

Image-based High Dose Rate (HDR) Brachytherapy Planning for Head and Neck Implants.

In image-based brachytherapy, reconstruction of the implanted catheters is carried out using CT data and the clinical treatment volume is marked in each transverse slice independent of the implant. Dose volume histograms (DVH) and the uniformity indices derived from the 'Natural' DVH's were used to analyze 20 head and neck implants planned for HDR brachytherapy. Geometrical optimization in all the cases led to a dose distribution which always required major adjustments to get the desired coverage and dose uniformity within the implant. "Natural" DVH's are found to be very useful for dose analysis and consistent dose prescription. Hyperdose sleeve was within 5 % of the implanted volume for 14 cases and within 9 % for the remaining 6 cases. For accurate dosimetry, it is important to precisely reconstruct the implant. For QA of the reconstructed implant, reconstructed lengths of the flexible catheters as obtained from the CT data were compared with the actual measurements made from the skin to the distal end of the implant with a measurement wire for oral cavity implants. CT reconstructed catheters were found to be smaller by as much as 7 mm if the window / levels were not properly selected. Artifacts resulting from the high density materials like the tooth fillings, gold buttons etc., contribute to the uncertainty in the identification of the implanted catheter tips, which need to be corrected. Treatment planning, uniformity indices and QA aspects of these head and neck implants will be presented.