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before the
Senate Finance Committee
Maryland General Assembly

AGAINST SB 59
(Giving artificial priority to embryonic over adult stem cell research in state funding)

March 14, 2007

I am Richard M. Doerflinger of the Secretariat for Pro-Life Activities, U.S. Conference of Catholic Bishops. I have been invited by the Maryland Catholic Conference to comment on SB 59, which would require the state's Stem Cell Research Commission to give priority to embryonic over adult stem cell research.

Currently, the state's stem cell research fund requires that the Commission **"gives due consideration to the scientific, medical, and ethical implications of the research."** It also urges the Commission to base its review on "the guidelines of the National Institutes of Health Center for Scientific Review," which prioritize research in terms of scientific and medical merit. SB 59, then, is based on the proposition that these priorities are unacceptable – that we must, as it were, place our finger on the scale, to give greater weight to stem cell research that is embryonic *regardless* of its scientific, medical or ethical merit.

This prompts the obvious question: What kind of standard must one apply instead? The only one that easily comes to mind is this: The state of Maryland -- again, regardless of any prospect for advancing science or helping patients -- must give top priority to research that destroys human embryos, simply because it destroys human embryos.

The American people hold the opposite view. They believe that public funding should go first and foremost to stem cell research that poses no ethical problem of this kind (see Attachment 1). In fact, a number of federal advisory committees, including the bioethics commission advising President Clinton on this issue in 1999, said the same thing: If a scientific and medical advance can be achieved *without* destroying embryonic human life, one should follow that course instead.

For our part, we in the Catholic Church are actively engaged in promoting stem cell research to provide new treatments for debilitating disease (see Attachment 2). But we oppose research that requires deliberately harming and destroying human life at any stage. Therefore we oppose embryonic stem cell research as currently proposed and practiced, and we strongly oppose any public policy that would force Catholic and other taxpayers to subsidize such destruction. Certainly we find it unacceptable, indeed perverse, to prioritize research simply *because* it is destructive in this manner.

In support of my position on SB 59, however, I would like to present five points, each of which can be supported by citing statements of scientists and others who do *not* share our moral view.

1. The human embryo, at the one-week-old (blastocyst) stage, is a developing human life.

This is a basic biological fact, found in the standard human embryology textbooks:

"Zygote. This cell results from the union of an oocyte and a sperm during fertilization. A zygote is the beginning of a new human being (i.e., an embryo)." – K. Moore and T. Persaud, *The Developing Human: Clinically Oriented Embryology*, 7th edition (2003), p. 2.

"The development of a human begins with fertilization, a process by which the *spermatozoon* from the male and the oocyte from the female unite to give rise to a new organism, the *zygote*." - T. Sadler, *Langman's Medical Embryology*, 7th edition (1995), p. 3.

"Almost all higher animals start their lives from a single cell, the fertilized ovum (zygote)... The time of fertilization represents the starting point in the life history, or ontogeny, of the individual." – B. Carlson, *Patten's Foundations of Embryology*, 6th edition (1996), p. 3.

The status of the early human embryo as a human life deserving moral respect is even acknowledged by federal advisory bodies determined to recommend federal funding of destructive human embryo research:

"The preimplantation human embryo warrants serious moral consideration as a developing form of human life." - National Institutes of Health, *Report of the Human Embryo Research Panel* (Sept. 1994), p. 2.

"[M]ost would agree that human embryos deserve respect as a form of human life." - President Clinton's National Bioethics Advisory Commission, *Ethical Issues in Human Stem Cell Research* (September 1999), Vol. I, p. ii.

While some have used the term "pre-embryo" to imply that the embryo younger than 14 days is a lesser being, a disorganized mass of cells, that view is now discredited and is widely recognized as a political ploy, not a serious scientific claim.

