in 5 year brain tumor survivors (n = 1876) and compared to siblings. Multivariable regression models determined risk for late onset neurologic sequelae, with hazard ratios (HR) and 95% confidence intervals (CI).

RESULTS: Cumulative incidence for mortality was 25%, second malignant neoplasm (SMN) 4% and recurrence 21% at 30 years from diagnosis. From 5 years to 30 years, headache was the most frequent neurological problem (27% to 41%), cognitive problems 50% to 61%, weakness 21% to 35%, hearing loss 9% to 23%, and blindness 14% to 17%. Compared to siblings, survivors had elevated risk for seizures HR 27.2 (CI 15.9-46.5) for ages 5-14 years, and 4.4 (CI 2.5-7.4) for 15+ years; motor weakness HR 1.6 (CI 1.0-2.7) for 5-14 years and 4.9 (CI 2.3-10.4) for 15+ years; coordination problems 4.9 (CI 2.7-9.0) for ages 5-14 and 18.9 (CI 9.6-37.3) for ages 15+; and gait ataxia HR 12.0 (CI 8.2-17.4) for ages 5-14 and 7.0 (CI 4.8-10.3) for ages 15+. Risk factors for weakness were frontal radiation >49 Gy HR 2.0 (CI 1.2-3.4), temporal >49 Gy HR 1.6 (CI 1.0-2.5), and recurrence HR 3.0 (CI 2.1-4.4). Stroke was associated with a 7-fold increase (CI 4.3-11.0) in later onset coordination problems and a 15-fold increase (CI 10.6-21.7) in weakness. CONCLUSIONS: Adult survivors of childhood CNS tumors continue to experience new onset of neurologic conditions as they age and remain at higher risk than those without cancer. Late onset stroke, SMN and primary tumor recurrence are independently associated with risk for a new neurologic condition.

QL-007. THYROID FUNCTION IN IRRADIATED BRAIN TUMOR SURVIVORS

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BACKGROUND: The treatment of childhood brain tumors has developed during the last four decades so that 70-74% of children will become 5-year survivors of their primary CNS malignancy. This improved outcome has resulted in a new and growing population of childhood cancer survivors. METHODS: A total of 60 adults treated for childhood brain tumor in the Oulu, Kuopio and Turku University Hospitals were studied for secondary CNS tumors, osteoporosis, metabolic disease and hormonal dysfunction. All the patients had received CNS irradiation as part of their treatment. The follow-up time since cessation of therapy was more than 5 years, 93 patients were therefore initially identified to be eligible, but 33 (35.5%) declined to participate or could not be contacted. Thyroid function was assessed by thyrotropin (TSH) and thyroxine (T4) tests, pituitary gland was visualized by MRI. Current medication for thyroid disease was documented. RESULTS: 52 of 60 patients (86.7%) had thyroidal replacement therapy at the time of study. Serum thyrotropin levels (reference values 0.4 - 4.5 mU/L) were abnormal in 12/58 patients (20.7%). In 9 patients, TSH level was low and in 3 patients elevated. Serum T4 levels (reference values 10.2 - 21 pmol/L) were abnormal in 4/57 (7.0%) patients. In two patients with low TSH, T4 was over 21 pmol/L indicating biochemical hyperthyroidism. Seven patients with low TSH had T4 level within reference limits suggesting subclinical central hypothyroidism. Three patients had high TSH levels with T4 levels within limits consistent with subclinical peripheral hypothyroidism. Craniospinal irradiation increased the risk of hypothyroidism compared to cranial or local irradiation (78.4% vs. 30.9%). CONCLUSIONS: Half of the irradiated childhood brain tumor survivors had thyroid dysfunction. Most patients had peripheral and few had central disease. This patient group is in need for organized regular follow-up for endocrine disturbances.

