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## Cell Division

### **The right to life versus the right to life**

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*Illustration by Jamie Ezra Mark*

### **SCIENCE TOOK A GIANT LEAP FORWARD** in November 1998.

For the first time ever, human embryonic stem cells were successfully isolated and cultured, thanks to some pioneering developmental biologists from the University of Wisconsin (Madison). Theirs was a breakthrough that revealed the very essence of humanity. It also had the potential to completely alter and improve the practice of medicine. While most people had never even heard of embryonic stem cells, they would soon spark a debate that would carry over into all levels of society, the halls of Congress, and even the White House.

Human embryonic stem cells, which are derived from fertilized embryos less than a week old, have the ability to form any adult cell made by the human body. Because these cells are undifferentiated, they can potentially provide an unlimited source of specific, clinically important adult cells including bone, muscle, liver or blood cells. Using surplus embryos produced by in vitro fertilization and donated by couples who no longer wanted to use them for implantation, the team from the Madison campus, found they were able to develop the cells into a variety of specific cell types, including neural, gut, muscle, bone and cartilage cells.

Embryonic stem cells have since become of great interest to science and medicine. Theoretically, if stem cells can be grown and their development directed, it would be possible to grow cells of medical importance such as bone marrow, neural tissue or muscle. What's more, the first potential applications of human embryonic stem cell technology may be in the area of drug discovery. Treating specific cell types with chemicals and measuring their response offers a short cut to sort out chemicals that can be used to treat the diseases that involve those specific cell types. Stem cell technology therefore, would permit the rapid screening of hundreds of thousands of chemicals that must now be tested through much more time-consuming processes.

Embryonic stem cell research also benefits the study of human development which, until recently has been difficult, if not impossible, to study. Stem cells offer insights into developmental events that cannot be studied directly in humans in utero, or fully understood through the use of animal

models. Understanding the events that occur at the first stages of development has potential clinical significance for preventing or treating birth defects, infertility and pregnancy loss. A thorough knowledge of normal development could ultimately allow the prevention or treatment of abnormal human development.

Stem cells offer the ability to grow all kinds of human tissue. It opens the door to treating a range of cell-based diseases and to growing medically important tissues that can be used for transplantation purposes. Diseases like juvenile onset diabetes, mellitus and Parkinson's disease occur because of defects in one of just a few cells types. Scientists believe that replacing faulty cells with healthy ones offers hope of lifelong treatment. They also believe failing hearts and other organs could be shored up by injecting healthy cells to replace damaged or diseased cells.

There are several approaches now in human clinical trials that utilize mature stem cells (such as blood-forming cells, neuron-forming cells and cartilage-forming cells). However, because adult cells are already specialized, their potential to regenerate damaged tissue is limited: skin cells will only become skin and cartilage cells will only become cartilage. Adults do not have stem cells in many vital organs, so when those tissues are damaged, scar tissue develops. Only embryonic stem cells, which have the capacity to become any kind of human tissue, have the potential to repair vital organs. Many believe embryonic stem cells represent hope for millions of Americans. They believe they have the potential to treat or cure a myriad of diseases, including Parkinson's, Alzheimer's, diabetes, heart disease, stroke, spinal cord injuries and burns.

**THIS RESEARCH** is still in its infancy and practical application will only be possible with additional study. Scientists need to understand what leads cells to specialization in order to direct cells to become particular types of tissue. Research is required to determine how to control the differentiation of stem cells so they will be therapeutically effective. Research is also necessary to study the potential of immune rejection of the cells and how to overcome that problem, but the current debate over ethics is preventing it from moving forward.

The U.S. House of Representatives passed H.R. 810, Stem Cell Research Enhancement Act by a vote of 238 to 194 on May 24, 2005. The bill would have allowed federal funding for embryonic stem cell research on cells "derived from human embryos that have been donated from in vitro fertilization clinics, were created for the purposes of fertility treatment, and were in excess of the clinical need of the individuals seeking such treatment."

When President Bush vetoed the Stem Cell Research Enhancement Act of 2005 he argued: "If this bill would have become law, American taxpayers would, for the first time in our history, be compelled to fund the deliberate destruction of human embryos and I'm not going to allow it. I made it clear to the Congress that I will not allow our nation to cross this moral line. Crossing the line would needlessly encourage a conflict between science and ethics that can only do damage to both, and to our nation as a whole. If we're to find the right ways to

advance ethical medical research, we must also be willing, when necessary, to reject the wrong ways.”

The “moral line” Bush spoke of begs the question at the center of the stem cell debate: when does life begin?

Some claim it is when there is a heart beat; others say it is at conception. Still the question persists, when does conception occur? Is conception the moment when the egg is fertilized by the sperm, or is it when the egg is fertilized within the womb? Perhaps even more confusing, is it the moment, in the case of in vitro fertilization, when the fertilized egg is placed in the womb? A fertilized egg outside of the womb cannot survive on its own, so what is the true scientific and moral definition of conception? Are they the same, or are they different?

