

Sima Ferman<sup>3</sup>, and Barbara Monte Mor<sup>3</sup>; <sup>1</sup>Instituto Nacional de Cancer, Rio de Janeiro, Brazil, <sup>2</sup>The Hospital for Sick Children, Toronto, ON, Canada, <sup>3</sup>Instituto Nacional de Cancer, Rio de Janeiro, Brazil

Surgery consists in the mainstay of treatment in most gliomas, but in many cases, a resection is not feasible. Liquid biopsy is an ideal tool providing a minimally invasive method through plasma or CSF sampling to assess cell-free tumor DNA (ctDNA). Here we explore the feasibility of detecting DNA in plasma exosomes (exoDNA) extracted from glioma patients and further investigate its use in identifying molecular alterations. Exosomes were isolated from 2ml of plasma from 24 patients (13 LGG, 8 HGG, 3 DIPG) and fully characterized by nanoparticle tracking analysis and transmission electron microscopy. DNA was extracted from 13 samples (exoDNA) so far. Five patients had confirmed point mutations in the primary tumor (3BRAFV600E; 1FGFR1N546K; 1H3.3), additionally, 3 samples were collected from clinically diagnosed DIPG patients to inquire H3K27M mutations. DNA was extracted successfully from all exosome samples; a pre-amplification step was needed and direct sequencing was carried out for BRAFV600E, FGFR1N546K and H3K27M mutations were sought in patients with positive tumors. Wildtype BRAF fragment was identified in 12/13 samples (1 patient failed sequencing). However, none of the five tumor positive patients nor the DIPG patients had mutations detected at the exo-DNA level. There is growing evidence that CSF may be the ideal source of ctDNA in brain tumor patients, therefore although we could not detect mutations in plasma DNA we are currently analyzing CSF exoDNA and cell-free DNA to evaluate if this proves a successful strategy and whether exoDNA is more representative of the tumor content.

#### PATH-31. THE IMPACT OF MOLECULAR PROFILING OF PEDIATRIC CNS TUMORS ON TUMOR DIAGNOSIS AND MANAGEMENT - A SINGLE CENTER EXPERIENCE

Kazuhiro Sabet<sup>1</sup>, Marike Zwienenberg<sup>1</sup>, Mirna Lechpammer<sup>1</sup>, Lee-Way Jin<sup>1</sup>, David Solomon<sup>2</sup>, and Cassie Kline<sup>2</sup>, Reuben Antony<sup>1</sup>; <sup>1</sup>University of California Davis, Sacramento, CA, USA, <sup>2</sup>University of California San Francisco, San Francisco, CA, USA

**BACKGROUND:** Next generation sequencing (NGS) plays a role in neuro-oncology research and in clinical diagnosis and management. Here, we describe how NGS for pediatric CNS tumors impacted clinical diagnosis and therapy at a single institution. **METHODS:** NGS was performed using the UCSF 500 Gene Panel (targeted sequencing platform covering about 500 cancer associated genes). Patients were selected for NGS based on tumor pathology /need to identify therapeutic targets. We collected data on patient demographics, tumor histology/pathway alterations/therapeutic targets/therapy and used descriptive statistics for data analysis. **RESULTS:** Between January 2016 and July 2019, about one-third of patients with CNS tumors seen at our institution (N=29) were interrogated. NGS revealed pathway alterations in 20/29 patients. Treatment recommendations/modifications based on pathway alterations/therapeutic targets impacted the therapy of 18 patients. Patient groups: Medulloblastoma (N=6), alterations in WNT, SHH, and TP53 pathways (Vismodegib recommended for SHH pathway alteration but not used). **High-grade glioma** (N=4), alterations (with treatment changes) included, NF1(Trametinib, Everolimus); MSH2/MLH1(Nivololumab); CDKN2A/CDKN2B/CDKN2C(Abemaciclib); EGFR (Osimertinib, Afatinib); H3K27M (Panobinostat/ONC201); BRAFV600 (Dabrafenib, Trametinib); ATRT (N=1) SMARCB1; Low Grade Glioma (N=10), BRAFV600(Vemurafenib) /BRAFKIAA1549 fusion (Trametinib)/PIK3CA; DIPG (N=5), H3K27M/BCOR/ P53/ACVR/PIK3CA (LY3023414, Everolimus)/PDGFR(Dasatinib); Ependymoma (N=3), PFA/PFB/RELA Fusion. Seven patients were treated with targeted therapy + conventional therapy. In 8 patients targeted therapy remains an option but not yet needed. **CONCLUSIONS:** NGS of pediatric brain tumors is widely available and contributes to the diagnosis/therapy of pediatric CNS tumors. Optimal chemotherapy/targeted therapy combinations are areas of study.