QL-008. AN EXPLORATION OF ASSOCIATIONS BETWEEN HEALTH RELATED QUALITY OF LIFE AND MEDULLOBLASTOMA/PNET SUBGROUP STATUS IN SURVIVORS FROM THE SIOP UKCCSG PNET3 TRIAL

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OBJECTIVES: To explore the possibility of combining retrospective biochemical (Qb) data with a QoL questionnaire (QOL) to determine health-related quality of life (HRQoL) may be related to the underlying biology of medulloblastoma. METHODS: Using available data from our previous studies of SIOP UKCCSG PNET3 survivors whose tumours had been assigned to disease subgroup (SHH, WNT and non-SHH/WNT (Group 3 and Group 4) tumours) using DNA methylation and immuno-histochemical methods, and for whom HRQoL data were also available, we conducted univariate analyses to assess any differences in child- and parent-reported health status (HUI), behavioural functioning (SDQ), and HRQoL. (PedsQL) between subgroups. This followed by a three-step hierarchical forward multiple regression analysis; tumour subgroup was entered at step one followed by gender, age at diagnosis and interval from diagnosis (step two) and treatment and cerebellar mutism (step three) as predictors. Predictors were retained in the model if p < 0.1. RESULTS: There was a significant overall inter-group difference in parent-reported PedsQL (p = 0.018), due to significantly better PedsQL scores in the SHH group (median = 95.3) compared with the WNT group (median = 76.7, p = 0.015) and non-SHH/WNT group (median = 74.6, p = 0.015). SHH trended to better functioning in all other indices used. At each step in the regression modelling, SHH remained the only significant predictor of parent-reported HRQoL, even after controlling for factors previously associated with worse HRQoL outcomes (treatment and cerebellar mutism) in the final model (B = 17.1, R² = 0.25, p = 0.043). CONCLUSION: These initial investigations indicate combined analyses of biological and QoL data could provide new insights on HRQoL outcome, and should be incorporated into the planning of expanded studies of medulloblastoma survivors, aimed at fully establishing any basis to inform the future management of patients according to their molecular subgroup status.

QL-009. HEALTH OUTCOMES OF CHILDHOOD MEDULLOBLASTOMA/PNET. ONE CENTER RESULTS

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AIM: Assessment of health outcomes in survivors of childhood medulloblastoma/PNET. METHODS: 113 MB/PNET patients (70 boys 43 girls) at least 2 yrs from treatment completion were examined. Median patient's age at MB/PNET diagnosis was 8yrs2m, at
QL-010. OH, NO... NOT AGAIN! SECOND INTRACRANIAL TUMORS IN PEDIATRIC BRAIN TUMOR SURVIVORS
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Pediatric brain tumor survivors present a higher risk for a second intracranial tumor than other recurrent or therapy induced in need of further study. We present a retrospective study undertaken in our Institution's population of adult survivors of pediatric brain tumors to ascertain the occurrence of a second brain tumor diagnosed (including recurrence) after more than 5 years of remission. RESULTS: In a cohort of 132 patients we found 14 patients, 7 female, 7 male harboring new tumors either in scheduled follow-up or symptomatic imaging. Mean age of primary tumor was 7 years (range 3-16), mean latency to 2nd tumor diagnosis was 15.9 years (range 8-23). Primary diagnosis was Medulloblastoma/PNET-4 patients, Ependymoma-4 patients, Germ Cell tumor-4 patients and Astrocytoma-2 patients. Two patients were also childhood ALL survivors. All patients underwent Radiotherapy using various protocols according to tumor type and staging. 8 patients also received Chemotherapy. Secondary tumor diagnosis was by scheduled imaging in 10 patients and by symptomatic imaging in 4 patients. Diagnosis was Meningioma-6 patients, Germ Cell tumor recurrence-3 patients, Astrocytoma-1 patient, stPNET-1 patient, CNS Amyloidosis-1 patient, Inflammatory lesion-1 patient (corticosteroid sensitive) and unknown (asymptomatic, atypical imaging and no biopsy) in 1 patient. Pathological diagnosis was available in 7 patients, Meningioma diagnosis was image-based and only 1 patient had surgery due to tumor growth (path report WHO grade 1). Two patients (1 Germ Cell tumor and 1 Astrocytoma) died of disease progression, all other patients are alive, 3 under active treatment. CONCLUSIONS: An incidence over 10% of second intracranial tumors was found in our study population. As per literature the most frequent second tumor was Meningioma with no malignant cases. The incidence of late recurrence of Germ Cell tumor is worrisome. The rare diagnosis like CNS Amyloidosis and Inflammatory lesion highlight the need for further research in this population.

