

Feasibility of using EBI to inhibit restenosis following placement of a stent in a coronary artery was investigated. EBI can deliver a uniform dose to the vascular bed containing the stent. However the dose to the normal heart muscle must be minimized. Long-term radiation induced heart complication can be minimized by employing: (1) several small dose fractions, (2) small fields, and (3) multiple treatment beams. Designing conformal radiation fields requires knowing the location and movement of the stent during the cardiac cycle, and gating the radiation off when the stent moves outside the field. An amorphous Si- planar detector was used to obtain images of a Palmaz-Schatz coronary stent in a single video fluoroscopic frame. Correlating the movement of the stent during the cardiac cycle with the QRS wave in the EKG facilitates development of techniques to gate the accelerator beam. Images obtained from different directions permits selection of beam angles which optimally include the stented region. Patient immobilization and control of breathing motion during treatment will be important to achieve tight conformal fields that minimize the dose to the heart. The dose distribution was calculated for a simulated treatment of a stented region in a left descending coronary artery using three conformal coplanar photon beams that encompassed the stent with a 5 mm margin. These simulations indicated that a uniform target dose can be delivered to the tissues surrounding the stent, while less than 1.5 % of the normal heart volume receives more than 50% of the target dose.