Article from SIRS Discoverer Database; (ProQuest) Lexile:1270L

Lab Grows Bladders from Cells of Patients

ARGUS LEADER
(Sioux Falls, SD)
April 4, 2006, n.p.

Lab Grows Bladders from Cells of Patients

By Jeff Donn
Associated Press Writer

BOSTON (AP)--At age 16, Kaitlyne McNamara is different beyond her defective spine, crutch, leg braces and 54 surgeries. She has one of the world's first re-engineered bladders.

It is the first time a complex human organ like the bladder has been mostly replaced with tissue grown from a patient's own cells. Only simpler tissues--skin, bone, and cartilage--have been lab-grown and transplanted in the past.

"It's really science fiction at its best," said Kaitlyne's mother, Tracy McNamara.

The bladder transplants, performed on seven patients ages 4 to 19, were being reported online Tuesday in The Lancet medical journal--a breakthrough that could hold exciting promise for someday regenerating ailing hearts and other organs.

"This suggests that tissue engineering may one day be a solution to the shortage of donor organs in this country for those needing transplants," said Dr. Anthony Atala, the lead researcher.

Growing other organs will likely hold unforeseen challenges, however, since organs are so specialized in their functions, scientists stress.

Even for people with bladder disease--and there are an estimated 35 million in the United States alone--Atala's technique requires testing on more patients and for longer times, researchers say. Replacing an entire bladder would pose many more problems, including reconnecting urine tubes, blood supply and nerve signaling, according to Dr. Steve Y. Chung, an Illinois urologist who wrote a commentary for The Lancet.

Still, he called the work "a tremendous, tremendous advance."

For the children and teenagers in the study, the transplants reduced leaking from their bladders--a potentially big gain in quality of life. For Kaitlyne McNamara, the transplant has meant a new social life.

Since birth, the teen from Middletown, Conn., has coped with spina bifida, a defect that leaves the spine incompletely closed. She's trudged through a grinding series of medical tests, treatments and procedures.

There was the urinary infection that nearly killed her as a toddler. There were the surgeries to correct her spine and legs. By age 11, there was the kidney damage from her weak bladder that again put her life in jeopardy.

Yet maybe the worst part, for a teenager, was simply being different. "I didn't fit in with the kids," she said. "Sometimes the kids made fun of me."

It wasn't necessarily her crutch, braces, or 4-foot-2 height that set her apart, at least in her mind. It was more the accidents from her diseased bladder, which would frequently leak.

That was before her surgery five years ago. Now, her kidneys are working again, and she no longer wears a diaper. Instead, she was waiting for alterations on a low-cut champagne-colored dress for her junior prom.

"Now that I've had the transplant, my body actually does what I want it to do," she said last week. "Now I can go have fun and not worry about having an accident."

Scientists, marveling at how animals like salamanders regenerate lost limbs, have long toyed with the futuristic possibilities of regrowing worn-out or injured human parts.

Over the past decade, researchers began fashioning better scaffold-like platforms that hold growing cells and dissolve inside the body. The study of stem cells, which can mature into all the body's other tissues, has also supercharged progress in regenerative medicine.

The researchers at Children's Hospital in Boston used a more mature cell type known as a progenitor. They first operated on the patients to remove bad tissue that made up more than half their bladders. They fished out muscle and bladder wall cells, seeded them on cup-like bladder-shaped scaffolds of collagen, then let the cells reproduce in the lab for seven weeks. Starting with tens of thousands, they ended up with about 1.5 billion cells. The cell-bearing molds were then surgically sewn back to the remnants of the patients' original and partly working bladders, where the lab-nurtured cells kept maturing.

The team, which began its work in 1999, followed the last patient for almost two years. In undergoing the experimental procedure, the patients skirted the typical side effects of grafts that would otherwise have been made with their own intestinal tissue.

Atala, who has since moved to Wake Forest University, has already begun commercializing his transplant techniques through Tengion, a company he helped found in King of Prussia, Pa. It has licensing rights to patents on his work.

Some researchers were more cautious about the promise shown with the new procedure, saying the study lacks any direct comparison group of patients getting the traditional graft.

Dr. Joseph Zwischenberger, who edits the journal of the American Society of Artificial Internal Organs, questioned how well the new bladders worked in the first few patients and raised a "red flag" about two patients who left the study for personal reasons and were ultimately omitted from the results. He also said Atala's attempts to commercialize the technique should add some skepticism toward the findings, which he nonetheless called "very interesting preliminary data."

The patients in the study must still deal with the ravages of spina bifida, which can turn off nerve signals that keep the bladder healthy. It causes the stiff, leathery bladder to leak frequently.

The rebuilt bladders, though, were up to three times more elastic and better at holding urine, the researchers report. In all seven patients, kidney function was preserved, the study said. The patients must still empty their bladders regularly with a tube but can avoid leaking in between.

"You don't want your little girl to wear a diaper all her life," said Tracy McNamara.

She used to worry about her daughter dying from kidney damage or urinary infections. That's all faded into the past. Now, she worries about all the time her daughter fritters away on the telephone, talking to friends.