

# Stem cell therapy: medical advance or moral challenge?

Peter J. Lachmann\*

*Microbial Immunology Group, Centre for Veterinary Science, Madingley Road, Cambridge CB3 0ES, UK*

Received 20 June 2002; accepted 1 July 2002

Presented by Jean Rosa

---

**Abstract** – My professional lifetime has seen progress in the biomedical sciences that beggars belief. This has led to astonishing advances in the ability to prevent and treat disease and, in the developed world at least, people live longer and healthier lives than ever before. Paradoxically, this has gone hand in hand with the growth of a vocal and influential anti-science lobby that not only rejects much modern science but is also deeply suspicious of new medical interventions. The prospect of cell therapy in the near or middle future is their current target especially where the use of embryonic stem cells or of cell nuclear transfer techniques is concerned. The prospect of cell therapy is welcomed with enthusiasm by patients with genetic and degenerative diseases who hope to benefit from them. On the other hand the whole idea is regarded as repugnant by the anti-science lobby. While some of this opposition is essentially luddite in nature, there are some more persuasive arguments raised particularly to any research than uses embryonic or foetal materials. These arguments will be examined critically. The moral problems of denying the sick the hope of effective treatments have to be weighed against those seen in the development of such treatments. (This article is closely based on an already published paper. P. Lachmann, Stem cell research: why is it regarded as a threat? An investigation of the economic and ethical arguments made against research with human embryonic stem cells. *EMBO Rep.* 2 (3) (2001) 165–168.) **To cite this article:** P.J. Lachmann, *C. R. Biologies* 325 (2002) 1049–1051. © 2002 Académie des sciences / Éditions scientifiques et médicales Elsevier SAS

**stem cells / disease / moral**

**Résumé – Thérapie cellulaire : avance médicale ou défi moral ?** Ma vie professionnelle a coïncidé avec une avancée des sciences biomédicales si impressionnante qu'elle est au-delà du croyable. Le traitement et la prévention des maladies ont tant progressé que, au moins dans le monde développé, les gens vivent plus longtemps et en meilleure santé que jamais auparavant. Paradoxalement, ces progrès ont été accompagnés par l'émergence d'un lobby anti-science, qui s'exprime bruyamment et exerce une grande influence et qui, non seulement, rejette une grande partie de la science moderne, mais considère avec une profonde suspicion les interventions médicales nouvelles. La perspective de la thérapie cellulaire à proche ou moyen terme est aujourd'hui la cible de ce lobby, spécialement lorsqu'elle fait appel à l'utilisation des cellules souches embryonnaires ou à des techniques de transfert nucléaire. Les possibilités de la thérapie cellulaire sont, au contraire, accueillies avec enthousiasme par les patients qui souffrent de maladies génétiques ou dégénératives et espèrent une amélioration de leur état. Mais cette idée est considérée comme repoussante par le lobby anti-science. Bien qu'une partie de cette opposition soit d'origine sectaire, les arguments qui concernent les recherches impliquant des cellules embryonnaires ou fœtales sont plus convaincants. Il faut donc les évaluer d'une manière critique. Dénier aux malades l'espoir d'un traitement efficace pose des problèmes éthiques qui doivent être mis en balance avec ceux que pose la mise au point de ces traitements. (Cet article est basé sur une publication antérieure : P. Lachmann, Stem cell research: why is it regarded as a threat? An investigation of the economic and ethical arguments made against research with human embryonic stem cells, *EMBO Rep.* 2 (3) (2001) 165–168.) **Pour citer cet article :** P.J. Lachmann, *C. R. Biologies* 325 (2002) 1049–1051. © 2002 Académie des sciences / Éditions scientifiques et médicales Elsevier SAS

**cellules souches / maladie / morale**

---

\*Correspondence and reprints.

E-mail address: pjl1000@cam.ac.uk (P.J. Lachmann).

Others in this issue of *Comptes rendus Biologies* have discussed the potential that stem cell research has for the treatment of disease. I wish to discuss some reasons why this exciting advance has been greeted in many quarters with suspicion and even hostility.

### **1. That stem cell technologies will be expensive and therefore available only to rich countries and to rich people, and that they will exacerbate inequalities in health care**

It is true that most novel medical techniques are expensive but they do get cheaper as the scale on which they are used increases. Bone marrow transplantation and coronary artery bypass grafts are good examples.

In the UK, the NHS makes treatments generally available, as does the compulsory insurance-based health provision in France.

The great increase in the price of medical care since the Second World War is due in large part to advances having been in *control* of disease rather than *cure*. Therapies based on stem cells are potentially curative and may end up cheaper than the treatments they replace.

### **2. That this research will deviate effort from other health strategies**

The research underpinning stem cell therapy came from fundamental developmental biology. Research to understand cellular reprogramming and the growth requirements for different cell lineages is likely to prove of widespread value in human biology and medicine.

### **3. That interference with the genome involves ‘playing God’**

The proposition that underlies this objection is that there are things that it is too dangerous to *know*. This proposition is pernicious but there is general agreement that there are things one should not *do*. Humanity is to be treated “as an end in itself” (Kant). Furthermore, Stem cell research has a therapeutic aim and there can be no moral objection to curing the sick.

Some religious views seek to place limits on interventions – particularly in relation to reproduction and genetic manipulation – that they see as interfering with natural processes and therefore inappropriate for man to undertake.

