

AbstractID: 13754 Title: Validation of a Varian BrachyVision calculation model for a GammaMed Plus HDR source and evaluating heterogeneity effects for four clinical cases using EGSnrc Monte Carlo user code.

**Purpose:** Varian BrachyVision (BV) treatment planning system uses TG43 parameters derived from Monte Carlo modeling. Dose perturbation effects due to the presence of heterogeneities have been examined previously to verify Plato TPS using various MC codes. The purpose of this work was 1) to obtain an independent verification of the calculation model used by the BV treatment planning system for a GammaMed Plus source using EGSnrc Monte Carlo code, 2) to evaluate the heterogeneity effects for a sample of clinical cases planned for GammaMed Plus HDR cylinder and MammoSite. **Method and Materials:** Dose profiles and point dose calculations for three MammoSite cases with varying distance to the skin and lung, and a vaginal cylinder case were compared to MC simulations using EGSnrc dosxyznrc user code which allows for a 3D arbitrary geometry as well as to perform calculations using full planning CT data. In a previous work which used an EGSnrc dosrznrc code researchers performed 2D calculations due to cylindrical geometry constraints for that code. **Results:** Our Monte Carlo and BV calculations were in a good agreement for a test case of uniform medium. Dose reduction was observed inside the balloon due to the presence of higher-Z contrast media and on the side of the tissue at the tissue - air bubble interface and tissue-lung interface. Dose in the lung was also elevated. These heterogeneity air perturbation effects however seem slightly more pronounced: 17.1% for BV vs previously reported 3.6% for the Plato system. **Conclusion:** These preliminary results demonstrate excellent agreement with the BrachyVision model in a uniform medium, but show rather pronounced dose perturbation effects in heterogeneous media. More investigation is needed to understand the higher scale of the heterogeneity perturbation effects.