

Virtual Simulation and CT-Based Planning of Interstitial GYN Brachytherapy

The pre-planning of interstitial GYN implants using a template and post-implant planning based on planar films is traditionally a tedious and laborious process. A virtual simulation technique has been developed for the pre-planning of these implants that allows the simultaneous visualization of patient anatomy and the potential needle tracks in the patient. A patient is scanned on MRI or CT with a vaginal obturator and template applicator inserted. The applicator set is also scanned separately on CT with needles inserted into the template. This image data set is then registered to the patient image data set through image fusion, using the vaginal obturator for alignment. The fused image data set, with all potential needle tracks in the patient displayed as overlay on the patient anatomy, is used directly for preplanning of the implant. A set of post-implant CT images is obtained of the patient for treatment planning. The needles are localized on CT images and dose distributions are calculated. Image fusion may again be used to overlay the preplanning CT/MRI images on the post-implant CT images to evaluate the accuracy of needle insertion. This process has been found to be significantly more efficient than the traditional process of preplanning and post-implant dosimetry for interstitial GYN implants based on planar films, and allows quantitative evaluation of doses to organs at risk and target coverage.