AbstractID: 8573 Title: Normal Tissue Complication Probability: Updating the model parameters for modern radiotherapy.

Purpose: To find appropriate parameter values for the Lyman-Kutcher-Burman (LKB), Normal Tissue Complication Probability (NTCP) model for modern, clinically relevant late rectal side effects experienced after prostate radiotherapy. **Method and Materials:** Rectal dose-volume histograms and detailed long-term follow-up data from 178 patients from the MRC RT01 multicentre randomized controlled trial of conformal prostate radiotherapy were analysed. Endpoints chosen to represent late toxicities reported in modern practice were rectal bleeding and proctitis recorded by the clinician and loose stools and urgency recorded by the patient. The various grading schemes used in the trial were standardized in terms of moderate/severe toxicity. Patients with pre-treatment symptoms were excluded from the analysis. Optimal LKB parameter values for TD50(1), m and n were found using the maximum likelihood estimation of log-likelihood. 95% confidence intervals were calculated using the profile-likelihood method. **Results:** The maximum-likelihood estimation yielded values of TD50(1)=67.50 (CI 65.49-69.96), m=0.15 (CI 0.11-0.21), n=0.10 (CI 0.07-0.14) for proctitis; TD50(1)=67.75 (CI 63.64-72.89), m=0.25 (CI 0.20-0.34), n=0.28 (CI 0.18-0.45) for rectal bleeding; TD50(1)=73.50 (CI 64.29-86.73), m=0.38 (CI 0.30-0.49), n=1.00 (CI 0.37 – outside range calculated) for loose stools and TD50(1)=67.00 (CI 61.89-73.60), m=0.30 (CI 0.22-0.44), n=0.30 (CI 0.17-0.56) for rectal urgency. **Conclusion:** The NTCP parameters obtained for four clinically relevant rectal side effects were significantly different from each other. The results for proctitis provide the best comparison with the original Emami data, the values for m and n were in good agreement whilst TD50(1) was significantly lower, perhaps reflecting the reduction in severity of complication. Values of n implying both serial and parallel volume effect were observed. These variations highlight the complexity of the dose-volume response of the rectum and indicate that the NTCP model should be used with caution as a clinical tool.