

# Author's Accepted Manuscript

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PII: S0969-8043(16)30012-4  
DOI: <http://dx.doi.org/10.1016/j.apradiso.2016.01.012>  
Reference: ARI7372

To appear in: *Applied Radiation and Isotopes*

Received date: 19 September 2015  
Revised date: 5 January 2016  
Accepted date: 7 January 2016

Cite this article as: Hossein Jarahi, Yaser Kasesaz, Saleh Koutahi and Seyed Mohsen, Evaluation of the effective dose during BNCT at TRR thermal column epithermal facility, *Applied Radiation and Isotopes* <http://dx.doi.org/10.1016/j.apradiso.2016.01.012>

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# Evaluation of the effective dose during BNCT at TRR thermal column epithermal facility

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## Abstract

An epithermal neutron beam has been designed for Boron neutron Capture Therapy (BNCT) at the thermal column of Tehran Research Reactor (TRR) recently. In this paper the whole body effective dose, as well as the equivalent doses of several organs have been calculated in this facility using MCNP4C Monte Carlo code. The effective dose has been calculated by using the absorbed doses determined for each individual organ, taking into account the radiation and tissue weighting factors. The ICRP 110 whole body male phantom has been used as a patient model. It was found that the effective dose during BNCT of a brain tumor is equal to 0.90 Sv. this effective dose may induce a 4% secondary cancer risk.

**Keywords:** Tehran Research Reactor; BNCT; MCNP4C Monte Carlo code; ORNL phantom; effective dose

## 1.Introduction

Boron neutron Capture Therapy (BNCT) is under development at Tehran Research Reactor (TRR) (Kasesaz et al. 2014a, Kasesaz et al. 2014b, Kasesaz et al. 2014c). In the recent study it has been shown that the epithermal BNCT beam could be achieved in the thermal column if all graphite blocks removed from it and replaced by an appropriate set of beam shaping materials (Kasesaz et al. 2014b). In view of radiation protection and health physics, the estimation of the effective dose during BNCT is

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