New Hope for Kids With a Rare Disease, Thanks to a Dinner Party

And a box of mice. Wall Street couple pushed for first potential treatment of spinal muscular atrophy.

By Doni Bloomfield | September 2, 2016
Photographs by Uno Yi/Bloomberg

Lauren Gibbs looks at a schedule while visiting her friend at a yoga gym in Leawood, Kansas, on Aug. 11, 2016.

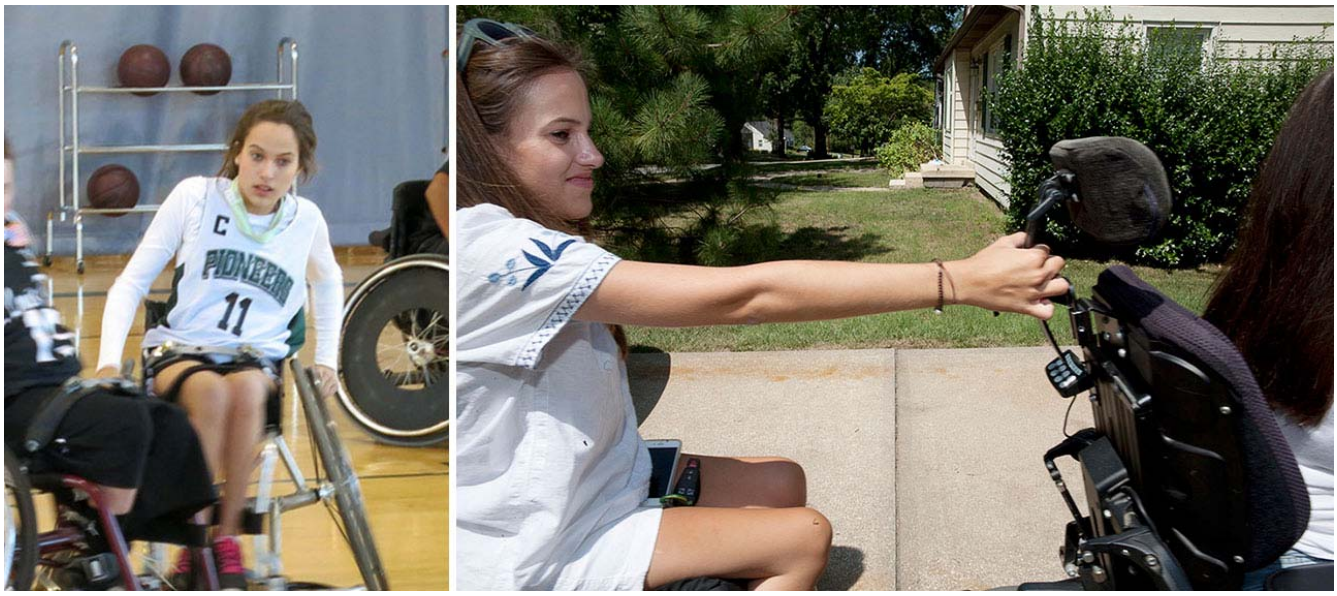
Since grade school, Lauren Gibbs had been a dogged defensive player on her wheelchair-basketball team. Offense wasn't a big part of her game because it was a struggle to heave the ball high enough to hit the rim.

Then Gibbs, who was born with spinal muscular atrophy, enrolled in a trial of an experimental drug developed by a startup, Ionis Pharmaceuticals Inc., and biotech giant Biogen Inc. "After the second time I got the drug, I hit probably 50 baskets in a row," said Gibbs, now 19 and a Baylor University sophomore.

The treatment, called nusinersen, will soon be reviewed by the U.S. Food and Drug Administration after the companies reported positive results from a final-stage trial last month. If the FDA approves it, nusinersen could help people like Gibbs and will show how private industry, philanthropists and patients can join forces to promote research into specific diseases.

What started as an idea in a Long Island, New York research lab got to the brink of FDA review with charitable support from Loren Eng, a former Morgan Stanley banker, and her husband, Dinakar Singh, chief executive officer of the hedge fund TPG-Axon Capital Management. The couple, who have given millions of dollars for science, helped seat

executives from the two companies together at a dinner, which launched the deal that would speed nusinersen ahead.



