Year Two: Use of Intestinal Scaffolding as a Pumping Assist Solution to Heart Failure

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Technological advancements in biomedical sciences have circumvented the problem of heart failure by creating a risky solution that only mitigates the severity of the problem for a short period. These “solutions” come in the form of battery driven ventricular assist devices (VADs) – they endow an artificial way to allow the heart to continue pumping blood throughout the body, saving thousands of lives each year, but taking hundreds more due to complications. Problems that arise with these devices make it evident that a less synthetic solution is needed – this research aims to create one. It’s hypothesized that decellularized intestinal segments could be used as scaffolds to grow beating heart cells, which might beat in unison as a "pump." Intestine has been harvested from a lab mouse, removed of cells, and cut into small pieces. HL-1 Cardiac Mouse Myocytes have been used to repopulate the intestine through use of culturing methods; the resulting segment is examined for confluence and beating. Culturing methods have been successful in growing heart cells on the intestinal segment. However, the cardiac myocytes that have attached and grown on the intestinal wall have failed to beat in unison, although some solitary cells were beating. If the culturing methods are optimized to yield an entirely beating segment, then the result would be ground breaking in helping stop the problem of heart failure, providing a "pump" fueled by the beating of the cells themselves.

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