The *Good News* of Adult Stem Cell Research: Working Towards the Common Good

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ABSTRACT

Stem cell research is an exciting new area of science and medicine, but it raises serious ethical questions. Unfortunately, ethical discussions about the use of stem cells for medical therapy often end in confusion due to the technical nature of this research. This paper cuts through the confusion by explaining the basics of stem cells, especially regarding the difference between research that focuses on embryonic stem cells and human cloning, as opposed to research that uses adult stem cells. Once the science involved with stem cell research is understood, the ethical issues involved become clear. Embryonic stem cell research, including the use of cloning to harvest such stem cells, is unethical because it destroys human embryos. However, research using adult stem cells raises *no* ethical concerns and promotes the true common good. The paper concludes with several success stories regarding the *good news* of adult stem cell research.

STEM CELL RESEARCH IS AN ISSUE that many people simply find overwhelming. When addressed in public forums and by the mainstream media, stem cell research is typically discussed in such a technical manner that the public is often left confused. In the wake of this confusion, scientists urge us not to worry about the details and to focus instead on all of the good that is going to come from this research. In short, we are asked to "leave the science to the scientists."

Now it is true that stem cell research is a very technical area of contemporary scientific and medical research. To do justice in considering the ethical nature of this research, one must have a basic grasp of certain scientific facts such as what stem cells are, how they are collected, and how scientists and doctors are trying to use them to treat human ailments and diseases. It is also true that a lot of good will come from stem cell

research–indeed, much already has been done using various types of human stem cells. This is a point that deserves emphasis: there is a lot of *good news* involved with stem cell research. Nevertheless, there are also serious ethical concerns that cannot be ignored because they strike at the very heart of human dignity.

So, how do we sort through all of this? It is my belief that even though the science involved with stem cell research is complex, it is not so complicated that non-scientists cannot comprehend the basic facts. Therefore, the first part of this paper will focus on the basic science behind stem cell research by clarifying the technical terminology and jargon that cause much of the confusion surrounding this issue. I will then demonstrate that once the science involved with stem cell research is understood, the ethical issues involved become quite clear and simple. In this way we can get past the hope for good consequences from this research, and ask the more important question of whether or not various actions being proposed in stem cell research are right and good and so to be pursued, or whether they are wrong and evil and so to be avoided. I will conclude by focusing on those aspects of stem cell research that help promote the true common good, and on which everyone interested in improving human health can agree.

WHAT ARE STEM CELLS?

The National Academies of the Sciences defines stem cells as "nonspecialized cells that have the capacity to divide indefinitely in culture and to differentiate into more mature cells with specialized functions."[1] There are three key aspects of this definition that need to be clarified for us to understand what stem cells are and why they are considered so important.

First, these are referred to as nonspecialized, or undifferentiated, cells. The vast majority of cells in higher organisms are specific types–for

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[1] The National Academies of the Sciences, Committee on Science, Engineering, and Public Policy, *Scientific and Medical Aspects of Human Reproductive Cloning*, "Glossary," Committee on Science, Engineering, and Public Policy (Washington, D.C.: National Academy Press, 2002), accessed on the web 5/15/07 at: http://books.nap.edu/openbook.php?record_id=10285&page=270.

example, in humans we have bone cells, muscle cells, neurons, etc. Stem cells are different because they do not belong to any specific cell type. Second, researchers found that they could remove stem cells from an organism and keep them growing in a petri dish indefinitely with a culture medium for nutrition. As these cells replicate, they can be transferred to other petri dishes to continue reproducing, thereby establishing what researchers refer to as a "stem cell line"–a batch of stem cells growing from one original source. The third and most significant aspect of the definition is that under certain conditions stem cells can differentiate into specific types of cells such as bone cells, muscle cells, neurons, etc. Thus, these nonspecialized cells are what all the other cells in our body come from or "stem" from. In fact, researchers have discovered that an embryo is basically a developing group of stem cells. So, you and I began as a single cell, and from these cells all the other cells in our body have stemmed. However, we retain a supply of stem cells throughout the body to help with basic repair and regeneration.

It may help to consider a concrete example of how stem cells might be used. Suppose that someone has had a heart attack and as a result some of that person's heart muscle has died. The only recourse that current medicine has to offer is medication to ease heart functioning, or in the worst case, a heart transplant if the damage is irreversible. But since stem cells can turn into specific cell types, in theory we could transplant some into the patient's heart and regenerate it with new, functioning heart muscle. This example can help to show why stem cell research excites so many interested in health care and medicine. In theory, any cell in the body that is damaged or degenerated could be repaired or regenerated using stem cells. Imagine how many diseases and injuries stem cell therapy could help? The possibilities are truly amazing.

