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ghost heart

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I have submitted this report to finish activities requirement

Abstract

The report shall discuss one of the possible solutions to one of the biggest problems facing mankind, lack of organs for transplant, and mainly lack of hearts. A new procedure which is referred to as ghost heart shall be covered along with its possible helpful effect in reducing the increasing demand over human organs. The report shall discuss the statistical aspects covering mortality due to lack of available transplants and shall also compare this solution to another one known as organ farms

Introduction About 4,003 individuals in the United States are awaiting a donor heart while this report is being written ⁽¹⁾; worldwide, 22 million individuals are living with heart failure. A bioartificial heart is a theoretical alternative to transplantation. Generating a bioartificial heart requires engineering of cardiac architecture, appropriate cellular constituents and pump function. The heart is decellularized by coronary perfusion with detergents, preserved the underlying extracellular matrix (Protein scaffold), and produced an acellular, perfusable vascular architecture, competent acellular valves and intact chamber geometry. To mimic cardiac cell composition, these constructs were reseeded with cardiac and endothelial cells ⁽²⁾. On the other hand Xenotransplants is the transplant of living cells from one specie to another The two methods have been lately compared as they can both provide good solutions.

Discussion

The 2nd study will talk about how to establish function, eight constructs were maintained for up to 28 days by coronary perfusion in a bioreactor that simulated cardiac physiology. By day 4, we observed macroscopic contractions. By day 8, under physiological load and electrical stimulation, constructs could generate pump function (equivalent to about 2% of adult or 25% of 16-week fetal heart function) in a modified working heart preparation. To create a whole-heart scaffold with intact three-dimensional geometry and vasculature, we attempted to decellularize cadaveric hearts by coronary perfusion with detergents, which have been shown to generate acellular scaffolds for less complex tissues, by direct immersion. We then repopulated decellularized rat hearts with neonatal cardiac cells or rat aortic endothelial cells and cultured these recellularized constructs under simulated physiological conditions for organ maturation. Ultimately, chronic coronary perfusion, pulsatile left ventricular load and synchronized left ventricular stimulation led to the formation of contractile myocardium that performed stroke work. However in this experiment the implantation wasn't performed, but this could be done in the close future ⁽²⁾

The 3rd study which has a similar goal and result to the 2nd study but with a slightly different method which would be the xenotransplantation

Xenotransplantation is the transplantation of living cells, tissues or organs from one species to another. Such cells, tissues or organs are called **xenografts** or **xenotransplant**

Human xenotransplantation offers a potential treatment for end-stage organ failure, a significant health problem in parts of the industrialized world. It also raises many novel medical, legal and

ethical issues. for example A continuing concern is that many animals, such as pigs, The lifespan of most pigs is roughly 15 years, currently it is unknown whether or not a xenograft may be able to last longer than that., meaning that their tissues age at a quicker rate. Another concern is Disease transmission (xenozoonosis) and permanent alteration to the genetic code of animals are also causes for concern the most known concern to every day people is organ rejection . A few successful cases of xenotransplantation are published⁽³⁾. The most famous of these cases being the first one recorded is a case back in 1984 is An American infant girl known as "Baby Fae" with hypoplastic left heart syndrome was the first infant recipient of a xenotransplantation, when she received a baboon heart. The procedure was performed by Leonard L. Bailey at Loma Linda University Medical Center in Loma Linda, California. Fae died 21 days later due to a humoral-based graft rejection thought to be caused mainly by an ABO blood type mismatch, considered unavoidable due to the rarity of type O baboons. The graft was meant to be temporary, but unfortunately a suitable allograft replacement could not be found in time.⁽⁴⁾

Conclusion

To conclude both may provide novel solutions for the increasing demand of organ transplants ,With rejection being the main decider between the two with this in mind ghost hearts will be the better method as they have proven to work on a smaller scale, however these two methods are far from clinical experimentations on humans ,but, however these two should be seriously taken as both could have substantial effect

References

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