Three weeks after a conventional conception, the heart begins beating; within six to seven weeks brain waves can be detected, all vital organs are present and fingers and toes can be seen as the baby moves its arms and legs. The baby responds to touch at nine weeks with its tiny hands able to grasp an object, and at 16 weeks it can hear and recognize its mother’s voice.

What of the fertilized embryo outside of the womb that is less than a week old and has no heartbeat or brain waves? Is it human life, or is it a mass of cells preparing to become a human life? It is that embryo science wants to use for stem cell research.

**PRESIDENT BUSH BELIEVES** life begins at conception. His belief is stopping federal funding and oversight, something Congressman Dennis Kucinich (D-OH) believes is wrong. He says, “Embryonic stem cell research will continue with or without the federal government. This bill would have expanded federal research, which would have been subject to greater oversight and safeguards.”

Our local congressman, Cliff Stearns (R-FL), agrees with the president that life begins at conception, arguing, “It is not justifiable to destroy an innocent life in pursuit of research that could save other lives.” Stearns voted against H.R. 810, and he voted to uphold the president’s veto while our neighboring congresswoman, Virginia Brown-Waite (R-FL), saw it differently. She voted for federal funding of embryonic stem cell research and she voted to override Bush’s veto. She falls in line with science rather than religious belief.

“I specifically supported H.R. 810 because it adds moral and ethical regulations that are today only optional for the bio-medical industry. As a mother and a grandparent, I cannot ignore the possibility that this research could cure our children of some of the most horrendous and deadly diseases. I look forward to this bill’s reintroduction next Congress,” Waite says.

**Patricia E. Berg, Ph.D. and associate professor,  
Department of Biochemistry and Molecular Biology, George  
Washington University Medical Center, does not mince words**

**on the issue, saying, "My position — as a scientist — is that the Administration is blocking science, that life- saving research is needed, that existing cell lines President Bush allowed have deteriorated, and that all lines without limiting them to existing ones should be allowed in any case. Moreover, the limited cell lines authorized by the Administration might have picked up a mouse virus since some of the human lines were grown together with mouse feeder cell lines in the same flask. In addition, it is accepted that cell lines change genetically over time, acquiring characteristics that allow them to grow better in culture. This means that scientists must be able to establish new lines as the older ones change, but the Administration has blocked doing so."**

**Dr. Berg is more in step with what the American people believe than are George Bush and Cliff Stearns. In an August 10 ABCNEWS/Beliefnet poll, Americans supported stem cell research by a 2-1 margin and said it should be funded by the federal government, despite controversy over the use of human embryos. The poll found that 58 percent of Americans support stem cell research, while 30 percent oppose it. Six in 10 also say the federal government should fund it.**

The race for governor in Florida is even a battleground. Democratic nominee Congressman Jim Smith supports stem cell research, voted for it and voted to override Bush's veto saying: "I voted to override the President's veto because he is wrong to put politics before sound science and the prospect of a cure for countless Americans. I was greatly disappointed that President Bush ignored the pleas of patients, our nation's leading scientists and health organizations, as well as leaders such as former First Lady Nancy Reagan and Senator Orrin Hatch." Charlie Crist on the other hand has a firm record as being pro-life, defending the rights of parents to know when their daughters are seeking an abortion and opposing government funding of stem cell research.

**PRESIDENT BUSH CLAIMS THE MORAL** authority to oppose government funding of embryonic stem cell research, saying that because there is private research he is not stopping it. While it is true that some research is continuing, absent of government oversight and funding, any breakthroughs or discoveries will belong to the organizations and/or pharmaceutical and medical corporations that make the discoveries. It is possible for someone holding a cure for cancer to purposely hold it back in order to continue reap the profits from existing ineffective treatments. Conversely, the cost of the cures from any breakthrough could be priced to make them unavailable to the average person.

There is no guarantee that embryonic stem cell research will be the miracle many say it can be. It could well be a nightmare waiting to be unleashed and could easily explode into a cancerous mass following a stem cell implant,

making the cure worse than the problem. Some say we are ignoring a potential danger to patients, a medical Pandora's box, if you will, but how will we ever know without the proper safeguards and government oversight?

**Bob Weiner, National Democratic Strategist and former Chief of Staff, U.S. House Aging Committee and Subcommittee on Health and Long Term Care under Chairman Claude Pepper (D-FL) says, "From my own view, the people who want to put their heads in the sand barring research to improve human health from embryos that would never become people, because they would never have had the opportunity, are ostriches themselves."**

**Ocalans seem to agree with Mr. Weiner and disagree with Mr. Bush and our own congressman. We mirror the nation (58 percent for and 30 percent against) with 55 of 84 people surveyed [see page 87] supporting government funding of embryonic stem cell research (65 percent), while 23 of 84 do not (27 percent).**

Many in our city and all over the nation feel it is not only unfortunate, but also a travesty that politics has not put the well being of its citizens first. Are we dealing with a matter of conscience, is it a matter of science, or is it a bit of both? Where do we draw the line to make the proper decision? Only time knows how we will choose to answer those questions. So science must continue to wait, nearly a decade after it took its great leap in that laboratory on the Madison campus, for the rest of us to catch up.