reveals reduced ADCs in responding tumors, with the percent change in ADC from baseline correlating with deeper RANO responses. CONCLUSION: DWI analysis reveals reductions in ADC values that correlates with treatment response and a shift toward more normal cellularity in tumors treated with DAY101. Changes in ADC may represent a novel imaging biomarker, reflecting biological response to DAY101 treatment.

IMG-06. PREDICTING SURVIVAL FROM PERFUSION AND DIFFUSION MRI BY MACHINE LEARNING

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INTRODUCTION: Magnetic Resonance Imaging (MRI) is routinely used in the assessment of children's brain tumours. Reduced diffusion and increased perfusion on MRI are commonly associated with higher grade but there is a lack of quantitative data linking these parameters to survival. Machine learning is increasingly being used to develop diagnostic tools but its use in survival analysis is rare. In this study we combine quantitative parameters from diffusion and perfusion MRI with machine learning to develop a model of survival for paediatric brain tumours. METHOD: 69 children from 4 centres (Birmingham, Liverpool, Nottingham, Newcastle) underwent MRI with diffusion and perfusion (dynamic susceptibility contrast) at diagnosis. Images were processed to form ADC, cerebral blood volume (CBV) and vessel leakage correction (K2) parameter maps. Parameter mean, standard deviation and heterogeneity measures (skewness and kurtosis) were calculated from tumour and whole brain and used in iterative Bayesian survival analysis. The features selected were used for k-means clustering and differences in survival between clusters assessed by Kaplan-Meier and Cox-regression. RESULTS: Bayesian analysis revealed the 5 top features determining survival to be tumour volume, ADC kurtosis, CBV mean, K2 mean and whole brain CBV mean. K-means clustering using these features showed two distinct clusters (high- and low-risk) which bore significantly different survival characteristics (Hazard Ratio = 5.6). DISCUSSION AND CONCLUSION: Diffusion and perfusion MRI can be used to aid the prediction of survival in children's brain tumours. Tumour perfusion played a particularly important role in predicting survival despite being less routinely measured than diffusion.

IMG-07. GADOLINIUM IS NOT NECESSARY FOR SURVEILLANCE MR IMAGING IN CHILDREN WITH CHIASMATIC-HYPOTHALAMIC LOW GRADE GLIOMA

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BACKGROUND: Patients with chiasmatic-hypothalamic low grade glioma (CHLGG) have frequent MRIs with gadolinium based contrast agents (GBCA) for disease monitoring. Cumulative gadolinium deposition in children is a potential concern. The purpose of this research is to establish whether MRI with GBCA is necessary for determining tumor progression in children with CHLGG. METHODS: Children with progressive CHLGG were identified from Texas Children's Cancer Center between 2005–2019. Pre- and post-contrast MRI sequences were separately reviewed by one neuroradiologist who was blinded to the clinical course. Three dimensional measurements and tumor characteristics were collected. Radiographic progression was defined as a 25% increase in size (product of two largest dimensions) compared to baseline or best response after initiation of therapy. RESULTS: A total of 28 patients with progressive CHLGG including 683 MRIs with GBCA (mean 24 MRIs/patient; range: 10–43 MRIs) were reviewed. No patients had a diagnosis of NF1. Progression was observed 92 times, 91 (98.9%) on noncontrast and 90 (97.8%) on contrast imaging. Sixty-seven radiographic and/or clinical progressions *necessitating management changes* were identified in all (100%) noncontrast sequences and 66 (98.5%) contrast sequences. Tumor growth >2 mm in any dimension was identified in 184/187(98.4%) on noncontrast and 181/187(96.8%) with contrast imaging. Non primary metastatic disease was seen in seven patients (25%), which were better visualized on contrast imaging in 4 (57%). CONCLUSION: MRI without GBCA effectively identifies patients with progressive disease. One should consider eliminating contrast in imaging of children with CHLGG with GBCA reserved for monitoring those with metastatic disease.

IMG-08. UNUSUAL IMAGING FINDINGS IN TWO CASES OF PAEDIATRIC LOW GRADE GLIOMA

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Low grade gliomas (LGG), including pilocytic astrocytoma (PCA), are the commonest paediatric brain tumours and their behaviour is well understood, typically following a benign course. BRAF fusion is common, particularly in PCA of the cerebellum and optic pathway. Here we present two patients whose LGG behaved in an unusual fashion. The first patient who was treated 6 years previously on LGG2 with vincristine and carboplatin for a tectal plate lesion was identified on routine imaging to have local tumour progression and underwent completion staging. This showed a new enhancing soft tissue abnormality within the spinal cord at the level of L2. Due to radiological dubiety both lesions were biopsied for histological and molecular analysis, confirming LGG of the tectal plate and finding the spinal lesion to be a myxopapillary ependymoma. The second patient presented with acute hydrocephalus following a 2 year history of neurocognitive impairments. He was found to have a large, complex tumour centred in and expanding the bodies of both lateral ventricles with significant mass effect. Radiologically this was most in keeping with a central neurocytoma but histological analysis confirmed it to be a PCA with KIAA1549-BRAF fusion. The first case demonstrates the utility of molecular analysis in confirming two distinct tumour types in one patient, in a situation where metastasis would not be expected and would significantly alter treatment and prognosis. The second is an example of how imaging can be misleading in a KIAA1549-BRAF fused PCA presenting as an intraventricular mass.

IMG-09. RESPONSE ASSESSMENT IN DIFFUSE INTRINSIC PONTINE GLIOMA (DIPG): RECOMMENDATIONS FROM THE RESPONSE ASSESSMENT IN PEDIATRIC NEURO-ONCOLOGY COMMITTEE

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Optimizing the conduct of clinical trials for diffuse intrinsic pontine glioma (DIPG) involves use of consistent, objective disease assessments and standardized response criteria. The Response Assessment in Pediatric Neuro-Oncology (RAPNO) committee, an international panel of pediatric and adult neuro-oncologists, clinicians, radiologists, radiation oncologists, and neurosurgeons, was established to address unique challenges in assessing response in children with CNS tumors. A subcommittee of RAPNO was formed to specifically address response assessment in children and young adults with DIPG and to develop a consensus on recommendations for response assessment. Distinct issues related to the response assessment of DIPG include its definition and recent molecular classifications, dearth of imaging response data, the phenomena of pseudoprogression, and measuring response in the era of focal drug delivery. The committee has recommended response be assessed using magnetic resonance imaging (MRI) of brain and spine, neurologic examination, and use of supportive medication, i.e. steroids and anti-angiogenic agents. Clinical imaging standards and imaging quality control