Evaluation of Caffeic Acid Transport in an In Vitro 3D Model of Hepatocellular Carcinoma
(Technical Report)

An Actor Network Theory Approach to Hepatitis C Treatment Access in 2013
(STS Research Paper)

An Undergraduate Thesis Portfolio

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By

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Socio-Technical Synthesis: Hepatitis C and Hepatocellular Carcinoma

My technical project and my STS research project are connected by the overarching objective of reducing liver cancer incidence. These two projects work together to solve this problem through differing strategies. My technical work focuses on the development of innovative treatment methods for liver cancer, whereas my research project explores the setbacks patients face with regards to access to the medicine. In this document, I will explain my technical and STS projects and how my overall research topic benefited from the two projects being completed simultaneously.

To address the technical aspect of my overall research objective, my team and I designed and manufactured a tissue surrogate that closely mimics the hepatocellular carcinoma (HCC) tumor microenvironment to evaluate the release kinetics of caffeic acid, a drug that has been shown to cause extensive regression of HCC tumors in rat models, in order to optimize current treatment methods. The results of this technical project will be impactful for future animal testing procedures and the eventual reduction of liver cancer incidence once implemented in a patient setting, since HCC is the most common form of liver cancer.

In contrast to my technical project, my STS project addresses the role of various groups within the Hepatitis C curative drug network to determine why the system did not function successfully. Specifically, in this project I use actor network theory to analyze why patients were prevented from accessing Hepatitis C treatment. This STS project will provide an increased understanding of the obstacles to medical treatments that should be considered once the improved HCC treatment, involving caffeic acid, is developed. Additionally, it is essential to

evaluate Hepatitis C treatment access because the untreated infection can cause liver damage which significantly increases a person's risk of developing HCC. Therefore, both projects work in conjunction to solve my overarching research aim of reducing liver cancer incidence.

I found it valuable to work on my technical and STS projects simultaneously. Analyzing both topics separately gave me additional insight into my research problem that I would not have gained if I conducted the projects independently of each other. In particular, my research on access to Hepatitis C medication gave me a greater understanding of the importance of ensuring that there is widespread access to new HCC treatment once it is completed. This will prevent any group within the patient population from being marginalized due to not being able to get treated. Prior to conducting this research for my STS project, I was unaware of the substantial impact of effective or ineffective treatment access strategies within the healthcare field. Additionally, my work on my technical project has helped me better understand the amount of research and money that goes into developing a new therapeutic which can explain the financial pressures a company experiences to maximize the profit from their drug. These projects have illustrated for me the complexities of the healthcare field and the pathway from drug development to patient access. As a result of this research process, I am now more aware of the intimate relationship between technology and society and the influence that both domains exert on each other. Ultimately, I now have an increased appreciation for the significant impact that an engineer can have on both a technology and a society.

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