PO-0873
Modelling severe late rectal bleeding (LRB) after radical radiotherapy (RT) for prostate cancer, in a pooled population from two large prospective trials.

Purpose or Objective: To develop a model for grade 3 (G3) late rectal bleeding (LRB) after radical radiotherapy (RT) for prostate cancer, in a pooled population from two large prospective trials.

Material and Methods: The trials included patients (pts) treated with a conventional fractionated 3DCRT at 66-80Gy. Planning data were available for all pts. G3 LRB was prospectively scored using the LENT/SOMA questionnaire, with a minimum follow-up of 36 months. Rectal dose-volume histograms were reduced to an Equivalent Uniform Dose (EUD) with n=0.06. A 4-variable MVL model was fitted including EUD (OR=1.07 n=0.06 was the best dosimetric predictor for G3 LRB. A 4-variable MVL model was fitted including EUD (OR=1.07 n=0.06 was the best dosimetric predictor for G3 LRB.

Results: A total of 1337 pts were available: 708 from first trial and 669 from the second one. G3 LRB was scored in 95 pts (7.1%): 62 and 33 in the first and second trial, respectively. EUD calculated with the volume parameter HL=0.43.

Figure 1 shows dose response relationship (model vs observed toxicity rates) as a function of SV irradiation, cardiovascular disease and abdominal surgery.

Conclusion: EUD with n=0.06 was predictive of G3 LRB in this pooled population, confirming the importance of sparing the rectum from high doses. Irradiation of seminal vesicles together with the presence of cardiovascular disease and previous abdominal surgery were relevant dose-modifying factors highly impacting the incidence of G3 LRB.

PO-0874
Dose prescription in carbon ion radiotherapy: how to compare different RBE-weighted dose systems.

Purpose or Objective: In carbon ion radiotherapy (CIRT), mainly two calculation models are adopted to define relative biological effectiveness (RBE)-weighted doses (D_{\text{RBE}}): the Japanese Kanai model and the Local Effect Model (LEM). The Japanese Kanai model and the Local Effect Model (LEM). Taken the Japanese longest-term clinical data as a reference, the use of a different RBE model, with no correction for the Gy (RBE) scale, leads to deviations in target absorbed dose (Dabs) with a potentially significant impact on tumor control probability. In this study we validate a conversion method linking the two D\text{RBE} systems, confirming D\text{RBE} prescription dose values adopted in our LEM-based protocols.

Material and Methods: The NIRS beamline was simulated with a Monte Carlo (MC) code, according to design information about elements position, size and composition. Validation went through comparison between simulated and measured pristine and Spread Out Bragg Peaks, ridge filter based, in water. CT scan, structure set, plan and dose files of 10 treatment fields delivered at NIRS were exported in DICOM format, for prostate (3.6 Gy (RBE) per 16 fractions), Head & Neck (4 Gy (RBE) per 16 fractions) and pancreas (4.6 Gy (RBE) per 12 fractions) patients. Patient specific passive system geometries (range shifter, MLC, compensator, collimator) were implemented, for each field, to simulate delivered Dabs distributions. The MC code was then interfaced with LEM to calculate D\text{RBE} resulting from the application of a different RBE model to NIRS physical dose. MC and TPS calculated Dabs and D\text{RBE} were compared in terms of dose profiles and target median dose. Patient CT and structure sets were also imported in a LEM-based commercial TPS where plans were optimized prescribing the non-converted and converted D\text{RBE} values, respectively.

Results: The agreement between MC and measured depth dose profiles in water demonstrated beamline model accuracy. Patient dose distributions were correctly reproduced by MC in the target region, with an overall target median dose difference < 2%. MC median D\text{RBE} resulted 16% higher than NIRS reference, for the lower prostate dose level,