REASON & REVELATION

A MONTHLY JOURNAL OF CHRISTIAN EVIDENCES OCTOBER 2001

HUMAN CLONING AND STEM-CELL RESEARCH—SCIENCE'S "SLIPPERY SLOPE" [PART III]

Bert Thompson, Ph.D. and Brad Harrub, Ph.D.

[EDITOR'S NOTE: Parts I and II of this three-part series appeared in the August and September issues. Part III follows below and continues, without introductory comments, where the last article ended.]

ENTER THE STEM CELLS

The incredible brouhaha created by global cloning efforts has spawned equally incredible scientific scenarios–which are turning into reality even as we write this series of articles. Researchers generally distinguish among four types of genetic applications. **Somatic cell therapy** refers to efforts to correct the functioning of a defective gene in an individual's body cells or to replace it and thus cure the disease that it causes. **Germline interventions** alter germ (reproductive) cells, thereby making changes that affect the next generation through the present generation's progeny. **Enhancement genetic engineering** entails using genetic engineering to produce (in already healthy individuals) improvements such as greater height, increased strength, or sharper memory. **Eugenics** involves systematic efforts to breed superior individuals, in this case through genetic selection or alteration.

Scientists are absolutely enthralled with the possibilities they see on the horizon of treating (or preventing) all kinds of diseases or creating "replacement" organs. Plus, people around the world are clamoring for "designer babies." With the new technology that is becoming available on almost a daily basis, apparently the sky is the limit. As one Web site promised: "Come [to our facility] and return to your country pregnant with the child of your dreams" (see Boisellier, 2001). Under the heading, "Designer Baby," the October 16, 2000 issue of *Time* reported a real-life scenario about that very thing–the child of your dreams.

A Colorado couple–the Nashes–had a daughter, Molly, who desperately needed a bone marrow transplant–preferably from a genetically matched sibling. But the Nashes had no other children. So, using presently available *in vitro* fertilization techniques, they set out intentionally to create a "genetically matched" brother or sister for Molly–with the specific goal of using the newborn's stem cells (derived from the umbilical-cord blood shortly after birth) to treat Molly's condition. In late 1999, the IVF procedure was carried out, and in early October of 2000, as *Time* reported, researchers working at the Fairview University Hospital in Minneapolis, Minnesota, successfully transferred the stem cells from the newborn's (his name is Adam) umbilical cord to Molly. The *Time* writer acknowledged, however:

> The Nashes' decision has prompted inevitable questions about the ethical implications of parents' choosing their offspring's features as if they were options on a minivan. But even as the issue is debated, the practice is catching on. Already, 300 IVF babies in the U.S. have been born after the same genetic-screening procedure the Nashes used.... Welcome to Brave New World, Molly and Adam (Park, 2000, 156[16]:102).

Unfortunately, it is not just Molly and Adam that are entering a "Brave New World." The rest of us are being dragged–kicking and screaming–into that Huxlian alternative cosmos as well.

So where is all this leading? And why the sudden interest in "stem cells"? While employing "stressed" body cells (e.g., mammary gland cells from an adult, such as those used to clone Dolly the sheep) has no ethical overtones (when used in non-human cloning procedures), the use of certain **human** stem cells does. Stem cells are the body's "blank slates"–sometimes referred to as "magic seeds." As such, they have the ability to divide for indefinite periods in a laboratory culture to produce more stem cells, or to give rise, under specified conditions, to a veritable plethora of other cells. [Humans have over 250 cell types; Baldi, 2001, p. 147.] Stem cells are known to exist in three varieties. **Totipotent** stem cells possess an unlimited capability to specialize into any type of cell necessary–extraembryonic membranes and tissues, post-embryonic organs and tissues, etc. [The embryo itself is totipotent.] **Pluripotent** stem cells are capable of giving rise to most, although not all, tissues found within an organism; generally, their potential for future development has not yet been "locked in." **Multipotent** stem cells are committed to giving rise to cells that have a particular function. For example, blood stem cells give rise only to red blood cells, white blood cells, and platelets. Skin stem cells give rise only to the different types of skin cells (melanocytes, keratinocytes, fibroblasts, etc.).

CONTENTS

ARTICLES

DEPARTMENTS

Reason & Revelation is published monthly by Apologetics Press, Inc., a non-profit, tax-exempt work dedicated to the defense of New Testament Christianity.

Editor:
Bert Thompson, Ph.D.*
(*Microbiology, Texas A&M University)

Associate Editor
Brad Harrub, Ph.D.*
(*Neurobiology, University of Tennessee)

Annual Subscription Rates:
$ 8.00 Domestic
$13.00 Canada & Overseas Airmail

Mailing Address:
Apologetics Press, Inc.
230 Landmark Drive
Montgomery, AL 36117-2752

General inquiries, changes of address, or international callers:
Phone: (334) 272-8558
Fax: (334) 270-2002

Orders:
Phone: (800) 234-8558
Fax: (800) 234-2882

On-line Web store/catalog, subscription order/renewal form, current issues, archives, and other information (all orders processed on a secure server):
URL: www.ApologeticsPress.org
E-mail: mail@ApologeticsPress.org

Discovery—Scripture & Science for Kids is a sister publication for children. For more information, please contact our offices or visit the *Discovery* Web site at:
URL: www.DiscoveryMagazine.com

Sources and Functions of Stem Cells

In the past, stem cells generally were obtained from four main sources: (1) umbilical-cord blood from a newborn's afterbirth; (2) adult bone marrow and/or brain tissue; (3) aborted fetuses; and (4) "discarded" embryos that no longer are "needed"—and thus will be destroyed—after *in vitro* fertilization (IVF) procedures.

