Researchers 'Clone' Human Embryos

For the first time, scientists have "cloned" human embryos, a step that has raised a host of ethical and scientific issues regarding the brave new world of reproductive research.

A team led by Robert J. Stillman and Jerry L. Hall of the George Washington University Medical Center in Washington, D.C., reported the research Oct. 13 at the annual meeting of the American Fertility Society. The duo appeared at a press conference this week to answer questions about their work.

Although it is not unusual for researchers to clone animal embryos, this marks the first known attempt to split a human embryo into individual cells, a technique more accurately described as "twinning." The practical application of the work is to boost the efficiency of *in vitro* fertilization, the procedure in which an egg and a sperm are united in the laboratory and the resulting embryo is placed in a woman's uterus.

Twinning could help women who produce very few eggs and thus have trouble getting pregnant, even with the aid of *in vitro* fertilization, Stillman says. By splitting an early embryo into its constituent cells, doctors could transfer more than one embryo, thus increasing the odds of a successful pregnancy. "Our research is one small step in that direction," Stillman says, adding that much more research remains before that vision becomes a reality.

The George Washington team began their experiment with 17 very young, flawed human embryos. These abnormal embryos result from the union between a single human egg and more than one human sperm. Such embryos contain too much genetic material and therefore are not viable.

First, the researchers used a chemical solution to strip the young embryos of their tough outer coating, called the zona pellucida. The shell-like zona pellucida protects the embryo, which at this stage has started to divide and consists of from two to eight cells. Next, the researchers carefully separate the individual cells and coat each with an artificial shell. The team created 48 embryos using this technique.

Cells split from a two-cell embryo appeared best able to divide, with some reaching the 32-cell stage of development, Hall said at the press conference. That finding suggests that researchers could create viable embryos with this process, although the abnormal embryos used in this experiment would not grow even if implanted. They were discarded after six days, Hall says.

If scientists go forward with this technique, it could be used to split a normal human embryo, one in which a single sperm has fertilized the egg. Thus, a researcher could fertilize one egg, let it divide, and then separate the cells, thus creating two, three, or more embryos, all carrying identical genetic material.

An infertile couple who had two such embryos implanted could end up with identical twins, Stillman says.

This research proves that splitting human embryos can be done, comments Robert Visscher, executive director of the American Fertility Society, which is based in Birmingham, Ala. "The question is, Should this research be done at all?"

Indeed, the research has sparked an ethical debate, with critics voicing many concerns. For example, couples could opt to implant one embryo and freeze the rest, notes Cynthia B. Cohen, executive director of the Washington-based National Advisory Board on Ethics in Reproduction. If the child created from the implanted embryo develops a failing organ later in life, one of the genetically identical embryos could be used as a source of "spare parts," she warns.

Scientists wonder whether the technique would really improve a woman's chance of becoming pregnant. Some women may produce eggs that appear normal but are somehow unhealthy, says Lucinda L. Veeck of the Jones Institute for Reproductive Medicine in Norfolk, Va. Splitting may merely lead to a host of unsuitable embryos, she says.

For now, such questions remain unanswered. The George Washington team has no plans to forge ahead until ethical guidelines are in place.

– K.A. Fackelmann

Shattering the SSC vision: What next?

The end came abruptly. Last week, the House voted overwhelmingly to reject further funding for construction of the $11 billion Superconducting Super Collider (SSC). Within days, Senate SSC supporters conceded and Congress allocated $640 million – funds originally slated for continuing the project in fiscal year 1994 – for shutting it down.

The decision strands thousands of physicists, engineers, and other workers attracted to Waxahachie, Texas, by the prospect of building a gigantic particle accelerator to probe the origin of mass, particularly the interactions that allowed energy to condense into a universe of protons, electrons, and neutrons. "This clearly has been devastating to our community," says Michael Barnett of the Lawrence Berkeley (Calif.) Laboratory. "They've devoted 10 years of their lives to this project. Right now, they feel like they've been shot in the knees. It really hurts."

House opponents of the SSC generally insisted that they were not rejecting the science behind the accelerator. They simply believed that the nation could no longer afford such an expensive undertaking. Reports of alleged mismanagement and cost overruns also hurt the SSC cause.

"I hope . . . that I am correct in interpreting the will of the House as a call for building better partnerships with other countries in the conduct of large science projects," said Rep. George E. Brown Jr. (D-Calif.), a strong SSC supporter. "The research that we envisioned for the SSC – and the economic spin-offs of that research – must continue."

One option open to the high-energy physics community is to throw their support behind the Large Hadron Collider, now under development at the European Laboratory for Particle Physics (CERN) in Geneva, Switzerland. But there's no guarantee that CERN will speed ahead with its project or that the United States will readily accept terms CERN sets for U.S. involvement.

"For years, in basic research, people came from around the world to the United States," Barnett says. Now, "a lot of us will be going to Europe to do research."

At the same time, the demise of the SSC might free up funds that could go to speeding up key improvements in the particle accelerator at Fermilab in Batavia, Ill. In the same energy and water development appropriations bill that killed the SSC, Congress allocated $25 million for the Fermilab modification and approved the expenditure of $36 million to start work on the B Factory at the Stanford Linear Accelerator Center (SN: 10/16/93, p.245).

"There are still some big questions out there to be solved, and the B Factory and the [Fermilab] upgrade are aimed at solving two of those," says Robert L. Park of the American Physical Society.

"I think the worst outcome would be that the United States feels that it can no longer support big projects," Park says. But "it is hard to see in this environment how any such project can survive to completion."

– I. Peterson