"Your world was shaped in the first 24 hours after conception. Where your head and feet would sprout, and which side would form your back and which your belly, were being defined in the minutes and hours after sperm and egg united.... What is clear is that developmental biologists will no longer dismiss early mammalian embryos as featureless bundles of cells..." – H. Pearson, "Your destiny, from day one," *Nature*, 4 July 2002, pp. 14, 15.

"I'll let you in on a secret. The term pre-embryo has been embraced wholeheartedly by IVF practitioners for reasons that are political, not scientific. The new term is used to provide the illusion that there is something profoundly different between what we nonmedical biologists still call a six-day-old embryo and what we and everyone else call a sixteen-day-old embryo... The term pre-embryo is useful in the political arena -- where decisions are made about whether to allow early embryo (now called pre-embryo) experimentation..." – L. Silver, *Remaking Eden: Cloning and Beyond in a Brave New World* (1998), p. 46.

2. A moral presumption against taking human life requires us at least to treat stem cell research requiring embryo destruction as a last resort, to be pursued only if medical progress cannot be achieved in other ways.

To be sure, the Catholic moral position is more forthright than this. We hold to an *absolute* moral norm against directly taking any innocent human life, even on the pretext of helping other human lives in the future. We may not "do evil that good may come of it" (Rom. 3:8). On this point we agree with the great modern declarations establishing ethical principles for research involving human beings:

"The protagonists of the practice of human experimentation justify their views on the basis that such experiments yield results for the good of society that are unprocurable by other methods or means of study. All agree, however, that certain basic principles must be observed in order to satisfy moral, ethical and legal concepts.... No experiment should be conducted where there is an a priori reason to believe that death or disabling injury will occur; except, perhaps, in those experiments where the experimental physicians also serve as subjects." - The Nuremberg Code (1949), from *Trials of War Criminals before the Nuremberg Military Tribunals under Control Council Law No. 10.* Nuremberg, Oct. 1946–Apr. 1949. U.S. G.P.O, 1949–1953.

"In medical research on human subjects, considerations related to the well-being of the human subject should take precedence over the interests of science and society." - World Medical Association, *Declaration of Helsinki* (first issued 1964; 2000 text cited).

Or as G.B. Shaw put it, more colorfully: "No man is allowed to put his mother into the stove because he desires to know how long an adult woman will survive at a temperature of 500° Fahrenheit, no matter how important or interesting that particular addition to the store of human knowledge may be." – "Preface on Doctors," in *The Doctor's Dilemma: A Tragedy* (1911).

What the numbered proposition represents is a "least common denominator" ethic. Even those who *reject* the principled stand of the Nuremberg Code – those who think research ethics can be conducted in terms of a "cost-benefit" analysis, weighing the direct harm to innocents against the potential benefits to people considered more numerous or more valuable – have conceded that destroying human embryos (even so-called 'spare" human embryos) for their stem cells poses a moral problem and is a last resort:

"In our judgment, the derivation of stem cells from embryos remaining following infertility treatments is justifiable only if no less morally problematic alternatives are available for advancing the research." - National Bioethics Advisory Commission, *Ethical Issues in Human Stem Cell Research* (Sept. 1999), Volume I, p. 53.

NBAC nonetheless concluded that embryonic stem cell research should be funded: "The claim that there are alternatives to using stem cells derived from embryos is not, at the present time, supported scientifically. **We recognize, however that this is a matter that must be revisited continually as science advances**." – Id.

So let us revisit that question.

3. Adult stem cells and other alternatives are much more promising than once thought, offering many benefits once thought to be achievable only with embryonic cells.

NBAC's assumption that there is no "alternative" to embryonic stem cells had already been called into serious doubt by the time the National Institutes of Health issued its book-length review of stem cell science in 2001:

"Today there is new evidence that stem cells are present in far more tissues and organs than once thought and that these cells are capable of developing into more kinds of cell than previously imagined. Efforts are now underway to harness stem cells and to take advantage of this new found capability, with the goal of devising new and more effective treatments for a host of diseases and disabilities. What lies ahead for the use of adult stem cells is unknown, but it is certain that there are many research questions to be answered and that these answers hold great promise for the future.... Whether embryonic stem cells will provide advantages over stem cells derived from cord blood or adult bone marrow hematopoietic stem cells remains to be determined" - NIH, *Stem Cells: Scientific Progress and Future Research Directions* (June 2001), pp. 23, 63.