Are there potential benefits that could inure from the use of stem cells? Yes, there are. When asked in an interview, "What are the potential benefits of researching these cells," bioethicist Alta Charo of the University of Wisconsin (who is a member of the National Bioethics Advisory Commission to the President), responded:

> They could help regrow heart muscle after a heart attack. They could regrow brain tissues that could be an answer to Alzheimer's, Parkinson's, and Lou Gehrig's disease. They could be used as a therapy for burns or to regenerate skin and would help in developing new drugs (2001, 56[8]:101).

But **why** is this the case? The answer lies in the way stem cells "differentiate." In his book, *The Genetic Inferno*, John Medina explained the procedure.

> [T]he cells in your cheek have the genetic instructions for your heart, your liver, your big toe, in fact every tissue in the body. Sixty million copies of everything, truly an exercise in redundancy.
>
> If that extraordinary fact is true—and it is—you can ask an important question of your mouth: why is a cheek cell always a cheek cell? If that cell truly has all the genetic information to make every tissue, why isn't every tissue in your cheek? Even if you wound the inside of your mouth, you won't grow back a foot, but rather other cheek cells. So not only is there selectivity, there is also memory. How does it all occur?
>
> The answer to that question is beginning to be understood at a refined level, and it is the reason why scientists are so delighted. It turns out that all the genes necessary to make a cheek cell are turned on in a cheek cell, and all the other genes are repressed, rendered nonfunctional. The same is true of a liver cell, where all the genes necessary to make a liver function correctly are active, and everything else (including any cheek cell genes) is turned off. This idea of turning genes on and off is exciting because we are learning how nature does it, and are in kind learning to turn them on and off ourselves (2000, p. 16).

In his intriguing book, *Fly: The Unsung Hero of Twentieth-Century Science* (about the tiny fruit fly *Drosophila melanogaster* used in so many research programs), Martin Brookes elaborated on the idea discussed by Medina.

> The ability of genes to be turned off and on could account for the range of cell identities. But the deeper question still remained: **Who was throwing the switches in the first place? Who was overseeing and organizing the whole operation? Who was the architect?**...
>
> To understand the overall picture of genes and development, think of the body in terms of everyday geography. Instead of the body, for example, think of a map of the United States. At the beginning of development, there is just a basic country. Then a group of control genes swings into action, dividing the outline into north, south, east, and west. A second group of genes, the "state" genes, if you like, is responsible for directing the division of the country into fifty states. Of course, the same "genes" will be present in all states. But in Texas, only the "Texas" genes are switched on, while in Maine, only the "Maine" genes are switched on. Next, the "county" genes become active, dividing each state into a collection of counties. After counties, yet another group of control genes directs the formation of towns and cities within each county, and so on (2001, pp. 61,66, emp. added).

The fact that embryonic stem cells—at such an early juncture in their lives—are undifferentiated (what Brookes referred to as a "basic country") makes them both valuable and widely sought after. Within them lies the potential, for example, to grow heart muscle that could be used to repair the damage brought on by a heart attack. They could be used to regenerate skin cells as a therapy for burn patients, or pancreas cells to treat diabetics. They could grow into fresh new brain cells that might restore brain functions in conditions like Alzheimer's, Parkinson's, and Lou Gehrig's disease. And so on.

Pro-life groups have no problem whatsoever with scientists harvesting stem cells for use in research or in procedures intended to

help cure certain diseases (such as diabetes) when those stem cells are derived from either the umbilical-cord blood of a newborn or adult bone marrow and/or brain tissue. Harvesting such cells does not kill an already-living human being.

However, the minute quantities of cells that can be obtained from umbilical-cord blood, and the complexity of obtaining such cells from adult tissues, have made these two practices unpopular. Plus, scientists fear that stem-cell lines from adults may lose their potency over time because they do not always grow well in culture settings. In addition, researchers are uncertain as to whether stem cells derived from adults will prove to be as versatile as embryonic stem cells. Scientists have learned that the earlier they obtain stem cells, the less likely those cells are to have undergone any differentiation. As a result, scientists involved in stem-cell research generally prefer to use cells derived from the earliest possible (embryonic) stages of development, rather than from the umbilical cord blood of newborns or tissues harvested from adults. Therefore, the use of stem cells from aborted fetuses and discarded embryos from "leftover" IVF procedures now is viewed as a practical necessity since those two sources guarantee large quantities of undifferentiated cells.

But this "practical necessity" has developed into a roiling controversy because of some of the sources of the **non-adult** stem cells that are being recommended for use in research programs (specifically, sources such as aborted fetuses and soon-to-be-discarded IVF embryos). In fact, emblazoned across the front cover of the July 9, 2001 issue of *Newsweek* were the words, "The Stem Cell Wars." In her feature article ("Cellular Divide") in that issue, staff writer Sharon Begley commented that using stem cells from aborted fetuses and/or discarded IVF embryos has resulted in "the latest embryo war" (138[2]: 24).

