NEER FY 2001
PROJECT ABSTRACT

Grant Number: 01ID14107

Project Title: Engineering Radioactive Stents for the Prevention of Restenosis

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Abstract: Radioactive stents have been shown to inhibit recurrent blockage of arteries (restenosis) following angioplasty. This project provides the physical foundations for delivering these treatments accurately and optimally. Part 1 of this project develops the techniques necessary to incorporate radionuclides with various properties into arterial stents. Currently available stems use P-32 with a half-life much longer than the acute cellular proliferation phase, and too short to provide long-term inhibition. We have been experimenting with other radionuclides, such as reactor-produced Au-198, that may better fit the biological characteristics. Part 2 of this project addresses the requirements for accurate dose distribution delivery with radioactive stents. The first requirement is consistent calibration procedures that apply to all radionuclides. The basis for this calibration would be a concentric cylindrical extrapolation chamber. The second requirement is a methodology for calculating the dose distribution delivered from a deployed stent to surrounding tissues. This calculation will use intravascular ultrasound to determine the actual geometry, and sum the contributions of the parts of the stent in each image. Monte Carlo simulations will determine the contribution from small parts of the stent. This project also addresses tailoring the source distribution along the stent to produce the optimal dose distribution.