It is usually at this point that many people begin to wonder how anyone–especially a person who claims to be pro-life–could be opposed to research that seems to have so much potential to ease human suffering. When asked why I oppose it, I tend to offer an answer that catches the questioner by surprise. I do not oppose stem cell research, or at least not all types. In fact, I have never come across a single person who (once the issue is properly understood) opposes all forms of stem cell research.

This point is worth some reflection. If one considers the description of stem cell research given above, one will find that there is nothing

intrinsically evil about using human stem cells to treat disease and illness. The design of living organisms has included the presence of stem cells within the organism as a kind of natural repair kit. All that stem cell research really does is to harness the body's own natural powers of regeneration. As such, stem cell research falls well within the traditional goals of medicine and health care.

So why is there controversy here? The answer is simple: there is more than one type of stem cell research. Unfortunately, the distinction between the two types is rarely brought out clearly in public hearings or by the media when stem cell research is discussed. Indeed, the media often oversimplify the whole issue by implying that there are only two sides to the debate: one is either for all types of stem cell research, or opposed to all types of stem cell research; more starkly, one either supports lifesaving cures, or one is willing to see innocent children and disabled people to suffer and die. To show this line of thinking for the fallacy that it is, we need to clarify the various types of stem cell research. The distinction is based on the *source* of the stem cells used for research and thus falls into two basic categories: the research based on embryonic stem cells and the kind that uses adult stem cells.

THE CONTROVERSY OVER EMBRYONIC STEM CELL RESEARCH

The stem cells that are most often focused on in the current debate are referred to as embryonic stem cells.[2] How are embryonic stem cells obtained? Human beings start life as a single cell, technically referred to as a zygote. That initial cell divides into two cells, then into four cells,

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[2] See James A. Thomson et al., "Embryonic Stem Cell Lines Derived from Human Blastocysts," *Science* 282 (Nov. 6, 1998): 1145-47, and John Gearhart, "Cell Biology: New Potential for Human Embryonic Stem Cells," *Science* 282 (Nov. 6, 1998): 1061-62. These were the first two researchers to actually isolate human embryonic stem cells using two different methods. See also the National Academies of the Sciences, Committee on Science, Engineering, and Public Policy, *Scientific and Medical Aspects of Human Reproductive Cloning*, "Glossary": "Primitive (undifferentiated) cultured cells from the embryo that have the potential to become a wide variety of specialized cell types (that is, are pluripotent). They are derived from the inner cell mass of the blastocyst." (Washington, D.C.: National Academy Press, 2002), accessed on the web 5/17/07 at: http://www.nap.edu/openbook.php?record_id=10285&page=263.

then into eight cells, then sixteen, thirty-two, and so on, until it eventually becomes a small sphere referred to as a blastocyst at five to seven days of development. A blastocyst is composed of an outer layer of cells that will eventually become the placenta when the embryo attaches to the uterus in order to continue its development. Inside the sphere is the developing human being, composed at this point of stem cells. To get to these stem cells, researchers have to break apart the blastocyst, which destroys the embryo.[3] There is, in fact, currently no other way of obtaining human embryonic stem cells than by destroying a developing embryo. Once the cells are harvested, researchers place them in petri dishes with culture medium so as to establish a stem cell line that can then be used for research and (they hope) eventual therapeutic application.

Supporters of this research attempt to argue that the blastocyst is not an embryo, and therefore not a human being, until it implants in a uterus.[4] This point is easy to debunk, as it completely flies in the face of contemporary embryology. From the first moment of conception, a single-celled organism containing human DNA is, biologically speaking, a human being. Referring to this developing being as a zygote, a blastocyst, an embryo, or a fetus does not imply that it is changing into different types of beings, one of which will eventually be human. Rather, embryologists point out that human development is a continuum from the single-cell stage on. The variety of terminology may seem confusing, but no more so than when (after birth) we talk about babies, toddlers, tweens, and teenagers. These terms also refer to different phases of human development (the toddler, for instance, is less developed than the teenager). But the central point here is that they are phases of *human* development. These

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[3] National Institutes of Health, "Stem Cell Basics," accessed on the web 5/17/07 at: http://stemcells.nih.gov/info/basics/basics3.asp.

