# AbstractID: 13907 Title: : A Practical Method for Verifying Constancy of Output Factor for Small Fields Shaped by Variable Beam Limiting Devices

**Purpose:** To develop a reliable and clinically efficient method for checking the constancy of the output of small field sizes shaped by variable beam collimators. This is an important quality assurance measure because the output is strongly sensitive to even small changes in field size. Such fields typically require the use of diodes for beam measurement. A water phantom is required to center the diode for the output measurements, but a water phantom is impractical for frequent QA checks. We investigate instead a method based on the concept of integrated dose over the whole irradiated field using a large area parallel plate ionization chamber. **Method and Materials: A** PTW Bragg Peak parallel plate chamber (8 cm) and PTW UNIDOS electrometer were used to measure integrated dose delivered by the CyberKnife® Robotic Radiosurgery System (CK, Accuray Incorporated, Sunnyvale, CA) in a fixed geometry. CK field size was defined using an Iris™ Variable Aperture Collimator (Accuray Incorporated). Field size was determined from radiochromic film exposed simultaneously with the chamber measurement. **Results:** A quadratic relationship was established between the radiation field size and the temperature/pressure corrected reading from a reproducibly placed parallel plate chamber. For the 5-mm field size, the smallest available on the CK, this measurement technique detected changes with an uncertainty of 0.1 mm. For this small field, a 0.1-mm field size change corresponds to relative a change in output of 2%. **Conclusion:** For a given Linac and its output**,** a change in an area-integrated dose reading is a clinically practical method sensitive to the field size changes. The Bragg Peak parallel plate chamber is practical, and large enough to accommodate the range of the field sizes (5 mm to 60 mm) offered by the CyberKnife. **Conflict of Interest:** The author is employed by Accuray Incorporated, Sunnyvale, CA.