

# STEREOTACTIC RADIOSURGERY USING A LINEAR ACCELERATOR

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## GOAL OF RADIOSURGICAL TECHNIQUE

to deliver a high dose of radiation in a single fraction to a well defined, small, intracranial volume without delivering significant radiation to adjacent normal tissue with great accuracy

## THE TERM RADIOSURGERY IN GENERAL SENSE

1. accurate stereotactic localization of a small intracranial target
2. accurate dose-planning determination of three-dimensional isodose surface contours with respect to the target volume
3. accurate, external beam, stereotactic irradiation of the target, usually in a single fraction, utilizing radiation beams distributed about the target in three dimensions

## HISTORY OF RADIOSURGERY

1951 Leksell introduced term radiosurgery and technique.

--> orthovoltage (100-350 kVp) X-rays

### *Charged particle beam*

1946 Wilson proposed the therapeutic use of charged-particle beams.

1947 Lawrence Berkeley Laboratory (LBL)- 184 inch synchrocyclotron

1952 Tobias et al began to study the biologic effects of collimated beams of protons, deuterons and helium ions.

1954 First stereotactic radiosurgical procedures using charged particle were performed in clinical patients for pituitary hormone suppression in the treatment of metastatic breast carcinoma.

### *Gamma unit*

1951 Lars Leksell introduced radiosurgery.

1968 The first gamma knife using  $^{60}\text{Co}$  sources was installed at Sophiahemmet hospital.

1974 The second unit was designed to produce a spherical radiation dose distribution using 179 tiny  $^{60}\text{Co}$  sources for treatment of tumors and arteriovenous malformations(AVM)

1980s The third and fourth units, which had 201  $^{60}\text{Co}$  sources, were established in Buenos Aires, Argentina and Sheffield, England, respectively.