QL-011. REPRODUCTIVE HEALTH OUTCOMES IN FEMALE PEDIATRIC CANCER SURVIVORS DIAGNOSED WITH BRAIN TUMORS
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OBJECTIVE: Treatment of CNS tumors may affect the hypothalamic/pituitary axis. Our objective was to assess reproductive outcomes in females who survived CNS tumors. STUDY DESIGN: We retrospectively compared reproductive health outcomes in children diagnosed with CNS tumors between 1997-2008 in a tertiary referral center. RESULTS: We reviewed charts of 222 childhood cancer patients. Patients were divided into two groups: CNS tumors (N= 38) and Non-CNS tumors (N= 183). No difference was noted between patients with CNS tumors and Non-CNS tumors in age (median 7 for both groups) or BMI (Median 19.3 vs. 17.9, P = 0.9) at diagnosis. Similarly,equal numbers in both groups received radiation above the brain (18% vs. 24%, P= 0.4), or chemotherapy (18% and 3% vs. 8%, P= 0.1 respectfully). Patients with CNS tumors were significantly less likely to receive chemotherapy (49% vs. 80%, P< 0.001). Most patients were premenarchal at the time of diagnosis (80% in each group). Of those patients that were older than 13 years of age, there was no difference in menstrual cycle regularity (40% vs. 24%, P = 0.2), or elevated FSH levels (12%, vs. 34%, P = 0.5) between the two groups. CONCLUSION: Many female pedi- atric cancer patients did not have reproductive health status documented in details in their charts; despite ASCO guidelines recommendation that FSH be measured prior to age 13. Our study did not detect a difference in menstrual cycle regularity or elevated FSH level between patient with or without CNS tumors.

QL-012. VINCristINE: MECHANISM OF ADVERSE REACTION AND PROGRESS OF PREVENTIVE RESEARCH
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Vincristine is one of the most widely used and most effective drugs for the treatment of childhood cancer. However, neurotoxicity and unclear pharmacokinetics and pharmacogenomics has limited its clinical applications. In recent years, studies have found that the metabolism of vincristine varies between individuals and in administration with certain drugs may enhance its adverse effects. Research on a new drug delivery system has provided ideas in order to reduce the side effects and improve bioavailability of vincristine.

QL-013. A CROSS-SECTIONAL SURVEY EXPLORING BEHAVIORS AND PSYCHOSOCIAL DETERMINANTS OF PHYSICAL ACTIVITY AND DIET IN CHILDREN WITH BRAIN TUMORS (BT)
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BACKGROUND: Children with a BT experience a range of nutritional and physical morbidities during and after treatment. Dietary and physical activity (PA) interventions may improve tolerance to cancer therapy and physical function; however, understanding current behaviors and patients’ motivation to adopt healthier behaviors is unknown in children with a BT. METHODS: Information on dietary intake of fruits and vegetables (FV), dietary fat, PA, and their associated psychosocial variables were measured using the Patient-Centered Assessment & Counseling for Exercise survey. Surveys were administered during a routine visit to the outpatient center. Frequencies of demographics and responses were analyzed with SPSS (v21). RESULTS: Data from 12 patients [9F/3M; Mean age: 17.3y (range: 10 - 22y)]; 17% Hispanic, 28% Asian, 17% Black were available. BMI ≤ was within the normal range for most patients (75%) with the remaining (25%) overweight/obese. Half of the respondents were survivors, with the remaining on treatment. For PA, most patients (67%) reported exercising ≥ two times per week and 34% reported at least three times per week. Only 17% met PA recommendations. The majority (67%) were satisfied with their current PA regimen. Dietary recall revealed that 75% consumed less than 5 FV per day, 33% and 42% consumed 0 - 1 and 2 - 3 servings, respectively. However, nearly 20% of respondents were planning to increase servings of FV. Most patients (66%) reported following a low-fat diet; however, analysis of diet indicated most exceeded fat guidelines. CONCLUSIONS: The results of this interim analysis suggest that the majority of children with or survivors of a brain tumor are not meeting and may not understand the importance of PA. FV or dietary fat within the setting of cancer. Improving educational opportunities and delivery of interventions may result in improved adherence and reduce the burden of cancer therapy.

