working to establish clear criteria, based on available data, and expert consensus through Delphi survey methods, and plan to have this completed in the fall of 2022.

Radiotherapy

P091: EARLY ANALYSIS OF THE PRO-HODGKIN STUDY: CLINICAL INVESTIGATION OF PENCIL BEAM SCANNING PROTON TREATMENT IN HODGKIN LYMPHOMA PATIENTS

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Background: Most stage I-IIA classical Hodgkin lymphoma (cHL) patients are cured with limited chemotherapy followed by radiotherapy (RT), with a risk of late toxicity from RT. The dose to normal tissue can be minimized with proton therapy (PT) due to the finite range in tissue and the rapid dose-drop beyond that. This study reports preliminary results of the PRO-Hodgkin study.
Method: The first 19 patients included (median age 31 (19–53)) are analysed. They received 2–4 cycles of ABVD followed by involved-node/site PT to 29.75 Gy (RBE; relative biological effectiveness)/17 fractions for patients with risk factors, and 20 Gy (RBE)/10 fractions for those without risk factors. Planning CT in deep inspiration breath hold was recommended; if not feasible, a 4DCT was performed to ensure motion amplitudes within 5 mm. Patients were typically treated by pencil beam scanning with two anterior oblique fields, sometimes with a complementary posterior field. All treatment plans were robustly optimized.
Results: All patients were in complete remission at end of therapy. Acute toxicity was generally limited and similar to photon treatment, except slightly more skin reaction, which occurred in all patients (1 grade 3, 1 grade 2 and 17 grade 1).
Surprisingly 4 patients (age 26–45), previously healthy and non-smokers, presented with skin hyperesthesia radiating from the neck or the scapula/chest wall area towards the axilla and upper arm, starting weeks or a few months after RT. The symptoms mostly resolved within a month, but one patient had symptoms gradually improving for 4 months. None of the patients had skin rash during symptoms and none had motor affection.
Analysis of the dose plans showed that the brachial nerve plexus was frequently located in or close to the target, and often had a modest overdosage (max 5% over the prescribed dose). Thoracic nerve roots and the spinal cord were usually located in the dose drop-off. Even assuming slightly higher RBE towards the end of the proton range, the dose to spinal cord/peripheral nerves was well within tolerance.
Conclusion: PT was generally well tolerated, except for an unexpected, transient neurological toxicity in 4 out of 19 patients. This could not be explained by an overdosage, and the potential mechanism has not yet been identified. Radiation- induced inflammation and cytokine release could be a possible cause. Further analyses are warranted and neurological toxicity will be reported for future patients.

P092: ESTIMATING THE DOSIMETRIC BENEFIT OF INVOLVED-NODE RADIOTHERAPY IN COMPARISON TO INVOLVED-FIELD RADIOTHERAPY - IMPLICATIONS FROM THE GHSG HD 17 TRIAL

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Question: The HD17 trial of the German Hodgkin Study Group evaluated the value of consolidative involved-node (IN)RT for patients with PET-positivity after chemotherapy and enabled a comparison between INRT and involved-field (IF)RT [1]. The present work analyzes the organs at risk (OAR) exposure of the performed RT.
Methods/Material: For dosimetric evaluation, all INRT-plans in the HD 17 trial were requested and compared to a random selection of IFRT-cases in the standard arm. Dose-volume histograms (DVH), either paper-based or digital, were analyzed using SPSS (version 28, IBM, Armonk, NY, USA). For comparisons between the two RT concepts, a two-sided t-test or a Mann-Whitney U test was used with a p-value < 0.05 considered as significant.
Results: In total, 148 DVH (INRT: 112, IFRT: 36) could be evaluated. Details on planning target volume (PTV) size and OAR exposure are shown in table 1. The introduction of INRT decreased the PTV size without reaching statistical significance. There was a consistent decrease in OAR-doses with INRT except for V5 in both lungs and V10 and Dmean in the right lung. Despite the dosimetric advantages, significant differences in favor of INRT could only be found for the spinal cord and thyroid.
Conclusion: INRT, in comparison to IFRT, decreases PTV-size and OAR exposure and may help to comply with modern dose constraints [2].

	Total cohort	IFRT	INRT	p
PTV (ml)	1265.2 (86.7-5125.3)	1438.1 (97.6-4238.0)	1181.6 (86.7-5125.3)	0.082
Lung right D_{mean} (Gy)	9.8 (0.3-20.0)	9.5 (4.0-17.8)	10.1 (0.3-20.0)	0.861
V_5 (%)	54.6 (0.0-100.0)	48.0 (0.0-98.0)	57.5 (0.0-1.0)	0.141
V_{10} (%)	37.0 (0.0-86.0)	32.0 (0.0-86.0)	38.0 (0.0-83.0)	0.538
V_{20} (%)	20.0 (0.0-48.0)	21.0 (0.0-46.0)	19.1 (0.0-48.0)	0.509
V_{25} (%)	13.0 (0.0-42.0)	16.0 (0.0-40.0)	11.9 (0.0-42.0)	0.197
V_{30} (%)	2.0 (0.0-32.0)	2.0 (0.0-30.0)	1.5 (0.0-32.0)	0.477
Lung left D_{mean}(Gy)	10.5 (0.2-26.5)	11.6 (1.0-23.5)	10.1 (0.21-26.5)	0.291
V_5 (%)	55.1 (0.0-99.0)	50.0 (0.0-99.0)	58.0 (0.0-99)	0.527
V_{10} (%)	37.8 (0.0-92.0)	39.5 (0.0-90.0)	37.5 (0.0-92.0)	0.981
V_{20} (%)	20.0 (0.0-85.0)	22.3 (0.0-70.0)	19.2 (0.0-0.85)	0.403
V_{25} (%)	13.3 (0.0-80.0)	16.0 (0.0-62.0)	12.0 (0.0-80.0)	0.136
V_{30} (%)	2.0 (0.0-60.0)	3.0 (0.0-30.0)	2.0 (0.0-60.0)	0.426
Spinal cord D_{max} (Gy)	29.6 (6.9-34.2)	31.2 (15.6-34.2)	28.8 (6.9-32.6)	**<0.001**
Esophagus D_{mean} (Gy)	21.4 (8.9-30)	23.4 (10.1-27.9)	20.5 (8.9-30.0)	0.164
Heart D_{mean} (Gy)	13.1 (0.5-30.4)	14.4 (0.62-30.4)	12.4 (0.5-26.9)	0.691
Thyroid D_{mean} (Gy)	26.5 (13.9-33.3)	31.1 (29.4-33.3)	24.2 (13.9-31.3)	**0.023**
Thyroid V_{25} (%)	49.5 (0-100)	100 (98-100)	43.6 (0-100)	**0.036**
Breast left D_{mean} (Gy)	3.6 (0.5-9.3)	3.9 (2.1-10.9)	3.5 (0.5-9.3)	0.476
Breast right D_{mean} (Gy)	3.7 (0.4-15.6)	4.3 (1.0-6.8)	3.7 (0.4-15.6)	0.935

Table 1: Size of the planning targe volume (PTV) and dose exposure to organs at risks in comparison between involved-field (IFRT) radiotherapy and involved-node radiotherapy (INRT). Gy: Gray

Literature
1. Lancet Oncol. 2021 Feb;22(2):223-234.
2. Blood. 2019 Mar 21;133(12):1384-1385.

P093: FROM INVOLVED- FIELD TO INVOLVED-NODE – QUALITY ANALYSIS OF THE RADIATION THERAPY IN HD 17 BY THE EXPERT PANEL OF THE GERMAN HODGKIN STUDY GROUP

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