

INTISARI

ANALISIS DOSIS TERAPI KANKER PANKREAS BERBASIS *PROTON THERAPY* DAN *BORON NEUTRON CAPTURE THERAPY (BNCT)* MENGGUNAKAN MONTE CARLO *PARTICLE AND HEAVY ION TRANSPORT CODE SYSTEM (PHITS)*

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Pada penelitian ini akan dilakukan perbandingan *Proton Therapy* terhadap *Boron Neutron Capture Therapy (BNCT)*. Kedua metode tersebut dapat digunakan untuk mendeteksi lokasi kanker yang berdekatan dengan organ kritis, seperti kanker pankreas adenokarsinoma yang terletak di antara saluran pencernaan. Untuk mensimulasikan *Proton Therapy* digunakan *Particle and Heavy Ions Transport code System (PHITS)*. Kanker berstadium IB terletak pada ekor pankreas dengan kedalaman 5,8 cm dari permukaan kulit. Energi yang digunakan pada simulasi *Proton Therapy* dalam penelitian ini adalah 86 MeV hingga 115 MeV. Pemberian variasi berkas proton digunakan modalitas *passive scattering (PS)* dan *pencil beam scanning (PBS)*. Sementara itu, data BNCT diambil dari penelitian sebelumnya oleh Azzam Zukhrofani Iman pada tahun 2018. Hasil penelitian menunjukkan dosis optimal pada *Proton Therapy* didapat dari variasi berkas PBS, yaitu 50,01 GyE pada tumor dan 2,07 GyE pada pankreas sehat. Pada BNCT berdasarkan penelitian sebelumnya, untuk dosis target yang sama, pankreas sehat menerima 3,74 GyE dengan konsentrasi boron 150 µg/g.

Kata kunci: *Proton Therapy*, BNCT, dosis radiasi, kanker pankreas, PHITS

ABSTRACT

***DOSE ANALYSIS OF THE PANCREATIC CANCER THERAPY-BASED ON
PROTON THERAPY AND BORON NEUTRON CAPTURE THERAPY
(BNCT) USING MONTE CARLO PARTICLE AND HEAVY ION
TRANSPORT CODE SYSTEM (PHITS)***

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In this study, Proton Therapy will be compared to Boron Neutron Capture Therapy (BNCT). These methods can be used to detect the location of cancer adjacent to critical organs, such as adenocarcinoma pancreatic cancer located between the digestive tract. Simulate Proton Therapy used Particle and Heavy Ions Transport Code System (PHITS). An IB stadium cancer is located in the pancreas' tail with a depth of 5.8 cm from the skin's surface. The energy used in the Proton Therapy simulation in this study is 86 MeV to 115 MeV. The proton beam variation used passive scattering (PS) and pencil beam scanning (PBS) modalities. Meanwhile, the BNCT data was taken from previous research by Azzam Zukhrofani Iman (2018). The results showed that the optimal dose for Proton Therapy was obtained from the PBS bundle variation, namely 50,01 GyE for tumours and 2,07 GyE for the healthy pancreas. In BNCT, related to previous studies, for the same target dose, a healthy pancreas received 3,74 GyE with a boron concentration of 150 $\mu\text{g} / \text{g}$.

Keywords: Proton Therapy, BNCT, radiation dose, pancreatic cancer, PHITS