ABSTRAK

Penelitian mengenai simulasi dosimetri BNCT bertujuan untuk mendapatkan karakteristik fluks neutron, mengetahui konsentrasi boron yang efektif melalui perhitungan laju dosis pada organ, dan waktu iradiasi yang paling optimal pada terapi kanker otak. Penelitian dilakukan dengan metode simulasi menggunakan pemrograman *Particle and Heavy Ion Transport code System* (PHITS). PHITS digunakan untuk menyimulasikan proses terapi pada kanker otak. Sumber neutron berasal dari kolimator *Double Layer Beam Shaping Asembly* (DLBSA) berbasis siklotron 30 MeV. Model kepala yang dibuat mengacu pada model kepala Snyder, sel kanker terletak di tengah otak pada kedalaman 3,8 cm dari permukaan atas kepala. Variasi konsentrasi boron yang digunakan yaitu 30, 40, 50, 60, 70, dan 80 μg/g jaringan. Keluaran dari simulasi PHITS berupa fluks neutron termal dan laju dosis neutron. Hasil dari penelitian berupa karakteristik fluks neutron, konsentrasi boron yang paling efektif membunuh sel kanker adalah 80 μg/g jaringan, dan waktu iradiasi paling optimal adalah 13 menit 5 detik.

Kata kunci: BNCT, kanker otak, PHITS, dosis, dan waktu

ABSTRACT

Research on dosimetry simulation of BNCT aims to obtain a characteristic of neutron flux, determine the effective boron concentration through the calculation of the dose rate in the organs, and the optimal irradiation time in brain cancer therapy. The research was conducted with a simulation method using Particle and Heavy Ion Transport Code System (PHITS) programming. PHITS is used to simulate the therapeutic process in brain cancer. The source of the neutron comes from a 30 MeV cyclotron based Double Layer Beam Shaping Asembly (DLBSA) collimator. The head model made refers to the Snyder head model, cancer cells are located in the middle of the brain at a depth of 3,8 cm from the top surface of the head. The boron concentration variations used were 30, 40, 50, 60, 70, and 80 μg / g of tissue. The output of the PHITS simulation is a thermal neutron flux and a neutron dose rate. The results of the study were a characteristic of neutron flux, the boron concentration that most effectively killed cancer cells was 80 μg / g of tissue, and the optimal irradiation time was 13 minutes 5 seconds.

Key words: *BNCT, brain cancer, PHITS, dose, and time*