PTCOG-AO 2025
HONG KONG
NOV 7-9
PTCOG-AO

Theme: Physics

Abstract No:. PTCOG-AO2025-ABS-0032

Abstract Title: Proton Boron Capture Therapy: Microdosimetry study with Boron

Author Names: Seung Hoon Yoo, Yen Hwa Lin, Wei Sing Tan, Ying Ying Cheah, Ru Xin Wong, Wen Shen Looi, Shaun Ho, Kwek Boon Han, Paul Yeo and SK Djeng

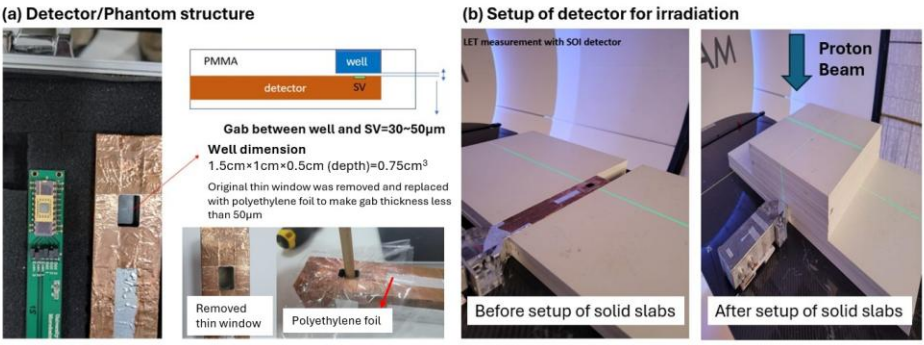
Proton Therapy PTE LTD, Singapore Advance Medicine, Singapore

Background / Aims:

Proton-boron capture therapy (PBCT) has been proposed as a method to enhance the biological effectiveness of proton therapy through the p + ^{11}B → 3α nuclear reaction. The resulting alpha particles may increase local radiation quality, but the dosimetric and microdosimetric consequences remain uncertain.

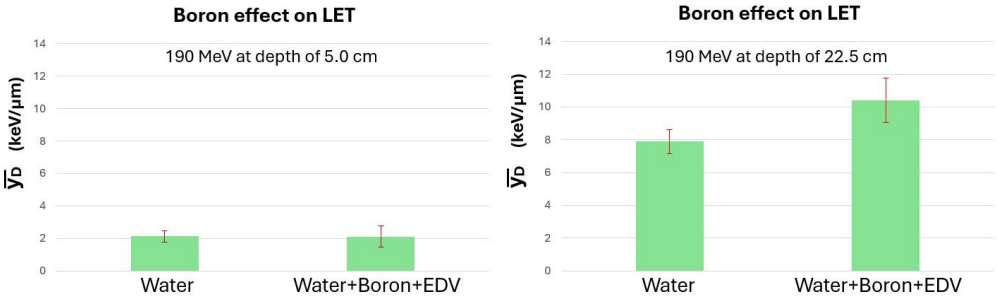
Subjects and Methods:

Lineal energy distributions were measured using a Silicon-On-Insulator (SOI) detector for microdosimetry under 70 MeV and 190 MeV monoenergetic proton beams delivered with pencil beam scanning. Dose-averaged lineal energy (y_d) values were derived from oscilloscope signals calibrated against Geant4 Monte Carlo simulations. Measurements were performed at both entrance and Bragg peak depths, with and without boronophenylalanine (BPA) delivered via EnGeneIC Dream Vector (EDV™).



Result:

For 70 MeV protons, no significant difference in y_d was observed between boron-loaded and control conditions. At 190 MeV, a reproducible increase in $\overline{y_D}$ was detected at the Bragg peak in the presence of boron ($p < 0.01$), while no effect was observed at the entrance depth.



Contact: Seung Hoon Yoo, Medical Physicist at PTPL
Seunghoon.yoo@proton.sg