

ABSTRACT

Proton therapy is an effective and safe method for treating Hepatocellular Carcinoma (HCC). Proton therapy utilizes the Bragg peak to precisely target tumors and minimize damage to Organs at Risk (OAR). The passive scattering technique in this therapy uses a Range Modulated Wheel (RMW) in the form of a rotating wheel that functions to scatter and compensate for the scattering effect. The purpose of this study was to analyze the dose distribution of HCC cancer cell diameters (1.6, 2.3, 3, and 6 cm) to target cancer cells and healthy tissues using Mesh-Type Reference Computational Phantoms (MRCPs) phantoms with the Particle and Heavy Ion Transport Code System (PHITS) Version 3.34 program. The study was conducted by varying the RMW step consisting of lead and lexan to produce a Bragg peak according to the target cancer volume. The results showed that the dose to the cancer target decreased as the cancer diameter increased, while the dose received by the Organ at Risk (OAR) varied depending on the diameter but was below the set threshold, so that the risk of side effects on healthy organs could be minimized.

Keywords: PHITS, MRCPs, Bragg Peak, RMW, Passive Scattering.