

AbstractID: 3382 Title: Measurements of Dose Averaged LET Distributions in lateral direction in Water Using CR-39 for Collimated Carbon Ion Beam

**Purpose:** In order to develop more precise dose averaged LET calculation algorithm on the basis of the pencil beam algorithm (PBA) for carbon ion radiotherapy, we have to calculate depth and lateral dose averaged LET distribution for the pencil beam. Particularly, since the lateral dose averaged LET distribution is formed by scattered particles and fragment particles, we expected the distribution is somewhat complex. In this study, we focused on the lateral dose averaged LET distribution. Lateral dose averaged LET distributions were measured using CR-39 LET detector and analyzed.

**Method and Materials:** Carbon ion irradiation was carried out using the horizontal beam line at Heavy Ion Medical Accelerator in Chiba. A therapeutic carbon beam with energies of 290 MeV per nucleon (MeV/n) was used. Using a CR-39 solid state track detector, lateral dose averaged LET distributions in water were measured at various depths for collimated mono-energetic beam.

**Results:** We analyzed etch pits on the CR-39, and lateral dose averaged LET distributions in the region of penumbra were obtained. As a result, their LETs in even penumbra region were about constant at each depth.

**Conclusion:** Lateral dose averaged LET distributions in water were measured at various depths for collimated mono-energetic beam using a CR-39 solid state track detector. It was obvious that their LETs in even penumbra region about constant at each depth. We found that lateral dose averaged LET can be calculated roughly using depth dose averaged LET for broad beam.