

AbstractID: 11684 Title: Dosimetric characteristics of a P-32 conformal source for irradiation of paraspinal tumors

**Purpose:** A  $^{90}\text{Y}$  foil encased in a titanium plaque has been used to irradiate the dura for patients with paraspinal tumors. The plaque is applied to the dura intraoperatively after radiotherapy and surgery. Rapid falloff of the %DD allows the dura's surface to be treated, while sparing the spinal cord a few millimeters below. A new plaque, the RIC Conformal Source, utilizing  $^{32}\text{P}$  embedded in a polymeric film and bonded to a polycarbonate backing has been developed for surface irradiations. This new plaque has advantages over previous designs. The lower energy of  $^{32}\text{P}$  (1.709 MeV) allows for increased dose sparing of the cord over  $^{90}\text{Y}$  (2.28 MeV). Additionally, a longer half life of 14.28 days for  $^{32}\text{P}$  versus 2.67 days for  $^{90}\text{Y}$ , as well as a simpler manufacturing process make this new source worthy of investigation.

**Method and Materials:** To study the dosimetric characteristics of this new plaque, a flat plaque was constructed for measurements with radiochromic film. Surface profiles and %DD were measured and compared to Monte Carlo (Penelope) data. The  $^{32}\text{P}$  data was also compared to the  $^{90}\text{Y}$  data to show viability of the new source for treatment. Surface profiles were evaluated using a Therapeutic Width Index (TWI), defined as the width of the surface profile at 90% divided by the width of the source.

**Results:** The  $^{32}\text{P}$  plaque's surface profiles and %DD measurements agreed well with Penelope. Comparison of %DD showed a more rapid falloff for  $^{32}\text{P}$  (2.3% at 3mm) than for  $^{90}\text{Y}$  (14.1% at 3mm). The TWI for  $^{32}\text{P}$  was 0.82 and was 0.88 for the  $^{90}\text{Y}$ .

**Conclusion:** Better %DD characteristics and similar surface profiles show the new plaque utilizing  $^{32}\text{P}$  to be clinically acceptable. Inhomogeneities in the polymeric film need to be further evaluated before clinical use of this source.