AbstractID: 9154 Title: Partial blocking of cones in stereotactic arc therapy for treatment of small (about 1 cm) intra-cranial lesions; dosimetric and planning aspects

Stereotactic arc treatment of small intra-cranial lesions is usually performed with circular collimators (cones), resulting in spherically shaped treatment volumes, while often the target volume is non-spherical. Multiple isocenters improve dose conformation to the tumor, but also lead to large dose inhomogeneities. Therefore, using Radionics equipment, cones > 2cm can be partially blocked with the linac jaws, resulting in more homogeneous target doses. Partial blocking would also be advantageous for smaller lesions, irradiated with cones having a diameter of 1 cm or larger, with block positions from 0.3 cm from the central beam axis. A crucial prerequisite for using such small field sizes is the reproducibility in jaw positioning, which turned out to be 0.3 mm (1 SD) for our Varian Clinac 2300 C/D machine, resulting in a dose delivery reproducibility on the central beam axis within 0.8 % (1 SD). Furthermore, an accurate dose calculation algorithm is required. It turned out that the Radionics XKnife algorithm is critically dependent on the used penumbra fit. The agreement could be improved from a maximum deviation of 12% to 3% for all situations by using a deconvolved penumbra. Planning studies have shown that partial cone blocking indeed results in improved dose distributions for small elongated tumor sizes, such as schwannomas and uveal melanomas. The dose to critical structures such as the chiasm and brain stem (schwannomas) and the lacrimal gland (uveal melanoma) could be reduced considerably.