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Q&A: The Man Behind Embryonic Stem Cells

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Ten years ago in a small, closet-like laboratory, James "Jamie" Thomson, an embryologist at the University of Wisconsin, Madison, changed the world by creating the first human embryonic stem cells. Few research experiments have generated as much hype or controversy. More recently, he played a key role in creating induced pluripotent stem cells, which might someday provide the benefits of embryonic stem cells without destroying embryos.

Thomson had to get industry support from a tiny biotech, Geron (nasdaq: GERN - news - people), to do his early experiments, because neither his university nor the government would provide them. But he cut his relationship with Geron in 2001 when government funds became available, and he has mostly steered clear of commerce.

Now, however, he has co-founded a company, Cellular Dynamics International, which is focused on testing experimental drugs for heart side effects. Most of the hype about embryonic stem cells has been about replacing damaged body parts, but Thomson sees real promise in drug discovery. Forbes sat down with him, and portions of the interview are excerpted here. Both the questions and answers have been edited slightly for clarity.

Forbes: Do you think the value of embryonic stem cells is more in drug discovery than in cell transplantation?

Thomson: I really believe personally that the value of these cells is not in transplantation. It's hard to predict the future, but my guess is 20 years from now if you look backwards, 90% of the value of these cells will be in things that don't make the front pages. It will be things like drug screening, which is kind of boring, but it does get drugs to market that are safer and faster.

I do think there will be some niches where transplantation is important, but I think people are grossly underestimating how hard it is going to be for most diseases. I think there is some low-hanging fruit people can go after, but for things like neurological disease, it's just so hard to get things reconnected. It's so much better to understand why cells are dying and to prevent it.

These cells suddenly give us access to all the bits of the human body we've never had access to. That's going to lead to understanding why certain cells are dying, and more traditional therapies are likely to prevent them from dying. Parkinson's, if you can diagnose somebody early in the course of that disease and arrest it, that's as good as a cure. And that I think is fairly probable.

Why do you think the idea of transplantation therapies is so seductive?

It just captures the imagination, the whole idea that you could just make a new part, and it is very seductive. I have felt this way for the last 10 years. I derived the human embryonic stem cells originally as a model for human development. I knew it had all these other implications, but that was my personal interest. Because there's no other good accurate model, you can't get access to the human material itself, and mice are just different than people.

Where things are considered with mice, mice are faster, cheaper and better in a lot of ways. But where there are species-specific differences, these cells are incredibly valuable, and there's a lot of the human body that we just haven't had access to because the cells won't grow. Most of the human body.

Dopaminergic neurons, which die off in Parkinson's--people can routinely make them now. It's the first time ever. And I know that a lot of people are going to work on transplantation, I hope it's successful, but I'd actually be fairly shocked if 10 or 20 years from now we didn't have such a good understanding of the biology of that disease that we didn't have to do transplantation. And although human embryonic stem cells and induced pluripotent stem cells are not the whole story for doing that, I think they're going to be one critical component of it.

Why do you think the opportunities for embryonic stem cells in drug development are so big? What are the opportunities for drug development?

The really easy one is heart. We went after that one both because pharma realized it was important already, and we had a huge amount of expertise. The original assay for what is called long QT prolongation was developed here, and that fellow [Craig January] is a founder. He already knows the toxicology industry, they already trust him and the market is very simple. And it's already easy to make those heart cells, and there's simply no other reliable source of human heart samples. People already know there are these tremendously important drug responses that occur in human heart cells that don't happen in mice. That was such an easy sell that pharma was already knocking on our door.

You must have been approached by a lot of venture capitalists over the past 10 years. Why start a company now?

It was only recently that I was interested in doing it. My sense is, the time is right now. There are several things. Back when I derived the human embryonic stem cells, I wasn't at a point in my career where spending the time building a business made sense. It was also my sense that it was simply too early, that there was an awful lot of basic stuff that had to be worked out. And my sense is, a lot of that basic stuff has been worked out over the last 10 years.

My other sense is that nobody's really done it right yet, and there's very much an opportunity there. Part of that is that everybody really wanted to focus on therapeutics and kind of left this other thing off by the side. Nobody's really executed it yet. Since we had this local expertise in heart toxicity, it seemed natural to try.

How much do you think the political debate has warped the public view of what the science actually is?

I think it has a lot. The hype that was created is largely a part of that political debate. Both sides played a little bit loose with the truth, I think, at various times. One side would say one thing, the other side would feel obligated to counter it, and if you say rational, reasonable things, it doesn't get the message across. So it's kind of understandable, but the consequence of that is that people

are ill-prepared for how difficult it's going to be to get transplantation therapies based on these cells. And that that's to be expected, because it's so brand-new.

I actually haven't pulled the statistics for bone marrow transplants in the early days, but people died. For such a brand-new approach to diseases, there could be fatalities, and some of these transplantation therapies won't work. That doesn't bankrupt the field. It's just that some of these approaches are going to be very hard.

Did you expect the level of controversy you encountered?

Dolly was cloned in 1997. All the reporters doing Dolly switched to embryonic stem cells in 1998. I certainly perceived it would be a firestorm. I didn't anticipate how long it lasted, and most of that is because of the election of George Bush. Had this become normal science eight years ago, we'd be past it already.

I do think there are real big parallels to be found with DNA. The same kind of social controversy occurred in the early '70s, followed by compromise, followed by getting on with it. It's taken a little longer now, because of the election cycle.

The other thing is, people wouldn't have predicted where it was going. People thought gene therapy would be here, and it hasn't happened. Nobody ever predicted the genome project would be done at this point.

I think the same things are going to happen with these cells. People are under-appreciating how broadly applicable a research tool they are. Every single medical school laboratory will use them. But they won't call themselves stem cell biologists anymore; they simply will use them to study their tissue of interest. And when there are results from that, it will be disconnected from stem cell biology. I do think that is going to profoundly change human medicine.