#### NEUROPSYCHOLOGY/QUALITY OF LIFE

##### QOL-01. LONGITUDINAL COMPARISON OF NEUROCOGNITIVE TRAJECTORIES IN PEDIATRIC MEDULLOBLASTOMA PATIENTS TREATED WITH PROTON VERSUS PHOTON RADIOTHERAPY

Lisa Kahalley<sup>1,2</sup>, Rachel Peterson<sup>3</sup>, M. Douglas Ris<sup>1,2</sup>, Laura Janzen<sup>3</sup>, M. Fatih Okcu<sup>1,2</sup>, David Grosshans<sup>4</sup>, Vijay Ramaswamy<sup>3,5</sup>, Arnold Paulino<sup>4</sup>, David Hodgson<sup>6</sup>, Anita Mahajan<sup>7</sup>, Derek Tsang<sup>6</sup>, Normand Laperriere<sup>6</sup>, William Whitehead<sup>1,2</sup>, Robert Dausier<sup>1</sup>, Michael Taylor<sup>3,5</sup>, Heather Conklin<sup>8</sup>, Eric Bouffet<sup>3,5</sup>, Murali Chintagumpala<sup>1,2</sup>, and Donald Mabbott<sup>3,5</sup>; <sup>1</sup>Baylor College of Medicine, Houston, TX, USA, <sup>2</sup>Texas Children's Hospital, Houston, TX, USA, <sup>3</sup>The Hospital for Sick Children, Toronto, ON, Canada, <sup>4</sup>MD Anderson Cancer Center, Houston, TX, USA, <sup>5</sup>The University of Toronto,

Toronto, ON, Canada, <sup>6</sup>Princess Margaret Cancer Centre, Toronto, ON, Canada, <sup>7</sup>Mayo Clinic, Rochester, MN, USA, <sup>8</sup>St. Jude Children's Research Hospital, Memphis, TN, USA

**PURPOSE:** By reducing dose to normal brain tissue, proton radiotherapy (PRT) may lessen neurocognitive risk traditionally associated with photon radiotherapy (XRT). We examined change in neurocognitive scores over time in pediatric medulloblastoma patients treated with PRT versus XRT. **METHODS:** Neurocognitive scores from 79 patients (37 PRT, 42 XRT) were examined. Patients were treated between 2007–2018 on the same treatment protocols that differed only by craniospinal modality (PRT versus XRT). Change in scores over time since diagnosis were compared between groups. **RESULTS:** Groups were similar on most demographic/clinical variables: sex (67.1% male), age at diagnosis (mean 8.6 years), CSI dose (median 23.4 Gy), length of follow-up (mean 4.3 years), and parental education (mean 14.3 years). Boost dose ( $p<0.001$ ) and margin ( $p=0.001$ ) differed between groups. Adjusting for covariates, the PRT group exhibited superior outcomes in global IQ, perceptual reasoning, and working memory versus the XRT group (all  $p<0.05$ ). The XRT group exhibited significant decline in global IQ, working memory, and processing speed (all  $p<0.05$ ). The PRT group exhibited stable scores in all domains except processing speed ( $p=0.003$ ). Posterior fossa syndrome imparted risk independent of modality. **CONCLUSION:** This is the first study comparing neurocognitive trajectories between pediatric patients treated for medulloblastoma with PRT versus XRT on comparable, contemporary protocols. PRT was associated with more favorable neurocognitive outcomes in most domains compared to XRT, although processing speed emerged as vulnerable in both groups. This is the strongest evidence to date of an intellectual sparing advantage with PRT in the treatment of pediatric medulloblastoma.