Even in 2001, many researchers had begun to realize that the "alternatives" may actually be *better* than embryonic stem cells at a variety of therapeutic tasks:

"The stem cells likely to yield the quickest, least expensive, and largest clinical benefit are readily available and present no ethical dilemma. They are umbilical cord blood stem cells." - J. Chen et. al., "Intravenous Administration of Human Umbilical Cord Blood Reduces Behavioral Deficits after Stroke in Rats," *Stroke* 32 (2001): 2682-88.

Today that judgment can be seen as prophetic. Umbilical cord blood stem cells, obtained harmlessly after live births, have treated dozens of medical conditions, most recently being used to help patients with devastating *neurological* conditions such as Krabbe disease (*N. Engl. J. Med.* 352 (2005):2069-81), Hurler's syndrome (*N. Eng. J. Med.* 350 (2004): 1960-9), and even chronic paralysis from spinal cord injury (*Cytotherapy* 7 (2005): 368-73). These cells can be readily multiplied in culture for treatments, and recent studies suggest they have the same versatility as embryonic stem cells (e.g., *Cell Proliferation* 38 (2005): 245-55).

Versatile stem cells have also been found in a wide array of adult tissues, including nerve, muscle and fat as well as bone marrow and blood. These cells have been used in very promising animal trials, and in some cases to treat human beings, including patients with Parkinson's disease (Annual meeting of American Assoc. of Neurological Surgeons, April 8, 2003), heart damage (*Circulation* 112 (2005): 521-6), Crohn's disease (*Roanoke Times & World News*, 14 June 2005), lupus (*Skin & Allergy News*, 1 May 2005), corneal damage (*Daily Mail*, 3 May 2005 and 15 October 2005), and spinal cord injury (*The Indianapolis Star*, January 16, 2005).

Says Dr. Douglas Losordo, a cardiologist who is using adult bone marrow stem cells to heal heart damage: **"I think embryonic stem cells are going to fade in the rearview mirror of adult stem cells... Nature provided us with these tools to repair organ damage"** (*Washington Post*, Feb. 2, 2005, A3).

4. There are more drawbacks and obstacles to the safe and effective clinical use of embryonic stem cells than once thought.

These cells are now known to pose a variety of very serious problems, leading researchers to conclude that "it could be decades before embryonic stem cells cure anything" (*U.S. News and World* Report, June 6, 2005) (see Attachment 3). Among the problems:

- The cell lines are difficult to maintain, and they spontaneously develop genetic abnormalities over time – abnormalities closely associated with cancer (*Nature Biotechnology* 22 (2004): 53-4; *Nature Genetics* 37 (2005): 1099-1103).

- When placed in animals they form dangerous teratomas (tumors), nullifying their therapeutic goals and often killing the animals. For example, placing cells derived from embryonic stem cells in the injured rat spinal cord "does not improve locomotor recovery and can lead to tumor-like growth of cells, accompanied by increased debilitation, morbidity and mortality" (*Somatosensory and Motor Research* 22 (2005): 37-44); "Embryonic stem cells injected into the mouse knee joint form teratomas and subsequently destroy the joint" (*Rheumatology* 42 (2003): 162-165).

- Efforts to get these cells to differentiate into functioning cells of one type often fail. Claims that embryonic stem cells had produced functioning pancreatic islet cells were debunked in 2004, when it was found that the cells were only absorbing insulin from their culture medium and releasing it again (*Diabetes* 53 (2004): 2603-9). Another attempt produced cells that release insulin, but randomly and not in response to their environment (*Diabetologia* 47 (2004): 499-508). Yet another attempt failed when the cells derived from embryonic stem cells produced tumors in diabetic mice (*American Journal of Pathology* 166 (2005): 1781-91). Commenting on efforts to use embryonic stem cells to create cells for treating diabetes, Douglas Melton of Harvard has said: "We are convinced we can do it. We just don't know how" (*Wall Street Journal*, Aug. 12, 2004).

