

AbstractID: 2498 Title: The Application of Sr-90/Y-90 for the Prevention of Abdominal Adhesions

Recently, a resurgence in the use of beta particles from  $^{90}\text{Sr}/^{90}\text{Y}$  has occurred, primarily due to its use in intracoronary brachytherapy.  $^{90}\text{Sr}/^{90}\text{Y}$  has also been employed in the ophthalmologic community for postoperative irradiation of pterygia. Due to these successes and other advantageous results of irradiating benign tumors and diseases, a new use for the  $^{90}\text{Sr}/^{90}\text{Y}$  ophthalmologic applicator has been hypothesized: the use of beta radiation for the prevention of abdominal adhesions.

To characterize the source for this use, preliminary measurements were made in a polystyrene phantom using GafChromic film and TLDs. Our results compared favorably with measured values for clinically relevant depths. Upon completion of the phantom measurements, experiments commenced to test the hypothesis in an animal model. Two potential adhesion sites were created in the abdomen of rats via denudation of the serosa of the small intestine. Irradiation of one site with the  $^{90}\text{Sr}/^{90}\text{Y}$  beta applicator occurred; the other site was used as a positive control (no radiation). A 10-day recovery followed, allowing adhesion formation if it occurred; the animals were then euthanized and the injured areas analyzed for efficacy of treatment.

Nine Sprague-Dawley rats were irradiated with varying doses (to determine a dose-response relationship) to a prescribed depth of 1mm. This choice was based on the Novoste clinical trials, clinical treatment depths for the  $^{90}\text{Sr}/^{90}\text{Y}$  applicator, and experimental research on  $^{90}\text{Sr}/^{90}\text{Y}$  beta particles (Buckley *et al.*, 2001).

The animals were sacrificed and gross and microscopic pathology was performed. Results show that radiation is effective in preventing adhesion formation. Eight of nine irradiated sections showed no formation of adhesions, while the ninth developed a single adhesion, whereas twelve of thirteen unirradiated sections formed adhesions. The Mann-Whitney U test yielded a p-value of 0.022 confirming the effectiveness of adhesion prevention by the addition of small amounts of beta radiation.