

How a Linac Works

A linear accelerator, or "linac," generates X-ray radiation via the acceleration of electrons that are extracted off the surface of a heated metal disk. The electrons are accelerated through a vacuum chamber

by microwaves to nearly the speed of light, an action that greatly boosts their energy levels. These speeding electrons bombard a metal target, usually tungsten, causing it to emit X rays, which are collimated

into pencil-thin beams that can be adjusted to cover the 4- to 25-million-volt spread of energies needed to penetrate tumors. The beams are intense, meaning they contain a large number of X-ray photons.

Varian's Clinac EX linac can deliver a dose rate of X rays up to 600 centigray per minute and concentrate them on an area 2 millimeters in diameter, which is about the size of this spot. ●

1

Radiation therapy begins with a linear accelerator, which speeds electrons toward a target to generate a radiation beam aimed at the patient's tumor.

2

The multileaf collimator shapes the radiation beams and varies their intensity. This enables physicians to target higher radiation doses to the tumor while sparing healthy tissue.

4

A computer system uses three-dimensional images of the tumor and surrounding anatomy to optimize a treatment plan for delivering radiation according to the oncologist's specifications.

3

The radiation beam is precisely tailored to the shape of a patient's tumor. This shape changes as radiation is delivered from different angles, so that the tumor is always targeted and healthy tissues are protected.

