

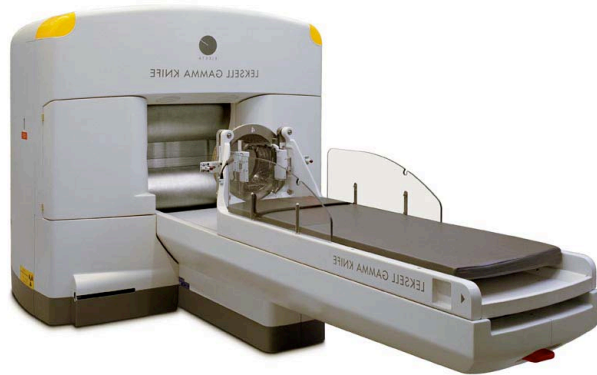
Gamma Knife

David Dionisopoulos – Biomedical Engineering – University of Rhode Island

The Gamma Knife has actually been around longer than one may think. It was invented in 1967 by a Swedish neurosurgeon Lars Leksell which was first used clinically at the Karolinska Institute in Sweden. The name of the instrument was referred to as Leksell Gamma Knife®.

This mechanism is used for brain related disorders. These disorders range from removing brain tumors (primary brain tumors and metastatic tumors), benign brain tumors (meningiomas, pituitary adenomas), blood vessel damage, and Obsessive Compulsive disorder. Currently there's some research on possible removal of epilepsy and Parkinson's disease.

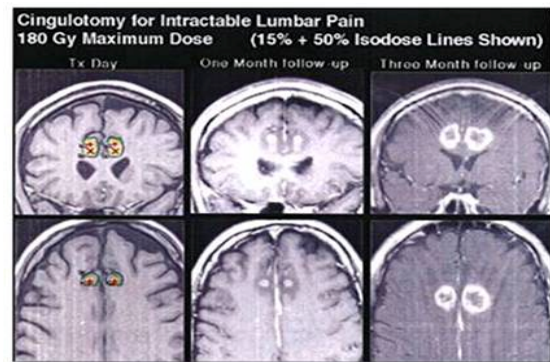
The Gamma Knife works by a process known as stereotactic radiosurgery. Stereotactic radiosurgery is a process where multiple rays of radiation are focused on a small precise volume. It uses 201 separate sources of Cobalt -60 which has an accuracy of 0.1mm which leaves the surrounding areas unharmed.



The patient wears a specific helmet during the procedure allowing delivery of Cobalt-60. The helmet also takes MRI's and/or computed tomography (CT) which the results are sent to a nearby computer system. They scan the size, shape, and location of the tumor or abnormality. The images are then computerized into 3 dimensions. The patient is then lies down onto a table and moved into the Gamma Knife area where the actual surgery takes place. Once the surgery is complete the patient leaves the Gamma Knife and the helmet is removed.

The procedure is completely painless and bloodless. There are no incisions needed for any sort of tissue removal. This decreases the chance of any possible infections or complications. Gamma Knife surgery lasts for approximately one hour allowing enough time for multiple removals. Some side effects may include but are minimal. They are: nausea, local hair loss, and scalp numbness.

Nothing is perfect as we may know. With everything there are some risks involved. The risks pertaining to Gamma Knife surgery are: formation of a new tumor (secondary malignancy) caused by the radiation, minor hemorrhage, infection from placement of the helmet, paralysis and even death.



Currently the number of Gamma Knife units being used world wide is over 140. 60 of the units are being used here in North America. 1 unit is actually used in Rhode Island at Rhode Island Hospital. Prices of the procedure can range from anywhere of \$4,500- \$11,000 (depending on volume of removal)

Sources:

- http://en.wikipedia.org/wiki/Gamma_knife
- http://www.radiologyinfo.org/en/info.cfm?pg=gamma_knife&bhcp=1
- http://www.irsa.org/gamma_knife.html
- <http://www.namisc.org/Research/2002/LeksellGammaKnife.htm>