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## State's bold technology bet

By Jeremy Manier Tribune reporter

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Proton therapy may be the next big thing in cancer treatment and a wonder of applied physics, but not everyone is convinced that the Chicago area needs two of the expensive, cutting-edge facilities.

State regulators last week approved a \$140 million proton therapy center for west suburban Warrenville, to be built just 9 miles from a \$159 million device under development in West Chicago. That's a bold bet on the technology, considering that the U.S. as a whole currently has only five proton treatment centers.

What is proton therapy, and why do some doctors think it can improve care for certain kinds of cancer patients? The answer begins with a 1946 paper written by physicist Robert Wilson, who later became Fermilab's first director.



## The physics

Wilson identified a potentially useful feature of protons, particles that normally are packed tight in the center of atoms. When a beam of protons strikes an object, the particles slow down and then release most of their energy in a quick burst just before they stop entirely.

Wilson realized that the localized burst of energy meant doctors could use protons to precisely target radiation treatment for cancer patients. Like other types of radiation treatment, proton therapy kills cancer cells by destroying their DNA. But other kinds of radiation therapy, such as high-energy X-rays, typically inflict damage on tissue around the tumor.

Proton therapy "minimizes damage to normal good cells in front of the tumor, and delivers no radiation beyond the tumor," said G.P. Yeh, a physicist at Fermi National Accelerator Laboratory, near Batavia, who has worked on such applications.

Fermilab constructed the first hospital-based proton therapy center at Loma Linda University Medical Center in California. In essence such facilities are small versions of Fermilab's mighty particle accelerator.

They speed up the protons and give them high energies, then direct the particles to a room where patients get the treatment.

## The debate

Proton therapy is most attractive for patients who need targeted radiation, especially pediatric patients.

For those younger patients, "the reduction in the dose to normal tissue means you can spare growing bones and other growing tissues," said Dr. Tom DeLaney, medical director of the proton therapy center at Massachusetts General Hospital in Boston.

Recent studies indicate that pediatric cancer patients may face decades of heart problems and other side effects from radiation treatment, making targeted therapies even more desirable.

But many cancer specialists are skeptical that proton therapy represents much of an improvement for most cancer patients. The therapy often is used for prostate cancer, even though many doctors say existing treatments can deliver the same benefit for patients at much less cost.

"Where I have grave reservations is the use of protons for common adult tumors," said Dr. Ralph Weichselbaum, chairman of radiation oncology at the University of Chicago Medical Center.

To date no controlled studies have shown that proton therapy benefits patients more than conventional radiation therapy. But DeLaney said numerous studies have found that the protons damage surrounding tissue less than other treatments—it's simply difficult to prove the targeted therapy produces better patient outcomes.

For one thing, such a study would require doctors to randomly assign some patients to receive X-ray therapy, even though doctors such as DeLaney believe patients are better off with proton treatment.

## Higher cost

Recent studies suggest the cost of proton therapy is about 2.5 times more than conventional radiation treatment per patient, on average. In practice, that means insurers get billed anywhere from \$25,000 to \$50,000 per course of proton treatment, experts said. Such high costs illustrate how the builders of such facilities hope to recoup the enormous upfront expenses. Assuming 1,000 patients per year or more once a facility gets up to speed, the centers can bring in more than \$25 million per year, said Yeh of Fermilab.

But in a health sector with skyrocketing costs across the board, many experts say doctors must work hard at identifying which patients would benefit most from the treatment, rather than simply handing it out to any customer who can pay.

"If the cost of proton therapy and [other radiation] therapy were equivalent, we'd be seeing proton centers all over by now," DeLaney said.

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