involving the posterior fossa. In this large study, there were no cases of symptomatic brainstem injury. Further research is needed to determine if a difference exists in brainstem injury risk between photon and proton therapy.
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Neuropsychological Outcomes of Pediatric Brain Tumor Patients Treated with Proton (PRT) or X-ray (XRT) Radiation Therapy

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Purpose/Objective(s): To compare neuropsychological outcomes following PRT versus XRT for pediatric brain tumors.
Materials/Methods: A total of 125 patients received treatment for tumors located in the supratentorial (17.6%), midline (28.8%) or posterior fossa (53.6%) compartments. All received age-appropriate neuropsychological assessment of intelligence quotient (IQ), processing speed (PS), visual motor integration (VMI), executive function, memory and parent-reported function at a single institution. Tests of IQ, PS, VMI and parent-reported functioning were standardized with mean of 100 and standard deviation of 15. Tests of digit and memory were scaled with mean of 10 and standard deviation of 3. Univariate and multivariate linear regression analyses were used to assess predictors of neuropsychological outcomes.
Results: Median age at diagnosis was 7.0 years; median time from treatment to last assessment was 4.0 years. Patients receiving PRT had higher socioeconomic status (SES), differing distributions of race and tumor locations, and shorter median time from treatment conclusion to last neuropsychological assessment compared to XRT (2.6 vs. 6.6 years, $p<0.001$). On univariate analyses, patients receiving PRT had higher mean verbal IQ (99.6 vs. 92.9, $p=0.03$), full-scale IQ (99.6 vs. 88.6, $p=0.02$), PS (86.9 vs. 80.0, $p=0.03$), VMI (87.1 vs. 80.8, $p=0.04$), general adaptive composite (91.4 vs. 80.7, $p=0.04$), conceptual function (94.6 vs. 84.1, $p=0.002$), social function (94.8 vs. 86.2, $p=0.002$), and practical function (91.1 vs. 78.9, $p=0.002$). There were no significant differences in digit span or long-term memory. Multivariate analyses including test for interaction with follow-up time identified higher full-scale IQ ($\beta=10.6$ points/year, $p=0.048$), PS ($\beta=12.6$, $p=0.02$), and parent-reported practical function ($\beta=13.8$, $p=0.049$) following PRT relative to XRT; lower PS ($\beta=-15.9$, $p=0.04$) and VMI ($\beta=-14.0$, $p=0.006$) following craniospinal irradiation (CSI); and higher verbal IQ ($\beta=0.84$, $p=0.02$) and full-scale IQ ($\beta=1.03$, $p=0.01$) for older patients. VMI was higher in those with higher SES ($\beta=1.2$ points/$10,000 household income, $p=0.04$), but lower following receipt of vincristine chemotherapy ($\beta=-16.6$, $p=0.01$). Parent-reported practical function was lower in those with posterior fossa tumors ($\beta=-10.8$, $p=0.048$). Subgroup analyses demonstrated that treatment with PRT, relative to XRT, was associated with higher full-scale IQ ($\beta=17.2$, $p=0.02$) following CSI or whole ventricular RT ($n=76$) and higher PS ($\beta=22.6$, $p=0.01$) following partial brain RT ($n=49$).
Conclusion: In terms of full-scale IQ, processing speed, and parent-reported practical function, favorable neuropsychological outcomes are observed following PRT relative to XRT, with differences in full-scale IQ noted in patients receiving CSI or whole-ventricular RT and differences in processing speed noted in patients receiving partial brain RT.
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Impact of Radiation Therapy on Patterns of Relapse and Survival in Children with Stage III Favorable Histology Wilms Tumor

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Purpose/Objective(s): To determine the impact of radiation therapy (RT) on patterns of relapse and survival in children with stage III favorable histology Wilms tumor (FHWT) after multimodality therapy on Children's Oncology Group (COG) protocol AREN0532.
Materials/Methods: COG study AREN0532 prospectively accrued stage III FHWT pts between 2006 and 2013. All patients were centrally reviewed. All pts were recommended nephrectomy, RT (10Gy to flank/whole abdomen) and chemotherapy (regimen DD4A vincristine, dactinomycin, and doxorubicin). All RT records were reviewed and verified centrally. The relation between relapse sites and RT fields was determined. Relapses were classified as either 'in-RT field' or 'out-of-RT field' or 'both'. Distant metastases were classified as 'out-of-RT field' failures. Statistical methods included log-rank test and Kaplan-Meier estimates of Failure Free Survival (FFS).
Results: A total of 535 pts with a median age of 3.7 years were eligible. 52% were female and 70% were White. 419 pts (78%) had upfront

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FACTOR	GROUP	IN-RT FIELD RELAPSE RATE, FFS	P VALUE	OUT-OF-RT FIELD RELAPSE RATE, FFS	P VALUE
RT	Yes	2%, 98%	NA	10%, 90%	**<0.001**
	No	NA		40%, 58%	
LN	Yes	3%, 97%	0.058	15%, 85%	**0.001**
Invasion	No	0.4%, 99.6%		5%, 95%	
LOH	Neither	1%, 99%	**0.007**	7%, 93%	**0.001**
	16q only	2%, 98%		17%, 84%	
	1p only	9%, 91%		20%, 80%	

None of the other patient or treatment factors had any influence on relapse rates.