AbstractID: 7172 Title: Measurement of secondary neutron dose for scattering modes of proton radiotherapy in KNCC

**Measurement of secondary neutron dose for scattering modes of proton radiotherapy in KNCC**

**Purpose:** Recently, the secondary neutron dose for scattering modes of proton radiotherapy has been a big issue, since some study groups had reported that the neutron flux produced in scattering modes could be one hundred times of IMRT and 3D CRT. In this presentation, the neutron dose measured in proton therapy facility of KNCC (Korea National Cancer Center) is presented.

**Method and Materials:** For the neutron dose measurement, a proton beam field with 20 $g/cm^2$ of depth range and 9 $g/cm^2$ of Spread Out Bragg Peak (SOBP) were produced. 6 Bonner spheres with various diameters ranging from 3.5cm to 25 cm were set up 270cm away from an isocenter. Neutron doses were measured using the CR-39 neutron detector installed by a fixed interval focusing into the isocenter in the treatment room.

**Results:** As a result of neutron spectrum analysis, the average neutron energy was measured to be 2.09 MeV. The difference of doses measured using $^3$He neutron detector and CR-39 was checked to be within $\pm$15%.
The measured neutron dose distribution shows a big population at 90˚of beam direction, which agree with previously published papers. But, differently from Binns & Hough published results, the measured dose values is one order lower than the dose values for existing IMRT treatment.

**Conclusion:** For the meantime, secondary neutron is generated a lot in the proton radiotherapy especially in scattering modes, but it is considered to reap a better treatment effect by showing the same or rather lower dose distribution compared to existing general radiation therapy.

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**Key words:** secondary neutron, proton therapy,