The argument set forth by those who support embryonic stem-cell research is that fetuses are being aborted by the thousands every day in America (conservative estimates, place the number upwards of 4,000/day!). And, left-over IVF embryos are becoming available in similar (or larger!) numbers. So, why not make "good use" of these aborted fetuses before they reach the landfill? Why not "retrieve" the extra, unwanted, soon-to-be-discarded embryos produced by IVF clinics that never will be used? After all, these represent invaluable sources of ready-made stem cells that otherwise would be destroyed. As paralyzed Hollywood star Christopher Reeve (of the *Superman* movies) remarked, in his view it would be unethical to let healthy embryos "be tossed away as so much garbage when they could help save thousands of lives" (as quoted in Chapman, 2001). The banner across the front cover of the July 23, 2001 issue of *Time* heralded "Stem Cells: The Battle Heats Up," and in his feature article, staff writer John Cloud spent five full pages discussing the controversy and laying out the options presently available to researchers (158 [3]:22-26).

The Sanctity of Human Life and Science's "Slippery Slope"

There are those who insist that such non-adult sources are the very ones we **ought** to be using in research efforts (especially IVF "left-over" embryos). In his volume, *Clones, Genes, and Immortality*, John Harris suggested that "it would not be wrong" to use unwanted embryos left over from IVF procedures "so long as the embryo is not in fact implanted" (1998, p. 63). Hubert Markl, current president of the Max Planck Society, wrote a stinging article for the "Commentary" section in the August 2, 2001 issue of *Nature*, under the title of "Research Doesn't Denigrate Humanity," in which he wrote:

> This all boils down to the eternal question, "What is a human being?" ...Every human being is new, unique and developed from a fertilized egg cell. However, **the fertilized egg is far from being a human being** in the full sense of that word: it can be called a human being only if the word is given a meaning totally different from its usual definition. When we refer to an organism as "human," this is an expression of self-reference, the meaning of which is stipulated not by nature but by humans themselves. "Human" is a culturally defined attribute, not a purely biological fact....
>
> **A human being is made not at conception but when the zygote becomes implanted**.... [T]here is no biological reason to attribute complete personhood to a few-celled embryo simply because, in interaction with a mother organism, it has the ability to become one (2001, pp. 479,480, emp. added).

And so—if we are to understand these two scientists correctly—were the embryo to be allowed to attach itself to the uterine wall, **then** it would be wrong to employ it in any given research procedure. But if it is **not** allowed to implant, then there would be nothing wrong with destroying the embryo by robbing it of its stem cells. [One cannot help but wonder, upon seeing statements such as these, what makes it "right" to destroy the embryo seconds **before** it attaches itself to the womb, but "wrong" to destroy it seconds **after** it implants? Furthermore, think for a moment (from the viewpoint of those who defend such a position) about how this argument simultaneously would apply to those cells harvested from aborted fetuses—which represent embryos that most definitely have "already implanted." Such a procedure—given their own definition—would be "wrong"!]

Pro-life supporters object (and rightly so!) to **any** procedure that results in the death (like aborting a fetus) or destruction (like dissecting an IVF embryo) of a human being—regardless of the potential for good that may result from being able to use the harvested cells for such noble purposes as the alleviation of suffering or the extension of life. In her article titled "Cloning: Where Do We Draw the Line?" in the August 13, 2001 issue of *Time*, Nancy Gibbs properly assessed the pro-life position when she wrote:

> For strict pro-lifers the issue is straightforward: an embryo at any stage of development is a human life, worthy of protection, and any kind of research that entails destroying an embryo to harvest its cells is immoral, no matter how worthy the intent. It involves using people as means; it turns human life into a commodity and fosters a culture of dehumanization that we accept at our peril (158[6]:20).

While many scientists today adhere to the "technological imperative" that we mentioned earlier (the idea that whatever **can** be done, **will** be done), they have failed to realize that **the end does not always justify the means!** We **can** retrieve stem cells from aborted fetuses. And we **can** obtain stem cells from discarded IVF embryos. But that is not the point. The question is: **should** we? Is it **right** to abort fetuses in the first place? Is it **right** to create by *in vitro* fertilization thousands of "extra" embryos that we know never will be permitted to grow into an adult human? John Cloud summarized the issue quite well when he wrote in his July 23, 2001 *Time* article:

> Stem cells derived from human embryos could lead to cures for some of humanity's most devastating illnesses—**but to get to the little knots of magic tissue, we have to destroy the embryos, which might otherwise one day become babies** (158[3]:22, emp. added).

Yes, those aborted fetuses and discarded embryos "might otherwise one day become babies"—a reality that United States President George W. Bush artfully acknowledged in his carefully crafted August 9, 2001 speech on funding of stem-cell research by the federal government. During that speech, he stated:

> Research on embryonic stem cells raises profound ethical questions, because extracting the stem cell destroys the embryo, and thus **destroys its potential for life**. Like a snowflake, each of these embryos is unique, with the unique genetic potential of an individual human being....
>
> At its core, this issue forces us to confront fundamental questions about the beginnings of life and the ends of science. It lies at a difficult moral intersection, juxtaposing the need to protect life in all its phases with the prospect of saving and improving life in all its stages.... Embryonic stem-cell research is at the leading edge of a series of moral hazards.... [W]hile we must devote enormous energy to conquering disease, it is equally important that we pay attention to the moral concerns raised by the new frontier of human embryo stem cell research. **Even the most noble ends do not justify any means**....
>
> **I also believe human life is a sacred gift from our Creator.** I worry about a culture that devalues life, and believe as your President I have an important obligation to foster and encourage respect for life in America and throughout the world. And while we're all hopeful about the potential of this research, no one can be certain that the science will live up to the hope it has generated.
>
> Eight years ago, scientists believed fetal tissue research offered great hope for cures and treatment—yet, the progress to date has not lived up to its initial expectations. Embryonic stem-cell research offers both great promise and great peril. So I have decided **we must proceed with great care** (2001, emp. added).

