

AbstractID: 9344 Title: Simulation of Neutron Equivalent Doses in Proton Therapy as a Function of Patient's Age for Different Tumor Sites.

Purpose: There is a growing concern of increased risk of treatment complications among radiation therapy patients as the age of patients diagnosed with cancer is decreasing, due to early cancer detection. Pediatric and young adult patients receive higher doses at organs and tissues distal to the PTV and stand a higher risk of developing secondary cancers during the span of their longer post treatment lives. It has become imperative to study the effects of secondary radiation doses at various organs distal to the PTV.

Method and Material: Age and gender specific whole-body phantoms have been implemented in Geant4 in order to determine the doses from the secondary radiation in patients undergoing proton treatment. We have used different fields planned for different treatment sites (head & neck, abdominal) to determine the secondary organ doses. This work is an extension of the previous work done at the Massachusetts General Hospital and is based on six voxelized phantoms: an adult, a 9 month old male, a 4-year old female, an 8-year old female, an 11-year old male, and a 14-year old male.

Results: We found large variations on the amount of dose to various organs distal to the PTV. The equivalent neutron doses depend on age and treatment site.

Conclusions: We found the neutron equivalent dose at various organs and tissues decreases with phantom age and depends on the field size. Furthermore, our study suggests that organ specific neutron doses in proton therapy depend on the treatment site.