AbstractID: 1465 Title: Beta Based Detector for Intravascular Brachytherapy

Intravascular Brachytherapy using catheter based high dose rate β sources has taken nowadays an important role in interventional cardiology to combat in-stent restenosis following percutaneous transluminal coronary angioplasty. At the present time, there is no detector system which can record accurate quantitative doses and spatial information in real time for intravascular brachytherapy. This is partially because of the short-range of the low energy beta emission of ^{32}P (average of ~690 keV) and $^{90}Sr/^{90}Y$ (average of~930 keV) and the resolution limitation of existing extrapolation chambers and radiochromatic-dye films (currently the preferred method used). However, relatively high non-uniformity, which occurs at the stepping region due to excessive gapping or overlapping between steps, might result in in-stent restenosis or detrimental to the coronary vascular structure due to significant discrepancies between prescribed and delivered doses. We have developed a Scintillating Fiber Based Beta Detector prototype which will permit: extracting in real time of accurate dose measurements of the radioactive emitter in 2D or 3D; address the junction/stepping problem in a reliable fashion; allow extraction of information on the (in)homogeneity of the radioactive source; and provide a quick feedback to radio-therapists for a fast re-adjustment of the radiation exposure for patient treatments. It is composed of an array of scintillating fibers optically coupled to photo-multiplier tubes. Calibration results from two $^{90}Sr/^{90}Y$ and ^{32}P point sources will be presented. In addition, dose measurements were extracted at the Eastern Virginia Medical School. Preliminary results will be presented from the $^{90}Sr/^{90}Y$-Novoste and the ^{32}P-Galileo III catheter-based delivery systems.