University of Utah doctor performs historic first procedure using new technique of retrograde gene therapy on a human heart

By: *Melinda Rogers* | *Nov 26, 2013 8:00 AM*

(Salt Lake City) — Ernie Lively moved to a scenic home in the mountains of Wasatch County to escape the hectic pace of Hollywood when he retired.

The actor, who resides in Heber City with his wife Elain has credentials that include a long list of TV and film appearances, including Passenger 57 and the Sisterhood of the Traveling Pants —the latter that he starred in with his daughter, Blake.

But retirement didn't provide Lively with the active lifestyle he craved because of simple reality: His heart was failing. He'd suffered a massive heart attack in 2003, which left him functioning on half a healthy heart. As time marched on, his ejection fraction —the measurement of the percentage of blood leaving the heart each time it contracts —continued to decline.

The condition left Lively without energy. Miles away from some of the world's best ski resorts, an envious Lively watched skiers from the sidelines, unable to participate in an activity he once loved. He barely had energy to walk up the 45 steps of his home without needing to stop —or take a significant rest afterwards.

"I live here because of the outdoor life, and I couldn't enjoy it," said Lively, 66. "I didn't have enough energy to do much of anything."

Frustrated with his quality of life, Lively connected with Amit Patel, M.D., director of Clinical Regenerative Medicine and Tissue Engineering and an associate professor in the Division of Cardiothoracic Surgery at the University of Utah School of Medicine.

Lively became a patient of Patel's in February, when Patel saved Lively's life after a complication with an angiogram left the actor with a severed aorta and problems with his coronary arteries. During the journey of his heart health issues, Lively peppered Patel with questions about one idea for helping to heal his ailing heart: stem cell therapy.

This month, Lively got his wish when he became the first patient in the world to undergo retrograde gene therapy at University of Utah Hospital, a novel procedure designed to deliver stem cells to the heart to repair damaged muscle and arteries in the most minimally invasive way possible.

Patel started investigating cell and gene-based therapies for the treatment of heart disease 12 years ago, but only recently received FDA approval to try the therapy on Lively, who was the first of several patients anxious to receive the treatment.

More than 6 million people are currently living with heart failure. As the condition progresses, patients' options are usually limited to a heart transplant or assist devices, such as an artificial heart. Patel wanted to find a way to intervene in the progression of heart failure before a patient advanced to the point of needing a heart transplant or device.

Patel and his team came up with the idea of retrograde heart therapy, a concept that has been discussed for 50 years. The first successful procedure was performed on Lively on Nov. 7.

"It's incredible. Imagine having a heart procedure that can potentially regenerate or rejuvenate your heart muscle — and it's done as an outpatient procedure," said Patel.

Patel uses a minimally invasive technique where he goes backwards through a patient's main cardiac vein, or coronary sinus, and inserts a catheter. He then inflates a balloon in order to block blood flow out of the heart so that a very high dose of gene therapy can be infused directly into the heart. The unique gene therapy doesn't involve viruses (a rarity for gene therapy, Patel notes) and is pure human DNA infused into patients. The DNA, called SDF-1, is a naturally occurring substance in the body that becomes a homing signal for a patient's body to use its own stem cells to go to the site of an injury.

Once the gene therapy is injected, the genes act as "homing beacons." When the genes are put into patients with heart failure, they marinate the entire heart and act like a look out, he said.

"The genes basically act like a light house with a bright signal. They say, ' How can we help the ships that need to get to the port — which is the heart –get there. When the signal, or the light from the SDF-1, which is that gene, shows up, the stem cells from not inside your own heart and from those that circulate from your blood and bone marrow all get attracted to the heart which is injured, and they bring reinforcements to make it stronger and pump more efficiently," said Patel.

After becoming the first patient in the world to undergo the procedure, Lively returned home and is recovering. Before the technique Patel used was available, Lively's other option would have been a three- to five- day hospital stay. Instead, he is recuperating while daydreaming about what it will be like to be able to ski and enjoy life fully again. He said he has noticed an immediate difference in his health following the procedure.

"I woke up this morning and told my wife, 'I haven't felt this good in years," said Lively. "I moved to Utah because of the snow, but I haven't been able to ski. I literally didn't have the heart to do it. Now, I'm excited about living the rest of my life instead of sitting around."

Besides skiing, Lively said he plans to use his newfound energy to travel and to keep up with his grandchildren. The patriarch of a showbiz family, Lively's son Eric is an actor who lives in Santa Monica, Calif. His children Lori, Robyn and Jason Lively and their families are split between Utah and California, with daughter Blake residing in New York with her husband, actor Ryan Reynolds.

"I have three rambunctious grandchildren in Utah and three more in California who are a lot of fun and keep me busy," said Lively. "And I think I'll have more. My youngest daughter is newly married and wants a big family. She says she wants 30 kids. I said, 'Why don't you start with one?"

Patel said watching Lively recover successfully from the surgery is both rewarding and exciting for what the future holds for the procedure and those who may benefit from it. He is already training other physicians around the U.S. to model what he accomplished first this month. He is overseeing a trial of the procedure in which 72 patients will participate over the next few months.

"This is one of the great moments in biological therapy for the heart," said Patel. "We are providing options for patients who have no possible solutions. This is one of the safest and most reproducible therapies out there for these very sick patients."

Said Lively, summing up the opportunity that Patel provided for him: "He saved my life."

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People

Blake Lively's Dad Speaks Out About His Groundbreaking Heart Procedure

By KEN LEE

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Ernie Lively and Blake Lively

ROBERT PITTS/LANDOV

Blake Lively's father, Ernie Lively, who suffered a massive heart attack in 2003, will now have more energy to chase after his grandkids following a groundbreaking heart procedure on Nov. 7.

"My youngest daughter is newly married and wants a big family," says Lively, 66, about Blake, 26, and son-in-law Ryan Reynolds, 37. "She says she wants 30 kids. I said, 'Why don't you start with one?'"

Lively, a veteran actor who lives in Heber City, Utah, with wife Elain, also 66, previously had only half of a functioning heart and had trouble walking up a flight of stairs.

After Lively connected with Dr. Amit Patel, a professor at the University of Utah School of Medicine's Division of Cardiothoracic Surgery earlier this year, he became the first known patient to undergo retrograde gene therapy for the heart – injecting a patient's own stem cells in the heart to repair damaged muscle and arteries.

"I woke up the other morning and told my wife, 'I haven't felt this good in years,'" said Lively, who has four other children, in comments released by the University of Utah Health Care.

"I moved to Utah because of the snow, but I haven't been able to ski," Lively added. "I literally didn't have the heart to do it. Now, I'm excited about living the rest of my life instead of sitting around. Dr. Patel saved my life."