ABSTRACT Submission #1893-60896

Improved Dose Uniformity for Radioactive Stents in Endovascular Brachytherapy

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Endovascular brachytherapy has rapidly gained acceptance as a new treatment modality for reducing restenosis and improving the success rate of Percutaneous Transluminal Coronary Angioplasty (PTCA). Recent clinical results on patients treated with beta emitting P-32 stents suggest that radiation reduces `in stent' restenosis but may exacerbate neointimal growth at the edges of the stents. This has been referred to as `candy wrapper effect'. It is well known that radioactive stents yield extremely inhomogeneous dose distributions, with low doses being delivered to tissues in between stent struts, at the ends of the stent, and also at depth. Some animal model studies suggest that low doses of radiation may stimulate rather than inhibit neointimal growth in an injured vessel, and it is hypothesized that dose inhomogeneity at the ends of a stent may be a cause of `candy wrapper effect'. We present comparisons of dose distributions for;

a. beta stents vs. gamma stents;
b. `dumbbell' radioactive loaded stents vs. uniformly loaded stents;
c. stents with alternate strut design.

It is demonstrated that dose inhomogenieties around a stent-particularly in regions between stent struts and at the ends of stents can be reduced by better stent design and isotope selection. Radiobiological modeling suggests that improved dose distributions could reduce `candy wrapper effect'.