QL-014. TREATMENT DEVELOPMENTS AND THE UNFOLDING OF THE QUALITY OF LIFE DISCUSSION IN CHILDHOOD MEDULLOBLASTOMA: A REVIEW
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PURPOSE: To describe how the QOL discussion in childhood MB relates to treatment developments, survival and sequelae from 1920 to 2014. METHODS: Articles containing “childhood medulloblastoma” and “quality of life” were identified in PubMed. Those containing phrases...
pertaining to psychological, emotional, behavioral or social adjustment in the title, abstract or keywords were selected. Inclusion of relevant older publications was assured by cross-checking references. RESULTS: 1920-30’s: Surgery, electromyography, KV-irradiation. 1940’s: Radiotherapy, microscope, bipolar coagulation. 1950’s: Chemotherapy and intubation. Survival = years. Opinions oscillated between optimism/awareness of physical sequelae of radiotherapy, 1960’s: Magnified vision, VP-shunts, MV-irradiation. 1970’s: CT, microscope, bipolar coagulation, shunt-filters, neuroanesthesia, chemotherapy trials and staging studies. Operative mortality decreased and many patients re/entered to school; emphasis on psychological sequelae, IQ and academic performance. 1980’s: MRI, CUSA, laser surgery, HFR T. Cerebellar mutism, psychological and social issues. 1990’s: Pediatric neurosurgery, proton beams, stem cell rescue. Reflections on quality of life as such. 21st century: Molecular genetics. Premature aging, patterns of decline, risk- and resilience factors. DISCUSSION: QOL is a critical outcome measure. Focus depends on survival and sequelae, determined after years of follow-up. Detailed measurements are limited by time, money and human resources, and self-reporting questionnaires represent a crude measure limited by subjectivity. Therapeutic improvements raise the question of QOL versus cure. QOL is a potential primary research endpoint; multicenter international studies are needed, as are web-based tools that work across cultures.

QL-017. DO CHILDREN WITH BRAIN TUMORS HAVE WORSE QUALITY OF LIFE THAN THE GENERAL POPULATION? Jin-Sheh Lai†, Cindy Nowinski‡, William Hartsell§, John Han-Chih Chang, David Gell, and Stewart Goldman∥. Northwestern University, Chicago, IL, USA; 2Ann & Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL, USA; 3CDH Proton Center, Warrenville, IL, USA.

