

# Author's Accepted Manuscript

BNCT of skin tumors using the high-energy D-T neutrons

S. Farhad Masoudi, Fatemeh S. Rasouli, Marjan Ghasemi



PII: S0969-8043(17)30036-2  
DOI: <http://dx.doi.org/10.1016/j.apradiso.2017.01.010>  
Reference: ARI7732

To appear in: *Applied Radiation and Isotopes*

Received date: 20 January 2016  
Revised date: 13 January 2017  
Accepted date: 13 January 2017

Cite this article as: S. Farhad Masoudi, Fatemeh S. Rasouli and Marjan Ghasemi BNCT of skin tumors using the high-energy D-T neutrons, *Applied Radiation and Isotopes*, <http://dx.doi.org/10.1016/j.apradiso.2017.01.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# BNCT of skin tumors using the high-energy D-T neutrons

S. Farhad Masoudi<sup>1</sup>

*Department of Physics, KN Toosi University of Technology, P.O. Box 15875-4416, Tehran, Iran*

Fatemeh S. Rasouli

*Department of Physics, K.N. Toosi University of Technology, P.O. Box 15875-4416, Tehran, Iran*

Marjan Ghasemi

*Department of Physics, K.N. Toosi University of Technology, P.O. Box 15875-4416, Tehran, Iran*

---

## Abstract

Owing to the continuing need for providing improved and universally accepted facilities to be used in radiation therapies, a number of recently published BNCT-related studies have focused on investigating appropriate neutron sources as alternatives for nuclear reactors. Of special interest are D-T neutron generators, which theoretically have shown the potential to be utilized as neutron sources for BNCT of deep-seated tumors. This work is devoted to investigate the feasibility of using the high-energy neutrons emitted from these generators for treatment of surface tumors, especially skin. Using a set of MCNPX simulations, the D-T neutrons are passed through an optimized arrangement of materials to slow-down toward the desired energy range, and to remove the neutron and gamma contamination considering the IAEA recommended criteria, especially determined for pre-clinical survey for treatment of surface tumors. By assessment with these parameters, it is shown that the designed beam, corresponding to a configuration composed of natural uranium as neutron multiplier, D<sub>2</sub>O as moderator, Pb as reflector, Bi as gamma filter, and polyethylene and BeO as collimators provides high-intensity of desired neutrons, and low-background doses as well. It was found that an appropriate material for collimator, if accompanied with an optimized geometry, is an important parameter for keeping the undesired components to the recommended level.

A typical simulated phantom, subjected to the irradiation of the designed spectrum, is used to study the performance of the resultant beam in shallow tissue. For an arbitrary chosen <sup>10</sup>B concentration, the evaluated depth-dose curves show

Download English Version:

<https://daneshyari.com/en/article/5497959>

Download Persian Version:

<https://daneshyari.com/article/5497959>

[Daneshyari.com](https://daneshyari.com)