(p = 0.16). Mean dice coefficient for PTV_3D and PTV_4D was 78%.
Conclusions: ITV_4D was larger than GTV_3D which was missed on free breathing CT scan and hence compromised PTV_4D coverage with 95% isodose. DVH for OAR was not statistically different. Tumour delineation on 4D captures tumour motion and improves PTV coverage with the prescribed dose.

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DOSIMETRIC COMPARISON OF THREE TECHNIQUES FOR SPINE STEREOTACTIC BODY RADIOTHERAPY
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Purpose: The use of Stereotactic Body Radiotherapy (SBRT) in patients presenting with oligo-metastatic spine disease has increased. However, technical challenges remain due to the concave target juxtaposed with the spinal cord. It remains unclear if a particular technique allows for superior target volume coverage whilst sparing critical structures. We aimed to evaluate the dosimetric advantages between three modalities for spine SBRT: CyberKnife (CK), Volumetric Modulated Arc Therapy (VMAT) and Helical Tomotherapy with Dynamic Jaws (HT).
Methods and Materials: Datasets from 10 consecutive patients treated with CK were utilized. Contours were based on the International Spine Radiosurgery Consortium Consensus Guidelines. All patients were planned to receive 24 Grays (Gy) in 2 fractions, with the primary goals of: 1) maintaining the max tolerance of the cord (≤ 17 Gy) or cauda equine (≤ 20Gy); and 2) the clinical target volume (CTV) to receive at least 95% of the prescribed dose. During planning priority was given to OAR tolerance. Treatment plans were generated by separate dosimetrists on the technique-specific software then compared using Velocity AI. Parameters of comparison include target volume coverage, maximum cord (or cauda) dose, Conformity Index (CI), Gradient Index (GI), Homogeneity Index (HI), treatment time per fraction (TT) and monitor units (MU) per fraction. Statistical analysis was performed with STATA v14.
Results: CTV mean D98% coverage was significantly worse with VMAT (85.7%) versus CK (93.9%) and HT (91.2%, p = 0.01). The CTV mean D2% and mean HI were significantly greater in CK (129.7%; 41.86) versus VMAT (109.5%; 26.96) and HT (107.6%; 21.17, p < 0.01 for both). There was no difference in mean CI between CK (0.58) and HT (0.60) both were more conformal than VMAT (0.42, p < 0.01). Mean GI was sharpest in CK (3.96) versus HT (4.86) and VMAT (10.28, p < 0.03). VMAT had the least treatment time and MU usage per fraction (8.5 minutes, 9764 MU) versus HT (27 minutes, 11419 MU) and CK (62.4 minutes, 14059 MU, p < 0.01). There was no significant difference between the three techniques in the maximum dose to the cord or cauda equina.
Conclusions: CK and TOMO plans were both able to achieve conformal target coverage while respecting cord tolerance. Dose heterogeneity was significantly larger in CK. VMAT required the least treatment time and MU, but had the least steep GI, CI and target coverage especially for concave shaped targets.

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NEW ASPECTS REGARDING THE RADIATION OF THALAMIC GLIOMAS
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Purpose: Thalamic tumours represent 5.2% of all intracranial tumours and are typically diagnosed in the paediatric population. These tumours arise from glial cells with an aggressive behavior and a high grade histology. They have a poor prognosis. The aim of this study was to find new approaches for defining the clinical target volume for these tumours.
Methods and Materials: Clinical data was collected form archived files of 30 patients diagnosed with thalamic gliomas based on pathologic and radiologic criteria.
Results: Three patterns of tumour spread were found. The first pattern followed the thalamic tributaries of the posterior part of the internal cerebral veins. These were the anterior and superior thalamic veins. For the second pattern the close proximity of the internal cerebral vein branches of the superior thalamic veins was a potential route of spread between the medial surfaces of the thalami. In addition to spread across the midline tumours could also spread along the adjacent tectal, pineal and/or vermian veins. The third pattern of thalamic tumour spread was found in gliomas which use the anterior tributaries of the internal cerebral venous architecture of the posterior and inferior branches from the basal vein of Rosenthal.
Conclusions: Thalamic gliomas spread upon the peritumoural architecture of the perivenous/subglial Scherer structures and this knowledge should be used for redefining the clinical target volume for radiation therapy in thalamic gliomas.

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THE RELATIONSHIP BETWEEN HOT FLASHES AND TESTOSTERONE RECOVERY FOLLOWING 12 MONTHS OF ANDROGEN SUPPRESSION FOR MEN WITH LOCALIZED PROSTATE CANCER IN THE ASCENDE-RT TRIAL
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Purpose: This study was designed to characterize the proportion of men who experience hot flashes (flashes), their peak intensity and cessation in relation to testosterone (TT) levels, with androgen deprivation therapy (ADT). These relationships have not been described in the literature previously. We also characterize testosterone recovery following 12 months of ADT in men undergoing external beam radiation therapy (EBRT) (+/- brachytherapy boost).
Methods and Materials: This is a pre-specified secondary analysis of the ASCENDE-RT clinical trial, which is a multicenter, randomized trial of dose-escalated EBRT versus low-dose-rate brachytherapy for men with unfavourable-risk localized prostate cancer. Three hundred and ninety-eight men were randomized. All received 12 months of ADT with luteinizing hormone releasing hormone (LHRH) agonist plus a non-steroidal anti-androgen for at least one month. TT was measured every two months until eight months, at one year, every three months until 24 months, every six months until five years, and yearly thereafter. Patients were censored at last follow up or at date of PSA failure. TT recovery was defined as any single serum TT above threshold, as defined below. Presence and intensity of flashes were assessed every four months until one year, every six months until five years, and yearly thereafter.
Results: TT and hot flash data were available in 392 patients. Analysis was restricted to 334 patients in which baseline (pre-ADT) TT was collected. Median age at first LHRH injection was 68 years (range 45-86). Median follow up from date of ADT to last assessment of flashes was 6.1 years. Median TT at baseline was 13.1 nmol/L. All patients with baseline TT ≥ 5 (91% of study cohort) recovered TT to this threshold with a median time to recovery of 9.6 months. Eighty-seven percent of patients with baseline TT ≥ 7.5 (84% of study cohort) recovered TT to this threshold after a median of 12.7 months. Eighty-one percent of patients with baseline TT ≥ 10 (68% of study cohort) recovered TT to this threshold after a median time of 18.2 months. Ninety-four percent of men experienced flashes at some point. Flashes were first reported at a median of 4.0 months from first LHRH injection, when the TT had fallen to castrate. Peak intensity of flashes also occurred at this time and TT level. Median time of cessation of flashes was 7.6 months following cessation of ADT, when median TT had risen to 5.7 nmol/L. Ninety-one percent of

patients recover TT to at least this level within a median 10.9 months. At last follow up, 99.7% of men had cessation of flashes. **Conclusions:** Hot flashes occur with castrate levels of testosterone, and cease when TT has recovered to about half the pre-intervention level (5.7nmol/L). Over 90% recover to at least this level.