By comparing children with brain tumors (BT) to children in the general population, one can better understand the impact of QOL (QoL). This is possible with the Patient Reported Outcomes Measurement Information System (PROMIS), a national resource funded by the US NIH for precise and efficient measurement of common symptoms, functional status and QoL. Our study will use PROMIS to monitor the long-term effects of BT treatment and compare the effectiveness across treatments. We plan to recruit 500 children (ages 5-21) with BTs, at any disease stage, and their parents. Participants will complete PROMIS measures online every three months over 12 months. Of these children, 12% of the childhood brain tumor (CST-1) 21% non-proton radiation (Group-2), and 32% chemotherapy (Group-3). All raw scores were converted into the same T-score metrics as used by the PROMIS, where mean = 50, SD = 10. Preliminary results show that, compared to the general population, group-1 reported worse upper extremity function (T = 47.7; group-2 reported worse mobility (T = 41.2), depression (T = 54.7), and social function (T = 44); group-3 reported worse fatigue (T = 54), mobility (T = 48.8) and upper extremity function (T = 48.9). In all other cases, participants’ scores were better at a similar level as that of the normative population. Our preliminary results suggest that brain tumor treatment may negatively impact only a few aspects of QOL. These early trends must be confirmed in the full, completed study. In the future, parents from other geographic locations will be recruited to increase the representativeness of the sample to the BT population. Recruitment will be completed in 2016.

QL-018. LONG-TERM NEURO-REHABILITATION OUTCOMES IN ACTIVITIES OF DAILY LIVING ASSESSED BY MODIFIED BARTHEL’S INDEX IN CHILDREN/YOUNG ADULTS WITH PROGRESSIVE BENIGN/LOW-GRADE BRAIN TUMORS TREATED WITH HIGH-PRECISION CONFORMAL OR CONVENTIONAL RADIOTHERAPY.

Uday Krishna, Akshya Nagarkar, Anup T, Aastik Talke, Sadhana Kannan, Tejal Gupta, and Rakesh Jalali; Tata Memorial Centre, Mumbai, India.

BACKGROUND: We report long-term neuro-rehabilitation outcomes of children and young adults with progressive benign and low-grade brain tumors treated in a randomised controlled trial with high-precision conformal (CRT) or conventional (Conv) radiotherapy. METHODS: Between 2003-10, 200 patients (132 boys & 68 girls, median age = 13 years), fulfilling eligibility criteria of trial (NCT00517959) were randomised to CRT (n = 105) or Conv RT (n = 95) to 54 Gy/30 fractions. ADL was assessed by BI in 10 domains, personal hygiene, bathing, feeding, toilet use, stairs, dressing, bowel/bladder control, ambulation, transfer. Each domain has 5 levels of dependency (0 = unable to perform to 5, 10 = fully independent) to total score of 100, higher scores indicating higher independence. Serial longitudinal evaluations were performed at baseline (pre-RT), 6-months, 2, 3, and 5-years post-RT. RESULT: Among the 200 patients, 14 were visually handicapped. Difference in baseline BI score was not significant in children with low neurological performance scale (NPS). Mean of total BI at baseline in

QL-016. THE SPECTRUM OF SYMPTOMS AND ITS MANAGEMENT IN CHILDREN WITH AN INCURABLE BRAIN TUMOR; INSIGHT IN THE PALLIATIVE PHASE.

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INTRODUCTION: A CNS tumor is diagnosed in 25% of pediatric oncology patients with a mortality rate of 30%. Our aim is to gain insight in the course of the palliative phase of children with an incurable brain tumor. METHODS: Retrospective review of the medical charts of patients who died of a brain tumor between May 2007 and September 2012. RESULTS: 34 children aged 0.4-17.2 years when diagnosed were included. After 0-2400 days (median 1680) the infant prognosis was evidence of death followed after 1-603 (median 80) days. Palliative-directed therapy was given in 23 (68%) patients, comprising of chemotherapy solely in 12 (32%), radiotherapy solely in 5 (22%) patients, and 6 (26%) received a combination. Frequent symptoms during the palliative phase were pain (91%), poor mobility (74%), somnolence (58%). Sixty-three (18%) patients were admitted 0-31 days (median 5) during palliative care. Pain was treated satisfactorily in 96%, necessitating systemic morphine in 38% and sedation in 13%. A do-not-resuscitate code was discussed with all parents (median 50), and agreed upon by 23 (97%) patients and/or parents. Twenty-seven (82%) patients died at home in somnolent state and one in a hospice. Six (18%) patients were admitted for systemic anticonvulsants, pain medication and sedation until death. CONCLUSION: A diversity of symptoms occurred during the palliative phase of a childhood brain tumor, necessitating intensive symptom management, mostly conducted at home. This knowledge facilitates palliative care planning and helps to prepare parents and professionals to optimise palliative care.

