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Sweating on a hard sell

The scientific community is holding its collective breath, hoping a change of legislation will allow members to stay in Australia to pursue breakthroughs in medical research, writes **Leigh Dayton**

09nov06

FOR Paul Verma, the timing of Tuesday's Senate vote was impeccable. By voting to permit therapeutic cloning, Australia's upper house went a long way towards resolving a pressing personal and professional dilemma for the internationally respected stem cell scientist.

The Indian Government has been trying to lure Verma, an expert in therapeutic cloning in pigs and cows, and his entire laboratory to Mumbai to develop India's expertise in therapeutic cloning, also known as somatic cell nuclear transfer. Not only would he be permitted to apply his skills to human eggs and cells, he and his team would also be generously funded.

"I don't want to move," says Verma at the Melbourne-based Centre for Reproduction and Development at the Monash Institute of Medical Research. What's more, even if he agreed to shift continents he would still be troubled by an ethical dilemma. "Could I work in India in an area not permitted in Australia?" he asks. "I will limit myself to animal and non-human primate SCNT," he says, answering his rhetorical question.

If the House of Representatives follows the Senate later this month and approves the private member's bill put forward by former health minister Kay Patterson, Verma will stay put.

It will be a win-win-win solution. Not only will he remain in Australia but he'll be able to advance the science jointly with Indian colleagues, free from ethical conundrums.

Australia will also benefit medically and financially by ensuring key experts aren't lured away by any of the nearly 20 nations that already permit SCNT. The list includes India, Britain, Canada and the US, if scientists do not use federal grants for SCNT.

"For me, personally, I couldn't be more pleased. But we're not counting our chickens yet," Verma says, reflecting the view of his colleagues nationwide.

As expected, church leaders came out in condemnation of the Senate vote yesterday, claiming the narrowness of the 34-32 margin vindicated their view that the Australian community is split on the issue.

A QUESTION OF LIFE

Jill Rowbotham

NO uniform position covers where the world's great religions stand on therapeutic cloning, and they differ widely on when they believe life begins.

Generally speaking, Catholics and conservative Christians are against it while liberal Christians, Jews and Muslims give it qualified support. The Uniting Church of Australia has no formal position, leaving worshippers to make their own decision.

Melbourne Anglican priest and ethicist Alan Nichols points out that "no Bible verses say when life begins". For Nichols, the important moment is syngamy, which occurs 14 days after fertilisation, when the spine, limbs and brain start to appear. That, he says, is when life begins, and he has no difficulty with excess embryos being used for therapeutic processes before that point.

The Catholic Archdiocese of Sydney's Life Office executive director Brigid Vout says: "Human life begins when you have a one-cellular being, so that includes the zygote, whether it is created by fertilisation of an egg by a sperm naturally, or via IVF, or by cloning. Because from that moment that cell has all the necessary genetic material and power or capacity to drive its own growth and development. Nothing needs to be added other than time and nurture for that one-cell human being to become an embryo, a fetus, a child."

The Jews call the crucial moment the point of no return or ensoulment, and have traditionally fixed that at 40 days. Hence the majority Jewish view is that using excess IVF embryos for experimentation is permissible. Rabbi Moshe Gutnick, who is a

Sydney's Anglican Archbishop Peter Jensen believes that if Australians understood the legislation they would be appalled. Adelaide's Catholic Archbishop Philip Wilson says the closeness of the vote is a "reflection of the way people are pondering these issues in the community as well". Sydney's Catholic Archbishop George Pell praises the senators who led the fight against the legislation, saying they did "better than expected".

Baptist Union of Australia national president Ross Clifford reflects a dispirited attitude, saying that while churches would not stop lobbying MPs in the lead-up to the House of Representatives debate, the Senate had been the key battleground. "I think the sense is that it is already lost in the House of Representatives," Clifford says.

judge on the Sydney Rabbinic Court and holds an orthodox position, says there is a difference between a fertilised ovum in a Petri dish and in a mother's womb. "Majority opinion makes the distinction between the two: if you left the Petri dish alone the fertilised ovum would not grow into a fetus, so you cannot give a fertilised ovum life status, but if it is implanted in the mother's womb, you are not allowed to bring that to an end."

Muslims say the spirit is infused into the fetus at about 120 days. The Australian Institute of Islamic Culture's director Ibrahim Abu Muhammad says after 120 days, harming this life form can be treated as a criminal offence.

"This means that if there is a good reason, then the issue of dealing with embryos and fetuses when they have not reached 120 days of gestation may be permissible if this dealing is ethical. If the research is done to find cures for ailments, this is seen as ethical research."

Jill Rowbotham is The Australian's religious affairs writer.

Although nothing is certain until the bulk of the Lockhart review committee's 54 recommendations regarding Australia's embryo research and cloning legislation are approved, scientists are beginning to consider their next step.

