

## Secondary Verification of Calculated Treatment Time for Co-60 External Beam Planning System

K.A.H. Navodya<sup>1\*</sup>, P.A.S. Madushan<sup>2</sup>, K.K.D.L. Ruvinda<sup>2</sup>, K.V.A.W. Kumara<sup>2</sup>,  
N.S. Bandara<sup>1</sup>, and W.T.L.S. Fernando<sup>1</sup>

<sup>1</sup>Department of Physical Sciences and Technology, Faculty of Applied Sciences,  
Sabaragamuwa University of Sri Lanka.

<sup>2</sup>Department of Medical Physics, National Cancer Hospital, Maharagama, Sri  
Lanka.

\*[kahnavodya@gmail.com](mailto:kahnavodya@gmail.com)

In radiotherapy, it requires accurately calculated radiation dose to reach maximum success in radiation treatments. Although Co-60 is widely used in certain applications of therapeutic treatments of cancer, it is mandatory to have a treatment planning system (TPS) to estimate reliable radiation dose on the targeted area. Along with that purpose, this study focused on building up a system to estimate the treatment time by analyzing 2D computed tomography (CT) images. In such a treatment system, it is important to identify the effective depth to the tumor from the patient's surface, as it affects the estimated treatment time. Axial 2D chest CT images were analyzed using Python programming language to find the specific regions along the beam path to obtain the effective depth while the estimation of treatment time was carried out using the source to tumor distance (STD) setup. Estimated treatment time using this new system shows significant variance compared to the existing system which estimates the treatment time without considering the inhomogeneous materials in our body. It can be attributed as such a variance is due to the consideration of different values of attenuation in tissues or inhomogeneous materials which were obtained through the analyzed CT scan images to the beam from the new system while attenuation values are considered to be equivalent to water in the present system. With these results, this study revealed that different attenuation values from inhomogeneous materials largely affect radiation treatment time estimation.

Keywords: Co-60, 2D CT Image, Source to Tumor Distance (STD) Setup, Treatment Time, Treatment Planning System (TPS)