CORRESPONDANCE

ADULT STEM CELLS.

FROM PROFESSOR PETER WEISSBERG, MEDICAL DIRECTOR AT THE BRITISH HEART FOUNDATION

Dear Editor

In your recent article entitled "Cardiology and Stem Cell Research" Dr Kearney used the British Heart Foundation's (BHF) Mending Broken Hearts Appeal as an opportunity to communicate his personal views on stem cell research and its impact on heart disease. Whilst we fully respect his personal antipathy to embryonic stem cell research, we feel it is important to challenge some of the inaccuracies in his arguments.

He begins by challenging our statement that 'advances in stem cell research have only been possible through the knowledge and insight gained using embryonic stem cells'. In our view, the only real 'breakthrough' in stem cell research so far, as it applies to heart disease, is the development of inducible pluripotent stem cells (iPSCs). These are stem cells produced from adult tissue, usually a skin sample, by introducing specific genes which cause the mature skin cells to become stem cells with the capacity to be turned into any other cell type. It is possible to make beating heart cells in a culture dish that have all the genetic characteristics of the original skin donor. This technology has enormous potential for all fields of medicine. It allows us for the first time to study a person's own heart cells in the laboratory and to test the effects of potential new drugs without using animals. It also holds great promise for regenerative medicine: the ability to repair irreparably damaged organs, but only time and a lot of research can tell if this potential is realised. None of this would have been possible without the knowledge of precisely which genes are responsible for conferring a state of 'stemness' on a cell and subsequently for differentiating such iPSCs into heart cells in particular. This knowledge came, and could only have come, from studying embryonic stem cells.

Dr Kearney points to two studies of so-called adult stem cells that have shown promise. These are two of a large number of such studies that have now been completed. The informed scientific conclusion from these studies is that by injecting adult stem cells (usually from bone marrow) into the damaged heart, one can derive a small improvement in cardiac performance. This is now thought to be due to, as yet unknown, factors that leak out of the marrow cells and exert a beneficial influence on the remaining healthy heart cells: a so called paracrine effect. Attention is now turning to what these factors might be, but what is now abundantly clear is that the adult stem cells do not repair or replace damaged heart muscle.

Finally, Dr Kearney points to Dr Zeiher's scepticism that we will ever use embryonic stem cells to treat patients with heart disease. This is a notion we entirely agree with. It is our hope and expectation that we will ultimately learn how to induce adult cells, either from the bone marrow, skin or possibly from the heart itself, to repair the damage caused by a heart attack. But, to do this,

we need to understand the molecular signals that determine why a cell becomes a heart cell in the first place, and the way to do that is to study embryonic cells.

We see embryonic stem cell research as only a small, but essential component of the overall strategy to mend a broken heart. We appreciate that some people do not approve of this aspect of the research and we respect their opinion. But it is essential that opinion is accurately informed.

Yours

PROFESSOR PETER WEISSBERG, MEDICAL DIRECTOR AT THE BRITISH HEART FOUNDATION

RESPONSE TO PROF WEISSBERG FROM RR DERMOT KEARNEY

Dear Editor

In this issue of the Catholic Medical Quarterly, Prof Weissberg, Medical Director at the British Heart Foundation, takes exception to some of the statements I made in my article "Cardiology and Stem Cell Research" published in the August 2011 issue of the Quarterly [1]. He disagrees with my argument that many leaders in the field of stem cell research do not support the British Heart Foundation's belief that "advances in stem cell research have only been possible through the knowledge and insight gained using embryonic stem cells". I accept that many researchers are convinced that this is the case, but not all. Prof Neil Scolding, Director of the Bristol Institute of Clinical Neurosciences and a highly-respected researcher with a particular interest in adult stem cell research and multiple sclerosis, has stated that advances in stem cell research, including the advances in inducible pluripotent stem cells (iPSCs), could have been learned by studying "the conventional paths to scientific progress", that is using human adult cells and animal models such as rodent embryonic stem cells[2]. Prof Colin McGuckin, President and Director of the Cell Therapy Research Institute in Lyon, France and founder of the recently-established Adult Stem Cell Foundation of Ireland, is a world-renowned figure in the field of umbilical cord blood stem cell research opposed to the use of human embryos for research purposes. He is also advisor to the Vatican on stem cells. He has previously voiced his concern over the excessive emphasis on human embryo stem cell research in the United Kingdom to the detriment of adult stem cell research[3].

