

... Pions

normal tissue have not yet been reached, while the tumor responses have been "remarkably good. Many tumors have regressed two or three times faster with pion treatment than would be expected with ordinary X-rays," the UNM-Los Alamos group states. Full clinical trials for about 100 patients with advanced tumors of various kinds are about to begin.

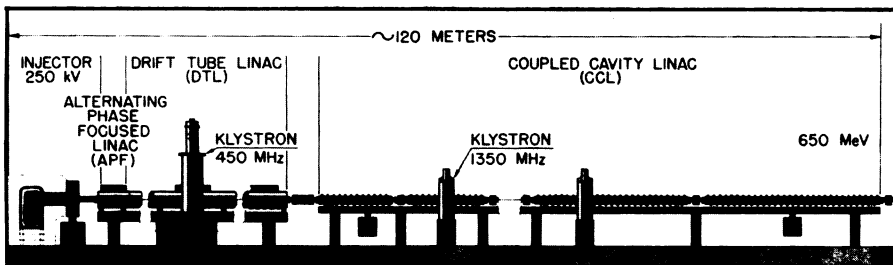
But Kligerman cautions that pion therapy is still in its infancy. "We are just at the point where we feel we can continue, not to where we can prove our hypotheses."

"It will take years to say whether pion therapy is superior to other treatments," says Malcolm Bagshaw, a radiation oncologist from Stanford University, who is visiting Los Alamos. "We are looking for local control where cancer has started. We probably can't do much about a cancer that has spread through the body."

Local control is important, because a large proportion of cancer patients die

we can show results." The written statement of the experimental group sees a 200 to 300 percent improvement in five-year survival rate as a sufficient basis to recommend government support of additional pion treatment facilities elsewhere in the country.

Already, however, a group of accelerator specialists under Donald Swenson, leader of the Linac Technology Group of Los Alamos's Accelerator Technology Division, is working on a pion source that may be applicable to such installations. It is called PIGMI (Pion Generator for Medical Irradiations), and it is designed to give somewhat less than LAMPF's total energy at much less cost and length. The hope is to get PIGMI to deliver 650-million-electron-volt protons in 120 meters (about the length of a football field). "We think PIGMI can be built for about \$10 million, and a small neutron-producing version for less than \$2 million [neutrons will also make pions when they hit nuclei]. Whether this will sell like hotcakes or not, we don't yet



Future pion medical facilities may use a PIGMI accelerator designed like this plan.



Gene Purkiss and Roy Slice operate the control room for the biomedical facility.

from continued growth of the primary tumor, and chemotherapy and immunotherapy are weak in their ability for local control. Nevertheless, pion therapy will have to show significant improvements over alternates to be worth the expense and effort.

Kligerman again: "If the cure rate for cancer of the lung is seven percent, and we increase that by 10 percent, we still only have a cure rate of 7.7 percent. But if we can increase the rate by 100 to 200 percent,

completely know," Swenson says.

Such an accelerator could be built in a chamber under a parking lot, especially if a design that includes a bending magnet to fold the length in half turns out to work, but the capital and operation costs mean that it would be for major medical centers only. Indeed, the price alone is likely to preclude the kind of rush to get one by neighborhood hospitals that greeted the introduction of computer assisted X-ray tomographs. □

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