Abstract—Scientists have developed a method to strip a given organ of genetic material, leaving only a nonliving scaffolding behind. This scaffolding can then be seeded with donor cells from the intended patient to grow a new organ without concerns of tissue rejection or donor compatibility.

I. INTRODUCTION

ALTHOUGH modern medicine allows for safer and more organ transplants than past practices did, our current solutions are still far from ideal. The finite nature of organ donors forces those in need of transplants to be on a wait list, and for many, time is critical. In addition to the simple insufficiency of numbers, organ donations are problematic in that the donor organ must be compatible with the recipient, and even then there is a non-zero chance of complications from tissue rejection. Artificial tissue and organ generation can address these issues by allowing for a great increase in the number of available organs, as they can be generated at will, and by using the donor’s own cells to help grow the new organ, thus eliminating the potential for hostile reaction of the body’s defenses.

II. METHODS

A scaffold, or sterile 3-d mold of an organ, can either be synthetically produced or taken from a living creature and decellularized before being seeded with the donor cells. The cells will then grow around the scaffolding to form the new organ, which can then be implanted into the patient.

III. RESULTS

Scientists are currently able to replicate simple structures such as blood vessels and hollow organs with few cell layers, but solid organs, such as the kidney, with several different types of cells and many different cell layers continue to prove evasive. Transplants from organs grown from the cells provided by the intended patient show much lower rates of rejection and are guaranteed matches for the patient, eliminating a time-consuming and limiting aspect of organ donation.

IV. DISCUSSION

While synthesized organs are not a currently viable replacement for donations, they hold great promise for future developments. They would greatly increase availability and timeliness of organ transplants, as well as eliminating the risk of complications due to the patient’s immune system regarding foreign tissue as hostile, as the tissue would not be foreign at all. Although synthetic organs would be more accessible and friendly to the recipient, the option is under heavy scrutiny by researchers with concerns about the synthetic organ’s viability. It is yet to be proven that these artificial organs, grown either on a synthetic or sterilized organic scaffold, are equally as efficient, durable, and reliable as a naturally grown and donated organ.

Although these concerns are valid, it is worth noting that there have been successful transplants of artificially grown tissue, notably the first such transplant of a windpipe into a cancer patient who was unable to wait for a donor organ, who regained full functionality after the operation.

While artificially grown organs may never completely replace donations, it seems likely that they will at least supplement, and perhaps even predominate the practice, given time to refine the techniques and develop methods for synthesizing more complex organs.

REFERENCES