[4] For some noteworthy examples, see Guido de Wert and Christine Mummery, "Human Embryonic Stem Cells: Research, Ethics and Policy," *Human Reproduction* 18/ 4 (2003): 672-82, and William B. Neaves, "The Ends and Means of Stem Cell Research," *Practical Bioethics* 1/1 (2005): 3-5.

terms all refer to the growth and maturation of a *human* individual.[5] And so, the fact remains that embryonic stem cells can only be obtained by destroying a developing human being.

Even given the manner in which they are harvested, many scientists are eager to conduct research with embryonic stem cells because they are believed to hold the most promise for developing curative and regenerative therapies. What, then, is the current state of this research? Despite all of the media attention, the reality is that embryonic stem cell research has not led to a single therapy for human beings because embryonic stem cell research faces serious clinical and technical obstacles.[6] One significant problem observed in animal research is that embryonic stem cells have a tendency to form tumors when transplanted into a body. The great "power" and "potential" that embryonic stem cells are said to possess is also their great undoing. They are extremely difficult to control when one is trying to differentiate them into specific cell types. A similar problem occurs under lab conditions, with embryonic stem cells turning into all sorts of cell types in the petri dish, which makes the cell culture unsuitable for transplantation because it is impure. Finally, since embryonic stem cells would come from someone other than the patient, treatment would constitute a transplant, and immune rejection could occur.

This is where the connection to cloning, or somatic cell nuclear transfer, arises. As explained by the *National Institutes of Health* in their report on the scientific progress of stem cells, "the potential immunological rejection of human ES-derived cells might be avoided by ...using

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[5] For example, see Dianne N. Irving, "When Do Human Beings Begin? 'Scientific' Myths and Scientific Facts" in "Abortion and Rights," a special edition of the *International Journal of Sociology and Social Policy* 19/3-4 (1999), ed. Doris Gordon and John Walker, Volume 19, Number 3/4, 1999; and Maureen L. Condic, "Life: Defining the Beginning by the End," *First Things* (May 2003): 50-54.

[6] David A. Prentice, "Current Science of Regenerative Medicine with Stem Cells," *Journal of Investigative Medicine* 54/1 (2006): 33-37; and Maureen L. Condic, "What We Know About Embryonic Stem Cells," *First Things* (Jan. 2007): 25-29. For a fuller discussion, see also, John F. Morris, "Stem Cells, Cloning, and the Human Person," *Medicine, Health Care, & Ethics: Catholic Voices* (Washington. D.C.: The Catholic Univ. of America Press, 2007), pp.252-98, esp. pp.261-62.

nuclear transfer technology to generate ES cells that are genetically identical to the person who receives the transplant."[7] That is, researchers hope to produce genetically compatible stem cells for patients by using what they refer to here as "nuclear transfer" or cloning. The *NIH* goes on to explain the process of somatic cell nuclear transfer in this manner:

> It has been suggested that this could be accomplished by using somatic cell nuclear transfer technology (so-called therapeutic cloning) in which the nucleus is removed from one of the transplant patient's cells, such as a skin cell, and injecting the nucleus into an oocyte. The oocyte, thus "fertilized," could be cultured *in vitro* to the blastocyst stage. ES cells could subsequently be derived from its inner cell mass, and directed to differentiate into the desired cell type. The result would be differentiated (or partly differentiated) ES-derived cells that match exactly the immunological profile of the person who donated the somatic cell nucleus, and who is also the intended recipient of the transplant–a labor-intensive, but truly customized therapy.[8]

And so, by cloning the patient using one of his or her own body (somatic) cells, a new life would be produced for the sole purpose of destroying it for its stem cells. Given the "hope" and "promise" of embryonic stem cell research and the advantage of using cells obtained from a genetically matched donor (one's own clone) for reducing immune rejection, the call for obtaining more embryonic stem cells for research and eventual (they hope) therapeutic application using somatic cell nuclear transfer is growing stronger within the medical and scientific communities, as well as within the political arena.

At this point scientists have not yet been successful in using somatic cell nuclear transfer with human cells, so it is unclear if these customized therapies that they are hoping for can ever be achieved. And, even if they do successfully clone human beings and can derive genetically compatible embryonic stem cells for patients, this will not resolve the other technical problems of tumor formation and the impurity of the embryonic stem cell cultures. These obstacles are serious, and at the very least we need to be

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[7] National Institutes of Health, "Stem Cell Reports," 3: "The Human Embryonic Stem Cell and the Human Embryonic Germ Cell," accessed 5/18/07 at: http://stemcells.nih.gov/info/scireport/chapter3.asp.

