AbstractID: 13217 Title: A Unique Method for End-to-End Quality Assurance Test For Trigeminal Neuralgia Treatments in CyberKnife

Purpose: To develop an End-to-End QA test for Trigeminal-Neuralgia in CyberKnife.

Method and Materials: Functional treatments like Trigeminal-Neuralgia are treated with small collimators(5mm-10mm) at high doses.Currently all End-to-End tests performed in CyberKnife utilize larger collimators(20mm-30mm).There is no specific QA for trigeminal-path using small collimators.It is critical to have specific End-to-End test for this path as it lacks correction for rotational shifts during treatments.A styrofoam insert was designed to retrofit the mini-ball cube replacing the regular-ball cube inside the stereotactic head phantom.The insert was designed to maintain precise geometry similar to original ball cube.The head phantom was CT-scanned with precision cut films positioned inside the mini ball cube in anterior-superior and anterior-left planes.A spherical target of 5mm contoured in center of mini ball cube simulates the volume of Trigeminal Nerve.A isocentric treatment plan was developed with 7.5mm collimator with trigeminal-path.A maximum dose of 3000cGy to target is planned using RPC protocol,with 80% isodose line covering entire target volume.The plan is then delivered on Cyberknife machine with rotational limits reduced to 0.5mm during treatment delivery.The films are then scanned using Epson Flat bed scanner and analyzed.

Results: The total targeting error for Trigeminal End-to-End test was found to be 0.3±0.1mm.An analysis of films using RPC protocol for stereotactic QA shows that the 80% isodose widths measured in the sagittal–axial,axial-coronal,sagittal-coronal plane and treated volume are in close agreement with the plan.A comparison and analysis of separate films without center cut is also presented.

Conclusion: This specific End-to-End test with small collimators provides a unique method for proper verification of trigeminal-path.It is recommended that this test can be implemented with other End-to-End tests.Because of small collimator size,the passing criteria recommended for targeting error is < 0.5 mm.End-to End test with separate films without center cut,enhances the accuracy and precision of the test.