Indeed, we **must** proceed with great care! We are dealing not merely with the lives of those in this generation, but with the lives of those who will compose the next generation as well. And, truth be told, on January 22, 1973 when the U.S. Supreme Court legalized abortion on demand, it took the first step on the slippery slope toward the dehumanization of every American. As newspaper columnist Cal Thomas put it: "A nation that will not protect babies at the moment of their birth is not likely to acquire a latent morality on the way to exterminating them at ever-earlier stages" (2001). Or, as *Time* writers Gibbs and Duffy commented in their "We Must Proceed with Great Care" (August 20, 2001) article: "**This is biology spilled down a slippery slope**" (158[7]:15, emp. added). A slippery slope indeed! No amount of impassioned or inflamed rhetoric on the part of those who support research using aborted fetuses or left-over IVF embryos can alter the fact that the tiny "knots of magic tissue" known as stem cells could—given an opportunity—one day become babies.

When Does Life Begin?

Life—contradictory claims by eminent scientists notwithstanding—begins **at conception**. When the gametes join to form the zygote that will grow into the fetus, and when the full complement of chromosomes necessary to produce and support life combines, it is at that moment that the formation of a new body begins. It is the result of a **viable** male gamete joined sexually with a **viable** female gamete, which has resulted in the formation of a zygote containing the standard human chromosome number—46. The embryo is growing, and is alive. It is not just "potentially" human; it **is** human!

As it develops, the embryo will move through a variety of important stages. The first step in the embryonic growth process—which eventually results in the highly differentiated tissues and organs that compose the body of the neonatal child—is the initial mitotic cleavage of that primal cell, the zygote (the cell resulting from the union of the sperm and egg). At this point, the genetic material doubles, matching copies of the chromosomes move to opposite poles, and the cell cleaves into two daughter cells. Shortly afterwards, each of these cells divides again, forming the embryo. [In both humans and animals, the term "embryo" applies to any stage after cleavage but before birth (see Rudin, 1997, p. 125).]

As the cells of the embryo continue to divide, they form a cluster of cells. These divisions are accompanied by additional changes that produce a hollow, fluid-filled cavity inside the ball, which now is a one-layer-thick grouping of cells known as a blastula. Early in the second day after fertilization, the embryo undergoes a process known as gastrulation in which the single-layer blastula turns into a three-layered gastrula consisting of ectoderm, mesoderm, and endoderm surrounding a cavity referred to as the archenteron. Each of these layers will give rise to very specific structures (see Wallace, 1975, p. 187).

Within 72 hours of fertilization, the embryo will have divided a total of four times, and will consist of sixteen cells. Each cell will divide before it reaches the size of the cell that produced it; hence, the cells will become progressively smaller with each division. By the end of the first month, the embryo will have reached a length of only one-eighth of an inch, but already will consist of millions of cells. By the end of the ninth month, if all proceeds via normal channels, a baby is ready to be born. As one biologist (and author of a widely used secular university biology textbook) noted:

> As soon as the egg is touched by the head of a sperm, it undergoes violent pulsating movements which unite the twenty-three chromosomes of the sperm with its own genetic complement. From this single cell, about 1/175 of an inch in diameter, **a baby** weighing several pounds and composed of trillions of cells will be delivered about 266 days later (Wallace, 1975, p. 194, emp. added).

Is it alive? Of course it is alive. In fact, herein lies one of the most illogical absurdities of arguments set forth by those who defend abortion. They opine that the "thing" in the human womb is not "alive." If it is not alive, why the need to abort it? **Simply leave it alone!** Obviously, of course, from their perspective that is not an option because, as everyone is well aware, in nine months that developing fetus will result in a **living human baby**. The truth of the matter is that human life begins at conception and is continuous, whether intrauterine or extrauterine, until a person's death. The fact that the zygote/embryo/fetus is living is critically important when answering the question, "When does a person receive his or her soul?" When James observed that "the body apart from the spirit

(Greek *pneuma*) is dead" (2:26), the corollary automatically inherent in his statement is the fact that **if the body is living, then the spirit must be present**. Since at each stage of its development the zygote/embryo/fetus is living, then it must have had a soul/spirit instilled at conception. No other view is in accord with both the biblical and scientific evidence.

The Ethics of Stem-Cell Research

Medical ethics requires that any experiment on humans be to the **subject's benefit**. It hardly is to the benefit of the tiny embryo to be ripped apart as it is "mined" for its mother lode of stem cells. Nor is it to its advantage to be washed down the drain and drowned in the early hours of life! Are these tiny embryos human? If one of them were traveling down a woman's Fallopian tube or implanted in her uterus instead of floating in a Petri dish, it would be considered unquestionably human. Yet somehow because it now is capable of being manipulated outside the safety of the womb its "humanness" ceases? With what kind of incongruous logic do we reach such a conclusion? In his response to the manner in which IVF procedures are carried out, ethicist Allen Verhey commented:

> Even if one did not hold that the human being's history begins with conception, respect for human life is nevertheless violated here...because here human life is created in order to be destroyed. Here the procedure demands from the very beginning the intention to kill those intentionally fertilized but not chosen (1978, p. 16).