These views are not shared by all religions even within the Christian tradition. The following quotation on ‘co-creation’ is from Prof. Iain Torrance, a distinguished Scottish theologian (personal communication):

“Creation, understood in the light of the trajectory of the incarnation, is not a simple act. It is an enabling: a process in which a created realm is brought to its own reality and enabled to be itself. I suggest that this may give us a charter for some acts in which we do co-operate with God, though it would be rash ever to claim confidently that any specific act were such. I believe we are invited to share in this activity of enabling, which brings the created world closer to perfection. We never know what perfection is or when we have arrived there. Art is a kind of creation of beauty and may in some sense act an analogy.

“I believe we have an authority to intervene, so as to heal and restore, but not to manipulate and destroy.”

To some extent, scientists have themselves to blame for some of these attitudes in as much as some traditional evolutionary biologists tended to take a rather ‘Panglossian’ view of evolution and to replace the perfect divine creation with the perfect evolutionary adaptation. Studies of molecular evolution however show that this is far from the case. There a limited range of evolutionary strategies which give rise to ‘best compromises’.

To give just one example no competent engineer would design a creature walking on two legs as badly adapted to the upright posture as is man!

### **4. That somatic cell nuclear transfer is immoral as it involves creating embryos only to destroy them**

The essential question here is to decide at what stage an embryo acquires interests and rights to protect these interests. When does the embryo become a full part of ‘humanity’?

Sentience is widely regarded as a necessary condition for a creature to have interests. Sentience is neither necessarily the power to think nor the capacity to feel pain but it does require some ability to make contact with the outside world. It is not possible to attribute sentience to a pre-implantation embryo, or even to an implanted embryo until it has some nervous system and some sense organs. An analogy can be drawn with the situation at the end of life. We do not require every cell in the body to be dead in order to regard the person as dead. Death is equated with absence of central nervous system function.

Pius IX introduced the doctrine that an embryo acquires full human status at fertilisation in 1869. It is

at variance with the Aristotelian view that *formatus* equals *animatus*, which had been accepted by the medieval church. Males were said to become *formatus* at 40 days and females at 80 days of gestation. The doctrine of Pius IX is not accepted by many other religions, including Protestant Christianity, Islam or Judaism. It is more widely held that an embryo acquires full human status gradually.

It is also the case that cell nuclear transplantation does not involve fertilisation and might be seen as reducing the Pius IX doctrine *ad absurdum*. If any cell has the potential to develop into a full embryo and needs to be accorded full human status, this would indeed be absurd.

The emphasis on fertilisation raises the question whether embryos made by cell nuclear replacement are really embryos at all. The ‘pro-life alliance’ asked for a judicial review whether fertilisation is essential for creating an embryo recognised as such in British law. At the initial hearing, Mr Justice Crane ruled that regulations do not cover embryos created by CNR, rather than through traditional fertilisation by sperm (November 2001).

However, the Court of Appeal (Lord Justice Phillips) robustly reversed this ruling (January 2002) and British law now recognises embryos made by CNR as legally equivalent to those created by fertilisation. Meanwhile, a law was passed to make reproductive cloning (placing an embryo made by CNR into a uterus) a criminal offence.

The problem of drawing a definitive line between two categories occurs in many fields. Examples include distinguishing between:

- between plants and animals;
- between male and female;
- between living and dead at the end of life;
- as well as between the conceptus and the embryo who is part of humanity.

These categories all exist, even though there can be blurring at the interface. That drawing a line is difficult is not a good reason for taking a fundamentalist line or refusing to draw a line at all.

## **5. That this is the thin end of a wedge leading to neo-eugenics, ‘designer’ children, and discrimination against the less-than-perfect**

This argument is intrinsically flawed. Francis Cornford in his 1908 book ‘Microcosmographica Academica’ enunciated the ‘Principle of the Wedge’:

“The Principle of the Wedge is that you should not act justly now for fear of raising expectations that you may act still more justly in the future – expectations which you are afraid you will not have the courage to satisfy. A little reflection will make it evident that the Wedge argument implies the admission that the persons who use it cannot prove that the action is not just. If they could, that would be the sole and sufficient reason for not doing it, and this argument would be superfluous.”

It is inherent in what Francis Cornford writes that the fear that one may not behave justly on a future occasion is hardly a reason for not behaving justly on the present occasion.

Furthermore, the UNESCO Universal Declaration on the Human Genome ruled out the use of genetic techniques for ‘enhancement’; and stem cell research, which forbids reimplantation, is no part of this wedge in any case.

## **6. The child with leukaemia (or thalassaemia) who needs a histocompatible bone marrow transplant provides a good case study to test the moral case**

There are two principal therapeutic strategies:

- to have a further child using preimplantation embryo selection for histocompatibility; this is already possible and has recently been allowed in the UK “in spite of vocal protests from the pro-life alliance”;
- to use CNR inserting a nucleus from the sick child into a maternal oocyte to grow ‘autologous’ BM stem cells; such cells would be fully histocompatible.

A third alternative would be to let the child die.

Which course of action is least objectionable to ‘pro-life’ sentiment? One ‘pro-life’ apologist to whom this question was put in public preferred to let the child die. If this is pro-life, what is anti-life?