Stem cell experts are now urging reduced expectations, fearing a public backlash when patients realize embryonic stem cells were hyped and oversold to them:

"In order to persuade the public that we must do this work, we often go rather too far in promising what we might achieve…I am not entirely convinced that embryonic stem cells will, in my lifetime, and possibly anybody's lifetime for that matter, be holding quite the promise that we desperately hope they will" - Prof. Lord Robert Winston, Gresham Special Lecture, June 20, 2005.

"The safety issues are high enough that I suspect it will take a long time to get to the clinics, because you don't want to create a disease that's far worse than what you're trying to cure." – Dr. James Thomson of U. of Wisconsin, MSNBC interview, June 25, 2005

NIH stem cell expert Ronald McKay, on why many people believe embryonic stem cells will cure Alzheimer's disease despite the scientific consensus that this is extremely unlikely: "To start with, people need a fairy tale." – *Washington Post*, June 10, 2004, A3.

5. Efforts to solve current problems with embryonic stem cells to develop treatments will require ever broader violations of widely accepted ethical norms.

Supporters cite the RAND Institute's estimate that there are 400,000 "spare" frozen embryos in the U.S., but they ignore the Institute's other conclusions: "Patients have designated only 2.8 percent (about 11,000 embryos) for research. The vast majority of frozen embryos are designated for future attempts at pregnancy… From those embryos designated for research, perhaps as many as 275 stem cell lines (cell cultures suitable for further development) could be created. The actual number is likely to be much lower" (www.rand.org/publications/RB/RB9038/). This is a woefully inadequate number if any human disease is to be treated.

Two prominent researchers say that merely determining the "best options for research" (to say nothing of treatments) would require "perhaps 1,000" stem cell lines -- about four times as many as are available nationwide (*New York Times*, June 12, 2003, A33). Others say that to reflect the genetic and ethnic diversity of the American population, an embryonic stem cell bank geared toward treating any major disease must include cell lines from many embryos **created solely in order to be destroyed for those cells** – including a disproportionate number of specially created embryos from black couples and other racial minorities, who are underrepresented among fertility clinic clients (*Hastings Center Report*, Nov.-Dec. 2003, pp. 13-27). Yet another stem cell researcher says "millions" of embryos from fertility clinics may be needed to create cell lines of sufficient genetic diversity (*Scientific American*, May 2004, pp. 93-99 at 94).

Some say the problem of genetic matching and tissue rejection can be solved by pursuing **human cloning**, using a technique known as "somatic cell nuclear transfer" (SCNT). But this poses insurmountable moral and practical problems of its own:

- It could require specially creating and then destroying millions of embryos, and exploiting many millions of women for their eggs to create these embryos.

- It will almost certainly pave the way to "reproductive" cloning (cloning to produce live-born babies), which almost everyone claims to oppose (*Fertility and Sterility* 74 (2000): 873-6).

- Embryonic cells from cloning have the dangers and genetic problems of other embryonic stem cells, *plus* added dangers from *epigenetic* problems (chaotic gene expression from cell nuclei being imperfectly reprogrammed by the procedure)(*Nature Biotechnology* 22 (2004): 25-6).

- To solve *that* problem, "therapeutic cloning" studies in animals have required **"fetus farming"** – placing cloned embryos in wombs, developing them to the **fetal** stage and aborting them for more developed tissues (www.usccb.org/prolife/issues/bioethic/cloning/farmfact31805.shtml). Such "farming" in humans would require exploiting women for their **wombs** as well as their eggs; yet some stem cell laws in other states explicitly allow this further abuse of human cloning. New Jersey, for example, allows research cloning and only forbids researchers to develop the cloned embryo "*through* the egg, embryo, *fetal and newborn stages* into a *new human individual*." (NJ Rev. Stat., c. 203; emphasis added). This specter of moving "fetus farming" into human applications has become serious enough that Congress voted unanimously last year to make it a federal crime to use human stem cells obtained in this way (Pub. L. 109-242).