They hope that an SCNT-friendly environment will enable them to strengthen ties to overseas facilities such as the California Institute of Regenerative Medicine, funded to the tune of \$US3 billion (\$3.9 billion), and the new Centre for Stem Cell Biology at the University of Texas in Houston, which is attached to the world's largest hospital. CSCB's Australian director Paul Simmons hopes to combine forces to make the dream of embryonic stem cell therapy real as soon as possible.

Simmons is excited by the opportunities a hospital and research facility with multinational partners can bring in the complex process of turning laboratory research into new or improved therapies for conditions as diverse as motor neurone and Parkinson's diseases and spinal-cord injury.

For hands-on scientists such as Alan Trounson from the Australian Stem Cell Centre and the Monash Immunology and Stem Cell Laboratories, the first step is to pick up the telephone.

"We have to talk to our IVF colleagues," he says. After all, in-vitro fertilisation clinics will be the primary source of eggs for therapeutic cloning. At present, scientists such as Trounson who work with human embryonic stem cells obtain the versatile cells from embryos surplus to IVF needs.

But SCNT is different. It doesn't begin with a fertilised embryo. It involves placing genetic material from, for instance, an individual's skin cells into an egg that has been emptied of its gene-bearing nucleus.

The egg is artificially triggered to begin dividing and within seven days embryonic stem cells have formed and can be collected from the blastocyst, which is then destroyed. Without human eggs, SCNT is impossible.

Also impossible is Rabbit Man, the mythical human-hybrid that Liberal senator Julian McGauran used to bolster his opposition to Patterson's bill. "It's simply biologically impossible," says Robert Jansen, the medical and managing director of Sydney IVF.

Speaking at the recent Senate inquiry into the Lockhart recommendations, Jansen said the two animals had a different number of chromosomes, the structures that carry genes inside every cell. No new creature would develop beyond a cell division or two.

"The number of chromosomes must be the same and match," he said, adding that it would be illegal to even attempt to implant such an oddity.

SCNT is now the only way to study complicated diseases at the molecular level, explains Trounson, who hopes to use SCNT to investigate the fundamental causes of conditions such as juvenile diabetes, motor neurone disease and multiple sclerosis.

So how many eggs does he think he'll need? "We really don't know yet. It may take tens of eggs or possibly hundreds," he says, dismissing as absurd claims that women will be coerced into donating eggs in the thousands to feed the research. What's more, egg donation would be strictly regulated, subject to informed consent from the donor and tightly licensed through the National Health and Medical Research Council.

According to Trounson, the likeliest sources of eggs will be those surplus to fertility treatments or from women who want to further research into specific conditions for personal reasons, perhaps because a family member suffers from heart disease or spinal cord injury. If consent is given, says Trounson, IVF physicians are the most qualified to stimulate a woman's ovaries.

Jansen states that "we will never be (coercing) women on fertility programs to donate eggs. That would be completely unethical in Australia."

Groups such as Sydney IVF have made no decisions about future projects involving therapeutic cloning but Jansen says "we are considering applying for a therapeutic cloning licence". As hands-on scientists and clinicians consider the logistics of SCNT, leaders in the field such as Stephen Livesey, chief executive of the Australian Stem Cell Centre in Melbourne, are looking further afield. For them, legal therapeutic cloning would enable them to compete, as Livesey says, "on a level playing field" in the international race to attract the best scientists.

Not only could scientists such as Verma not have to leave, Livesey says, but overseas experts could be enticed here, including overseas-based Australians with expertise in therapeutic cloning. He already has a list of home-grown talent on his wish list. "They have a strong desire to come home," he says.

Moreover, if one of the hottest techniques in stem cell research becomes legal, young scientists will be more willing to move into a field that offers a career path.

Already, the ASCC has a strong program geared to training the best students in the field, one that promises to become a productive and lucrative part of the nation's biotechnology sector.

"With SCNT we want the option to be able to use it and the option to form collaborations with overseas groups," says Megan Munsie, head of development at Stem Cell Sciences, a private biotechnology company with headquarters in Melbourne. According to Munsie, who in 2000 published the world's first paper on SCNT using animals, the legalisation of therapeutic cloning and creation of clear guidelines are central to building international partnerships.

"You want certainty for your company to function and certainty for the investor community when forming collaborations overseas. (Prohibition of SCNT) may well deter interactions and collaborations," says Munsie, whose firm intends a dual listing on the Australian and London stock exchanges.

Clearly stem cell research, like most fields of modern science, is not just a two-way street. It's a highway with multiple destinations. The potential to join forces is a powerful lure for scientists keen to fulfil the promise of embryonic stem cell research.

"I've just come back from the US and it's very clear we want to work together internationally on these things," Trounson says.

"We want to work together with colleagues in Harvard, Sweden, China, Britain and other places that already have data, which is important. We want to do it together."

It's a sentiment Verma shares as he considers projects that Australia's new-look legislation would allow as he counts down to the final vote.

Leigh Dayton is The Australian's science writer. Additional reporting by Craig O'Neill.

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