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Cloning conundrums

A little knowledge is a dangerous thing. A simple precept, perhaps, but nowhere more pertinent than in the recent debate on human cloning on the floor of the United Nations. At issue is the banning of all forms of human cloning, which would obviate the therapeutic potential of embryonic stem (ES) cells and set a precedent for global restrictions on basic research.

On November 7, the United States, supported by 36 other nations, blocked a UN initiative led by France and Germany to ban reproductive cloning worldwide. The US supports instead an international ban on all human cloning including cloning for research purposes and therapeutic application. Because of the contentious nature of the topic, the debate will once again be deferred—this time until September 2003. In the interim, there exists no UN-sponsored legislation to prevent or discourage the cloning of a human being.

In a related move on October 30, the Bush administration altered the wording of the charter of the Secretary's Advisory Committee on Human Research Protections, which considers the safety of research volunteers. The charter now includes embryos under the term 'human subjects', with the disingenuous claim that 'embryo' was included because some people use it interchangeably with 'fetus'. Although the committee functions only in an advisory capacity and its recommendations to the Department of Health and Human Services are not legally binding, the new wording sets the stage for future regulations and signals the politicization of this committee.

Collectively these efforts by the Bush administration could well presage the eventual ban, at least in the US, of all embryo research. Underlying these efforts is the erroneous belief that adult stem cells can effortlessly replace ES cells as research and therapeutic tools. Organ-specific or adult stem cells have been thought to be capable of self-renewal and differentiation into multiple lineages, much like ES cells. This multipotency and its promise of therapy for degenerative diseases have prompted much excitement. The supposed therapeutic potential of adult stem cells probably also influenced the establishment in the US of a limited registry of ES cell lines, and restrictions on the use of federal funds to develop new lines. Legislation is now being debated that would bar further development, use, and import of ES cell lines in the US. Yet as the use of ES cells is curtailed, the promise of adult stem cells remains latent. In the past year, concerns regarding the reproducibility of results obtained with adult stem cells—questions of plasticity and cell fusion—have, if not dampened enthusiasm, certainly given us pause to consider the limits of our knowledge and the need for a greater understanding of the fundamental properties of stem cells.

From a scientist's standpoint, it is hardly unusual to revise a hypothesis, in this case the plasticity of adult stem cells. But perhaps where we fail most strikingly as a scientific community is in educating the public, not about scientific achievements, but about the scientific process. To quote Sydney Brenner, "All experimentalists know you have to do an experiment four times. The first one is a complete mess and shows only a hint that it might have worked. The second one is better but still messy. Then you do it the third time for the book. This is when you forget to add a reagent, or mix up the tubes or the centrifuge leaks. That is why there is always a fourth time.". The recent findings in stem cell research make it eminently clear that reproducibility in different labs is also paramount to the confidence in a result. In a culture where science is a source of both fascination and distrust and new discoveries may be reported in the media before they are subjected to the rigor of peer review, the sensationalizing of science increases the distance of the fall when reproducibility is not achieved. Loss of public trust is a reminder that, in the public view, veracity is not distinguished from reproducibility. A review of the year's achievements in stem cell research should force the scientific community to carefully consider the impact of its claims.

In the wake of these concerns, it is reassuring to see that the federally imposed impediments to ES cell research are not going unchallenged. A new law in California permits state funding of the development of new ES cell lines, and a similar bill is under debate in New Jersey. The question remains whether ES cell research can effectively continue in a country fractured by extreme viewpoints and contradictory laws, and under the threat of ever more repressive legislation. In this context, perhaps it is time for the US to decide whether it wishes to be an active participant in stem cell research, or be relegated to a bystander in this arena. If the US institutes a complete ban on all research using ES cells not included in the registry, it stands to lose out on several grounds. From research and economic perspectives, the US will continue to see an exodus of minds and money to those countries that permit this research. Clearly the impact of this stance on the development of future therapies for diabetes, and neurodegenerative diseases, and their availability in the US must be addressed. What will be the effect on international collaborations, and how will US policies affect those outside its boundaries?

The present divide among state and federal governments should be used as a starting point for discussion, and not as an excuse to reinforce an intransigent stance against considering the specific merits of ES cell research. Without a systematic approach and open discussion within the US of all aspects of embryonic stem cell research, this critical issue is unlikely to fare any better at the UN.