AbstractID: 11663 Title: Development of a system to measure neutron microdosimetry spectra in a mixed proton-neutron field.

Purpose: To develop a miniature tissue-equivalent proportional counter (TEPC), timing-coincidence veto, and pulse-height analysis system for the purpose of measuring neutron Microdosimetry spectra in a proton beam. **Method and Materials:** TEPC's were constructed with active volume geometry consisting of a 2.5mm right circular cylinder and employing a 10µm diameter stainless steel wire as the detector anode centered on the axis of an A150 tissue-equivalent plastic cylinder with 2mm thick wall. Stainless steel field tubes define the active volume which is filled with propane based tissue-equivalent gas to 168torr simulating a tissue density volume with 2µm diameter. Two fully depleted transmission-type silicon detectors with diameter of 31.6mm will be operated in timing coincidence with the proportional counter as a charged particle veto system. Detector pulses are digitized in a 60MS/s sampling ADC and the data acquisition software is written in the LabVIEW graphical programming language which acquires and writes pulse waveforms to disk where pulse heights and timing information are extracted for further analysis. **Results:** A TEPC was tested in a mixed field produced in a proton treatment room with the proton beam incident on a closed tungsten MLC. The timing and energy resolutions for the TEPCs can be estimated from alpha spectra taken with a FWT LET-1/2 detector attached to the data acquisition system. Timing and lineal energy resolution for the TEPCs are estimated to be 200ns and >15keV/µm, respectively. **Conclusion:** Preliminary testing shows that the TEPC and silicon detector timing-coincidence veto system is a viable method for extracting neutron Microdosimetry spectra from the mixed fields present in a proton therapy treatment room. This work was supported by the US Army Medical Research and Materiel Command under Contract Agreement No. DAMD17-W81XWH-07-2-0121. Opinions, interpretations, conclusions and recommendations are those of the author and are not necessarily endorsed by the US Army.