Conclusion

Stem cell research that requires destroying human embryos is unethical, and even more obviously unethical because it cannot live up to the groundless and wildly exaggerated claims that have deceived so many into seeing it as a Holy Grail of miracle cures. At this point, pouring more public funds into this morally problematic and speculative venture can only divert resources and attention away from avenues that offer far more promise for suffering patients and their families. Artificially creating a *priority* in favor of funding this avenue regardless of medical merit would be grossly irresponsible.

The state of Mayland will best serve the interests of patients, as well as the interests of sound ethics in medical research, by pursuing these avenues instead:

- Focusing public funds on the pursuit of promising and ethically acceptable research using stem cells from umbilical cord and other non-embryonic sources;

- Promoting a statewide public bank for umbilical cord blood, which could immediately begin healing many more patients with devastating diseases and provide resources for further research into the capabilities of non-embryonic stem cells;

- Amending Maryland's confusing law on human cloning to more clearly forbid the cloning of human embryos for any purpose, including research.

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New Poll: Americans Continue To Oppose Funding Stem Cell Research That Destroys Human Embryos

WASHINGTON (May 31, 2006)— A new poll shows that 48% of Americans oppose federal funding of stem cell research that requires destroying human embryos, while only 39% support such funding. The poll, conducted by International Communications Research (ICR), surveyed over one thousand adults by telephone May 19-23.

Legislation to fund such embryonic stem cell research (H.R. 810), approved by the U.S. House of Representatives a year ago, may soon be considered in the Senate.It was commissioned by the Secretariat for Pro-Life Activities of the U.S. Conference of Catholic Bishops (USCCB).

When survey respondents were informed that scientists disagree on whether stem cells from embryos, or from adult tissues and other alternative sources, may end up being most successful in treating diseases, 57% favored funding only the research avenues that do not harm the donor; only 24% favored funding all stem cell research, including the type that involves destroying embryos.

"Congress should not be misled on this important issue," said Richard M. Doerflinger, Deputy Director of the USCCB's Secretariat for Pro-Life Activities. "Most Americans do not support federally funded research that requires destroying human embryos. Our opponents also know this. No doubt this is why their public statements – and many of their own opinion polls – either ignore or misrepresent what this research involves, while irresponsibly hyping its potential for miracle cures."

The new poll also shows overwhelming opposition to human cloning, whether to provide children for infertile couples (83% against) or to produce embryos that would be destroyed in medical research (81% against).

A comparison with identical polls conducted by ICR in the last two years shows a fairly consistent level of moral concern on this issue on the part of the American public. Federally funded embryonic stem cell research has never garnered majority support in this poll, reaching a high of 43% in August 2004. For the third year in a row, when informed of their options, most Americans support funding only stem cell research that does not require destroying embryos.
The ICR polls also consistently show opposition of 77% or higher to human cloning, whether for reproduction or medical research. The new poll's figure of 81% opposed to cloning human embryos for research is the highest in three years.
The International Communications Research poll questions and results are attached. USCCB press releases on the August 2004 and May 2005 polls are available at www.usccb.org/comm/archives/commarc.shtml.

Questions asked by International Communications Research, a national research firm headquartered in Media, Pennsylvania. A weighted sample of 1022 American adults was surveyed by telephone May 19-23, 2006, with a margin of error of plus or minus 3.1 percent.

1. Stem cells are the basic cells from which all of a person's tissues and organs develop. Congress is considering the question of federal funding for experiments using stem cells from human embryos. The live embryos would be destroyed in their first week of development to obtain these cells. Do you support or oppose using your federal tax dollars for such experiments?