QUALITY OF LIFE AND SYMPTOM CONTROL IN CHILDREN WITH HUMAN IMMUNODEFICIENCY VIRUS INFECTION. Therapeutic improvements raise the question of QOL versus cure. QOL is a potential primary research endpoint; multicenter international studies are needed, as are web-based tools that work across cultures.
CRT and Conv arms were 95.9 and 94.3 respectively. At 3 and 5 year evaluations, mean of total BI in CRT and Conv arms was 99.6, 99.1 and 100.2, 99.4. Maintenance of ADL over time between arms was found to be reaching significant difference (p = 0.054). Improvement in bipedal stance in BI score was no different in scores in serial evaluations in children with low NPS.

CONCLUSIONS: Patients with benign and low-grade brain tumours have low BI at baseline and the scores are maintained at long term follow up after conformal radiation therapy.

QL-019. SUPPORTING THE ACADEMIC NEEDS OF PEDIATRIC BRAIN TUMOR SURVIVORS: A MODEL OF CARE
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PURPOSE: To evaluate the effectiveness of a model of psychosocial, consultation, and advocacy provided by the School Liaison Program, for families and schools of children whose cancer-related diagnosis or treat- ment involved the central nervous system. Secondary goal was to assess par- ental understanding of academic supports and advocacy. METHODS: After IRB approval, a mailed survey was completed by parents of school-aged chil- dren demonstrating academic difficulties. Surveys were sent to 125 families of pediatric brain tumor survivors who received consultation through SLP. The ordinal responses of intervention were assessed using a univariate logis- tic regression model evaluating SLP impact on parental understanding of obtaining services, ability to advocate, knowledge of school services, ease of accessing services and achievement of academic potential. RESULTS: Ninety-three surveys were returned (75% response rate). Parents of children who had ongoing SLP services involvement (> 3 years) had a statistically sig- nificant better parental understanding and ability to advocate than parents of children who had less than 1 year of SLP services (p = 0.02/0.04). When SLP participated in school meetings there was better parental under- standing of a child’s needs and ability to advocate (p = 0.04/0.04). When SLP participated more than once in school meetings, there was improvement in knowledge of academic supports with less difficulty in accessing these services (p = 0.009/0.04). When the SLP clinician came to a patient’s school there was better parental understanding, better ability to advocate, less diffi- culty accessing service and greater belief in the child’s ability to meet their academic potential (p = 0.04/0.03/0.04/0.004). CONCLUSIONS: The con- sultation, psychoeducation, and parental advocacy training provided by the School Liaison Program has a positive impact on parent-reported knowledge of special education supports, satisfaction with their child’s school services, and increased belief that their child is meeting his/her academic potential. Further prospective studies to evaluate this program further are being developed.

