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Cloning and Stem Cell Discoveries Earn Nobel in Medicine

Rob Stein

Thomas Perlmann

George Daley

John Gurdon

Daniel Sulmasy

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ROBERT SIEGEL: This year's winners of the Nobel Prize in Physiology or Medicine work in an area rife with ethical debate - cloning and stem cell research. The winners, John Gurdon of the University of Cambridge and Shinya Yamanaka of Kyoto University, conducted their experiments decades apart. But as NPR's Rob Stein reports, together, they transformed what we know about how cells work.

ROB STEIN: For decades, scientists thought that once a cell had become a skin cell or a blood cell or any other type of cell that was it. According to Thomas Perlmann of the Nobel Committee, the scientific dogma was that a cell's clock could never be reversed.

THOMAS PERLMANN: It seemed impossible for mature cells to travel back all the way to the immature state.

ROB STEIN: And that's where John Gurdon came in. In 1962, the British scientist stunned the scientific world. He cloned a frog, showing that genes in the cell from an adult animal could be reprogrammed. They could essentially be taken back in time to when a cell was in its most primitive, most versatile state.

THOMAS PERLMANN: At first, many were skeptical and surprised about this result. But this paradigm shifting discovery was confirmed.

ROB STEIN: Gurdon's shocking realization was confirmed most dramatically in 1997, when scientists announced they had used similar techniques to clone Dolly, the sheep. A year later, scientists discovered human embryonic stem cells. That was electrifying because those cells could be coaxed into any kind of cell in the body. But because embryonic stem cells come

Kyoto Exhibit 2003 <i>BioGatekeeper v. Kyoto University</i> IPR2014-01286

from embryos, those cells, like cloning, are highly controversial. That's where Shinya Yamanaka of Japan comes in. Thomas Perlmann of the Nobel Committee picks up the story with Yamanaka's pivotal experiments in 2006.

THOMAS PERLMANN: Shinya Yamanaka, over 40 years later, made the discovery that also whole, intact mature cells can be reprogrammed. And that this could be achieved by surprisingly simple procedure.

ROB STEIN: Yamanaka took skin cells from an adult and morphed them into the equivalent of embryonic stem cells, using just four genetic switches. He called these cells induced pluripotent stem cells, or IPS cells.

THOMAS PERLMANN: The IPS cell technique is a truly groundbreaking discovery that has opened up whole new research area in cell biology and medicine.

ROB STEIN: Groundbreaking because it raises the possibility of creating any cell in the body much more easily - cardiac cells to treat heart attack patients, neurons to treat Parkinson's. George Daley says the work by Yamanaka and Gurdon has already enabled scientists to get crucial new insights into many diseases, and test possible new treatments. Daley is a leading stem cell scientist at Harvard.

GEORGE DALEY: Sometime within the next decade, I would imagine that we will have cells being delivered as medicines.

ROB STEIN: Gurdon said one of the big advantages of such cells is that they will be perfectly matched to patient's immune systems.

JOHN GURDON: What you really want to do is to give people back their own genetic kinds of cells. And this, in principle, is possible.

ROB STEIN: And since the cells don't come from embryos, they sidestep all the moral and ethical questions raised by human embryonic stem cells. That's prompted some to argue that human embryonic stem cells are no longer necessary. Daniel Sulmasy argues that such cells seem to be a kind of ethical and scientific homerun. He's a professor of medicine and a bioethicist at the University of Chicago.

DANIEL SULMASY: That really may provide the solution to the potential dilemma between respect for human life, in its embryonic form, and the care of the sick.

ROB STEIN: But scientists like George Daley argued that embryonic stem cells will probably always be needed.

GEORGE DALEY: As embryonic stem cells remain a gold standard for research, it's still important that we have them and be able to use them side-by-side with IPS cells.

ROB STEIN: For their part, Gurdon and Yamanaka are basking in the glow of winning the Nobel. During news conferences in Kyoto and Cambridge, they both said they hope their research would eventually lead to safe new treatments for sick patients. Rob Stein, NPR News.

ROBERT SIEGEL: This is ALL THINGS CONSIDERED.

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