cycle due to continued deterioration in performance status (both ECOG PS 3 pre-tx).
All patients had PD on pre-tx imaging.Table 1 summarises results.

Pt	Tumour response by 1D/ 2D post-tx	Tumour Vol pre-tx 1 (ccm)*	Tumour Vol pre-tx 2 (ccm)*	Time between pre-tx scans (months)	Tumour Vol post-tx (ccm)	Time between pre/ post-tx scans (months)	Growth pre-tx (% increase per month)	Growth During tx (% increase per month)	Growth Rate pre-tx	Growth Rate during tx	Pre-tx SUV_{max}	Post-tx SUV_{max}
1	PD/PD	1.1	4.2	1.5	19.3	15	255	24	0.388	0.044	16.6	16.2
2	SD/SD	17.6	28.8	4	49.7	12	16	6	0.054	0.02	9.5	14.6
3	SD/SD	5.1	17.9	12	18.3	16	21	0.1	0.045	0.0006	12.3	5.8
4	SD/PD	10.9	20.7	13	8.2 pre-PRRT (had surgery after pre-tx scan 2)	12	7	8.3	0.022	0.025	8.6	7.0
5†	N/A	14.7	26.8	6	30.9	6	14	2.5	0.044	0.01	14.3	N/A
6†	N/A	96.5	183.7	1.5	N/A	N/A	60	N/A	0.186	N/A	16.6	N/A

*2 scans at various time points pre-tx assessed to give pre-tx growth rate †Performance status deteriorated so patients received only 1 cycle

Table 1: Meningioma Growth Rates pre and during/ post ^{177}Lu-DOTA

All tumours increased in size although tumour growth rates at 1 year were substantially lower than pre-tx in 3 patients(p=0.28, small patient numbers). There was no clear trend in SUV_{max}. Volumetric growth rate analysis appeared to most accurately reflect growth in meningiomas which often grow irregularly.
Dosimetric analysis found that 7.4GBq administered dose equated to 43Gy in the tumour, but a further scan at 35 hrs would have been helpful. Regions of ^{177}Lu-DOTA therapy uptake mirrored regions of tracer avidity on ^{68}Ga-DOTA scans.
Conclusions: ^{177}Lu-DOTA is well tolerated and may reduce growth rates in some patients with advanced meningioma. Larger studies in patients of good PS are required. As ^{177}Lu emits γ rays, dosimetric evaluation of tumour uptake is possible and prescribed dose could be individually tailored to deliver a desired absorbed dose, however, further work is required to assess reliability of dose estimation.

POSTER DISCUSSION: YOUNG SCIENTISTS 5: SBRT, PAEDIATRICS AND IMAGING

PD-0471
Freedom from progression for standard-risk medulloblastoma: A model for incorporating multiple modes of failure
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Purpose/Objective: As paediatric medulloblastoma (MB) is a relatively rare disease, it is important to extract the most information possible on its response to therapy from trials and cohort studies. Here, a framework is developed for modeling tumor control with multiple modes of failure and time-to-progression, using pattern of failure data from published standard-risk MB series.
Materials and Methods: Using a meta-analysis approach, data from reports on outcome after radio-chemotherapy in standard-risk MB published after 1990 and containing information on pattern of relapse were selected. Out of 287 screened records, 12 were included to derive a tumor control dose-response model addressing failures in the high-dose boost volume and the elective craniospinal volume. Failures in the boost and elective volume were assumed to be statistically independent and failures diagnosed as simultaneous were assumed to have originated in the primary site and subsequently spread to the elective volume. Here, we used a mixture model to describe the freedom from progression (FFP). The time-to-progression distribution was based on Kaplan-Meier estimates of 5-year event-free survival from two large randomized MB trials (SIOP-PNET-4 from 2012 and Packer et al. from 2006). The uncertainty in the estimated 5-year FFP was estimated by Monte Carlo sampling (2000 samples) over the statistical uncertainty in the input data of the dose-response model.
Results: The estimated values of 5-year FFP, and 95% confidence intervals (CIs) were 69% (56-81%), 77% (74-81%), 79% (77-82%) and 82% (78-84%) for CSI doses of zero, 18, 24 and 36 Gy respectively, while keeping the boost dose constant at 54 Gy. The uncertainty in FFP estimates were considerably larger for craniospinal doses below 18 Gy compared to between 24 and 36 Gy, reflecting the limited amount of data in the lower dose range.

