

Gamma Knife radiosurgery is useful in the treatment of tumors or disorders of the brain due to its mechanical accuracy and ease of use. The Gamma Knife was originally designed to treat small lesions to very high doses using few shots; however, with expanding applications it is often necessary to use lower doses and multiple shots to obtain the desired treatment. In such cases, the added dose due to end effect can be significant. The end effect can be measured in many different ways including traditional interrupted readings, or linear fit of measured dose with time. A new technique for measuring end effect is enabled by an electrometer which reports the "radiation on time" to within 0.1s above a user-set radiation threshold (Keithley 35040). All three of these methods yielded the same results for our Model B Gamma Knife. End effect was measured as 0.17min for the 18mm helmet when the dose rate was 3.514 Gy/min. This corresponds to a dose of 59.7cGy and will represent a difference in shot dose of about 5% for any treatment time less than 3.4 min. With changes in the couch speed, and as the cobalt sources decay, this end effect will change. It is important that end effect be routinely measured and evaluated as it relates to the total delivered dose from each shot. Further, the user should consider that the end effect is not included in the dose distributions displayed by the planning system.