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The American Association of Anatomists and Stem Cell Research

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by

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Ever since President Bush's announcement on August 9, 2001, on the restrictions of federal funding for stem cell research using human embryos, the American Association of Anatomists (AAA) has promoted and endorsed the use of human embryos for stem cell research (hesc) using the "spare" human embryos from IVF laboratories and human embryos derived from cloning.

The AAA produces a newsletter four times a year. Since the announcement by President Bush, virtually every issue of the AAA Newsletter has included statements of support for the federal funding which the President has forbidden.

The AAA has never introduced the subject of stem cell research for debate or for critical analysis, or for a vote of the membership for or against the use of human embryos for stem cell research. In 2002, I wrote an article for the AAA Newsletter critical of using human embryos by any means for stem cell research and sent it to the editor. After an exchange of e-mails, the editor asked if I would shorten the article for publication as a letter to the editor in the next issue. I agreed and sent her the revised, shortened version. I immediately received an e-mail from the then-president of the AAA, John Fallon, who forbade the publication of my submission. He did not cite the reasons, but said that if I persisted in the publication of my article, he would write "a tightly-worded rebuttal" to my analysis. The full article was eventually published.[1] I sent a copy to Mr. Fallon, but to my knowledge he never published his "tightly-worded rebuttal," and I never received a reply from him.

Now comes the latest issue of the AAA Newsletter, in which a notice is printed on page 6 of a website announcing a "Toolkit" for arguing in favor of hesc research.[2] The announcement is headed: **"Don't Deny Hope" State Legislative Toolkit.** Going to the website one finds several options on which to click. One of them is called "SCNT: Myth versus Fact" and has the following title and subtitle:

DON T DENY HOPE
SAVING AND IMPROVING LIVES THROUGH STEM CELL RESEARCH

This article proceeds to declare presumed myths followed by presumed facts and discussion. What it does is to erect straw men in the form of myths, which, presumably are supposed to be charges proffered by pro-life advocates. This is followed by so-called facts, which in reality are distortions, falsehoods, and half-truths. Looking at this website selection from my viewpoint as a human embryologist, I decided that the several errors included in this site ought to be challenged and corrected. Thus, what follows are statements within this option which follow in boldface type, and then my commentaries.

Myth: Cloning is cloning is cloning. It's all the same.

No scientist familiar with cloning has ever said this. No human embryologist has ever made this claim. There are several forms of cloning, as their fact sheet points out. But under their "Fact" they say the following:

Fact: There's a world of difference between reproductive cloning – something that should be banned right away – and therapeutic cloning, also known as somatic cell nuclear transfer (SCNT).

Yes, there is a world of difference between the two, but only after the first several ages of the embryo. First of all, some cloning experiments, especially those by Ian Wilmut and his production of Dolly the sheep, demonstrated that cloning by SCNT, using an adult donor nucleus, can be achieved to the birth of a new offspring.[3] This method has been demonstrated in mice, cats, goats, and perhaps other animals. However, keep in mind that the success rate is extremely low. For example, the production of Dolly was one success out of 277 trials. In other animals the success rate was a little bit higher but with extremely high attrition rates.

The "world of difference" fades quickly considering that a new individual human life is possible upon SCNT and that this procedure is exactly the same for both reproductive cloning and therapeutic cloning. So,

the claim of "world of difference" is disingenuous at best, fraudulent at worst. In fact, Robert Rich, past president of the FASEB (Federation of American Societies for Experimental Biology) publicly stated: "*The creation of a human being by performing nuclear transplantation...*"[4] This may have been a Freudian slip; nevertheless, he admits that human life is produced by SCNT. Thus, it follows that therapeutic cloning, in which so-called stem cells are to be obtained from early human embryos, involves destroying human life.

Myth: SCNT will never cure any diseases – it holds no hope for medical research.

No responsible scientist, nor any human embryologist, to my knowledge, has ever made such a statement. What responsible critics are saying is that given the current knowledge claims of curing debilitating diseases by SCNT are sound-byte hype, and it is. See below.

Fact: When combined with stem cell research, SCNT could be used to develop new and innovative treatments – such as replacement cells and tissue – that allow organs to function again and restore hope to millions of families.

Well said. But there are two major problems with investing millions of taxpayer dollars into human SCNT research at this time. One: what has been known about SCNT for more than 50 years, and is coming back to haunt us now, is not being talked about, but which should be known publicly, and, two: virtually no effort to investigate SCNT in contemporary animal stem cell research, where it should be concentrated at this time, is being promoted.

