

Stereotactic radiosurgery delivered in a single fraction (SRS) or fractionated (SRT) is routinely used for the treatment of inoperable cerebral arteriovenous malformations (AVM's) and other intracranial lesions such as acoustic tumors, pituitary adenomas and some solitary brain metastases. The technique is also being extended to treat other than intracranial lesions specifically in the head and neck region. In narrow photon beams as well as in the buildup region the absorbed dose changes rapidly with beam radius and depth in phantom because of the absence of both lateral and longitudinal electronic equilibrium in radiation fields of dimensions smaller than the maximum range of secondary electrons. In addition, for the small photon fields used in stereotactic radiosurgery, significant underdosing is expected at the interface of air cavities with areas of overdose occurring beyond the air cavity. The opposite may occur for the higher density bone interfaces. Therefore, inhomogeneity corrections need to be considered for treatments of the sinus and nasopharynx region. Not much work has been done in this area as inhomogeneities were considered insignificant in the brain where stereotactic radiosurgery was first used. As this technique is being expanded to head and neck treatments, inhomogeneity corrections for tissues close to air cavities and the skull will be required. The inhomogeneity dose calculations in a commercial SRS treatment planning system (BrainLAB) have been evaluated. Measured doses in and beyond low density and bone equivalent inhomogeneities were compared to those calculated for typical small field photon irradiation of phantoms.