

*Times*  
14.7.18

# Transplants Transformed

## Stem cell science could make a whole branch of surgery redundant

The time may come within two decades when a patient suffering kidney failure has a new organ implanted that has been grown from his or her own stem cells. Alternatively, stem cells could be used to repair a damaged kidney. Either way the long wait for a transplant organ would be avoided, as would the rush to operate when one became available, and the high risk of rejection by the host's immune system.

This is the kind of leap forward in the brave and relatively new field of regenerative medicine envisaged by Professor Sir Robert Lechler, president of the Academy of Medical Sciences, in an interview with *The Times* today. It is significant not only for how it might transform the prospects of critically ill patients, but for how it could change the way traditional transplant medicine is perceived. The need to "cut bits out and move them from person to person" will come to be seen as barbaric, Sir Robert says, and he should know. He has spent much of his career making this sort of transplant possible.

If he is right, then in professional terms his forecast is like a turkey looking forward eagerly to

Christmas. His specialism is transplant immunology and a breakthrough in stem cell-based regenerative medicine could put him out of a job. Yet it is likely to happen. It would mark the dawn of a new age of medicine, and his role in articulating what is possible for the public and his peers should not be underestimated.

In a world of intense and ever narrower specialisation, scientific advances are being made all the time on myriad fronts. However, it takes a particular intellectual courage to persuade toilers in many disciplines to raise their eyes to the horizon and focus on a clear and simple goal.

Medical "moonshots" can be fraught, especially when announced by politicians rather than scientists with detailed knowledge of their subject. This does not mean they are wrong. In the search for a cure for type 1 diabetes, for a universal flu vaccine and for better treatment of inherited blindness, there are roles unfilled for informed communicators of what is possible. A few more visionaries in Sir Robert's mould would not go amiss.

Much of the optimism in stem cell medicine nowadays derives from the zebrafish, which can

regrow its own heart tissue thanks to a naturally occurring chemical known as fibroblast growth factor 1. Scientists at King's College London have seen parallels between automatically regenerating zebrafish hearts and the adult cells that help to repair damaged skin in humans. In due course these researchers hope to apply the biology at work in these processes to build mini "organoids" and full-size "chimeric" organs (grown in one species for transplant into another).

The key ingredients will be so-called pluripotent stem cells capable of developing into any sort of tissue with the right genetic and chemical manipulation; and where necessary 3D-printed "scaffolds" to give the new organs their shape. Pluripotent cells have already been used to treat age-related macular degeneration in humans with deteriorating sight.

They have been used to treat spinal cord injuries and symptoms of Parkinson's and stroke in rodents. For now, a successful traditional transplant seems miraculous because it usually saves a life. Not for the first time, science may be about to change the way we see the world.