Let's look at the first factor. Hardly anyone reports or acknowledges the first work done on SCNT research, which was accomplished in the early 1950s by Robert Briggs and Tom King.[5] At that time very little was known about gene activation and inactivation, that is turning genes on and off. But, the hereditary material was known to be housed in the nucleus of the cell. Briggs and Kind, experimental embryologists, investigated *nuclear potential* by conceiving of the SCNT procedure in frogs. What they did was to enucleate frog eggs and transfer nuclei into those eggs taken from varying embryonic stages of frogs. With subsequent culturing of these transfers, new clones of advanced ages were obtained. Some of the donor nuclei were taken from tissue of early embryonic stages, and some were taken from older embryonic stages.

What was even more important was early death and anomaly rates were higher when older nuclei were used. No one cites this work in the

current literature. Why is this important? Because Ian Wilmut's success with Dolly was one out of 277 trials, and the SCNT was done using an adult nucleus. The question to ask is: what happened to the other 276 embryos? What happened was early death and anomalies, and this has been manifest in other species tried. Further, Dolly had multiple medical problems and had to be put to sleep. Given these unwanted results, the next question to ask is what has happened to the gene pool in these cases? And, if attritional effects have occurred in these SCNT trials, what might be the consequences in the cells which may ultimately be derived for so-called stem cell pools? And, is it likely that any defects in these pools would be transferred within the stem cell pools to be used therapeutically?

Fact: SCNT could help scientists develop stem cells that will not be attacked and destroyed by the body's immune system.

It appears there might be a way to achieve this in SCNT. This would require using a donor nucleus from the very person in which therapeutic applications would be made. Presumably, the histocompatibility surface antigens on subsequent stem cells would be the same as on the resident subject. Thus, no rejection should occur.

However, there might be another consideration. The donor oocyte (egg) would have a presumably different mitochondrial DNA among its 13 or so mitochondrial genes. Whether or not these genes enter into the production of histocompatibility antigens is not fully known. The current evidence indicates that these genes are active only within the mitochondria and do not export proteins or signals into the cytosol.[6]

Let's look at the second factor. There have been many experiments published concerning animal SCNT since 1952, mainly using embryonic or germ cell nuclei. In every case the high incidence of early death and anomalies have been reported. Further, the principle that fewer successes occur the older the nuclei used has been consistently confirmed. Keep in mind that the current fervor over using SCNT for the production of so-called stem cells cites using *adult* nuclei.

Just what is wanted as an end result? To answer that question, let us examine the latest report that Ian Wilmut, the producer of Dolly the Sheep, has been granted a "cloning license" by British regulators. He will produce, then destroy, human embryos. Wilmut plans "*to clone cells from patients with [motor neuron disease], derive stem cells from the resulting embryo, make them develop into nerve cells and compare their evolution to that of cells derived from healthy embryos.*"[7]

This is not pie-in-the-sky hype. As a scientist, I am willing to admit that someday this sort of approach may turn out valid and worthwhile science. But, given the problems cited above with SCNT research, the

question to ask, aside from the moral aspects, is it redeeming to use public money for such a grand endeavor when the basic animal stem cell research has yet to be done? When Wilmut talks about "the evolution" he is talking about all the natural events which take place during normal differentiation of tissues. During that process, the early embryonic cells (blastomeres), by virtue of constructing the whole human body, will have gone through countless generations of differentiative steps to define the more than 200 tissues of the body. During those differentiative steps each cell is surrounded by many other cells. These cells are, figuratively, talking to one another, in the form of exchanging signals, triggers, inhibitors, and proteins of multiple uses. By extracting the blastomeres from early human embryos and putting them into culture, it is very probable that most of the differentiative activities of those cells will be bypassed or truncated. What will be lost? Predictably, quite a lot. What will this mean therapeutically? Who can tell? The differentiative steps have not been worked out. Thus, should this procedure be attempted, in the case of human embryos, when virtually nothing is known from the same kind of procedures in animals? A reasonable question to ask.

Fact: With therapeutic cloning there is no fertilization of the egg by sperm, no implantation in the uterus and *no* pregnancy (my emphasis). **Implantation into a womb is the clear, bright line that divides reproductive and non-reproductive technologies. *Without implantation, no human life is possible*** (my emphasis).

As a scientist, more specifically a human embryologist, and as a longtime member of the American Association of Anatomists, I am embarrassed for and ashamed of the AAA for sponsoring this so-called "Fact."

Human Embryology is one of several Anatomy disciplines, and has been taught within Anatomy for more than 100 years. Every human embryologist, and virtually every *bona fide* textbook of Human Embryology, declares that pregnancy begins with fusion of the egg and sperm.[8] Human development begins with fertilization and proceeds for 5 to 6 days, then implants into the body of the uterus, under normal conditions. "Human Life" is initiated by fertilization (sexual reproduction), or SCNT (asexual reproduction) and manifests the *CONTINUUM* of life, which continues until death, whenever that might occur.[9] To state otherwise is simply being arbitrary. At any point along this CONTINUUM there exists *a whole, integrated, human life. This is because all of the characteristics of life are forever changing, albeit at different rates at different times: size, form, content, function, appearance, etc.* A parsing or adulteration of the terminology will not change that truth.

