



UNPOPULAR SCIENCE: A laboratory technician in New Jersey processes umbilical cord blood.

Miracle cells

SCIENCE: Cutting-edge researchers are making unheralded breakthroughs with stem cells from umbilical cords—but have a hard time breaking through the NIH funding wall. “I think people who want embryonic stem cells just don’t want [alternatives] to work” | by Lynde Langdon in Lawrence, Kan.

AT THE UNIVERSITY OF KANSAS, Dr. Kathy Mitchell has two small labs that resemble high-school biology classrooms, just with more expensive equipment. In the smallest one, the size of a large supply closet, she pulls up a computer screen showing fluorescent dots in a sea of translucent green. She clicks her mouse, and the dots, which are stem cells,

start to repair a gash in the green membrane, which is a layer of kidney cells.

Dr. Mitchell wants to test on animals what she has learned under the microscope about fixing kidney damage. It would bring her one step closer to healing the malfunctioning kidneys of people with leukemia, diabetes, and other disorders. She might someday save the healthcare system millions in dialysis costs, if she

could just get a little funding for her research. The National Institutes of Health has shunned her grant applications three times. In one grant review, a fellow scientist commented that her stem cells come from tissue inside umbilical cords, not days-old embryos.

“We already have a good source of stem cells,” the grant reviewer wrote. “Why do we need another?”

But ethical questions surround the practice of extracting stem cells from embryos. While stem cells from embryos can produce all the tissue in the body, recovering them destroys the embryo. Doctors can extract stem cells from an umbilical cord with no negative impact on the infant.

Dr. Mitchell and Harvard researcher Dr. Denise Faustman say they have little to contribute to the ethical debate of using embryonic stem cells but much to contribute to medicine. Those contributions, however, have been ignored and even delayed because of the public fray over embryonic stem cells, they say.

Dr. Faustman also said she believes some research, such as her studies of the role of proteins in diabetes, has had little support or recognition because it goes against the popular belief that embryonic stem-cell research is the answer to curing diseases.

Science has always had its own popular culture, Dr. Faustman said. “It’s pretty typical for research to go through phases where one discipline is emphasized over another,” she said.

Frequently, the scientists supporting the popular culture are the ones deciding which research projects receive grants from the NIH. The NIH provides the bread and butter for medical research in the United States—more than \$19 billion a year in grant funding since 2002. Before a scientist can tap into that money, a panel of peers must review and accept the scientist’s research proposal. If a research proposal goes against the flow of popular science, it will have a hard time getting through the peer review process, Dr. Faustman says.

Drs. Mitchell and Faustman have both been frustrated by peer review. The problem, Dr. Faustman says, is that her peer reviewers also compete against her for different grants.

“The review is totally different than every other segment of the economy,” she says. “If every time you wanted to open a



SWAIN: "The national apology would not simply be an apology of whites to blacks."

WORLD: Some who are pushing for an apology say it should and would be followed by a program of financial reparations, but how could such a program be administered, given the biracial ancestry of many Americans?

CMS: I am not a proponent of monetary reparations for slavery for many reasons. African-Americans make up 13 percent of the total U.S. population. At least 5 percent of African-Americans and significant percentages of affirmative action beneficiaries are the offspring of more recent immigrants and are not direct descendants of American slaves.

Financial reparations for slavery would create an administrative nightmare for the government, it would be extremely divisive and counterproductive to promoting racial reconciliation, and most importantly it would not solve the most pressing problems affecting black communities. It is critical, therefore, that we distinguish the appeal for a national apology from the vociferous demands for slave reparations heard in recent years.

WORLD: You're not looking for reparations, but why wouldn't an apology further the cause of those who are?

CMS: A national apology for slavery is not an admission of guilt that could be successfully used in a court of law to justify the payment of monetary reparations. All indications suggest that the legal case for slave reparations has been put to rest by the failure of its advocates to prevail in a series of cases that have established important precedents.

Insurmountable obstacles include the lack of anyone alive with the legal standing to bring forth a valid claim of injury, traceable to the actions of an identifiable wrongdoer. Moreover, the statute of limitations and the lack of an adequate remedy at law mean that a legal case would not be advanced by the president or by the Congress making a goodwill gesture on behalf of the nation.

In the end, it does not matter whether Jesse Jackson, Al Sharpton, or the Congressional Black Caucus support the apology. What matters is that the goodwill gesture takes place during this century. A national apology from the current presidential administration would close the door on slavery and serve as a giant step forward toward healing the nation and reconciling the fractured relationship between blacks and Republicans. ☺

dollars to Israel and billions in separate payments to Holocaust survivors.

More recently, British prime minister Tony Blair apologized for the treatment of the Irish during the potato famine, Pope John Paul II apologized for the sins of the Roman Catholic Church, and Australia apologized to Aborigines.

WORLD: Why aren't the decades of affirmative action a sufficient apology?

CMS: Affirmative action was never a policy that benefited blacks exclusively. Women were included from the very beginning and by the early 1970s five protected minorities had been added.

Affirmative action has benefited some people at the expense of others and created divisiveness in its wake.

WORLD: How do you respond to critics who say a national apology imputes guilt to all white Americans, including those whose ancestors lived in other countries?

CMS: I would respond that all of our ancestors participated in the heinous crime in some form or the other. Moreover, the whites that came to the country later reaped benefits from the system that kept blacks in a subordinate position.

dry cleaners you had to go to 90 percent of your competitors and get a consensus, what would be the chance you'd be able to open a profitable business?"

She says she would have abandoned her research several years ago had she not received a surge of funding from an unusual source. Lee Iacocca, former chairman of the Chrysler Corporation whose wife died from diabetes, funded a seven-year, \$4 million research project for Dr. Faustman, with the promise of an \$11 million fundraising campaign. Dr. Faustman used the initial money to test her ideas about diabetes in mice.