[8] Ibid.

more honest in public debates and let people know that treatments from embryonic stem cells–if they ever occur–are not right around the corner.

But more importantly, somatic cell nuclear transfer does not remove the ethical dilemma of destroying a human being in order to obtain embryonic stem cells for research. While the science involved with embryonic stem cell research is complex, in the end the ethical issue remains simple. Even though supporters attempt to soften what this research really does by claiming they are simply "harvesting" stem cells for patients, the truth is that embryonic stem cell research and somatic cell nuclear transfer for immune compatibility both involve the intentional killing of an innocent human being. As such, they are intrinsically evil and must be avoided, regardless of any benefits promised by this research.

THE *GOOD NEWS*: ADULT STEM CELL RESEARCH

Although the mainstream media tends to focus almost exclusively on embryonic stem cell research and on the controversy that surrounds it, there is another avenue of stem cell research that raises no ethical debate. This involves what are referred to as adult stem cells. Adult stem cells are nonspecialized cells that reside in the specialized tissues of mature, developing organisms. Right now, each of us have these types of stem cells throughout our bodies. Now the term "adult" can be a little misleading here because it generally makes us think in terms of age, as if adult stem cells had to come from older people and not from children and babies. But that is not the case. The term "adult" simply indicates that these are stem cells that have "matured" to some degree, as opposed to embryonic stem cells that have not yet matured. As noted earlier, in our first four to five days of development, we all start off as stem cells. But by five to seven days our stem cells make their first major development towards the three primary cell layers in the body–cells that will become the central nervous system, cells that will become our muscle/skeletal system, and cells that will become our internal organs. So, technically speaking, from approximately eight days into human development all stem cells can be referred to as adult stem cells.

As implied above, adult stem cells can also be found throughout the body. The original discovery of stem cells came from bone marrow

transplants.[9] Physicians have been doing bone marrow transplants in the U.S. for over forty years. Researchers discovered that the presence of adult stem cells in the bone marrow make the transplants efficacious. Adult stem cells have since been found in umbilical cord blood, placentas, amniotic fluid, the mouth, the nose, the pulp of baby teeth, and even adipose tissue, that is, "fat" tissue.[10] Current research is also showing that some types of adult stem cells actually demonstrate the same potency for development as embryonic stem cells.[11]

But what is even more significant is that adult stem cells, unlike their embryonic counterparts, are already being used to treat human patients. Consider the story of Ian Rosenberg of Great Britain.[12] In 2003, at the age of 67, he was given only two months to live. Mr. Rosenberg had heart trouble ever since he suffered a heart attack in his late 30s. In 2003 he had been in the hospital a dozen times, and his doctors told him there was nothing more they could do for him. The only option was a new stem cell procedure being done in Germany. Mr. Rosenberg opted for the experimental procedure in which doctors removed stem cells from his bone marrow and injected them into his heart. In his own words, Mr. Rosenberg said: "It was a miracle. For over two years, I couldn't get around and go out. I had to have my bedroom downstairs. Now I can run up and down all the time. It didn't happen immediately, but I gradually felt better over

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[9] National Institutes of Health, "Stem Cell Basics," accessed on the web 5/17/07 at: http://stemcells.nih.gov/info/basics/basics4.asp.

[10] See the *Do No Harm Coalition* website for more information and specific references at http://www.stemcellresearch.org, in particular "Recent Advances (published since 109th Congress's stem cell votes) in Adult Stem Cell Research and Other Alternatives to Embryonic Stem Cell Research," accessed on the web 5/17/07 at: http://www.stemcellresearch.org/alternatives/90newreasons.pdf. See also John F. Morris, "Stem Cells, Cloning, and the Human Person," *Medicine, Health Care & Ethics: Catholic Voices* (Washington. D.C., The Catholic Univ. of America Press, 2007), pp.252-98, esp. ns.11-18.

[11] David A. Prentice, "Current Science of Regenerative Medicine with Stem Cells," *Journal of Investigative Medicine* 54/ 1 (2006): 33-37.