Dr. Verhey's statement was made in 1978 in regard to strict *in vitro* fertilization techniques. Now, more than two decades later, it has taken on an entirely new meaning. Why so? In the July 2001 issue of *Fertility and Sterility*, scientists from the famous Howard and Georgeanna Jones Institute for Reproductive Medicine in Norfolk, Virginia, announced that they had paid women volunteers from $1,200 to $2,000 each to donate their eggs—eggs that then were fertilized with donor sperm cells to produce living embryos **that subsequently were destroyed intentionally in a procedure that robbed them of their precious stem cells**.

Of the 162 eggs collected and inseminated by donor sperm, 50 embryos were successfully created. The researchers destroyed 40 of those to get the stem cells that resided inside. Until now, scientists had derived embryonic stem cells mainly from "excess" embryos donated from infertility treatments occurring at IVF clinics. That was not true in this particular case, however. Rather, researchers approached donors and informed them that their eggs and sperm would be used specifically to develop embryos for stem-cell research (see "Virginia Lab Harvests Stem Cells Created for Research," 2001).

In the July 23, 2001 issue of *Newsweek*, Debra Rosenberg and Karen Springen reviewed the Jones Institute's research.

> The ethics of the experiment immediately rang alarm bells. Until now most researchers have proposed using frozen embryos left over from *in vitro* fertility treatments as a source of stem cells. Creating embryos so they can be destroyed was something else, even though the researchers obtained informed consent from the egg and sperm donors (2001, 138[4]:6).

When Dr. Verhey suggested—as long ago as 1978—that "here the procedure demands from the very beginning the intention to kill those intentionally fertilized but not chosen," he likely had no idea how prescient his statement would be in regard to events occurring more than twenty years later. Now, as a result of the efforts of the Jones Institute, the creation of the embryos has nothing whatsoever to do with the **production** of life, but rather with the **destruction** of life. Now, we actually have reached the point in science where we are **creating** life in the laboratory for the sole purpose of **destroying** it!

And so, the argument that we merely are "making good use" of embryos left over as a result of IVF procedures—embryos that would have been discarded anyway—no longer holds sway. In fact, now, for all practical intents and purposes, it is a moot point. We no longer need those embryos. Why use frozen specimens when we can produce fresh ones at will—as we need them?

The thought of creating life to destroy it even upsets some of those who otherwise support stem-cell research. In the June 23, 2001 issue of *Time*, Charles Krauthammer authored an essay titled "Mounting the Slippery Slope" in which he lamented the current ongoings in science.

> Had we not all agreed that it is unethical, a violation of the elementary notion that we don't make of the human embryo a thing—to be made, unmade and used as a mere instrument for others?...
>
> A day after the news from Norfolk, we learned that a laboratory in Worcester, Mass. (the very same lab that three years ago produced a hybrid human-cow embryo) is trying to grow cloned human embryos to produce stem cells—but could be used to produce a full or (even more ghastly) partial human clone. **What other monstrosities are going on that we don't know about?**...

Dr. Bert Thompson

October 26-28	Branson, MO	(417) 334-3866
November 2-4	Hawthorne, CA	(310) 676-4868
November 9-11	Portland, TN	(615) 325-4811
November 16-18	El Cajon, CA	(619) 442-1938
November 30-Dec 1	Bremen, GA	(770) 537-3013

Dr. Brad Harrub

October 24	Montgomery, AL	(334) 264-2985
October 27-28	Hopewell, VA	(804) 458-3563

Kyle Butt

November 14	Nashville, TN	(615) 371-1091

Eric Lyons

November 3-4	Muskogee, OK	(918) 682-6382

> People are horrified when a virgin hill is strip-mined for coal; how can they be unmoved when a human embryo is created solely to be strip-mined for its parts?
>
> What next? Today a blastocyst is created for harvesting. Tomorrow, researchers may find that a five-month-old fetus with a discernible human appearance, suspended in an artificial placenta, may be the source of even more promising body parts. At what point do we draw the line?... [We] owe posterity a moral universe not trampled and corrupted by arrogant, brilliant science (2001, 158 [3]:80, emp. added).

Krauthammer is correct in his assessment. Barring governmental intervention, cloning human stem cells likely will become as routine as paying women to donate their eggs, or paying men to donate their sperm, to produce embryos for the sole purpose of destroying them in order to harvest their stem cells. That phrase, "barring government intervention," is critically important.

Legal Guidelines for Stem-Cell Research

In the United States, prior to the decision by President Bush on August 9, 2001 to allow limited research on stem cells using solely those lines already in existence, two distinct sets of guidelines addressed the status of research on human embryos—both of which militated against their use in research. The first was the *1994 Report of the Human Embryo Research Panel;* the second was a group of regulations regarding research on transplantation of fetal tissues (section 498A of the Public Health Services Act). Both sets of guidelines specifically prohibited the use of public funds for research on tissues derived from human embryos.