For almost 20 years, many scientists have hoped to cure diabetes by putting insulin-producing islet cells into the pancreas, replacing islet cells that were destroyed by white blood cells. Recently, they predicted that embryonic stem cells could be transplanted into the pancreas to produce the needed islet cells.

Dr. Faustman realized that such a treatment would be futile if white blood cells kept attacking the transplanted islets. She instead focused on why the white blood cells attacked the islets in the first place. She discovered a protein-processing defect was the cause and developed an easy way to treat it. The treatment cured the mice of Type 1 diabetes.

Successful experiments on mice are a critical step in getting approval to try a treatment on humans. One reason Dr.

Faustman said she has not tried embryonic stem-cell research is because she has not seen research in which a diseased mouse was successfully treated with an embryonic stem cell.

"I was taught something pretty young, and that was: Don't follow the dogma, follow the data," she says. Despite the lack of mouse data, however, the NIH has set aside millions for research on embryonic stem cells.

Meanwhile, Drs. Mitchell and Faustman, who have credible data on treating strokes, kidney damage, and diabetes—some of same diseases the NIH says embryonic stem cells can cure—are denied funding. "I think people who want embryonic stem cells just don't want [alternatives] to work," Dr. Faustman said.

BUT THE ALTERNATIVES ARE WORKING, miraculously. Four years ago, doctors diagnosed Steve Barsh's 1-year-old son, Spencer, with adrenoleukodystrophy. ALD, featured in the 1992 movie *Lorenzo's Oil*, is a degenerative brain disease that usually only affects boys. Doctors told the Barshes there was little they could do for



Mitchell

Spencer. There was a 50 percent likelihood he would die before age 10, and a 75 percent likelihood the disease would affect his brain, most likely leaving him disabled.

The Barshes refused to accept those odds. They started the Stop ALD Foundation to drive research to find a safe therapy for the disease. The Barshes devoted themselves to the foundation until just after Spencer turned 2, when he had trouble healing from brain surgery, a complication of ALD.

"We ran out of time to do research," Mr. Barsh said. Although the foundation continued its work, and still does today, the Barshes focused on getting Spencer the best treatment available. They found Dr. Joanne Kurtzberg and her colleagues at Duke University Medical Center. With the help of a five-year grant from the NIH, doctors at Duke were using stem cells from the blood in umbilical cords to treat children with diseases like Spencer's.

The Barshes moved from Philadelphia to Durham, N.C., for seven months while doctors treated their son. ALD affects the body's ability to break down a kind of fatty acids, which leads to excess fatty acids eventually causing brain damage. Doctors transplanted umbilical cord blood stem cells into Spencer in hopes that the healthy stem cells would help his body break down the fat molecules.

The stem cells did what the doctors hoped; they stopped Spencer's ALD. But something else happened, too, something



Faustman



Kurtzberg

the Barshes and Dr. Kurtzberg discuss gingerly. The treatment not only stopped the disease, it also reversed the effects ALD had on Spencer's brain, contradicting the scientific notion that it is impossible to heal the brain. Today, Spencer is a normal, healthy 5-year-old boy.

With the five-year grant they received from the NIH, Dr. Kurtzberg and her colleagues successfully treated other children with ALD, leukemia, sickle cell anemia, and severe combined immune deficiency, also known as bubble-boy disease. The same year President Bush set rules for federal funding for embryonic stem-cell research, the

NIH chose not to renew the cord blood transplant grant.

"The NIH said, 'Congratulations, cord blood transplants work. We fund basic research. You are now beyond that. You now need to get funding from somewhere else,'" Mr. Barsh said. There was no money left for Dr. Kurtzberg to do clinical trials, but so much left to discover.

Dr. Kurtzberg thinks that further research into diseases such as ALD could lead to a cure for adult diseases like Parkinson's. "We still have a lot to learn about understanding why cells do what they do," she said.

The federal Health Resources and Services Administration received \$10

million in appropriations last year for collecting and banking umbilical cord blood. Some of that money could eventually support research. The NIH, which bankrolls innovative medical research in the United States, has funded only 30 projects involving stem cells from umbilical cords. In contrast, it has funded 634 projects involving embryonic stem cells.

THOUGH THE PRIORITY FOR funding umbilical cord stem-cell research is low, the promise is great. A scientist in Denmark has shown stem cells from umbilical cord blood can turn into brain, bone, cartilage, liver, and heart cells. In Lawrence, Kan., Dr. Mitchell's research has led to stem cells from the inner tissue of umbilical cords, also known as the matrix, producing nerve cells.

But her passion is getting stem cells to repair damaged kidneys. Two years ago, her nephew died of acute renal failure, a complication of leukemia. At the time, a colleague in the KU medical school was urging Dr. Mitchell to apply her stem-cell discoveries to kidney damage. "I hate to tug at your heart strings," she remembers him telling her, "but this is the kind of thing maybe your stem cells could cure."

Despite her previous rejections, Dr. Mitchell plans to apply again to the NIH this February for a grant to test her stem cells in animals with damaged kidneys. She is a single mother who went to college for the first time after she had five children, and she has a calm patience when it comes to the NIH.

"I have high hopes that my research is going to get funded the next go-round," she says as she describes her greatest frustration as a stem-cell researcher. It is not the difficulty she has getting funded, but the way the public associates her with embryo-destroying stem-cell research. She supports research on embryos left over from in-vitro fertilization, but she despises the way some scientists insist that embryonic stem cells are the only way to cure diseases.

"If people were more aware of it . . ." she says, trailing off. "It's nothing short of a miracle to see the diseases (cured by umbilical cord stem cells). It's, gosh, mind-boggling." ☺