Tissue Engineering and Drug Testing
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Abstract—Through the use of tissue engineering, medicine can become personalized and approved much faster than it currently is. This process also makes medicine more affective in myriad ways.

I. INTRODUCTION

INCREDIBLE advances are in store in the field of medicine. One of the latest processes under development involves the use of pluripotent stem cells in order to create a micro-environment that emulates individual persons. By doing so, drugs being formulated to treat disease can be tested solely on these models, skipping less accurate versions of testing involving mice and people. While human test subjects are better than mice, our genetic composition is different enough for drugs to have different effects on us. It is because of this that tissue engineering can be more effective in the formulation and distribution of future medicine.

II. METHODS

The process all begins with pluripotent stem cells, which are reprogrammed somatic cells that emulate embryonic stem cells in terms of morphology, proliferation, surface antigens, gene expression, epigenetic status of pluripotent cell-specific genes, and telomerase activity. Once these cells are drawn from an individual, tissue engineers reprogram them to simulate the organs of that person's body. The purpose behind this is to get precise results while testing drugs. The information gathered from this can then be stored digitally, so that the information can be used for future medical purposes. This model can not only replace animal testing in general, but it can be used to discover how versions of a drug can affect people on an individual level.

Model of a Potential Prototype for Tissue Engineers

III. RESULTS

Given how recently this idea has come to fruition, there are currently no results to display for this complete idea. The piece are in place for testing, and the processes just need to be combined in order to fully implement the idea.

Neurons from a patient with Lou Gehrig's Disease

IV. DISCUSSION

There are major implications for this new process. For one, the use of a person's somatic cells to create a variation of embryonic stem cells removes actual embryos from the scenario, causing no conflicts of interest. Furthermore, this new process also removes animal testing from the equation, resulting in even less conflicts of interest in the terms of scientific testing. The process of releasing a new drug to the population involves lab testing, animal testing, clinical trials, and then the market comes into play. With this new method implemented, only lab testing would be necessary, with greater precision, and with lesser monetary expense.

REFERENCES

[1] Induction of Pluripotent Stem Cells from Adult Human Fibroblasts by Defined Factors


http://www.sciencedirect.com/science/article/pii/S1359644602022730