

AbstractID: 3302 Title: A simple theoretical verification of HDR calculation dose using point and line source approximation

Purpose: In order to reduce potential error that can occur in the planning and delivery of brachytherapy treatment, software which is able to be used for three commercial HDR sources was developed. The feasibility of the program was investigated.

Material and Method: This windows based program was developed by Visual-Basic language. The TG-43 algorithm was used for the dose computation at interested points. For source geometry, both point source and line source approximations were employed to be capable for most commercial HDR sources. Anisotropy tables for Nucletron microselectron, Gammamed 12i, and Veri Source were included. User is required to select the HDR source type in the beginning of the program, and to enter the number of catheters and dwelling position of a source. The position and the dose at the interested points, such as A and B points, are required to enter. The developed program used the treatment source position and interest point position in the reference frame of the catheters. The computed dose is compared to that in the RTP by calculating the percent dose difference. The accuracy of the code was validated by comparing with commercial RTP computation and hand calculation results for various prototype of treatment ranging from a single catheter to complex multi-catheter plans as well as clinical plans.

Result: The acceptance levels of performed tests were 5.0% for the percent dose difference at each interested point. For few real patient treatment plans using Nucletron sources, results of the developed program agreed with RTP (Plato, Nucletron) results within 3% error. For Veri Source, large difference between the developed program and RTP was observed if anisotropy was not used in the RTP.

Discussion: The developed program was adequate for independent dose verification as a part of brachytherapy quality assurance procedure.