Prof Weissberg mentions the achievement of Dr Shinya Yamanaka of Kyoto University and his work with iPSCs which recently led to his Nobel prize award. It is true that Dr Yamanaka has worked with human embryo stem cells and even now does not totally condemn this form of research. It is worth recalling, however, the 2007 report in the New York Times where he explained the inspiration behind his revolutionary discoveries. He recalled visiting a colleague's laboratory and looking at a human embryo under a microscope. When he saw the embryo he suddenly realised there was such a small difference between it and his daughters. He thought "we can't keep destroying embryos for our research. There must be another way" [4].

Prof Weissberg refers to my discussion of two well-publicised German studies [1] where adult stem cells, using patients' own bone marrow-derived stem cells, seemed to show some improvements in cardiac function and overall survival. My purpose was to draw attention to areas of stem cell research [using "so-called adult stem cells" in Prof Weissberg's words] that were already showing some clinical benefits. To balance the argument, however, I also referred to two other similar studies where no clinical benefits were found1. I wanted to demonstrate that these are areas of research showing some promise but that more work with larger studies needs to be carried out before these forms of treatment can be recommended or used in everyday medical practice. Prof Weissberg seems to agree with the assessment that no clinical benefits are ever likely to be demonstrated using human embryo stem cells. That was one of the main points that I wanted to demonstrate in the article.

Finally, Prof Weissberg refers to my "personal antipathy" towards human embryo stem cell research. I wish to clarify that this is not a personal issue for me and that I am not alone in opposing such research. The main inspiration behind my article was my desire to ensure that Catholic Healthcare workers were properly informed about the Church's teaching on the sanctity and value of all human life from the moment of conception, its positive support for ethical adult stem cell research and its consistent opposition to any research or intervention that treats human life, including that of the human embryo, as a means to an end.

Yours Faithfully

Dermot Kearney

REFERENCES:

1. Kearney D. Cardiology and Stem Cell Research. Catholic Medical Quarterly, Volume 62 (3) August 2012, pp19-23.

2. Scolding N. The Stem Cell Wars Are Over. Standpoint. February 2009.

3. "You would barely know adult stem cells exist" Times Higher Education, 23 October 2008.

4. The New York Times, 11 December 2007

FROM JAMES M. ROSSETTI, DO

Sir

The fact that adult derived stem cell can provide benefit in a multitude of disorders (including heart disease) cannot be refuted. Yes, much of the work is quite early in development and more studies are needed, but even transient benefit for some disorders is surely providing promise beyond that of embryonic stem cells and to date, iPSCs. The way in which this benefit actually occurs remains unclear in some disorders, thus necessitating further bench work. At the very least, we can say that the early risk associated with these more mature cells is far less than that of more primitive types.

The fact also remains that adult type stem cells have a record of clinical benefit that exists for no other type. To suggest that further research will not potentially change this would take hubris, but the data thus far strongly favor adult type stem cells in regard to both risk and benefit. Lastly, to suggest that the study of embryonic stem cells is essential for the healing of any tissue is speculative. Even if this were the case, one could make a cogent argument for the study of animal embyos. More importantly, we may learn similar information from slightly more mature cells; the study of which would not compromise a moral obligation to protect life. Many in the field, even some who do not acknowledge the moral aspect of this issue, would agree that the resultant understanding should then be applied to the promise of iPSCs as the potential utility of embryonic stem cells continues to grow dim.

JAMES M. ROSSETTI, DO