The aim of a study was to determine the efficacy of GKRS treatment in a saccular aneurysm animal model.

Aneurysms were surgically produced using an elastase-induced aneurysm model in the right common carotid artery of 10 New Zealand white rabbits. Following initial observation for 4 years, each rabbit aneurysm was treated with a conformal GKRS isodose of 25 Gy to the 50% margin. Longitudinal MRI studies obtained over 2 years and terminal measures obtained at multiple time points were used to track aneurysm size and shape index modifications.

Aneurysms did not rupture or involute during the observation period. Whole aneurysm and blood volume averages decreased with a linear trend, at rates of 1.7% and 1.6% per month, respectively, over 24 months. Aneurysm wall percent volume increased linearly at a rate of 0.3% per month, indicating a relative thickening of the aneurysm wall during occlusion. Nonsphericity of the average volume, aspect ratio, and the isoperimetric ratio of whole aneurysm volume all remained constant. Histopathological samples demonstrated a progressive reduction in aneurysm size and wall thickening, with subintimal fibrosis. Consistent shape indices demonstrate stable aneurysm patency and maintenance of minimal rupture risk following treatment.

Data indicate that GKRS targeted to saccular aneurysms is associated with histopathological changes and linear reduction of aneurysm size over time. The results suggest that GKRS may be a viable, minimally invasive treatment option for intracranial aneurysm obliteration [1].

1)
Meadowcroft MD, Cooper TK, Rupprecht S, Wright TC, Neely EE, Ferenci M, Kang W, Yang QX, Harbaugh RE, Connor JR, McInerney J. Gamma Knife radiosurgery of saccular aneurysms in a rabbit model. J Neurosurg. 2018 Dec 1;129(6):1530-1540. doi: 10.3171/2017.6.JNS17722. PMID: 29328001.