

A Novel Encapsulation Device for Mouse Neuronal Stem Cells

(Technical Report)

The Impact of Drug Use on United States Policy and Societal

Norms

(STS Research Paper)

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Sociotechnical Synthesis

Cell encapsulation—the process of coating cells with a semipermeable polymeric matrix—is of critical importance for many biomedical research applications including stem cell technologies, as the coating that encapsulates the cell is necessary to prevent immune rejection in cell transplantations. Using the layer-by-layer technique to encapsulate cells can provide several advantages to researchers, however, the current manual layer-by-layer process can be time-consuming and tedious, create difficulties in saving excess unbound material, and require cells to be kept out of an incubator for long periods of time during the encapsulation procedure. Therefore, a novel cell encapsulation device was designed to address these limitations. Through an iterative design process, an optimized prototype for this cell encapsulation device was developed specifically to aid stem cell researchers by providing improvements over the traditional layer-by-layer process. While lab closures due to the COVID-19 pandemic prevented complete assembly and testing of the final design iteration, it is expected that the outlined design validation process will prove the device capable of reducing the time necessary to complete the encapsulation procedure, reducing the amount of material lost during the procedure, as well as increasing the number of viable cells encapsulated during the layer-by-layer coating process. While the technical report included in this portfolio focuses on improving the process of cell encapsulation, the STS research paper takes a sociological look at the impacts of the War on Drugs.

For decades, the federal government has criminalized certain substances through a movement called the War on Drugs in an effort to oppress marginalized communities. Drugs are a biomedical technology that quite literally have the potential to change one's perception of the world, which can have huge implications on society. It makes sense that politicians may want to

diminish the effect drugs have on people's minds, but the way the legal system addresses drugs does not achieve this goal, but instead weaponizes the drugs in order to silence certain groups. This paper seeks to analyze the impact drugs have had on politics as well as society through the analytical framework of Co-Production, claiming that drugs and society both grow as a result of each other. This analysis will be done through case studies and personal interviews. Through this research, I expect to gain a deeper understanding of individuals due to a set of laws that in the twenty first century are generally seen as outdated. The drug technology and the analytical framework go hand in hand, because while the drugs themselves are simply chemicals that interact with the human mind a certain way, the widespread effects the War on Drugs has had are a result of STS concepts at play in the real world.