

## AbstractID: 5462 Title: Advances in Co-60 based Tomotherapy Including Megavoltage CT

**Purpose:** To evaluate the potential for Co-60 based tomotherapy including dose delivery and mega-voltage CT (MVCT). Tomotherapy is a rotational implementation of IMRT that provides highly conformal doses and patient setup verification using MVCT. Current tomotherapy is limited to linear accelerators. This poster presents advances in our investigation of Cobalt-60 based tomotherapy, including MVCT.

**Method and Materials:** The fundamental components for the Co-60 tomotherapy dose delivery and MVCT imaging experiments are a benchtop motion stage and a clinical Co-60 MDS Nordion T-780 unit. Film and polymer-gel dosimetry are used to validate the tomotherapy dose delivery planned using in-house software. Imaging is provided by a Varian Portal Vision LC250 EPID. MVCT imaging is demonstrated using a variety of phantoms, including an anthropomorphic head phantom, and various contrast phantoms. EGS Monte Carlo simulation is used to model different beam delivery approaches such as source design for increased radiation output.

**Results:** The computer simulations, film dose measurements, and three-dimensional polymer gel dosimetry all demonstrate that Co-60 tomotherapy provides conformal dose delivery required of modern IMRT techniques. Film measurements show that dose delivery corresponds excellently with treatment plans, validating our in-house planning system. Treatment planning studies show that Co-60 tomotherapy delivery compares favourably with that from linac based 6MV tomotherapy. Dose volume histograms show identical coverage and avoidance of target critical organs. Imaging results show that Co-60 CT provides sufficient contrast and resolution for image guidance. Results from Monte Carlo studies show that it is possible to increase beam output for a dedicated Co-60 tomotherapy unit by modifying the source geometry.

**Conclusion:** Co-60 is well suited to tomotherapy and imaging applications; the development of clinical implementations of Co-60 tomotherapy is warranted and work continues in our centre along these lines.