Support	38.6%
Oppose	47.8%
Don't know	11.9%
Refused	1.7%

2. Stem cells for research can be obtained by destroying human embryos. They can also be obtained from adults, from placentas left over from live births, and in other ways that do no harm to the donor. Scientists disagree on which source may end up being most successful in treating diseases. How would you prefer your tax dollars to be used this year for stem cell research?

(Options rotated)

Supporting all methods, including those that require destroying human embryos, to see which will be most successful	23.6%
or	
Supporting research using adult stem cells and other alternatives, to see if there is no need to destroy human embryos for research.	56.8%
Neither (volunteered)	11.1%
Don't know	7.2%
Refused	1.3%

3. Should scientists be allowed to use human cloning to try to create children for infertile couples?

Yes	9.7%
No	83.4%
Don't Know	5.9%
Refused	1.0%

4. Should scientists be allowed to use human cloning to create a supply of human embryos to be destroyed in medical research?

Yes	11.4%
No	81.2%
Don't Know	6.6%
Refused	0.8%

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Catholic Support for Ethically Acceptable Stem Cell Research

Sometimes it is wrongly said that the Catholic Church opposes stem cell research. In fact, the Church supports ethically responsible stem cell research, while opposing any research that exploits or destroys human embryos.

Because the Church opposes deliberately destroying innocent human life at any stage, for research or any other purpose, it opposes embryonic stem cell research as currently conducted. However, when scientists proposed avenues for possibly obtaining embryonic stem cells or their pluripotent equivalent without creating or harming embryos, Catholic leaders were among the first to welcome this idea: www.freerepublic.com/focus/f-news/1435477/posts.

The Catholic Church has long supported research using stem cells from adult tissue and umbilical cord blood, which poses no moral problem. Catholic institutions at times have taken the lead in promoting such constructive research, which is already providing cures and treatments for suffering patients:

- In October 2005, the Catholic bishops of South Korea said they will raise and donate about $10 million to advancing adult stem cell research: www.taipeitimes.com/News/world/archives/2005/10/06/2003274635
- South Korea's Catholic Medical Centre announced in June 2005 that it had successfully treated stroke and vascular disease in 64 patients using adult stem cells: www.asianews.it/view.php?l=en&art=3491
- A March 2005 breakthrough demonstrating the capabilities of adult stem cells in Australia was made possible by a grant of $50,000 (Australian dollars) from the Catholic Archdiocese of Sydney: http://edition.cnn.com/2005/TECH/science/03/21/australia.stemcell/
- In February 2005 a major Catholic teaching hospital in Boston, Caritas St. Elizabeth's Medical Center, announced that it had "identified adult stem cells that may have the capacity to repair and regenerate all tissue types in the body": www.caritas-semc.org/home/site_content_list_detail.asp?s=2328&ss=324
- Throughout 2005 the U.S. Conference of Catholic Bishops has worked to pass federal legislation creating a nationwide public bank for umbilical cord blood stem cells, for research and the treatment of a wide variety of diseases: www.usccb.org/comm/archives/2005/05-159.shtml
- In 2004 Monsignor Thomas Hartman, director of radio and television for the Catholic Diocese of Rockville Centre, founded The Thomas Hartman Foundation for Parkinson's Research. The foundation has raised millions of dollars for adult stem cell research and other avenues for curing Parkinson's disease: www.hartmanfoundation.org

Clearly, the Church favors ethically acceptable stem cell research. It opposes destroying some human lives now, on the pretext that this may possibly help other lives in the future. We must respect life at all times, especially when our goal is to save lives.

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Embryonic Stem Cell Research:

"Miracle" Cures, or Decades of Basic Research?