[12] "Patient 'funds stem cell study," BBC News, posted online June 18, 2004, accessed 5/16/07 at: http://news.bbc.co.uk/2/hi/health/3818885.stm.

around six to eight weeks."[13] Mr. Rosenberg finally died in August of 2006 at the age of seventy. Even though the therapy did not completely heal his heart, Mr. Rosenberg's own stem cells helped extend his life and dramatically improve the quality of his last three years, thereby giving him the opportunity to return to activities that he loved such as playing golf and traveling abroad. Upon his death, his wife Jennifer noted: "Stem cell therapy transformed Ian's life. It gave him three years he would never otherwise have had."[14]

The experimental procedure that Mr. Rosenberg had done for his heart has been developed and expanded since 2003. Mr. Rosenberg was actually a big part of moving this research forward in England, where he founded a charity called *Heart Cells Foundation* to raise money to bring the research from Germany back to his homeland. In October of 2005, a major clinical trial involving 700 heart patients was launched in Great Britain to explore various ways of developing the German techniques to treat the heart using adult stem cells.[15] Similar research has also begun in the U.S., although due to FDA restrictions it is only in limited trials. One prominent example was at the University of Pittsburgh's McGowan Institute for Regenerative Medicine, where a twenty-patient trial demonstrated marked and measurable improvement in heart function for people with severe congestive heart failure.[16] Another brand new study is investigating the use of stem cells from fat tissue to regenerate new blood

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[13] Ibid.

[14] Jenifer Rosenberg, quote posted on the *Heart Cells Foundation* website, accessed 5/16/07 at: http://www.heartcellsfoundation.com/.

[15] "Stem Cell Heart Cure to be Tested," BBC News, posted online October 11, 2005, accessed 5/17/07 at: http://news.bbc.co.uk/1/hi/health/4326698.stm. See also the *Heart Cells Foundation* website for more information at: http://www.heartcellsfoundation.com/.

[16] "Adult Stem Cell Injections in Heart Failure Patients Shows Treatment's Benefit" posted on the University of Pittsburgh's McGowan Institute for Regenerative Medicine website under "News," accessed on the web 5/17/07 at: http://www.mirm.pitt.edu/news/article.asp?qEmpID=64.

vessels to improve heart function.[17] The Gregorio Maranon Hospital in Madrid, Spain, conducted the first transplant on a 67-year-old patient using his own adult stem cells obtained through liposuction. The Spanish cardiologists are working in conjunction with researchers at the Texas Heart Institute in Houston, and have approximately 36 patients enrolled in the trial.

A second important area of adult stem cell research involves stem cells obtained from umbilical cord blood. These unique "adult" stem cells are obtained after delivery by simply collecting the umbilical cord and draining the blood that remains in it after it has been cut. Normally, the umbilical cord and placenta are discarded after birth, but now we find they contain a rich supply of stem cells that are extremely flexible in the sense that they can be coaxed into becoming other types of cells. Umbilical cord blood stem cells also do not cause a very strong immune reaction when transplanted, and so batches of cord blood stem cells can be used to treat a wide variety of genetically diverse patients.[18] Umbilical cord blood stem cells have already helped treat both children and adults who are recovering from heavy-duty chemotherapy for leukemia.[19] In July of 2001, Nathan Salley from Arvada, Colorado testified before a House Subcommittee regarding the issue of stem cell research as part of the debate

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[17] "Stem Cells from Fat Transplanted into Heart," MSNBC, posted online Feb. 6, 2007, accessed on the web 5/17/06 at: http://www.msnbc.msn.com/id/17007196.

[18] Suzanne Kadereit, Ph.D., "Adult Stem Cells," posted on the International Society for Stem Cell Research website, accessed 5/17/07, at: http://www.isscr.org/public/adultstemcells.htm. See also J.L. Goldberg et. al., "Umbilical Cord Blood Stem Cells: Implications for Cardiovascular Regenerative Medicine," *Journal of Molecular Cell Cardiology* 42/5 (2007): 912-20. Epub 2007 Feb 14.

