

## POSTER 59

Novel Accelerated Hypofractionated Radiotherapy in Soft Tissue Sarcoma, utilizing Simultaneous Integrated Boost

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**Background:** There is a movement towards more hypofractionated radiotherapy (RT) for its benefit in number of treatments, cost, patient convenience, decreased population interaction during a pandemic, and to exploit the lower  $\alpha/\beta$  of soft tissue sarcomas (STS). Therefore, we created an accelerated simultaneous integrated boost (SIB) regimen that replaced the standard adjuvant RT approach in STS.

**Question/Purposes:** This study evaluates the acute toxicity of this SIB approach, along with the difference in expected long-term sequela by dosimetrically comparing each patient's plan against a standard sequential RT plan.

**Patients and Methods:** A prospectively maintained database was retrospectively reviewed for 31 patients with STS who underwent resection followed by adjuvant radiotherapy. Standard radiation dosing for R0/R1/R2 resections (sequential: 50 + 14/16/20Gy in 32-35 fractions) were replaced with an SIB plan treating to 50.4 and 63/64.4/70Gy in 28 fractions, respectively. Acute toxicity during and after radiation treatment were reported as per CTCAE (v5). A subset of 10 patients were subsequently planned with a standard sequential approach, utilizing the same treatment volume and planning system. These approaches were then compared for differences in dosimetry via Wilcoxon signed rank test. Field size was defined as the volume which received at least 50 Gy. Time-to-event outcomes were estimated with Kaplan-Meier analysis from the start of radiation and included local control (LC) and overall survival (OS).

**Results:** With a median follow up of 8.2 months (1.6-15.6), age of 68 years (20-83) and preoperative tumor diameter of 6cm (2-31), the majority of patients in this cohort were male (61%), high grade (67.7%), lower (39%) or upper extremity (26%) STS, and underwent gross total resection with either negative (45.2%) or microscopically positive (19.4%) margins. Five patients (16%) experienced grade 3 toxicity, all of which were acute radiation dermatitis that resolved by the 3-month follow up visit. Grade 3 toxicity was most common in patients treated to 70Gy ( $p=0.023$ ), with no events observed in the 63Gy cohort. The 1-year LC and OS were 100 and 71%, respectively. In comparison to the sequential boost plan, the SIB approach had a significantly lower field size (mean difference 218cm<sup>3</sup>,  $p=0.002$ ), bone V50 (mean difference 10%,  $p=0.031$ ), and max dose to the skin (mean difference 4.1 Gy,  $p=0.008$ ).

**Conclusions:** In addition to benefits in cost, convenience, population interaction, and improved biological effect in STS, the use of adjuvant radiotherapy with accelerated SIB hypofractionation offers a safe approach that can lower field size and dose to surrounding structures, which may translate to improved long-term toxicity (e.g. fracture, joint stiffness, fibrosis, lymphedema, etc.) when compared to standard sequential radiation. Longer follow up is required to determine if these dosimetric benefits translate to improved long-term toxicity benefit.