COMMUNITY AFFAIRS COMMITTEE
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A Submission to the Senate Standing Committee in Support of the Exposure Draft
SCNT and Related Research Amendment Bill

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I appreciate the opportunity to make a submission in relation to the Exposure Draft Bill.

The Lockhart Review comprehensively, and with great clarity, addressed the many and complex issues involved in stem cell research. Its recommendations provide a way forward for Australia in this challenging field, as well as indicating limitations and controls. I will restrict my submission to two fallacies which have received publicity in recent months:

"We don't need embryonic stem cells, adult stem cells can be used instead"

"There has been no progress on embryonic stem cells since 2002, which would warrant continuing this research"

Is it true that "we don't need embryonic stem cells, adult stem cells can be used instead"? Actually, we don't know the answer to this yet. Research on human embryonic cells has been underway for just 8 years, compared with 50 years for adult cells. I lead a laboratory which receives a NSW Government Program Grant to compare human embryonic stem cells, adult bone marrow stem cells and olfactory stem cells in spinal cord injury. This is the only lab making such direct comparisons in Australia and, as far as I know, internationally. I collaborate with Prof. Mackay Sim (Griffith University) and am using adult olfactory stem cells from his lab, as well as adult bone marrow cells from Haematology, St Vincent's Hospital and embryonic cells from the Diabetes Transplant Unit at Prince of Wales Hospital. Our aim is simple: to learn which cells best support functional recovery after spinal cord damage.

Our data is still preliminary, but it is clear that adult and embryonic stem cells are fundamentally different. We need to understand the basic science of these cells and their differences before we can determine which would be most useful for the many disorders we seek to treat. For a disorder like multiple sclerosis current evidence, outlined below, indicates human embryonic stem cells may be better. Clearly we should not shut the door on any one type before we know its potential. Australia has the scientists and the expertise to be at the forefront of this cutting edge biotechnology. The potential of this research is immense and if we reject this bill Australians will lose this unique opportunity.

Is it true "there has been no progress on embryonic stem cells since 2002, which would warrant continuing this research"? Here we can be definite, this is simply untrue.

I would like to appraise you of the work of Dr. Hans Keirstead, Associate Professor at the Reeve-Irvine Research Centre, University of California. Dr. Keirstead's lab works with human embryonic stem cells from US federally approved cell lines. His group has shown that these cells can be differentiated into a type of nerve support (glial) cell that makes myelin, essential for normal nerve cell signals. Multiple sclerosis is a disease in which myelin is lost and patients become increasingly disabled, as they loose the ability to walk, and control their bladder and bowels. Myelin is also lost after traumatic spinal cord injury which results in quadriplegia and paraplegia. Dr. Keirstead's lab has developed glial cell precursors from human embryonic stem cells. Using animal models, they have shown that these cells can be transplanted into the spinal cord where they can replace some of the lost myelin, as well as improve functions such as locomotion. (*Faulkner & Keirstead, 2005; Keirstead et al. 2005, see references below*). The cells can be made in sufficient numbers and purity to meet US Regulatory Controls for human use (*Nistor et al 2005*).

Four independent groups, in 3 countries, (*Karimi-Abdolrezaee S, et al 2006; Cummings et al. 2005; Talbott et al. 2005, Olson et al 2005)* using both human and rodent stem cell lines, have confirmed Keirstead's findings of enhanced remyelination and functional recovery in different models of spinal cord injury. This can hardly be considered as "no progress" or "not warranting continuing research". A human trial using these cells is now being planned in partnership with Geron (http://www.geron.com/showpage.asp?code=prodstsp).

In summary, research in the last few years has demonstrated that:

- Human embryonic stem cells can be differentiated into myelin producing precursor cells and made in sufficient numbers and purity for human use.
- Human embryonic stem cells can repair demyelinating lesions in mice.
- Human embryonic stem cells can improve locomotor function in a rat model of spinal cord injury.
- Adult stem cells migrated less well in the spinal cord and mature glial cells would not remyelinate.
- Complications such as excessive growth of terratomas were never seen.

I urge the Committee to accept the recommendations as set out in the exposure draft bill, and allow this critically important research to proceed.

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References

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