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(EDITORS: Your reporters and photographers are invited to attend a press demonstration of the medical linear accelerator at 2 p.m. Wednesday, April 25, in the Radiology Department of Stanford University Hospitals, Clay and Webster Streets, San Francisco.)

STANFORD UNIVERSITY, APRIL 27 -- Stanford University's long-awaited "cancer gun" was unveiled today at Stanford Medical School in San Francisco.

The six-million-volt, six-foot machine is a linear electron accelerator, baby brother of the massive 220-foot-long atom smasher located on the University's Palo Alto campus. Construction of the junior-size medical version took more than four years of intensive research and development by Stanford microwave scientists.

Though in operation only a few weeks and still undergoing operational tests, the medical linear accelerator already is treating selected cancer patients on a limited capacity schedule.

"It is still much too early for an appraisal of the machine's ultimate value in radiation therapy of cancer," said Dr. Henry S. Kaplan, head of the Radiology Department. "However, its performance so far is both clinically and technically gratifying."

The six-million-volt beam of electrons, converted to high energy x-rays, is expected to destroy cancerous growths deep within the body. Medical scientists hope it will accomplish this with minimal damage--compared to conventional x-rays--to outer layers of skin.

"It will be five to ten years before we can tell with certainty whether the new accelerator provides a significant improvement in this type of treatment," said Dr. Kaplan.

Medical reports in the past have indicated that the high energy x-rays make no distinction between bone, muscle, and fat as do "softer" conventional x-rays. The

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high energy rays penetrate all three with about equal ease. Thus bone is less likely to be damaged by radiation absorption during treatment of nearby tissues, and the target area will show no untreated "bone shadows."

Dr. Kaplan and Professor Edward L. Ginzton, director of Stanford's Microwave Laboratory, collaborated to direct construction of the medical accelerator. More than a dozen scientists have worked on the project, which was made possible by support from numerous agencies.

Approximately $113,000 was granted by the National Cancer Institute of the National Institutes of Health. Nearly $100,000 came from the American Cancer Society. Another $75,000 for the accelerator's specially designed and shielded building was donated by the James Irvine Foundation of San Francisco.

The basic studies for development of linear accelerators, which made construction of the medical version possible, were sponsored by the Office of Naval Research.

While many accelerators can be used for radiation therapy, Stanford's machine is the first one able to produce easily accessible high energy x-rays at relatively economical cost.

Its two-ton bulk hangs from the ceiling of a radiation-proof chamber. It rests in an electrically operated cradle that can tilt it up or down and raise or lower it vertically.

A motor-driven lead door seals the chamber during treatments. The accelerator operator sits outside at a control board, watching the patient through a window of three-inch lead glass.

Inside, the patient lies on a special treatment table or sits in a power-driven revolving chair, depending upon the treatment required. In either case he is carefully aligned beforehand with the x-ray beam, and held motionless by ingenious supporting devices. An "intercom" permits conversation between patient and operator.

Critical element of the machine is its high-vacuum, sealed copper tube, 6 feet long by 3½ inches in diameter. Through this tube electrons are accelerated to high energy at prodigious speed.

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The high vacuum in such tubes has always been maintained by constant pumping, and engineers doubted that a tube of this kind could be sealed off successfully.

Dr. Ginzton and his associates managed to do it by electroforming the entire tube. The process is similar to electroplating, and requires a full month to form a single tube. The tube then underwent a special baking process while under compression, during which all joints were sealed with gold.

The permanently sealed-off tube eliminates the need for costly mechanical pumps, liquid nitrogen, and other elaborate equipment. At the same time it provides greater flexibility in use of the machine, and less space is required.

These advantages of the sealed-off tube bring maintenance and operating costs for the medical accelerator down to a fraction of what they would otherwise be.

The electron beam is converted to high energy x-rays by placing a solid gold disc in its path. A brass disc beyond the gold one filters out soft, low energy x-rays that occasionally appear.

The x-ray beam has an intensity of over 100 roentgens per minute at a distance of about one yard. In use, its peak intensity occurs approximately one inch below the skin surface, and as much as 80 percent of its output penetrates to the deepest structures of the body.

Calibration tables which will show the various doses delivered to tumors at different depths, as well as to surrounding normal structures, are still being worked out by a four-man team of physicists. They are directed by Professor Mitchel Weissbluth, who is in charge of the machine.

Dr. Weissbluth's group now tailors calibrations to order for each patient. When they have completed the tables (probably within a year) physicians will be able to treat more patients than at present. A single treatment lasts only a few minutes, and the longest so far is eight minutes.

A lead diaphragm at the front of the accelerator adjusts like a theatrical spotlight to enlarge or shrink the radiation field. It can narrow the beam to a mere pinpoint, or spread it out over as much as 400 square inches.

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