ABSTRACT

The development of technology has brought significant changes to proton therapy facilities since they were first introduced. Currently, proton therapy facilities have been widely operational in several countries, especially the Compact Proton Therapy Centers (CPTC) type with specifications for a single radiation therapy room. The high usage of proton therapy must consider radiation protection because the use of high energy will affect the radiation exposure produced. Therefore, proton therapy facilities are designed with high radiation safety standards to ensure that radiation exposure does not negatively impact surrounding objects. Low activation concrete (LAC) and heavy concrete are used as radiation shields because of their ability to reduce the neutron and gamma radiation doses produced during the therapy process. This study used the Monte Carlo N-Particle (MCNP) 6.2 code to conduct a simulation of the H(10) equivalent dose on heavy concrete shields. The simulation model has the shape of the room, proton sources, and tally as detectors that are used to find different doses of H*(10). The simulation results indicate that the equivalent dose H*(10) values from the five measurement directions of each CPTC wall indicate an average dose value below 1 mSv/year. This indicates that variations in the density and composition of heavy concrete affect the shield's ability to reduce radiation dose. We expect this research to provide optimal design recommendations for radiation shields at CPTC, ensuring the safety of workers and the community.*

Keywords*: Proton Therapy, Heavy Concrete, MCNP 6.2, Equivalent Dose H*(10)*