Fact: We do not have enough stem cells for research.

This is undoubtedly true. The likely reason was recently released to the public in a declaration that those so-called stem cell lines, approved for research funding by President Bush, are contaminated with carrier viruses and animal proteins derived from growing the cells on mouse feeder cells. This was predictable. The problem of using feeder cells might be at least partially resolved, as cultured human embryonic cells in suspension appear to differentiate into many cell types.[10] When injected into immunodeficient mice they also form teratomas, which manifest several definitive cell types. This is a major problem which has not been resolved in animal studies. First, the cells put into culture want to differentiate, and this is not good, The objective is to derive so-called stem cells. These are cells that are only partially differentiated. When they divide they produce two daughter cells, one of which continues the partially differentiated stem cells, and the other daughter enters into the differentiated pathway. Virtually every body tissue has its stem cells. These cells are for the purpose of replacing damaged or lost definitive cells within the tissue. It is presumed that a damaged organ which has lost some of its tissue has also lost its stem cells. Therefore, the theory is that if those lost stem cells could be replaced, healing would take place. This is a viable premise.

Myth: There isn't a way to ban human reproductive cloning and stop unethical rogue scientists from this practice, while allowing therapeutic cloning for medical research. We need to ban it all.

This is not what is being said. What IS being said is therapeutic cloning destroys human life. Therefore, we need to ban ALL human cloning.

Fact: CAMR (Coalition For The Advancement Of Medical Research) supports... rules to ensure that therapeutic cloning occurs under a comprehensive system. We actively support bi-partisan legislation – the Human Cloning Ban and Stem Cell Research Protection Act (s. 303).

The co-authors of this act are Senators Hatch, Feinstein, Specter, Kennedy, Harkin and Miller. Senator Hatch has publicly stated that the early embryo "is not a human life until implanted in the uterus."[11] Again, every human embryologist world-wide knows that fertilization (or SCNT) initiates a new individual human life.[12,13] This is not a belief, it is a known scientific fact.

The CAMR also states that Senate Bill 303 has the backing of 40 Nobel Laureates. This is a very interesting observation. When the Webster case was brought before the Supreme Court in 1989, an *amicus curiae* brief was filed in support of Planned Parenthood, signed by 167 "distinguished scientists and 11 Nobel Laureates."[14] It turns out that only one of the 167 scientists was listed as a human embryologist. I have been unable to find any biographical information on that one person. Of the 11 Nobel Laureates, none was a human embryologist. I can also say that none of the 40 Nobel Laureates supporting S.303 is a human embryologist.

References

1. C. Wa[illegible]cher. "Cloning, Stem Cell Research and Some Historic Parallels," *The Linacre [illegible]erly*, v. 69:338-343, 2002.

2. http:[illegible]tsg.com

3. I. W[illegible] A.E. Schnicke, J. McWhire, A.J. Kind and K.H.S. Campbell, "Viable Offspri[illegible]ed from Fetal and Adult Mammalian Cells," *Nature*, v. 385, 810-813, 1997.

4. R.R [illegible]Therapeutic Cloning Shows Great Promise," *FASEB News*, 35:4, 2002.

5. T.J. [illegible]R. Briggs, "Transplantation of Living Nuclei From Blastula Cells Into Enucle[illegible]g Eggs," *Proc. Nat'l Acad. Sciences*, 38:455, 1952.

6. B. [illegible]D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson, 2nd ed., pp. 386-4[illegible]d Publishing, Inc., New York 1989).

7. Ass[illegible]ress, 9 February, 2005.

8. Br[illegible]on, *Human Embryology and Developmental Biology*, p. 3, (Mosby, St. L[illegible]

9. C. [illegible]er, "When Does Human Life Begin? The Final Answer," *The Linacre Quar[illegible]* 326-339, 2003.

10. M[illegible]J. Meneses, R.T. Rodriguez and M.T. Firpo, "Review: Propagation and M[illegible]of Undifferentiated Human Embryonic Stem Cells," *Stem Cells and Dev[illegible]* 243-253, 2004.

11. C[illegible]her, "Why Hatch is Wrong on Human Life," *Human Events*, July 16, 200[illegible]

12. C. Ward Kischer, "A Commentary on the Beginning of Life: A View from Human Embryology," *The Linacre Quarterly*, v. 63:78-88, 1996.

13. C. Ward Kischer, "The Beginning of Life and the Establishment of the Continuum," in C.W. Kischer and D.N. Irving, *The Human Development Hoax: Time to Tell the Truth*, 2nd ed., pps. 4-13, self-published, 1997, distributed by American Life League, Stafford, VA.

14. *William L. Webster et al. v. Reproductive Health Services et al. of Missouri, amicus curiae* Brief of 167 Distinguished Scientists and Physicians including 11 Nobel Laureates in Support of Appellaes, October, 1988.