Late in 1998, however, Harold Varmus, who at the time was the director of the National Institutes of Health, decided to allow funding of pluripotent stem-cell research. In response to his decision, in February 1999 seventy members of Congress signed a letter calling upon the Department of Health and Human Services to reverse Varmus' decision and impose a ban on stem cells from human embryos or fetuses. In July 1999, the National Bioethics Advisory Commission recommended federal funding not only for research on human embryonic stem cells, but also for the production of cell cultures, even at the cost of sacrificing embryos. The White House, however, eventually adopted a more conservative position which suggested that research on embryonic stem cells "is permissible under the current congressional ban"—a position that backed the NIH interpretation of current laws allowing government funds to be spent **to study, but not to derive,** stem cells from embryos (derivation could occur only in private laboratories).

In late 1999, the NIH issued new guidelines for research on embryonic stem cells. Those guidelines, reported in the December 10, 1999 issue of *Science*, were as follows: (see Vogel, 1999, 286:2050-2051):

Deriving new cells from embryos	Prohibited
Research on privately derived cell lines from embryos	Prohibited
Deriving new cell lines from fetal tissues	Allowed
Research that would use stem cells to create a human embryo	Allowed
Combining human stem cells with animal embryos	Prohibited
Use of stem cells for reproductive cloning	Prohibited
Research on stem cells derived from embryos created for research purposes	Prohibited

Then, in August 2000, the NIH revised the above guidelines (as reported in *Science,* September 1, 2000; see Vogel, 2000, 289:1442-1443) to state that NIH-funded researchers could work on embryonic pluripotent stem cells derived by privately funded researchers, provided that:

- Embryonic stem cell lines are derived only from frozen embryos created for fertility treatments (viz., IVF procedures).
- The decision to donate the embryos is separated from fertility treatment.
- Embryo donors are told they cannot accept financial or other compensation and that the cells may be used indefinitely, possibly even for commercial purposes (embryo donors may be identified, if they are notified in advance).
- No stem cells may be used for research if those cells have been derived from nuclear transfer technology (i.e., cloning).

On January 28, 2001, Tommy G. Thompson, Secretary of the U.S. Department of Health and Human Services, sent a letter to the National Institutes of Health, asking the NIH to submit a report on the current status of the science involved in stem-cell research. The 168-page, heavily illustrated document, produced in compliance with Secretary Thompson's request and titled *Stem Cells: Scientific Progress and Future Research Directions*, was released on June 10, 2001 (we were able to obtain a complete copy just as this article was about to go to press). The report encourages federal funding of human embryonic stem-cell research (see *Stem Cells: Scientific Progress...*, 2001).

Many scientists are loath to restrict their future experiments to already-existing stem-cell lines, due mainly to the fact that they do not believe current lines offer enough genetic diversity. Plus, cutting off the source for any future stem cells, scientists say, would limit severely the diversity that is required to make the stem-cell research applicable in all cases since each stem-cell line varies subtly from all others and researchers have not yet determined which ones are best. Cell biologists believe that even if there are as many as 60-65 cell lines available worldwide (the number identified by the NIH), that still would be too few to ensure successful therapies for many diseases. They also note that several of the existing cell lines do not grow well in culture, rendering them impractical for important research efforts.

Is Stem-Cell Research a Panacea?

Adding to the controversy is the fact that we now know that embryonic stem cells can be **disadvantageous** when injected into the body, since they may produce tumors resulting from rapid growth. In the words of Michael Shamblott, a researcher in John Gearhart's laboratory at Johns Hopkins University: "Injected into the body, stem cells can produce tumors" (see "New Lab-Made Stem Cells May be Key to Transplants," 2000).

Critics of stem-cell research point out, accurately, that the cells for this research still come from the destruction of human embryos. In a feature article in the July 30, 2001 issue of *U.S. News & World Report* on "Matters of Life and Death," Terence Samuel commented on this gruesome fact and presented the view of one conservative United States senator (Sam Brownback of Kansas) when he wrote:

> Stem cells are elemental human cells that can generate many different kinds of human tissue.... Opponents contend that extracting cells for research kills the embryos and therefore kills the children that might have developed from the embryos. It is, in their eyes, a simple act of murder (2001, 131[4]:16).

The fact that the destruction took place in the past does not lessen the dastardly nature of the deed; nor does it justify the use of the cells merely because the humans that provided them are not being killed **now**. As Gene Tarne, spokesman for the Coalition of Americans for Research Ethics, observed: "The stem-cell lines are derived from destroying embryos, whether that was yesterday or next week" (as quoted in Wadman, 2001).

The sad part of all of this is that the destruction of embryonic stem cells is completely unnecessary. There are acceptable alternatives. As Kelly Hollowell observed:

> The best sources of stem cells are (1) from our own organs—termed adult stem cells or tissue stem cells; (2) cord blood (the small amount of blood left in an umbilical cord after it is detached from a newborn); (3) bone marrow stem cells which have been demonstrated to make more than blood but also bone, muscle, cartilage, heart tissue, liver, and even brain cells; (4) and neuronal stem cells which can be stimulated to make more neurons, or to take up different job descriptions as muscle and blood.
>
> **Bone marrow and cord blood are already successfully being used clinically, while clinical use of embryonic stem cells is years away.** Current clinical applications of adult stem cells include treatments for cancer, arthritis, lupus and making new corneas, to name a few (2001, emp. added).

