Sunday, March 22, 2009 – Faith & Values

DILEMMAS & DECISIONS: THE ETHICS OF HEALTH CARE

Stem cell future

Those touched by diseases place hopes in research

BY ADAM PARKER
The Post and Courier

***Editor's Note**: This is one in an occasional series of articles devoted to medical ethics. In it, the significance of President Barack Obama's March 9 executive order concerning stem cell research funding is considered by two prominent bioethicists and others concerned with the issue.*

Maybe Pamela Quattlebaum's Parkinson's disease was triggered by a concussion she suffered after falling from a horse during a long-ago foxhunt.

She's got good reason to think so. A 2003 study published by the American Academy of Neurology found that those who have experienced a head injury are four times more likely to develop the disease than those who have never had a head injury. The risk increases eightfold for people who have required hospitalization for head trauma, and it increases 11-fold for patients who've been injured severely.

Quattlebaum, 62, was diagnosed with Parkinson's in 1985 when she was only 38. The disease has progressed slowly but inexorably. Early on, she avoided thinking about it and avoided others with the disease.

"The less I did about it, the happier I was," she says.

But she feels differently now. Accustomed to the degenerative nature of her condition, and fresh from her second battle with breast cancer, serious disease isn't a scarlet letter. It's pervasive.

For Quattlebaum and millions of others struggling with disease and injury, stem cells might contain a key that unlocks a medical future of successful therapies and cures.

But if other medical research is any indication, it will take many years of careful study and experimentation before useful treatments are developed.

And then there are the ethical considerations.

The advantage of using adult stem cells is that the source is an individual with whom the genetic composition of the cells is compatible, according to the National Institutes of Health. Since the adult stem cell is derived from a living person, often for use by that person, research and therapies that rely on them are not considered controversial.

Embryonic stem cells, cultivated at the five-day-old blastocyst stage, are more abundant, more flexible and develop faster in the laboratory. They require less manipulation than adult stem cells, and they are more likely to cure genetic disorders. But to get at the cells, the embryos are destroyed.

On March 9, President Barack Obama signed an executive order lifting the restrictions on federal funding for embryonic stem cell research that had been imposed by former President George W. Bush in 2001. Quattlebaum said the policy change comes as a relief. So long as clear research guidelines are in place, she has no qualms about the ethics involved; stem cells offer great promise, and people who struggle with disease should be the priority, she said.

"There are people already alive who can use them and who desperately want them," Quattlebaum said. "It's probably too late for me."

* * *

1. *Today, with the executive order I am about to sign, we will bring the change that so many scientists and researchers; doctors and innovators; patients and loved ones have hoped for, and fought for, these past eight years: We will lift the ban on federal funding for promising embryonic stem cell research.*

You could say the controversy in the U.S. over embryonic stem cell research began with legalized abortion in 1973 and the anti-abortion movement that developed in response. Those opposed to abortion typically argued that since life begins at conception, terminating a pregnancy, however early, was akin to murder.

Since embryonic stem cells are derived from a fertilized egg at the blastocyst stage (about the fifth day of development) in a process that destroys the embryo, opponents say it's immoral.

In 1995, citing ethical concerns, then-President Bill Clinton authorized the use of federal dollars to fund research only on existing embryos left over at fertility clinics after in-vitro treatments.

That year, Congress intervened, passing an appropriations bill containing the Dickey Amendment, a rider that prohibits federal funding of research that either creates or destroys embryos. The ban took effect in 1996.

In August 2001, President George W. Bush forged what might be considered a middle road, authorizing the use of federal funds for research using 21 stem cell lines (populations of dividing cells each derived from a single parent group) that already existed, but banning the use of public money for research on stem cell lines not yet available.

Supporters of the Bush policy claimed a moral victory, for no new embryos would be destroyed as a result of public funding. Opponents pointed out that the policy was inherently contradictory since Bush was permitting some embryos to be destroyed and failing to prohibit privately funded research, which would destroy many more.

What's more, critics argued, the policy would limit the ability of researchers and doctors to help millions of people with a variety of diseases and injuries, such as Parkinson's, ALS, multiple sclerosis, spinal cord trauma, diabetes and heart disease.

Privately funded research never has been restricted by Clinton, Bush or Congress, and some important discoveries have been made as a result. But many doctors and researchers say that real progress can be made only when government, historically the biggest funding source for scientific research, throws its full weight behind work that might lead to promising new therapies and cures.

2. *At this moment, the full promise of stem cell research remains unknown, and it should not be overstated. But scientists believe these tiny cells may have the potential to help us understand, and possibly cure, some of our most devastating diseases and conditions.*

When Obama signed his executive order, he lifted the ban on taxpayer-funded research on existing stem cell lines but did not authorize scientists to create new ones. Whether that happens depends on the National Institutes of Health, which Obama empowered to devise a set of guidelines governing how stem cell research is conducted.

But his message was clear: He wants the U.S. to take the lead on such research.

