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# Study of Radioactivity Induced by Therapeutic Proton Beam

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When compared with the conventional x-ray radiation therapy, it has been shown that an accelerated proton beam gives a great advantage on radiation therapy due to the Bragg peak characteristic. Based on this advantage, the number of proton therapy center has been increasing throughout the world. Proton therapy facility at National Cancer Center (NCC) in Korea is currently under installation and scheduled to start treatment in October 2006. The proton therapy center at NCC, Korea is consisted with a cyclotron, 2 gantry treatment rooms, 1 fixed beam treatment room and 1 experimental site where the cyclotron can produce 230 MeV proton beam with 300nA maximum current. Although a proton beam delivery gives various clinical benefits, there is the radiation safety problem since proton beam induced nuclear interaction produces radioactive isotopes in proton collimate system and patient body. The absorption dose from proton beam induced radioactivity is minor to the patient who is exposed by therapeutic proton beam directly, but it may be dominant radiation exposure to radiotherapists or workers in the treatment room. To check the distribution and physical specification of induced radioactivity, Monte Carlo simulation (GEANT 4) was performed with various patient specific devices under NCC Proton beam delivery setup condition. Simulation result will be compared with measurement data.

Keywords : Induced Radioactivity, MC Simulation, Patient Specific Device