

# The Gamma Knife

ELE 282 Biomedical Engineering Seminar

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The Gamma Knife is a non-invasive neurological tool used in the treatment of small to medium sized brain tumors and arteriovenous malfunctions (AVM's). Just as normal surgery does, the Gamma Knife eradicates the diseased area using a high dose of gamma radiation.



During the procedure the patient wears a lightweight head frame that attaches to a helmet. This helmet allows for the delivery of 201 beams of gamma radiation from a cobalt-60 source. The beams of radiation focus on a single target. Since each individual gamma ray is of relatively weak intensity, the normal brain tissue surrounding the abnormality is protected as the full dose of radiation is focused only at the point where all the 201 beams converge.

This procedure is both painless and bloodless. It is performed under mild sedation and local anesthesia. The procedure itself takes approximately one hour, therefore the patient can have it performed many times if there are multiple tumors. After the procedure the patient is released from the hospital usually within 24 hours and can be fully

functional within 1 week. Another advantage of this procedure is there is no risk of infection, hemorrhage or leakage of cerebral spinal fluid, that may be dangers in normal surgery.

The actual procedure of the surgery is as follows:

- Once the head frame is in place, a number of advanced imaging tests - such as an MRI or CT scan - will be required to precisely locate the size, shape and location of the tumor, lesion or abnormality
- The brain images are computerized, then using highly sophisticated 3-dimensional software, a treatment protocol is planned.
- Next, the patient lies on the treatment bed where the head frame will be attached to the helmet.
- The treatment table is then moved into the Gamma Knife, where the patient rests during the painless treatment.
- Between each treatment the patient is moved out of the Gamma Knife so minor adjustments can be made.
- After the surgery is complete the headframe is removed and the patient rests overnight.

References:

- [www.nwhgammaknife.com](http://www.nwhgammaknife.com)
- [www.gammaknife.uab.edu](http://www.gammaknife.uab.edu)
- [www.elekta.com](http://www.elekta.com)
- [www.texasneurosciences.com](http://www.texasneurosciences.com)