[19] See M.J. Laughlin et al., "Hematopoietic Engraftment and Survival in Adult Recipients of Umbilical-Cord Blood from Unrelated Donors," *New England Journal of Medicine* 344 (June 14, 2001):1815-22; V. Rocha et al., "Transplants of Umbilical-Cord Blood or Done Marrow from Unrelated Donors in Adults with Acute Leukemia," *New England Journal of Medicine*, 351/22 (2004): 2276-85; and V. Rocha et al., "Comparison of Outcomes of Unrelated Bone Marrow and Umbilical Cord Blood Transplants in Children with Acute Leukemia," *Blood* 97/10 (2001): 2962-71. See also the *Leukemia & Lymphoma Society* website, "Cord Blood Stem Cell Transplantation," accessed on the web 5/17/07 at: http://l3.leukemia-lymphoma.org/all_mat_toc.adp?item_id=9622#_q-4.

leading up to President Bush's decision regarding the federal funding of research on existing embryonic stem cell lines. Nathan was diagnosed at the age of eleven with an advanced case of Acute Myloid Leukemia, and he did not respond well to traditional treatments. When he was fourteen, doctors told Nathan and his parents that a cord blood transplant offered his best chance for survival. In 1999, Nathan received a transplant of adult stem cells from a donation of umbilical cord blood. To this date, Nathan has remained in complete remission, with a functioning immune system rebuilt by the transplanted cord blood stem cells.[20] In his testimony, Nathan remarked: "I am honored to represent some of the children that proponents of embryonic stem cell research insist they are trying to save. Yet embryonic stem cell research did not save me–cord blood research did. I am living proof that there are promising and useful alternatives to embryonic stem cell research and that embryos do not need to be killed to achieve medical breakthroughs."[21]

Cord blood stem cells also help provide a cure for sickle cell anemia. Keone Penn of Snellville, Georgia, received the world's first umbilical cord blood transplant to regenerate his defective red blood cells in 1998. In 2003, Keone had a chance to testify before Congress regarding his treatment. In his short testimony, he explained that:

> I was born with sickle cell anemia. Sickle cell is a very bad disease. I had a stroke when I was 5 years old. Things got even worse after that. My life has been full of pain crises, blood transfusions every two weeks, and more times in the hospital than I can count. The year before I had my stem cell transplant, I was in the hospital 13 times. I never was able to have a normal life. My stem cell transplant was not easy, but I thank God that I'm still here. I will graduate from high school this year. Sickle cell is now a part of my past. One year after my transplant, I was pronounced cured. Stem cells saved my life.[22]

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[20]Nathan Salley, Testimony before the *House Government Reform Subcommittee on Criminal Justice, Drug Policy and Human Resources,* July 17, 2002, posted on the *Do No Harm Coalition* web site, accessed 5/19/07 at: http://www.stemcellresearch.org/testimony/salley.htm.

[21] Ibid.

[22] Keone Penn, testimony given at a Science, Technology, and Space Hearing: Hearing on Advances in Adult and Non-Embryonic Stem Cell Research, Thursday, June 12 2003, posted on the U.S. Senate Committee on Commerce,

Sickle cell anemia has also been treated using bone marrow stem cells from related donors, but continuing research into cord blood stem cells is offering new hope for patients who cannot find a suitable bone marrow donor.[23] In 2005, Julius Erving of Philadelphia 76ers' fame, joined in the campaign to establish a public cord blood bank network across the U.S. and to raise awareness about cord blood stem cell therapy for sickle cell disease. "Dr. J" noted that he became involved because "each year thousands of Americans die who could be saved if larger and more diverse inventories of umbilical cord stem cells were in existence."[24]

Another example of progress being made with adult stem cells is in the area of spinal cord injury. In Lisbon, Portugal, Dr. Carlos Lima has been transplanting adult stem cells harvested from a patient's own nasal tissue to the site of the spinal cord injury for a number of years. He has performed the transplant on approximately seventy patients, including several Americans who traveled to Portugal for the procedure. His patients report regaining sensation in their paralyzed limbs and have demonstrated motor function and in a few cases, bladder control improvement. Many patients can walk with the help of walkers and braces–not a complete cure, but some of the most groundbreaking achievements that we have

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Science, & Transportation website, accessed 5/17/07 at: http://commerce.senate.gov/hearings/testimony.cfm?id=809&wit_id=2227.

[23] For example, see ClinicalTrials.gov, "Cord Blood Transplantation for Sickle Cell Anemia and Thalassemia," which is currently recruiting patients, accssed on the web 5/17/07, at: http://clinicaltrials.gov/ct/show/NCT00029380;jsessionid=4AD1A18423EAA5449F2BE14AAC3A007F?order=42, and M.C. Walters, "Sickle Cell Anemia and Hematopoietic Cell Transplantation: When Is a Pound of Cure Worth More than an Ounce of Prevention?" *Pediatric Transplant*, 8 (2004) Suppl 5: 33-38.