CONCLUSION

The potential legalization of the wanton destruction of human embryos represents a Pandora's box of evils about to be thrust upon society. Medical ethicist Paul Ramsey has suggested that we cannot even develop the kinds of reproductive technologies being discussed here "without conducting unethical experiments upon the unborn who must be the mishaps (the dead and retarded ones) through whom we learn how" (as quoted in Restak, 1975, p. 65).

If a person shoots an eagle—the symbol of our country—the American judicial system will throw him in prison and toss away the key. That same system will stop a multimillion dollar dam in the state of Tennessee to save an inch-long snail-darter fish, or fly a former President of the United States to the northwest sector of America to discuss the fate of a spotted owl. Yet should some scientist intentionally destroy a human child in its most defenseless, embryonic stage, such an act not only is viewed as desirable and beneficial, but simultaneously is countenanced as legal. The Proverbs writer stated: "There are six things which Jehovah hateth; Yea, seven which are an abomination unto Him; haughty eyes, a lying tongue, And **hands that shed innocent blood**" (6:16-17, emp. added). What blood could be more innocent than that of a tiny infant—regardless of whether it is in an embryonic *in vitro* state or a prenatal *in vivo* stage?

Faithful Christians must oppose such atrocities in a forthright (yet, of course, nonviolent) manner. It is not an option for Christians to choose whether or not to care for those who cannot care for themselves; God's Word contains specific commands regarding such actions on our part (Leviticus 19:32; James 1:27; Isaiah 1:23; Romans 15:1). Ignoring those commands, and remaining apathetic to the horrors around us—potential or real—invariably produces evil fruits. It is sad indeed to think that we have come to such a point in America's history. Yet here we are—at a time when scientists have stated publicly that they are willing to destroy human embryos in ever-increasing numbers in order to achieve their stated goals. Sad times!

REFERENCES

Baldi, Pierre (2001), *The Shattered Self: The End of Natural Evolution* (Cambridge, MA: MIT Press).

Begley, Sharon (2001), "Cellular Divide," *Newsweek*, 138[2]:22-27, July 9.

Boisellier, Brigitte (2001), "Clonaid: The First Human Cloning Company," [On-line], URL: http://www.clonaid.com/english/pages/home.html#.

Brookes, Martin (2001), *Fly: The Unsung Hero of Twentieth-Century Science* (New York: HarperCollins).

Bush, George W. (2001), "Remarks by the President on Stem-Cell Research," [On-line], URL: http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html.

Chapman, Steve (2001), "The Benefits of Stem Cell Research—and the Cost," *Chicago Tribune*, July 17.

Charo, R. Alta (2001), "Turning Point," Interview in *People* magazine, 56[8]:101-102, August.

Cloud, John (2001), "Bush's No-Win Choice," *Time*, 158[3]:22-26, July 23.

Gibbs, Nancy (2001), "Where do We Draw the Line?," *Time*, 158[6]:18-21, August 13.

Gibbs, Nancy and Michael Duffy (2001), "We Must Proceed with Great Care," *Time*, 158[7]:14-23, August 20.

Harris, John (1998), *Clones, Genes, and Immortality* (Oxford, England: Oxford University Press).

Hollowell, Kelly J. (2001), *Nobel Laureates Letter to President Bush Contains Misinformation and Omissions*, [On-line], URL: http://cbhd.org/resources/aps/laureates_letter_analysis.htm.

Krauthammer, Charles (2001), "Mounting the Slippery Slope," *Time*, 158[3]:80, July 23.

Markl, Hubert (2001), "Research Doesn't Denigrate Humanity," *Nature*, 412:479-480, August 2.

Medina, John J. (2000), *The Genetic Inferno* (Cambridge, England: Cambridge University Press).

"New Lab-Made Stem Cells May be Key to Transplants," (2000), [On-line], URL: http://hopkinsmedicine.org/press/2000/December/001225.htm.

Park, Alice (2000), "Designer Baby," *Time*, 156[16]:102, October 16.

Restak, R.M. (1975), *Pre-Meditated Man* (New York: Viking).

Rosenberg, Debra and Karen Springer (2001), "I'm Wrestling with This Decision," *Newsweek*, 138[4]:6, July 23.

Rudin, Norah (1997), *Dictionary of Modern Biology* (Hauppauge, NY: Barrons).

Samuel, Terence (2001), "Matters of Life and Death," *U.S. News & World Report*, 131[4]:14-17, July 30.

Stem Cells: Scientific Progress and Future Research Directions (2001), (Washington, D.C.: National Institutes of Health). This 168-page document, released on June 17, 2001, is the result of a request submitted on January 28, 2001 by Tommy G. Thompson, Secretary of the U.S. Department of Health and Human Services, asking that the NIH submit a report on the current status of stem-cell research.

Thomas, Cal (2001), "President Bush's Compromise," [On-line], URL: www.tmsfeatures.com/TMSFeatures/fs_feature3/1,1303,20010810tq—b-a,00.html.

Verhey, Allen (1978), "Test Tube Babies: Two Responses," *The Reformed Journal*, September.

"Virginia Lab Harvests Stem Cells Created for Research," (2001), [On-line], URL: http://www.cnn.com/2001/HEALTH/07/11/stem.cells.research.ap/index.html.

