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Stanford's first proton therapy patient is 7. His case shows why the treatment matters

By Grant Stringer | The Mercury News

Stephen De La Torre, 7, is usually all smiles. But on a recent Wednesday at Stanford Medicine's cancer center in Palo Alto, the boy climbed resolutely into the chair of a first-of-its-kind treatment device, focused for the task ahead.

De La Torre had been diagnosed with an unusual form of cancer, a rare tumor attached to his brain stem. His hair, just an inch long, had begun to grow back after emergency surgeries and a course of radiation. Scars were still visible on his scalp.



Patient Stephen De La Torre, 7, prepares for treatment in Stanford Medicine's new upright proton therapy suite in Palo Alto.

Now, the boy prepared to sit still as a statue for a session of proton therapy. It's a less common type of radiation treatment — a beam of charged particles travels through the skin to deposit cancer-killing radiation in a tumor. For the treatment to be effective, De La Torre would have to be unmoving. As his family and doctors exited the room, the humming machine lowered a ring around his body. Behind him, hidden from view, was the world's smallest proton particle accelerator.

This month, De La Torre became the first patient treated with proton therapy in the Bay Area since the 1990s.

Specialists say proton therapy is a precise tool that shrinks tumors while limiting side effects by sparing healthy parts of the body from harmful radiation. It's considered especially useful for children, who are sensitive to radiation, and others with tumors in hard-to-reach locations.

Validation of Upright Positioning

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Most cancer patients receive X-ray radiation. Though effective, X-rays enter the body and exit the other side, exposing healthy tissue and organs. But with protons, the radiation stops at the tumor.

This form of radiation treatment has been used for decades, and is offered at about 50 U.S. centers and hospitals. But patients in the Bay Area have long had to travel hundreds of miles if their doctors recommended it.

The new proton therapy device at Stanford also represents a technological breakthrough, experts said. Recent innovations have slashed the size of a proton system from as big as a three-story building to fitting in one room — a "game-changer," said Billy Loo, a Stanford Medicine radiation oncologist.

Neither Stanford nor Mevion Medical Systems, a Massachusetts medical technology company that developed the new device, would disclose its cost, citing confidentiality agreements. But a spokesperson for Mevion said a similar project cost \$33 million elsewhere — roughly one-tenth the cost of some other, larger proton systems.

Mevion CEO Tina Yu said the U.S. Food and Drug Administration approved the new device for use in clinical settings in 2025, and testing had solidified its effectiveness as a cancer treatment. Its use with patients at Stanford, she said, would be its first true application.

"You can do a lot of things on paper," Yu said. "But can you do it with a seven-year-old boy?"

Alone in the treatment room, De La Torre held two stuffed animals for support.

Proton therapy is painless. Still, the boy was disconcerted during his first sessions in early June, said his mother, Tricia LaBrasca.

Technicians used a custom mask to keep his head in place for the radiation beam, but for the boy, "his only frame of reference is scary movies, or whatever," she said. So, a staffer painted it with the red, white and gold of the San Francisco 49ers.

Watching with monitors in a nearby room, the care team aligned the boy's position with advanced CT scans of his brain. The particle accelerator, six feet wide, sped protons in a circular route nearly to the speed of light. The beam of proton radiation traveled out of a nozzle and into the tumor in his brain.

Over days and weeks, the goal of the treatment was to destroy the DNA in cancer cells making up De La Torre's tumor.

His family and doctors had opted for proton therapy because of the sensitive nature of his cancer.

Radiation treatment is a balancing act: it also damages healthy tissue near tumors, which can cause side effects and injuries, like scarring or swelling on organs. Specialists are careful when using radiation with children, who may live longer and require radiation again in the future. The brain is also particularly sensitive to radiation injuries — another factor in the case of De La Torre.

Limiting unnecessary radiation in these cases is critical, said Susan Hiniker, a Stanford radiation oncologist involved in the boy's treatment.

"In many patients, especially those who are growing and developing or have tumors in certain areas, or have had previous radiation, that can be really important," she said.

The boy had already completed a four-week course of conventional X-ray therapy, which delivers "pretty well-focused treatments," Loo said. But when the new proton device was operational this month, the team incorporated that into De La Torre's plan.

"Every little edge we can get, we can take advantage of," he said.

For the Stanford oncologists, this first treatment was the culmination of a years-long effort to add proton therapy to the hospital's suite of cancer treatments.

In the 2010s, proton therapy systems were simply too big and too expensive to install on Stanford's jam-packed campus where "you can't take a parking space away from anybody," Loo said.

"Every site we evaluated, we had to cross off the list," he said.

The New York Proton Center, which opened in 2019, installed its system for more than \$300 million. The busiest proton center in the world, it occupies half of a block in Manhattan, said Charles Simone, its chief medical officer. The cyclotron, or particle accelerator, is 10 feet wide and weighs 90 tons, he said. Rotating mechanical arms, or gantries, direct the radiation beam. Each weighs 280 tons.

Until the 1990s, Loo said, doctors would send patients to Lawrence Berkeley National Laboratory for proton treatment. Scientists there had pioneered the technology in the 1950s. Ultimately, those systems were decommissioned, Loo said.

Critically, the new Mevion system fits in treatment rooms holding conventional X-ray radiation devices, which are common in the Bay Area and nationally. With that "first of its kind" breakthrough, Simone said, hospitals and proton centers should be able to incorporate that treatment more easily by converting existing vaults, as Stanford did.

In the new proton treatment room last week, De La Torre completed his second-to-last session. After about 10 minutes of sitting frozen in place, the seven-year-old shuffled out of the room with his mother, sister and grandmother.

Radiation therapy can cause headaches, fatigue and nausea in patients with head or neck tumors. De La Torre has had remarkably few side effects, said LaBrasca, his mother, a phlebotomist who herself works with cancer patients in their hometown of Lakeport.

"It hasn't slowed him down much," she said. "He gets a little groggy after treatments, but he hits the ground running every day."

The boy stepped out of the chair, thanked the staff and said goodbye — only to sheepishly return for a hug with Hiniker.

It would be a busy rest of the day. After De La Torre had his blood drawn, LaBrasca planned to take the family to Great America amusement park in Santa Clara or the pool. The boy is under doctor's orders not to submerge his head, but he can still swim, his mother said.

The next day, De La Torre finished proton therapy, rang the bell at Stanford, and LaBrasca began preparing to move

the family back to their home in Lakeport, a small town about 90 miles north of the Bay Area. They'll return to Stanford in late July for an MRI, to see how the tumor in his brain responded to the treatments.

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