

There are currently a number of protocols considering the use of endovascular brachytherapy for the prevention of coronary artery restenosis following angioplasty. However, there are numerous disadvantages associated with this technique. The purpose of this work is to consider the dosimetric consequences of using conformal external beam radiation therapy (EBRT) for the prevention of restenosis. In this analysis, contours were drawn of vessels based on a spiral CT of a 70 y/o male for three potential targets : right coronary (RC), circumflex (CIRC) and the left anterior descending (LAD) arteries. The heart volume, lungs, atria, and ventricles were also contoured. External beam plans, consisting of multiple non-coplanar arcs, were calculated assuming an idealized, static situation. Dose volume histograms were calculated for all critical structures with each vessel treatment (only one vessel treated at a time). The results of this study indicate that typically 20-25% of the entire heart volume receives 10% of the dose or more. The regions which receive the most dose are those adjacent to the target – right atrium and ventricle for the RC, and the left atrium and ventricle for the CIRC and LAD. The percent volume irradiated at the 50% isodose (or greater) is no more than 8% with most structures receiving less than 1%. In each case, the dose to critical structures is well below the known radiation tolerance. These results suggest that EBRT is dosimetrically feasible for delivering a highly conformal dose to prevent restenosis. Techniques of delivery and limitations will be discussed.