"Major roadblocks remain before human embryonic stem cells could be transplanted into humans to cure diseases or replace injured body parts, a research pioneer said Thursday night. University of Wisconsin scientist James Thomson said obstacles include learning how to grow the cells into all types of organs and tissue and then making sure cancer and other defects are not introduced during the transplantation. 'I don't want to sound too pessimistic because this is all doable, but it's going to be very hard,' Thomson told the Wisconsin Newspaper Association's annual convention at the Kalahari Resort in this Wisconsin Dells town. 'Ultimately, those transplantation therapies should work but it's likely to take a long time.'.... Thomson cautioned such breakthroughs **are likely decades away**."

- Associated Press reporter Ryan J. Foley, "Stem cell pioneer warns of roadblocks before cures," *San Jose Mercury News* Online, posted Feb. 8, 2007, www.mercurynews.com/mld/mercurynews/16656570.htm

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"Much of the California electorate was sold last year on the idea that human embryonic stem cells might be turned into amazing cures for incurable diseases, propelling Proposition 71 to easy victory in the Nov. 2004 election. Now, it's increasingly clear that stem cell transplants for diabetes or Parkinson's or Alzheimer's are nowhere close, **maybe decades away**."

- Science writer Carl T. Hall, "Stem Cell leaders to talk strategy at conference," *The San Francisco Chronicle*, Sept. 30, 2005, page B4

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"One of the problems is that in order to persuade the public that we must do this work, we often go rather too far in promising what we might achieve… I am not entirely convinced that embryonic stem cells will, **in my lifetime, and possibly anybody's lifetime for that matter**, be holding quite the promise that we desperately hope they will."

- British stem cell expert Professor Lord Winston, Lecture at Gresham College, June 20, 2005, www.gresham.ac.uk/printtranscript.asp?EventId=347

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"[I]t is necessary that prospective donors recognize the large gap between research and therapy… [R]esearchers must make every effort to communicate to these volunteers that it is extremely unlikely that their contributions will directly benefit themselves or their loved ones. Also, **it is nearly certain that the clinical benefits of the research are years or maybe decades away.** This is a message that desperate families and patients will not want to hear."

- David Magnus and Mildred K. Cho of Stanford University, "Issues in Oocyte Donation for Stem Cell Research," *Science*, 17 June 2005, p. 1748

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"[R]esearchers say it could be **decades** before embryonic stem cells cure anything."

- Helen Fields, "Reigniting the Stem Cell Debate," *U.S. News and World* Report, June 6, 2005, www.usnews.com/usnews/news/articles/050606/6politics.b1.htm

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"I want to make a basic statement first — which almost never gets in the press, but I keep trying — on what I see as the legacy of these cells.

"One is the basic science, and simply having better access to the human body. That's the most important legacy. I'm very hopeful that there will be some transplantation applications for this technology, but they're going to be very challenging. And it's been so hyped in the press that people expect it to come the day after tomorrow. …

"**Ten or 20 years from now**, I'm actually currently optimistic that there will be transplantation-based therapies, but even if there was none, and it was a complete failure, this technology is extraordinarily important."

- University of Wisconsin stem cell expert James Thomson, in Alan Boyle, "Stem cell pioneer does a reality check," MSNBC, June 25, 2005, www.msnbc.msn.com/id/8303756/

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"Gone are the allusions to healing such afflictions as spinal cord injuries and Parkinson's and Alzheimer's diseases that dominated the 2004 campaign for Proposition 71. In fact, scientists say, **there is no guarantee of cures -- certainly not any time soon** -- from the measure that was optimistically titled the California Stem Cell Research and Cures Act….the draft plan is clear: **'It is unlikely that [the California Institute of Regenerative Medicine] will be able to fully develop stem cell therapy for routine clinical use during the 10 years of the plan.'** Instead, the top goal is to establish, in principle, that a therapy developed from human embryonic stem cells can 'restore function for at least one disease.'"

-Mary Engel, "Reality Check for Stem Cell Optimism," *Los Angeles Times*, December 3, 2006, http://www.latimes.com/news/local/la-me-stemcell3dec03,1,707176.story?page=2

(all emphases in boldface added)

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2/21/07