“Ultimately, I cannot guarantee that we will find the treatments and cures we seek. No president can promise that,” he said. “But I can promise that we will seek them - actively, responsibly, and with the urgency required to make up for lost ground.”

The fact is, no one knows whether embryonic stem cells will yield useful treatments and cures. The research is nascent and has been restricted for nearly a decade. But most scientists agree that more research opportunities, not less, are desirable, and that embryonic stem cells represent huge potential.

“Anything we can do more to learn about stem cell biology can have a broad impact,” said Steve Lanier, associate provost for research at the Medical University of South Carolina.

In just 10 years of limited research on embryonic stem cells, scientists already have been presented with challenges. The cells can cause tumors. And because they contain genetic material from two people, any tissue cultivated from them could be rejected by the patient.

3. *Medical miracles do not happen simply by accident. They result from painstaking and costly research - from years of lonely trial and error, much of which never bears fruit - and from a government willing to support that work. When government fails to make these investments, opportunities are missed. Promising avenues go unexplored. Some of our best scientists leave for other countries that will sponsor their work.*

“No actual scientist can say with any degree of certainty whether it will be embryonic, fetal, adult, clones or induced stem cells ... that will prove most effective,” Arthur Cap-lan, director of the Center for Bioethics at the University of Pennsylvania, wrote in an essay for MSNBC.com. “It will take a lot of money and at least five to 10 years to find out. Uncertainty simply is the state of stem cell science.”

It took 50 years of aggressive funding, research, trials and treatment to get bone-marrow transplants right, Caplan said in a telephone interview. Marrow is a source of blood cells and contains stem cells that, when introduced in patients with leukemia or other cancers, can replace diseased blood.

When the treatment was first used, it killed more people than it saved due to rejection, Caplan said.

Stem cell research enjoyed a breakthrough when, in 2006, Japanese researcher Shinya Yamanaka, a professor at the Institute for Frontier Medical Sciences at Kyoto University and at the David Gladstone Institutes in San Francisco, found a way to reprogram, or “induce,” stem cells from adult mice so they would behave like embryonic cells. A year later, he and his team did the same thing with human stem cells.

The implications were profound, and some therapies already are in use. Embryonic stem cells can develop into virtually any kind of tissue, but until this breakthrough, adult stem cells could be used mostly with the same kind of tissue from which they originated.

Critics of embryonic stem cell research argue that this new capability precludes the need to destroy embryos. But Caplan said embryonic stem cell research is so young, the promise it holds out so great and the opportunities to propel the U.S. into a leadership position so significant, it would be foolish to inhibit it.

“The people who know best - scientists and doctors - are nearly unanimous in the belief that embryonic stem cell research ought to be generously funded and aggressively pursued,” he wrote.

What’s more, the U.S. has fallen behind because of the controversy. Researchers have avoided the field for fear of being restricted or limited by government policy. Like everyone

else, scientists “follow the money,” Caplan said. “They don’t just want money, they want steady money.”

4. *But in recent years ... our government has forced what I believe is a false choice between sound science and moral values. In this case, I believe the two are not inconsistent. As a person of faith, I believe we are called to care for each other and work to ease human suffering.*

The Catholic Church and other opponents to embryonic stem cell research hold that personhood begins at conception. To destroy an embryo, then, is fundamentally wrong.

“Just because it’s microscopic doesn’t change the reality that it’s a human person,” said Steve Gajdosik, spokesman for the Catholic Diocese of Charleston. “There is no difference between the moment before implantation and after.”

Church doctrine condemns not only embryonic stem cell research but most assisted fertilization techniques, including in-vitro, which results in the discarding of defective and unused embryos.

But most bioethicists, including Caplan and the Medical University of South Carolina’s Robert Sade, make a distinction between “potential” and “actual” human beings.

Caplan and Sade likened the embryo to an acorn. The acorn has the potential to grow into an oak tree, but it is not an oak tree and will only become an oak tree under the right circumstances.

“Living things have potentialities that inorganic things don’t have,” Sade said. “The goal of a living thing is to actualize its potentialities.”

Intentions matter in bioethics, Sade said. Doctors interfere with the natural progress of human life all the time, always with the goal of helping to extend life or ease suffering. When such goals are justified, the doctor stands on firmer ethical grounds, even if damage is done in the process, he said.

Doctors do damage when they perform surgery. They do damage when they administer medicines that provoke side effects. They do damage when they intervene in emergencies. But most of these acts are morally acceptable when they’re done with good intentions and when the problems they cause are better than what might have ensued had there been no intervention, Sade said. The key is to ensure the patient, or another moral agent acting on his behalf, provided informed consent.

Embryos are not moral agents, Sade said. They have only the potential to become moral agents.

“A man gets enough signatures on a petition and decides to run for president. He is a potential president,” Sade said. “Does that mean he has all the rights and privileges of the president?”

