INTISARI

ANALISIS DOSIS PADA *BORON NEUTRON CAPTURE THERAPY* (BNCT) UNTUK PENANGANAN METASTASIS KANKER OVARIUM MENGGUNAKAN PHITS 3.26

Oleh

Asa Pratiwi
18/430207/PA/18720

Telah dilakukan penelitian mengenai analisis laju dosis, waktu iradiasi, dan konsentrasi optimal boron untuk BNCT (*Boron Neutron Capture Therapy)* dalam suatu penanganan kasus metastasis kanker ovarium untuk mendapatkan (1) dosis ekuivalen dan dosis efektif, (2) waktu iradiasi efektif, dan (3) konsentrasi boron optimal menggunakan PHITS 3.26. Pentingnya mengembangan metode penyembuhan kanker salah satunya kanker ovarium guna menekan angka kematian dan meningkatkan kualitas hidup para penderitanya.

Penelitian ini berbasis simulasi komputer menggunakan program PHITS 3.26 dengan cara mendefinisikan geometri dan komponen penyusun jaringan kanker dan organ disekitarnya. Serta sumber iradiasi yang digunakan adalah akselerator siklotron 30 MeV dengan optimasi *Beam Shaping Assembly* dari referensi yang sudah ada. Digunakan variabel bebas berupa konsentrasi boron yaitu 100, 120, 140, dan 150 μg/g jaringan kanker dan model arah iradiasi phantom *left lateral* dan *prone*, sedangkan variabel terikat dalam penelitian ini adalah laju dosis dan waktu iradiasi

Didapatkan hasil penelitian berupa: (1) telah didapatkan nilai dosis ekuivalen dan dosisi efektif dari analisa program PHITS 3.26. Semakin besar konsentrasi boron yang diinjeksikan maka semakin tinggi nilai laju dosis untuk pengobatan metastasis kanker ovarium. Namun, harus tetap mempertimbangkan arah iradiasi berdasarkan kedalaman jaringan kanker dari permukaan kulit dan organ-organ disekitarnya (OAR). (2) Didapatkan pula waktu iradiasi paling efektif dengan model arah iradiasi belakang phantom dengan rincian GTV2 selama 46 menit 56 sekon dan GTV1 selama 1 jam 12 menit 30 sekon. (3) Telah dianalisa efek kerusakan yang diakibatkan iradiasi, sehingga didapatkan konsentrasi optimal pada konsentrasi boron 140 μg/g jaringan dengan model iradiasi *prone* phantom dengan lebih minim kerusakan pada OAR.

Kata kunci: BNCT, metastasis, kanker ovarium, PHITS

ABSTRACT

DOSE ANALYSIS OF BORON NEUTRON CAPTURE THERAPY (BNCT) FOR OVARIAN CANCER METASTASIS TREATMENT USING PHITS 3.26

By

Asa Pratiwi
18/430207/PA/18720

Studies have been conducted on the analysis of dose rate, irradiation time, and optimal boron concentration for BNCT (*Boron Neutron Capture Therapy)* in a handling of ovarian cancer metastatic cases to obtain (1) equivalent dose and effective dose, (2) effective irradiation time, and (3) optimal boron concentration using PHITS 3.26. The importance of developing cancer healing methods, one of which is ovarian cancer in order to reduce mortality and improve the quality of life of sufferers.

This research is based on computer simulations using the PHITS 3.26 program by defining the geometry and constituent components of cancer tissue and surrounding organs. And the source of irradiation used is a 30 MeV cyclotron accelerator with *Beam Shaping Assembly* optimization from existing references. Free variabel is used in the form of boron concentrations, namely 100, 120, 140, and 150 μg /g of cancer tissue and a directional model of phantom *left lateral* and prone irradiation, while the bound variables in this study are dose rate and irradiation time

The results of the study were obtained in the form of: (1) the equivalent dose value and effective dose were obtained from the PHITS program analysis of 3.26. The greater the concentration of boron injected, the higher the dose rate value for the treatment of metastatic ovarian cancer. However, it should still consider the direction of irradiation based on the depth of the cancer tissue from the surface of the skin and surrounding organs (OAR). (2) The most effective irradiation time was also obtained with the phantom rear irradiation direction model with details gtv2 for 46 minutes 56 seconds and GTV1 for 1 hour 12 minutes 30 seconds. (3) The effect of damage caused by irradiation has been analyzed, so that an optimal concentration of boron concentration of 140 μg/g of tissue with a phantom *prone* irradiation model with less damage to OAR has been obtained.

Keywords: BNCT, metastases, ovarian cancer, PHITS