

## Effect of Standard Wiston Lutz (WL) Test versus Wiston Lutz (WL) Off-Isocenter for Multiple Brain Metastases

**Open Access****Abstract**

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### Abstract

Objectives:

To suggest a method to perform an additional check to the standard Wiston Lutz (WL) test in order to evaluate the concordance between the mechanical and the radiation field when using treatment of multiple brain metastases with a single isocenter. Using the ET Verification Head Phantom (VHP), BrainLAB, Feldkirchen, Germany, which contains three 5mm diameter tungsten carbide spheres (BB) placed in 3D non-coplanar locations; an immobilization mask was created and a CT scanner was taken and exported to Eclipse (Varian Medical System, CA, USA).

Methods:

Different plans were created as follows: Plan1, choosing one BB as the isocenter, the traditional WL was emulated test with that sphere as a target. Plan 2, keeping the same BB as the target, the isocenter was moved 3cm away from the sphere. Plan 3 was similar to plan 2 but with the sphere at 6cm from the isocenter. In all plans, a 2x2cm<sup>2</sup> square MLC aperture was centered on the BB. The phantom was positioned on the linac using ExacTrac 6D Patient Positioning system. The plans were delivered using a Truebeam Novalis system with portal imaging acquisition; each time the couch was moved a portal image acquisition was taken and then verify with the Exactrac the phantom position and if necessary reposition it and take another portal image. The location of the sphere with respect to the MLC aperture was visualized and analyzed using the DoseLab (Varian Medical System, CA, USA) software with the same protocol that the traditional WL test. The WL test using the VHP was performed with and without Exactrac correction for the plans with the tungsten ball at 3cm and 6cm from the isocenter

Results:

Results showed that Exactrac repositioning reduces the inherent machine deviation for off-isocenter targets. However, differences between radiation and mechanical field increase as the distance increase from the Isocenter. The test showed some differences that are out of tolerance can be corrected with Exactrac; however, at some distances from the Iso although Exactrac correction is performed, values cannot reach values within tolerances.

Conclusion(s):

This work recommend that when using treatment of multiple brain metastases with a single isocenter, this test must be performed in order to evaluate the concordance between the mechanical and the radiation field and decide if a greater PTV is necessary or that lesions that are at certain distances may need an extra isocenter.