Caplan went a step further, saying that not all embryos are potential people. The potential to develop into a person depends on many factors, he said. About 40 percent of embryos fertilized during the conjugal act never implant in the woman’s uterus, he said. They leave the body without her knowing. Many others implant but don’t develop.

“It’s true that life begins at conception, but it isn’t true that every conception begins life,” he said. “Not every embryo has the potential to become a person.”

5. *It is a difficult and delicate balance. Many thoughtful and decent people are conflicted about, or strongly oppose, this research. ... (Promoting science) is about ensuring that scientific data is never distorted or concealed to serve a political agenda - and that we make scientific decisions based on facts, not ideology.*

Science should be pursued without political interference, Obama said. But many critics of his stem cell policy argue that separating science and politics is virtually impossible, and it is disingenuous of Obama to suggest otherwise.

Moral concerns are all-encompassing, Louis A. Ruprecht, chairman of religious studies at Georgia State University, argues in a recent essay posted on the Web site of Religion Dispatches.

"This kind of rhetoric is maddening to conservatives and rightly so," Ruprecht wrote. "It places their moral concerns on a backburner, by suggesting that the articulation of such concern makes one anti-scientific."

Ruprecht goes on to cite the long history of conflict between state and science (Remember Galileo? Descartes?), insisting that depoliticizing science is a false goal. Besides, he wrote, science is not always the innocent party, and it would behoove the president to engage in a healthy discussion with his critics.

"There is a well-meaning middle here, a group of citizens who remain deeply concerned that federally funded science has given us not only new medicines and life-saving cures; it has given us human cloning, global warming and the bomb. These are the people with whom the president can and should be in dialogue," he wrote.

6. *I can also promise that we will never undertake this research lightly. We will support it only when it is both scientifically worthy and responsibly conducted.*

The flare-up in debate since Obama's announcement might signify the peak of the "embryo wars," according to Caplan. A consensus is emerging in the scientific community that the moral and ethical arguments in support of embryonic stem cell research outweigh the arguments against it.

If we deem an embryo to be fully human, its value is equivalent to an adult combating a disease that might be alleviated by treatments derived from stem cells, Sade and other bioethicists say.

Further, a majority of embryos, both naturally and artificially produced, never develop into babies because they fail to implant in the uterus, contain abnormalities or go unused at fertility clinics.

The Catholic Church might condemn in-vitro fertilization, but that hasn't stopped many Catholics from pursuing it, Caplan said. Society mostly has validated assisted fertilization as a reasonable medical alternative to natural pregnancy.

Over the past 30 years, about 750,000 embryos have been frozen by clinics in Australia; more than 500,000 are frozen in American clinics. Since most doctors will implant only two or three at a time, and since doctors assess their viability to last only about five or six years, the vast majority of these embryos have been, and will be, discarded.

"Why would we not permit these embryos, which already exist and whose fate is sealed, to be used in research?" Caplan asks.

GLOSSARY

Adult (or somatic) stem cell: An undifferentiated cell found in a differentiated tissue that can renew itself and differentiate (with certain limitations) to give rise to all the specialized cell types of the tissue from which it originated. Scientists do not agree about whether or not adult stem cells may give rise to cell types other than those of the tissue from which they originate.

Blastocyst: A preimplantation embryo of about 150 cells produced by cell division following fertilization. The blastocyst is a sphere made up of an outer layer of cells, a fluid-filled cavity and a cluster of cells on the interior.
Differentiation: The process whereby an undifferentiated embryonic cell acquires the features of a specialized cell such as a heart, liver or muscle cell.
Directed differentiation: Manipulating stem cell culture conditions to induce differentiation into a cell type.
Embryo: In humans, the developing organism from the time of fertilization until the end of the eighth week of gestation, when it is called a fetus.
Embryonic stem cells: Primitive (undifferentiated) cells derived from a five-day preimplantation embryo that have the potential to become a variety of specialized cells.
Embryonic stem cell line: Embryonic stem cells that have been cultured under in-vitro conditions that allow proliferation without differentiation for months to years.
Human embryonic stem cell: A type of stem cell derived from the inner cell mass of the blastocyst.
Stem cells: Cells with the ability to divide for indefinite periods in culture and to give rise to specialized cells.
Undifferentiated: A cell that has not yet generated structures or manufactured proteins characteristic of a specialized cell type.

On the web

--To read Arthur Caplan's commentary, see www.msnbc.msn.com/id/29588190.
--To read Louis Ruprecht's essay, see www.religiondispatches.org/blog/politics/1211.
--To read President Barack Obama's stem cell speech, see www.whitehouse.gov/the_press_office/Remarks-of-the-President-As-Prepared-for-Delivery-Signing-of-Stem-Cell-Executive-Order-and-Scientific-Integrity-Presidential-Memorandum.
--To access information on the bioethics of stem cell research, see http://bioethics.od.nih.gov.
--To watch the video "From Fertilization to Blastocyst," see http://stemcells.nih.gov/info/cellmovie.htm.