

Thesis Project Portfolio

Production of Adalimumab: A Humira® Biosimilar

(Technical Report)

**Inaccessibility and Unaffordability of Prescription Drugs in the United States: Assessment
of Contributing Factors and Methods for Improvement**

(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science

University of Virginia • Charlottesville, Virginia

In Fulfillment of the Requirements for the Degree

Bachelor of Science, School of Engineering

William Gawrylowicz

Spring, 2022

Department of Chemical Engineering

Table of Contents

Sociotechnical Synthesis

Production of Adalimumab: A Humira® Biosimilar

Inaccessibility and Unaffordability of Prescription Drugs in the United States: Assessment of Contributing Factors and Methods for Improvement

Prospectus

Sociotechnical Synthesis

This thesis portfolio contains two research projects that connect to the same central idea. In the STS research paper, I explored the history of the pharmaceutical industry and its interactions with society today to portray the dependence of the people of the United States on its products. I demonstrated that certain practices—in relation to the concept of pharmaceuticalization—of corporations in the industry both nurture that dependence and support a system in which drug prices can be set exceedingly high, thereby boosting corporate profit and negatively impact the consumers. I closed my research with a discussion of some methods through which the issues with accessibility and affordability can be addressed and improved by both the corporations in the industry themselves as well as the American people.

For the technical thesis project, my team and I designed a commercial production facility for a biosimilar monoclonal antibody to Humira, which is the most profitable drug on the market. Our facility was designed in a way that would ultimately allow us to market the product in the United States at a significantly lower price than its name-brand reference product. In order to accomplish this, our facility was designed to produce a total amount of product in accordance with estimates for potential market penetration. We also employed continuous manufacturing techniques and single-use technologies whenever possible and feasible during our process in order to improve the overall efficiency.

Both of these projects fit very well with the overall goal of my STS portfolio, which is to address issues with affordability and accessibility to prescription drugs in the United States, and each of my projects offers a different perspective in which that can be done. My STS project provides an analysis of the system and offers solutions through the lens of societal relations with the pharmaceutical industry. My technical project proposes, in a very different perspective, a

technological solution to the problem, where a new manufacturing facility has the ability to improve affordability and accessibility. My preparation of this portfolio has given me multifaceted insight into the workings of the pharmaceutical industry, insight that I hope one day helps me in my professional career.