[24] Julius Erving, quoted in "Rep. Smith, Dr. J. Urge Passage of Cord Blood Bill," Associated Press Newswires, posted online at StemCellNews.com, October 6, 2005, accessed 5/17/07 at http://www.stemcellnews.com/articles/stem-cells-bill-dr-j-erving.htm.

ever seen in spinal cord injury research.[25]

Erica Nader of Farmington Hills, Michigan, was the first American to go to Portugal for the experimental treatment in March of 2003. She was told by American doctors and therapists that she would never recover from her spinal cord injury suffered after a 2001 car accident. Erica and her family were simply not ready to accept defeat, and began their own research on alternative options that lead them to Dr. Lima in Lisbon. Two years after the procedure, Erica noted that:

> I don't think I actually gained a lot of motor recovery until the last year or so–my upper abdominals, lower back muscles and some of the muscles that connect to my hips. I have a lot more muscle spasticity throughout my whole body. I can stand with leg braces and not fall over–I couldn't do that before–just because of the amount of trunk control I now have. I have more hand and finger movement now than before. I also have more tone everywhere.[26]

Through her and her family's efforts, Erica has helped make other American patients aware of Dr. Lima's approach to spinal cord injury. Since then, the Rehabilitation Institute of Michigan, located in Detroit, where Erica had undergone traditional therapy with no success, began a collaboration with Dr. Lima that helped send other Americans to Portugal for the nasal stem cell treatments. The Rehabilitation Institute has also been working for the last several years to bring the actual procedure to the U.S., so that patients no longer have to travel out of the country (a huge cost factor in getting the procedure done).

The second American patient to travel to Portugal was Laura Dominguez of San Antonio, Texas. She had severely injured her spinal cord in a car accident at the age of sixteen, and American doctors gave her the same prognosis that Erica had received. Refusing to accept this prognosis, Laura and her family began researching alternative treatments and also discovered Dr. Lima. Since her treatment, Laura has engaged in

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[25] Carlos Lima et al., "Olfactory Mucosa Autografts in Human Spinal Cord Injury: A Pilot Clinical Study," *Journal of Spinal Cord Medicine* 29 (2006): 191-203.

[26] Erica Nader, quoted in "SCI Restoration: The Nose Knows" by Tim Gilmer, posted online at NewMobility.com (May 2005), accessed 5/17/07 at http://www.newsmobility.com/review_article.cfm?id=1007&action=browse.

strenuous physical therapy in the hope of maximizing the surgery's benefits. In her own words, Laura expresses her new goal in life, following upon her stem cell treatment:

> My training has continued to this day and I am able to better use the muscles in my hip area. I am able, with assistance and the use of braces, to walk a distance of over 1400 feet. It takes approximately thirty minutes to walk this distance and it is extremely tiring, but it can be done. I will continue to challenge myself until I can fully walk again with little or no assistance from braces or the help of a therapist. I hope…no, I know…this will be possible by my 21st birthday.[27]

Now, none of us really know how much progress Erica, Laura, and others will make. We must be careful not to over-hype these accounts. Nonetheless, the work of Dr. Lima is showing clear, clinically demonstrable results for spinal cord patients using their own adult stem cells.

These few stories barely scratch the surface of current adult stem cell therapies. Other promising areas of research include help with MS, lupus, Parkinson's, blindness, and various forms of cancer.[28] There are 1485 FDA approved clinical research trials using adult stem cells currently underway or recruiting patients.[29] The conclusion is clear: adult stem cells show tremendous therapeutic potential, and so offer real hope for many people suffering from disease and injury today. And these are real people being helped–these are not just promises. But what is even more important

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[27] Laura Dominguez, testimony given at a Science, Technology, and Space Hearing: Adult Stem Cell Research (July 14, 2004), posted on the U.S. Senate Committee on Commerce, Science & Transportation website, accessed 5/17/07 at: http://www.commerce.senate.gov/hearings/testimony.cfm?id=1268&wit_id=3673.

[28] See the *Do No Harm Coalition* website for more information and specific references at http://www.stemcellresearch.org, in particular "Recent Advances (published since the 109th Congress's stem cell votes) in Adult Stem Cell Research and Other Alternatives to Embryonic Stem Cell Research, accessed on 5/17/07 at: http://www.stemcellresearch.org/alternatives/90newreasons.pdf.

