Submission

regarding the

The Australian Parliament's Human Embryo Cloning Debate

to

Senators and Members of the Australian Parliament

by

James L. Sherley, M.D., Ph.D.
Adult Stem Cell and Cancer Cell Biologist
Associate Professor of Biological Engineering
Massachusetts Institute of Technology
Cambridge, Massachusetts, USA

October 16, 2006

From October 10-12, 2006, I had the honor and pleasure of visiting with senators and members of the Australian Parliament to discuss crucial aspects of the information that is currently driving their deliberation on the question of whether cloned human embryo research should be permitted in Australia. This debate is certainly an important and historic one for Australia, and other undecided countries are also looking on and will gauge their future scientific course by the judgment of Australians on this issue. It is this gravity of the Australian decision that inspired me to travel from America, at the invitation of Doctors Against Cloning, to be attended by Family First for presentations and meetings in Parliament to address the quality of the science underpinning human embryo cloning research. My purpose was and is to do whatever I can to insure that when Australian parliamentarians vote, they do so on the basis of sound scientific information.

What I found out about the Australian discussion on cloning human embryos for research greatly surprised me. Among members of Parliament, there was a complete lack of awareness of a basic biological principle that makes false the commonly pronounced claim that research with cloned human embryos has the potential to lead to new therapies for diseases in children and adults. This principle has been reported previously in both the scientific literature (*e.g.,* Sherley 2004) and the lay press (*e.g.,* Cook 2005; Sherley 2006).

It is fair to say that senators' and members' lack of familiarity with this criticism of cloned human embryo research is due to the complete absence of a mention of the biological principle in the Lockhart Report. I learned during my visit that the recommendations of the Lockhart Report have become the scientific "bible" in Parliament's debate of this issue. After becoming familiar with the Report, I think the "bible" metaphor is quite appropriate. The Lockhart Report contains fantastical ideas, and some members of Parliament accept its many erroneous recommendations on faith.

In my capacity as an external reviewer of the Lockhart Report, I recognized a fatal flaw in its development right away. There was no one with stem cell science expertise on the Lockhart Committee. To external reviewers, it seems unthinkable that the Australian Parliament would have charged such a poorly outfitted group with the responsibility of rendering such a crucial document for the debate on human embryo cloning research. Although the Committee reports that it interviewed stem cell scientists, the absence of such official expertise on the Committee proper is such an unbelievable oversight that it calls into question the integrity of the selection process and the quality of the Report. Thus, the absence of stem cell expertise on the Lockhart Committee is viewed to be sufficient cause to disallow the recommendations of the Report in the current debate.

Of course, members of Parliament, who recognize this problem in the Lockhart report, have been reassured of its worth by certain self-pronounced stem cell scientists in Australia. I had the occasion to hear one of those scientists, Dr. Robert Williamson, provide such assurances in a Parliamentary Library presentation that I attended during my visit. If only I could have a 15-minute one-on-one debate with Dr. Williamson, perhaps I could undo some of the falsehoods and misinformation that he is using to mislead Parliament. Here are some of his more egregious false statements:

1. “A cloned human embryo is not an embryo unless implanted into the uterus of a woman. “

Correction: It is the cellular make-up of an embryo that makes it an embryo. Not its location.

2. “Adult stem cells cannot be developed for disease therapies.”

Correction: Adult stem cells are the only type of stem cells for which there are current clinical treatments. Transplantation of bone marrow, which contains adult blood stem cells, to restore blood cell production is a well-known adult stem cell therapy.

3. “Animal-human hybrid embryos are needed for training IVF technicians.”

Correction: IVF technicians can be trained using animal eggs and animal sperm. Though this was the extent of Dr. Williamson’s comment on animal-human hybrid embryos, the Lockhart Report goes further to suggest that research with animal-human hybrids has potential for leading to new disease therapies. It also suggests that tests for human sperm function require the production of animal-human hybrid embryos. Of course, in the first case, animal-human hybrid embryos will be biologically so unlike natural human cells that studies with them will have little, if any, relevance to human cells and tissues. In fact, there is a long history of experiments in which human body cells were fused with animal body cells. The rare surviving hybrid cells were full of abnormalities. In the second case, even if the IVF industry needs to test sperm function with animal eggs, such tests do not require growth of animal-human hybrid embryos and production of hybrid embryonic stem cells.

Beyond the false statements from Dr. Williamson, like the three above, he made one other recommendation in his lecture that calls his professed expert knowledge into question. Dr. Williamson stated that women with devastating diseases like diabetes “should be the first ones in line to donate eggs for production of disease-specific cloned embryos, because they might benefit immediately from the research.” This is both an absurd and a medically irresponsible statement. Patients who participate in experimental research rarely benefit directly from the research, and the principles of responsible conduct of research preclude making such promises to research subjects. Moreover, the procedures for egg removal are sufficiently stressful for healthy women that it would be medically irresponsible to recruit women who suffer from debilitating illnesses. Dr. Williamson’s recommendation verges on medical malpractice, if indeed not criminal offense. I think that if the Australian public knew that some of their members of Parliament were basing their decision on recommendations like these from such questionable “experts,” it would be utterly disgusted.