QL-020. ASSOCIATION OF HYPERTROPHIC OLIVARY DEGENERATION WITH POSTERIOR Fossa SYNDROME IN CHILDREN FOLLOWING BRAIN TUMOUR RESECTION
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BACKGROUND: Hypertrophic olivary degeneration (HOD) is a neural degeneration caused by disruption of the dentato-rubro-olivary pathway, also known as the triangle of Guillain-Mollaret. Surgery for posterior fossa tumours is one among the various aetologies that can cause HOD. Posterior fossa syndrome (PFS) is a recognised complication of surgery in patients with posterior fossa tumours in children. It is characterised by neurological and neuropsychological disturbances which include cerebellar mutism. To our knowledge, the association between HOD and PFS has not been evaluated to date. This could contribute to further understanding of the aetiology of PFS. AIM: To evaluate if there is a significant relationship between HOD and PFS in children undergoing surgery for posterior fossa tumours. METHOD: All children who had posterior fossa surgery between July 2007 and December 2012 were included. The immediate post- operative scan and all follow ups scans until 12 months post-surgery were assessed. Statistical association between PFS and HOD were calculated. RESULTS: 48 children were included in the study. HOD was identified in 15 children with bilateral involvement in 9 children. PFS was identified in 15 children. There was significant association between PFS and presence of HOD (Relative risk = 4.8, 95% CI = 1.8, 10.6; p = 0.02). HOD was associated with bilateral HOD with relative risk = 3.8, 95% CI = 1.8, 7.7; p = 0.002) and not unilateral HOD (Relative risk = 3.3; 95% CI = 1.1,10.2; p = 0.08). CONCLUSION: The significant association between HOD, in particular bilateral HOD and PFS suggests involvement of dentato-rubro-olivary pathway in the development of PFS.

QL-021. IRON OVERLOAD IN PEDIATRIC PATIENTS WITH MALIGNANT BRAIN TUMORS
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BACKGROUND: Patients with malignant brain tumors undergo highly intensive therapeutic regimens necessitating repeated red blood cell (RBC) transusions, placing them at risk for iron overload. There are essentially no data regarding the incidence and relevance of iron overload in patients with malignant brain tumors. Magnetic resonance imaging (MRI) is the most sensitive imaging modality to detect hemosiderosis. METHODS: We reviewed T2 weighted images from routine screening MRI’s of the spine in 23 children with malignant brain tumors who received high intensity treat- ment regimens. Serial MRIs were evaluated and the signal intensity of the spine was compared to that of muscle and scored using a semi-quantitative scale (1 = hyperintense, 2 = mildly hypointense, 3 = isointense, 4 = hypointense) with scores of >3 considered evidence of hemosiderosis. RESULTS: All patients evaluated showed some signal change (score of >2) with 13 of the 23 patients showing evidence of hemosiderosis during or shortly after chemothera- peuty followed by chemotherapy (n = 8), 4 (50%) developed hemosiderosis after an average of 5.3 cycles of chemotherapy. Nine of 15 (60%) patients treated with myeloablative chemotherapy developed hemosiderosis, while 4 of 8 (50%) treated without myeloablative chemotherapy did so. DISCUSSION: The use of highly intensive protocols to treat malignant brain tumors in children results in multiple RBC transfusions placing them at risk for hemosiderosis. Iron deposition in end organs contributes to hormone receptor insensitivity in addition to decreased produc- tion of several hormones. As patients with malignant brain tumors have increased survival rates, we are learning a great deal about the late effects associated with our treatment strategies; however, the data on iron overload remain sparse. It is important to recognize iron overload, as it is a possible risk factor that can be treated and reversed.

QL-022. BOSWELLA AS AN ALTERNATIVE TO DEXAMETHASONE IN CHILDREN WITH BRAIN TUMORS
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INTRODUCTION: Childhood brain tumors may lead to significantly increased intracranial pressure (ICP) and edema, jeopardizing functionality. Dexamethasone is the standard treatment for increased ICP, but has many adverse effects including cushingoid appearance, increased appetite, weight gain, hypertension, hyperglycemia, irritability, immunosuppression, and acne. The use of resin from the Boswellia plant, a natural anti- inflammatory agent, has been studied to treat malignant brain tumors in children requiring multiple RBC transfusions, placing them at risk for iron overload. Iron deposition in end organs contributes to hormone receptor insensitivity in addition to decreased production of several hormones. As patients with malignant brain tumors have increased survival rates, we are learning a great deal about the late effects associated with our treatment strategies; however, the data on iron overload remain sparse. It is important to recognize iron overload, as it is a possible risk factor that can be treated and reversed.

