

## Open Access

## Abstract

Published 02/11/2022

## Copyright

© Copyright 2022

Hand et al. This is an open access abstract distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under

Creative Commons CC-BY 4.0

## The Utilization of the Machine Performance Check Application on a Varian TrueBeam as a Substitute for Performing the Winston-Lutz Test for Stereotactic Radiotherapy Treatments

Christopher Hand <sup>1</sup>, Caitlyn Fitzherbert <sup>2</sup>

1. Medical Physics, Einstein Medical Center Philadelphia, Philadelphia, USA 2. Radiation Oncology, Einstein Medical Center Philadelphia, Philadelphia, USA

**Corresponding author:** Christopher Hand, handchri@einstein.edu

**Categories:** Medical Physics

**Keywords:** truebeam mpc, winston-lutz

### How to cite this abstract

Hand C, Fitzherbert C (February 11, 2022) The Utilization of the Machine Performance Check Application on a Varian TrueBeam as a Substitute for Performing the Winston-Lutz Test for Stereotactic Radiotherapy Treatments. Cureus 14(2): a713

## Abstract

**Objective:** As technology advances, and treatment regimens decrease to fewer fractions with higher dose per fraction, the need for stringent machine QA strengthens. Multiple publications have demonstrated that the machine performance check (MPC) application with a Varian TrueBeam evaluates many aspects of the machine's parameters. Other publications have shown that these parameters are in-line with TG-142 criteria. The question remains, can you substitute certain additional QA procedures (such as the Winston-Lutz test) with the results obtained from the MPC application. Like any new procedure in therapy physics, clinical implementation requires careful evaluation & commissioning.

**Methods:** This study evaluated over a 33-month period (Jan 2018 - Sept 2020) the coincidence of the MPC (version 2.22.4) MV isocenter size with the mean & maximum total delta values obtained from a Winston-Lutz (W-L) analysis utilizing the commercially available DoseLab software (version 7.0.0, Mobius Medical).

**Results:** The analysis of 80 data points where the MPC application was run followed immediately by the acquisition and analysis of W-L images obtained from the four (4) cardinal angles on a Varian TrueBeam utilizing a 6MV beam. These MV images were analyzed using the W-L module of the DoseLab software. The MPC results showed a mean ( $\pm 1$  standard deviation) that the isocenter size was  $0.31 \pm 0.025$ mm. In comparison, the W-L mean total delta was  $0.24 \pm 0.081$ mm and a maximum total delta of  $0.34 \pm 0.100$ mm. Results of a t-test analysis comparing the MPC isocenter size to the mean total delta demonstrated statistical significance,  $t(148) = 6.6$ ,  $p < .001$ . Similar statistical significance,  $t(148) = -2.7$ ,  $p < .0065$  was also found when comparing the MPC isocenter size to the maximum total delta.

**Conclusion:** Studies have already demonstrated the coincidence of the isocenter size & coincidence between the MPC & W-L but have done so on either a measurement by measurement basis or over a short period (9 or 10 weeks) and utilizing an in-house W-L test. Barnes et al demonstrated that the MPC module is TG-142 compliant with the imaging vs treatment coordinate coincidence of  $<1$ mm for SRS/SBRT. This study suggests that the MPC module can be used to verify the radiation isocenter to be within 1mm tolerance for stereotactic radiotherapy treatments without performing an additional W-L test.