Lauren during a game with her wheelchair basketball team, left. Lauren hitches a ride from her sister, Claire, who also has SMA and uses an electronic wheelchair.
Source: Family handout (left); Uno Yi/Bloomberg

“This project is a prototypical example of how academia and industry and private foundations can” advance a drug, said Frank Bennett, Ionis’s head of research. “We didn’t do this by ourselves.”

It also took patients like Gibbs who enrolled in the trials necessary for approval by the FDA. Her disease, known as SMA, disables muscle-controlling nerve cells and affects more than 25,000 people in the U.S.—killing many before their second birthday. Gibbs has a milder form, and joined the tests four years ago. She saw the effects almost immediately.

The disorder was discovered in the early 1890s, when a retired Austrian army doctor, Guido Werdnig, wrote about babies who would lose their ability to sit and hold up their heads. Eventually, they became susceptible to infection, spiraling into immobility and death. By 1995, scientists traced the condition to a crucial protein, called survival motor neuron. When the SMN gene that makes the protein is broken or missing, nerve cells wither and die.

Gibbs has a milder form. Her body uses copies of a related gene, SMN2, to make a flawed yet workable version of the nerve cell protein. It’s enough to keep her alive, and it’s the foundation of a drug that began as an idea at the famed Cold Spring Harbor Laboratory in New York.

There, in 1999, a scientist named Adrian Krainer began looking at how to tweak SMN2 to provide even more benefit. At about the same time, Ionis’s Bennett was looking for opportunities to test his company’s technology to fine-tune the conversion of DNA code into protein. Their progress was quick, and by 2004 they ran into a problem: Mice they needed to test drugs were halfway around the globe in Taiwan, and obtaining them might have taken years.

Lauren and her sister, Claire, left, at home.
Photographer: Uno Yi/Bloomberg

That's where Eng and Singh stepped in. Their daughter also has SMA, and the Wall Street couple, who started the SMA Foundation in 2003, have said they've donated more than $100 million to a variety of research efforts, including the breeding of animals for research. They declined to comment for this article.

Eng got a shipment of the mice rushed from Taiwan to the U.S., Krainer said. Results came quickly, especially after nusinersen testing began in 2006.

"The mice go from living only 10 days to many mice surviving more than a year," he recalled.

But Ionis, a small biotech, wanted a big drugmaker partner. So, Bennett said, at an SMA foundation dinner in the summer of 2011, Eng arranged for him to sit next to Biogen Chief Medical Officer Al Sandrock.

Early in his career, as a doctor training in Boston, Sandrock cared for a baby on a ventilator whose room was strewn with flowers, cards and stuffed animals. When he tested the baby's muscles, they lacked nerve connections—the child had SMA.

As he talked with Bennett over dinner, Sandrock became convinced that Biogen needed to work with the smaller firm.

"You don't need to be a physician to see the treatment effect," Sandrock said. "I almost fell off my chair because it was a huge step forward." Flying back to Boston the next morning, he e-mailed his CEO George Scangos: "We have to do this deal."

Biogen paid $29 million up front for rights to license the drug in 2012, setting the stage for the biggest challenge yet—proving it could help people. Ionis reached out to patients like Lauren Gibbs. If she joined the trial, she'd be getting spinal injections of a potentially toxic drug.

Loren Eng, center, with her husband, Dinakar Singh, and their daughter on June 30, 2011.
Photographer: Paul Taggart/Bloomberg

Gibbs's father had known researcher Chris Lorson, who helped discover the SMN2 gene's involvement in SMA, since Lauren was a young child. They knew each other well enough that the elder Gibbs once sent a gift of barbecue sauce to Lorson's to show appreciation. With the Gibbs family around their kitchen table, Lorson "drew on a napkin how the drug worked so I understood it better," Lauren recalled.

She agreed to join. Other parents and children did the same—almost 130 babies were enrolled in a pivotal trial of the drug in the most lethal form of the disease.

A decade after the researchers saw the first promising signs in mice, Biogen and Ionis issued a statement on Aug. 1st. Babies who got the drug were developing motor skills faster than those who didn't. "You can go quicker, but then you're ratcheting up the risk that it won't get approved," said Kenneth Hobby, president of the advocacy group Cure SMA. "If you go too soon, you might lose everything."

Lauren and her father at home.
Photographer: Uno Yi/Bloomberg