Purpose:
We investigate the dosimetric impact of surgical embolization of Arteriovascular-malformations (AVM's) on further follow-up Stereotactic Radiosurgery. Two embolization media are studied. By introducing a tissue inhomogeneity, the breakdown in electron equilibrium at the interface impacts actual tissue dose within a few mm. As this is the precise location of the target tissue the dose departure from standard prescription is to be quantified.

Methods:
Inhomogeneity phantoms were constructed to model regions of various thickness 2mm - 16mm. Each phantom was constructed of a tissue equivalent material while drilled embolization cavities were filled with 4 different admixtures of embolizing media: Onyx (TM) with contrast-to-polymer ratio 18% and 34%; and Embucrilate (TM) (33% and 50%). Near tissue-equivalent radiochromic film was placed in planes 0, 1, and 2mm up-beam and down-beam from the inhomogeneity. The simulated embolizations and films were then irradiated in a 6MV radiosurgery beam at tissue depth of 7cm.

Results:
In a narrow beam geometry, we observe an immediate depletion of dose at the interface downstream of the Onyx medium of up to 20% compared to 18% for the Embucrilate. The dose enhancement immediately upstream of the embolization medium interface is typically 25% for the Onxy and 15% for Embucrilate.

Conclusions:
While radiosurgery beams are typically directed from a large range of angles, the two connected dose interface effects tend to cancel only laterally. Typical beam arrangements have a superior-to-inferior directional bias and the inhomogeneity interface effects on dose will have an effect on the target tissue at those aspects of the embolized portions of the AVM lesion.