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improvement of symptoms. CONCLUSIONS: Boswellia was an effective and well-tolerated treatment for cerebral edema in three pediatric brain tumor patients. In this limited experience, Boswellia was able to provide symptom relief and did not demonstrate the toxicities of dexamethasone. These data support a clinical trial of Boswellia as an alternative to dexamethasone in childhood brain tumors.

**QL-023. EFFECT OF HYPOTHALAMIC RADIATION ON CARDIOMETABOLIC RISK FACTORS IN SURVIVORS OF CHILDHOOD BRAIN TUMORS**

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**BACKGROUND:** The primary aim of this study is to examine cardiometabolic consequences of hypothalamic radiation among pediatric brain tumor survivors, using the diagnostic criteria for metabolic syndrome and the biomarkers leptin and adiponectin.  

**METHODS:** This study evaluated 115 survivors of childhood brain tumors (64 radiated, 51 non-radiated) between 5-20 years old (mean age: 13.3 years, SD: 4.0 years, average interval since treatment: 6.0 years). Patients underwent fasting lab assays (lipid panel, insulin, glucose, leptin, adiponectin), anthropometric measurements (height, weight, waist circumference), Dual-energy X-ray Absorptiometry (DXA) scan, and completed the Paffenbarger physical activity survey. Insulin resistance was identified using the homeostasis model assessment of insulin resistance (HOMA-IR).

**RESULTS:** There was no difference in the prevalence of metabolic syndrome among survivors who were exposed to hypothalamic radiation compared to those who were not (13% vs. 11%; p = 0.83). However, patients exposed to hypothalamic radiation had significantly elevated triglyceride levels (p = 0.027), elevated HOMA-IR (p = 0.031), and greater truncal body fat percentage (p = 0.04). Among patients over 10 years of age, hypothalamic radiation was associated with lower Paffenbarger scores (p = 0.038). Patients who met the diagnostic criteria for metabolic syndrome had higher leptin/adiponectin ratios (p = 0.013) and lower adiponectin/kg body fat (p < 0.001). Among all patients, evaluated HOMA-IR was correlated with low adiponectin (p = 0.014), high leptin (p = 0.005), and a high leptin/adiponectin ratio (p < 0.001).

**CONCLUSIONS:** These results suggest that exposure to hypothalamic radiation may have significant subclinical consequences that include dyslipidemia, insulin resistance, and the development of truncal obesity. This study also suggests that central leptin resistance may play a role in the development of cardiometabolic risk factors, due to decreased energy expenditure and increased fat storage, in these patients.

**QL-024. SEXUAL FUNCTIONING IN MALE PEDIATRIC BRAIN TUMOR SURVIVORS**

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Survivors of pediatric brain tumors are at risk of numerous complications, including cognitive and hormonal dysfunction. This can lead to poor sexual function which may affect quality of life. Twenty percent of survivors of adult cancers reported sexual dysfunction, however data is sparse on sexual function survivors of pediatric tumors. Clinical observation revealed a number of young men brain tumor survivors with reported sexual dysfunction. A pilot study estimated the prevalence of sexual dysfunction in this population using a convenience sample of off-therapy male patients age 18 or older who were cognitively able to understand the questionnaires and English-speaking. After signing informed consent, subjects completed two self-administered questionnaires to assess sexual functioning. Eighteen young men completed the study between the ages of 18 and 24. Diagnoses included intracranial germ cell tumor, PNET, low grade astrocytoma, craniopharyngioma. All subjects received chemotherapy, with 16 receiving radiation (6 received craniospinal radiation). Six of 18 (33%) of subjects reported sexual function was a small or moderate problem. However, 13 of 18 subjects (72%) reported their sexual ability was good or very good. No subject reported that sexual function was a big problem. Only 1 subject reported dissatisfaction overall with sexual function. Therefore, it appears sexual dysfunction may be at least equivalent in our population to that of adult cancer survivors. Other areas of future exploration include sexual function of female survivors and understanding of the etiology of sexual dysfunction in pediatric brain tumor survivors.