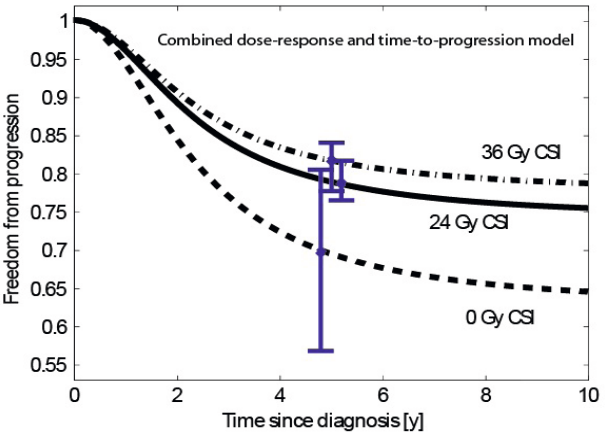

Figure 1. Estimated FFP for three scenarios, zero Gy craniospinal irradiation (CSI), 24 Gy CSI or 36 Gy CSI. Vertical bars represent the 95% CIs for FFP at 5 years after diagnosis (displaced slightly in the graph for visualization), based on 2000 Monte Carlo samples.

Conclusions: We show that while keeping the boost dose constant, varying the CSI dose only slightly alters the estimated outcome. Omitting the CSI however, shows a clear drop in the estimated FFP. Using this model, a post-hoc power calculation for the two treatment regimens compared in the recently published SIOP-PNET-4 trial yields a statistical power, given the trial sample size, at only 13%, which could explain the negative result of that trial. As illustrated in Figure 1, there are large gaps in the knowledge of the efficacy of very low CSI doses; therefore the tumor control estimates at low doses should be interpreted with caution.

PD-0472
Early stage unfavourable Hodgkin's Lymphoma in children: Treatment outcomes and patterns of failure
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Purpose/Objective: To evaluate the efficacy and outcome of using a combination of 4 - 6 cycles of Doxorubicin, Bleomycin, Vinblastine, and Dacarbazine (ABVD) chemotherapy (CTh) and involved field radiation therapy (IFRT) in the management of paediatric early stage unfavorable Hodgkin's lymphoma (HL).
Materials and Methods: Seventy children less than 18yrs of age with early stage unfavourable HL treated with 4-6 cycles of ABVD followed by IFRT were included in this analysis. There were 59 (84.3%) males and 11 (15.7%) females. The commonest histological subtype was mixed cellularity. Majority of the patients (54%) had stage IIAX disease. Based on response to CTh the radiation doses were 19.8Gy/ 11 fractions and 30.6Gy/ 17 fractions for patients with complete response (CR) and partial response (PR) respectively.
Results: After a median follow-up of 60 months, the 10 year disease free survival (DFS) and overall survival (OS) were 94% and 97% respectively. On univariate analysis prognostic factors found to have significant impact on DFS were, bulky disease (p=0.003), nodular lymphocyte predominant histology (p=0.003) and stage of disease (p=0.045).None of the prognostic factors had a significant impact on OS. On multivariate analysis using Cox regression model, none of the prognostic factors were found to have a significant impact on DFS and OS.There was no difference between 4 and 6 cycles of ABVD in terms of acute pulmonary, haematological and other treatment related acute toxicities. Grade II dermatitis for pts. receiving RTh doses more than 25Gy or less were 20% and 14.6% respectively, while the corresponding incidence of mucositis was 13.3% and 3.5% respectively.
Conclusions: Our study supports the current standard of care for paediatric early stage unfavourable HL of using four cycles of ABVD CTh followed by IFRT. This combination results in optimal outcomes in terms of disease control and treatment related toxicities.