



The Gamma Knife

ELE 282 Biomedical Engineering Seminar,
April 23, 2000

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The Gamma Knife is a type of radiosurgery that uses a high dose of gamma radiation. Like normal surgery the Gamma Knife eradicates the diseased area with a safe and effective approach. During the procedure, the patient wears a lightweight stereotactic head frame (see Minimally Invasive Stereotactic Neurosurgery, J.Mundy, 2000) that attaches to a helmet (see above picture). This helmet allows 201 beams of gamma radiation, that is emitted from a cobalt-60 source to precisely focus on a single target. Only the tissue being treated receives a very strong dose of radiation while the surrounding tissue remains unharmed. This is accomplished by the fact that one beam of gamma radiation is actually harmless

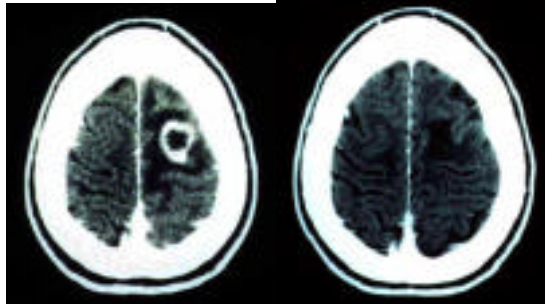


Figure 1 (before and after, 2 months)

to the brain tissue, but when 201 beams of radiation are aimed at the same spot, the beams can destroy the tissue

The painless, bloodless procedure is performed under local anesthesia with mild sedation. Another plus is that the procedure takes approximately only 1 hour. If there are multiple tumors or if the tumor spreads to another area, the same procedure can be repeated as necessary, unlike old methods of surgery in which the patient could normally not undergo the procedure again and again. After the original procedure is done the patient is normally able to be released from the hospital within 24 hours, and function normally within 1 month.

In this procedure there is no risk of surgical complications like infection, hemorrhage or leakage of cerebral spinal fluid.

Reference:

Clarian Health - Indiana Lions Gamma Knife Center,
<http://www.clarian.com/tyhealth/GammaKnife/default.asp>
Texas Neurosciences Institute,
<http://www.texasneurosciences.com>

The Gamma Knife also has many other uses other than just treating tumors. The following are a few examples of the great uses of this device:

- Tumors within the head from a primary site elsewhere in the body: metastatic tumors.
- Tumors originating within the brain itself ,abnormal blood vessels: arteriovenous malformations.
- Also specific centers within the brain can be destroyed to treat pain, tremors and other functional disturbances.



Figure 2 (Treatment Bed)

The following is a step by steps procedure on how the actual surgery is performed, keep in mind this only lasts between 30 and 90 minutes.

- After administering local anesthesia a stereotactic frame is attached to the patient's head
- Next the head is imaged using a CT or MRI scanner. For vascular malformations, an angiogram is obtained as well.
- A treatment plan is developed by a computer using the brain images. The completed plan outlines the gamma ray dose and location within the brain for each treatment.
- The patient lies on the treatment bed (see figure 2) of the Gamma Knife unit while the frame is affixed to the appropriate collimator, which determines the size of the treatment.
- The treatment table is moved into the Gamma Knife where the patient rests during each painless treatment.
- Between each treatment the patient is moved out of the Gamma Knife so minor adjustments in the stereotactic frame and collimator can be made.
- After Gamma Knife surgery the head frame is removed and the patient rests overnight.