There is no shortage of pro-cloning scientists like Dr. Williamson. We can only hope that their judgment is temporarily clouded by their own ignorance or misperception of the actual lack of potential for cloned human embryo research to yield new disease therapies. Of course, they may also be motivated by perceived opportunities for personal gain and recognition.

Scientists who speak truthfully about cloned human embryo research’s lack of therapeutic potential are harder to identify. This difficulty is not because they are fewer in number, but rather because they risk significant professional persecution and ridicule if they speak out. Moreover, if they are also persons of religious faith, it is typical for their scientific expertise to be ignored. Yet, whether or not they are persons of faith, their scientific objections should be evaluated independently, if proponents of the research are really committed to diligent consideration of the issues. However, this is usually not the case; and scientists who do speak out against human embryo cloning research on scientific grounds often find their input summarily dismissed by elected officials. I hope this Parliament will show a higher level of commitment to getting to the truth of the matter.

Let me turn now to the essential biological principle, missing from the Lockhart report, that leads to the conclusion that cloned human embryonic stem cells cannot be used to cure diseases in children and adults. Human embryo scientists mislead the public by insisting that there is no alternative to embryonic stem cells. Indeed, the alternatives, adult stem cells, are the only type of stem cells that can be used to treat mature tissues. This is because adult tissues undergo continuous cell renewal.

Although, mature tissues and organs appear static, on a microscopic cellular scale they are dynamic. New cells are continuously being produced by cell division. The new cells mature, stop dividing, and perform the functions of the tissue. Mature functional cells are short-lived. Within days to weeks, they die and are lost from the tissue. Therefore, they must be continuously replenished or "renewed" without the tissue losing the instructions for their elaboration. Adult stem cells accomplish this function by a process called asymmetric self-renewal. When an adult stem cell divides to make two cells, one cell is a "worker" cell that multiplies to become the short-lived mature functional cells. The other cell is a new adult stem cell that retains the gene instructions for how to elaborate more worker cells.

For success, any proposed approach to disease therapies for tissues in children and adults must be able to sustain the essential renewal process of adult tissues. Only adult stem cells can accomplish this feat. Embryonic stem cells cannot, because they lack the property of asymmetric self-renewal. In the culture dish, when they are forced to proliferate, they renew symmetrically, each division producing two embryonic stem cells. These symmetrical divisions are a form of cancer cell growth. When embryonic stem cells are converted to make worker cells, they convert completely. They are unable to make worker cells and at the same time retain instructions for continuing to elaborate them. Therefore, embryonic stem cells can never be used to develop effective cellular therapies for mature tissues and organs. Moreover, mature cells produced from embryonic stem cells will also be ineffective, because that are short-lived and cannot continuously renew on their own.

The only possibility for development of new therapies based on embryonic stem cells would require that they first be converted into adult stem cells. However, the conversion process is formidable compared to use of naturally occurring adult stem cells. So, why would any government decide to waste taxpayers' dollars on embryonic stem cell research that will not even get them to where they *already are* with adult stem cell research? In addition, even if adult stem cells could be developed from cloned embryonic stem cells, they would be ineffective because of the gene expression defects found in all cloned embryonic cells.

It is my hope that the admonishments in this submission (See summary in **Table 1** below.) and the meetings that prompted it will give senators and members of Parliament pause. If they look carefully at the facts and push their staffers to verify them, I do not see how they can support the Patterson bill in good conscience that they have done the best they could for the Australian people and the world. This is an opportunity for a great country and a great people to show the rest of the world the way out of a hopeless money pit. Resources for health research are among the hardest to secure. It is crucial that they be used as effectively as possible. Shifting resources away from traditional disease research and the advancing field of adult stem cell research to waste it on over-rated misrepresented cloned human embryonic stem cell research is still an avoidable mistake of significant proportion (Sherley 2003, 2004, 2006; Cook 2005). I hope Australia's Parliament can show other nations how to get it right.

References

Sherley, J. L. (2003) "Embryos Aren't Essential to Stem-Cell Research," correspondence to *Nature* 423, 381.

Sherley, J. L. (2004) "Human Embryonic Stem Cell Research: No Way Around a Scientific Bottleneck," *J. Biomed. Biotech.* 2, 71-72.

Cook, Michael. "To clone or not to clone," *Mercatornet*, http://www.mercatornet.com/index.php?option=com_content&task=view&id=193, December 6, 2005.

Sherley, J. L. (2006) "Opinion Editorial: Crossing Line on Cloning," *The Boston Globe*, Vol. 269, No. 163, June 12, p. A11.

Table 1. Issues Supporting a Vote AGAINST the Patterson bill

Issue	Criticism
1. Make-up of the Lockhart Committee	No stem cell science expertise
2. Credibility of pro-cloning scientific experts	False statements; medically irresponsible statements
3. Recommendation that cloned embryonic stem cells can be used to treat adult diseases	Untrue based on fundamental biological principles
4. Recommendation that animal-human hybrid embryos are a solution to shortages of human eggs	Scientifically untenable proposal; hybrid cells are abnormal
5. Recommendation that animal-human hybrid embryo production is necessary for training IVF technicians	Animal eggs and sperm can be be used; use of animal eggs for sperm tests does not require embryo formation
6. Diversion of research funding from traditional disease research and adult stem cell research	Wasted public funds
7. Persecution of scientists who speak out against cloned human embryonic stem cell research	Fewer examples of their testimony in the debate