[29] See www.clinicaltrials.gov/ct/search?term=stem+cell. The initial search will show clinical trials currently recruiting patients, but if you check the box in the upper left that says "Include trials that are no longer recruiting patients," you will get the complete list. Accessed on the web 5/17/07.

from the ethical perspective is that adult stem cells can be obtained without causing any harm to human beings. In many cases, these stem cells are taken from the patient's own body, and so people are literally healing themselves. Or, they are obtained from donor sources such as bone marrow or umbilical cord blood–procedures that offer the gift of life without any harm.

CONCLUSION: WORKING TOWARD THE COMMON GOOD

When one stops to examine the entire scope of stem cell research, one finds that research using adult stem cells is something that everyone interested in improving human health can agree upon because it raises no ethical concerns. Thus, opposition to embryonic stem cell research does not necessarily mean that one is anti-science or anti-cures. Even more importantly, support for adult stem cell research helps build the true common good, a good that all human beings can share and participate in because none are sacrificed for the so-called "good of others." Rather than letting the mainstream media or a handful of politicians and scientists dictate the terms of the debate over stem cell research as an oversimplification of either for or against, the pro-life community would do well to draw attention to the large area of stem cell research upon which we can all agree and which, by the way, is working. Adult stem cell research is not without its problems. Much research still needs to be done. But the progress is real and it is ethically sound. It is only one small portion of stem cell research that causes controversy because it attacks innocent human life. But if we can change our focus, we will see that the area of agreement far exceeds the disagreement. Personally, I believe that supporters of embryonic stem cell research are well aware of this reality, and strive to keep the focus on an all or nothing mentality that emphasizes embryonic stem cell research. I think this is because they realize that as the public becomes aware of adult stem cell research and its successes, attention is drawn away from embryonic stem cell research–something that they desperately want to avoid. Fanning the flames of controversy serves their purpose well.

One particular initiative that has begun, but which needs to be expanded, is with establishment of a public umbilical cord blood bank network across America. As Julius Erving noted above, many Americans

could be helped if we only had larger and more diverse supplies of umbilical cord blood. Several states have public banks, but there simply are not enough. Many couples would gladly donate their baby's umbilical cords for banking and research, but are unable to because they are too far away from a bank to get the cord transferred. One of the nation's largest and most successful public cord blood banks is at Cardinal Glennon Children's Hospital in St. Louis, Missouri. Yet, in order to ensure the quality of the cord blood stem cells it obtains, the St. Louis Cord Blood Bank only accepts donations from facilities within a 150 mile radius.[30] This is the only public bank in the state, and so residents in northern and western Missouri cannot donate to it. There is also a growing industry involving private cord blood banks that will freeze and maintain a baby's umbilical cord for parents who are willing to pay for this service. I do not see any real ethical problem with private banks. However, without public cord blood banking to collect stem cells for research, the cords banked in private storage may not be of any use for some diseases if the research does not progress, so public banking remains a priority.

The National Marrow Donor Program has begun working to help develop and coordinate this nationwide network for both cord blood donation and cord blood transplantation, but the network is still relatively small.[31] Federal money is also available to assist with the establishment of public cord blood banks, thanks to the Cord Blood Stem Cell Act of 2003 and the Stem Cell Therapeutic and Research Act of 2005. Pro-Life groups at the local and state levels could promote public cord blood banking to their local politicians as a winning issue because both sides agree we want cures. Making the development of a national network of public cord blood banks a legislative priority could serve as a tool for building political and ethical consensus on the issue of stem cell research. Since umbilical cord blood stem cells are so versatile and do not cause much immune reaction

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[30] National Marrow Donor Program, official website, "News & Events": "St. Louis Cord Blood Bank Selected to Participate in Pilot Project," posted online October 26, 2001, accessed 5/19/07 at: http://www.marrow.org/NEWS/News_Releases/2001/20011026_stlouiscord.html.

[31] National Marrow Donor Program, official website, "Network Cord Blood Banks," accessed 5/19/07 at: http://www.marrow.org/ABOUT/NMDP_Network/Cord_Blood_Banks/Network_Cord_Blood_Banks/nmdp_cord_blood_banks.pl.

when transplanted as noted earlier, public banking will help move potential lifesaving research forward so that others can benefit both now and in the future. Such a focus would draw attention more fully towards the *good news* of adult stem cell research, would potentially save the lives of innocent embryos slated for research destruction, and help save lives right now.