Vogel, Gretchen (1999), "NIH Sets Rules for Funding Embryonic Stem Cell Research," *Science*, 286:2050-2051, December 10.

Vogel, Gretchen (2000), "Researchers Get Green Light for Work on Stem Cells," *Science*, 289:1442-1443, September 1.

Wadman, Meredith (2001), "Stem-cell Fudge Finds no Favour with Biologists," [On-line], URL: http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v412/n6843/full/412107a0_fs.html.

Wallace, Robert A. (1975), *Biology: The World of Life* (Pacific Palisades, CA: Goodyear).

εις απολογιαν
AP
APOLOGETICS PRESS
του ευαγγελιου

APOLOGETICS PRESS • 230 LANDMARK DRIVE • MONTGOMERY, AL 36117

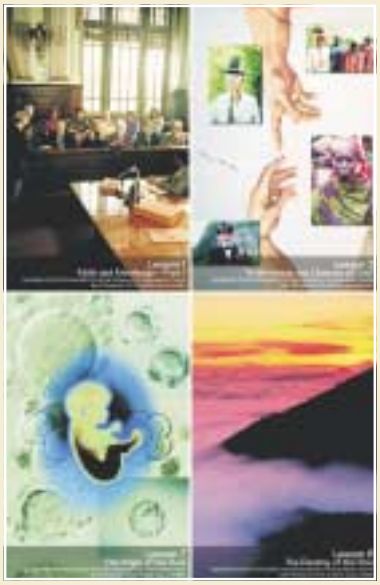
ADDRESS SERVICE REQUESTED

Nonprofit Organization
U.S. Postage
PAID
Montgomery, Alabama
Permit No. 513

NOTE FROM THE EDITOR

ANNOUNCING: NEW INTERMEDIATE CHRISTIAN EVIDENCES CORRESPONDENCE COURSE

In my "Note from the Editor" in the March 2001 issue of *Reason & Revelation*, I announced the availability of the first series (in a planned set of three) of our brand new *Christian Evidences Correspondence Course*. The initial (beginner's) course has 10, 8-page lessons, each of which is printed in full color on enameled paper in a large, easy-to-read typestyle and contains professional artwork. We intentionally wrote each lesson in an everyday vocabulary that would be appealing to young people, as well as to those who are incarcerated. Each lesson was designed to stand on its own, and contains written exercises on a tear-out sheet so that students may hand (or mail) them in for grading. The sets are shrink-wrapped and contain a separate answer sheet for the teacher's use. The 10 lessons in the first series cover the following topics: the faces of unbelief; the existence of God (three parts dealing with cause and effect, design, and morality); creation vs. evolution (two parts); a general introduction to the Bible; the inspiration of the Bible; what God expects of me (the Gospel plan of salvation); and the uniqueness and singularity of Christ's church.



In my March editor's note, I also announced that we were working on a second, intermediate-level course that we planned to release later this year. Well, "later" has arrived! It is with a great deal of pleasure that I announce the availability, as of this month, of our new intermediate-level *Christian Evidences Correspondence Course*. The course is identical to the first one in layout (10 lessons, full-color, professional artwork, student exercise sheets, same typestyles, teacher's answer sheet, etc.).

It is the **content** that is different. The course is designed for a student who already has completed the first course, or for someone who simply wants to pursue a somewhat more in-depth study. The 10 lessons in the series include discussions on: (1) Faith and Knowledge (two parts); (2) "In the Image and Likeness of God"; (3) Jesus Christ—Lord and Savior; (4) Satan—His Origin and Mission; (5) Evil, Pain, and Suffering; (6) The Origin of the Soul; (7) The Destiny of the Soul; (8) Creation and Evolution (two parts).

Kyle Butt (our Director of Biblical Research) and I co-authored the first series. Eric Lyons (our Director of Research) and I have co-authored the second series. Eric, like Kyle, did a splendid job on his part. I have no doubt whatsoever that this new series will have as big an impact as the first series did. [We printed 6,500 sets of the first series. As I write this note, our printer is having to reprint the entire series because we have sold out of it—a sales rate of approximately 1,000 sets/month (something to which my secretaries can attest, I assure you!).] We are grateful for, and humbled by, the incredible reception the first set has received.

Dr. Brad Harrub (our new Director of Scientific Information) and are I are working on the third and final set in the series. It will be an advanced-level course aimed at the student who has completed each of the other two sets, or who simply wants a much more intensive program of study in the fields of Christian apologetics and Christian evidences. Tentatively, we are planning to include in the third set lessons on such topics as alleged Bible contradictions and discrepancies, additional in-depth material on the creation/evolution controversy, the Christian's response to medical ethics, and numerous others. It will be printed in the same full-color format and typestyles as the first two courses, and will come complete with its own set of student exercise sheets, teacher answer sheet, etc. We hope to have the third set in print sometime shortly after the first of the year (possibly as early as March or April, 2002).

Once again, as with all of our products, we have done everything possible to make the new intermediate-level *Christian Evidences Correspondence Course* as professional, yet as affordable, as possible. Cost for the set of 10 lessons is still just $4.00 ($3.50 each in quantities of 25 or more). Individual lessons are available for 40¢ each in quantities of 24 or less (35¢ each in quantities of 25 or more). To order, simply call us toll free at 800/234-8558.

Bert Thompson