AbstractID: 2674 Title: Halftime for repair of sublethal damage in normal bladder and rectum: an analysis of clinical data from cervix brachytherapy

Purpose: The purpose of this work is to resolve an apparent contradiction between previously reported values of repair time (t_{rep}) for the normal bladder and rectum, as normal structures of cervical cancer. We reconcile previous analyses of clinical data and introduce new evidence to support a short repair time for these normal structures. The implications of a short repair halftime for critical structures on LDR versus HDR brachytherapy treatment planning are discussed.

Method and Materials: Urinary and rectal complications from gynecological radiation therapy are analyzed as a whole to derive a unique repair time for the normal bladder and rectum. The concept of biologically effective dose (BED) based on the linear-quadratic (LQ) model is used to compare treatment modalities**.** We analyze three published clinical studies that compare intracavitary brachytherapy applications of two different dose-rates. We define a sparing factor *f* for bladder and rectum and estimate a reasonable range for it. We calculate t_{rep} as a function of the α/β ratio by equating the BED of intracavitary treatments with two different dose-rates that yield equivalent levels of complications,.

Results: We find that if a sparing factor for the critical structures is considered, a short repair time for the normal structures (bladder and rectum) is consistent with the three clinical data sets studied. The present analysis does not support the long repair halftime component in the order of 4 or 5 hours found for other normal tissues. We find a repair time for normal bladder and rectum is in the range of 0.2-0.4h (12-24 minutes), if an α/β ratio of 3Gy is assumed.

Conclusion: If a sparing factor for the critical structures is considered, the three clinical data sets studied are consistent with a short repair time for the normal structures (bladder and rectum).