NEER FY 2001
PROJECT ABSTRACT

Grant Number: 01ID14104

Project Title: Investigation Into the Optimization of Multi-Source Strength Brachytherapy Treatment Procedures

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Abstract: Permanent-implant brachytherapy is a radiotherapy technique that is fast becoming the preferred method for treating prostate cancer. In this treatment approach, radioactive sources are surgically embedded within the diseased tissue in a pattern that is designed to deliver the prescribed dose to the treatment region. In conventional Brachytherapy isodose planning is used to determine the optimum internal placement of an array of radioactive sources to satisfy the needs of the patients' treatment. The current practice is to use only one radionuclide specie for the treatment of the diseased tissue. The optimization of patient treatment plans with multiple radioisotopes or multi-source intensities is currently viewed as tenuous given the current use of predetermined radionuclide dose deposition kernels. However, with advancement of optimization software and the use of radiation transport tools utilizing the adjoint transport methodology, the use of multiple isotopes with varying characteristics (spectra, intensity and halflife) or multiple intensity sources for the brachytherapy treatment of diseased tissue becomes feasible. Our goal is to investigate and develop the methodology for the use of multi-source intensity and multi-radioisotopic species in Brachytherapy and to incorporate that methodology into current patient treatment procedures. The radiation transport and optimization methodology will be based on the use of the adjoint transport method which provides a sensitivity distribution for the placement of a radionuclide treatment seeds.