##### QOL-02. PERCEPTIONS OF LATE EFFECTS CARE NEEDS AMONG SURVIVORS OF PEDIATRIC BRAIN TUMOURS

Chantel Cacciotti<sup>1,2</sup>, Adam Fleming<sup>1</sup>, Hanna Tseitlin<sup>1</sup>, JoAnn Duckworth<sup>1</sup>, and Stacey Marjerrison<sup>1</sup>; <sup>1</sup>McMaster University, Hamilton, ON, Canada, <sup>2</sup>Dana Farber / Boston Children's Cancer and Blood Disorder Center, Boston, MA, USA

**OBJECTIVES:** Pediatric brain tumour survivors are at risk of long-term consequences of therapy. Comprehensive late effects care may mitigate these risks, but the best care model is unclear. We sought to describe the care experience and quality of life (QOL) of pediatric brain tumour survivors at the McMaster Children's Hospital joint adult/pediatric Neuro-Oncology clinic. **METHODS:** Cross-sectional survey data were collected. Care needs were assessed with the Cancer Care Experience Questionnaire (CCEQ), Cancer Worry Scale (CWS), and Self-Management Skills Scale (SMSS). Quality of life was measured utilizing the PedsQL Brain Tumor Module. Data were analyzed descriptively. **RESULTS:** Thirty-two childhood brain tumor survivors and/or their parents participated. Their malignancies included embryonal tumors (medulloblastoma/ATRT) (62%), ependymoma (22%), and germ cell tumours (16%). Among 77%, therapy included chemotherapy, surgery and radiation. Most respondents reported high quality cancer care, although some could not recall discussions of late effects risks and health promotion. Mean cancer worry scores were low (71.8 ( $\pm 28.4$ )). Survivors reported limited self-management skills (58.5 ( $\pm 18.2$ )), with support required in clinic visits, arranging medical appointments, filling prescriptions and tasks of daily living. Overall median QOL scores were in the 'good' range (parental report 72.3 ( $\pm 17.7$ ), survivor 68.2 ( $\pm 16.6$ )). **CONCLUSION:** In comparison to other childhood cancer survivor cohorts, this group of long-term brain tumour survivors appear to have similar QOL, fewer cancer worries, and increased need for aid with self-management. Given this, along with the positive care experience reported, this clinic model of care appears to meet the needs of this population.

##### QOL-04. INFLUENCE OF FAMILY, SCHOOL, AND HOSPITAL SYSTEMS IN SUPPORTING SURVIVORS OF PEDIATRIC BRAIN TUMORS WITH NEUROCOGNITIVE LATE EFFECTS

Emily Moscato<sup>1,2</sup>, Lisa Gies<sup>1,2</sup>, Aimee Miley<sup>2</sup>, Ralph Salloum<sup>3,4</sup>, and Shari Wade<sup>1,2</sup>; <sup>1</sup>University of Cincinnati, Cincinnati, OH, USA, <sup>2</sup>Division of Pediatric Rehabilitation Medicine, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, <sup>3</sup>Cancer and Blood Diseases Institute, Brain Tumor Center, Cincinnati Children's Hospital Medical Center, Cincinnati, OH, USA, <sup>4</sup>University of Cincinnati School of Medicine, Cincinnati, OH, USA

**OBJECTIVE:** Pediatric brain tumor survivors (PBTs) are at risk for developing neurocognitive late effects that may interfere with academic and adaptive functioning. To mitigate the potential impact, some PBTs may implement strategies independently, while others may rely on system-level support from family, school, or hospital systems. Given the limited knowledge on survivor and family perspectives of these supports, we conducted a mixed-methods study involving PBTs and their caregivers to examine the