

Thesis Portfolio

Impact of PTP4A3 Expression on Ovarian Cancer Cell Migration
(Technical Report)

Telemedicine: Improving Medical Treatment in Underserved Areas
(STS Research Paper)

An Undergraduate Thesis

Presented to the Faculty of the School of Engineering and Applied Science
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In Fulfillment of the Requirements for the Degree
Bachelor of Science, School of Engineering

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Sociotechnical Synthesis

2011 marked the point where Baby Boomers, people born between 1946 and 1964, started reaching retirement age, and this will continue until 2030 (“The Baby Boomer Generation|Baby Boomers are Reaching Retiring Age,” 2011). With growing age, comes chronic disease, and as the largest subset of the population, Baby Boomer healthcare will pose an immense toll on the rest of the United States population. One of those chronic diseases is cancer, and Baby Boomers are predicted to drive up cancer incidence. In 2010, people over age 65 had a cancer incidence of a little less than 1 million, but in 2030 the incidence is predicted to be over 1.5 million (*CPR12_Slides_PDF.pdf*, n.d.). Statistically, the older generation has the most of any type of cancer over all age groups, and this will only increase as time goes on (*Cancer-treatment-and-survivorship-facts-and-figures-2019-2021.pdf*, n.d.). With the impending strain on the United States healthcare system, it is important to develop novel ways of treating and detecting cancer in people. Cancer treatment varies not only in how it is treated (drugs, chemotherapy, etc.) but also in how it is implemented across communities, cultures, and societies.

My research focused on both aspects of cancer treatment, direct treatment and its overall implementation. The technical research project worked to understand how the protein, Protein Tyrosine Phosphatase 4A3 (PTP4A3) influences ovarian cancer cell migration. Past studies showed that PTP4A3 does impact cancer colony formation and growth, but its influence on cancer metastasis is unknown. Two approaches were used: (1) a bioinformatics approach that used database information to determine PTP4A3’s influence on individual proteins and (2) a wet lab-based approach that created a migration assay to look at overall cell migration.

Unfortunately, the second approach could not be completed but the data mining research highlighted specific proteins that had a potential interaction with PTP4A3 and should be further studied. The research paper focused on a new approach, telemedicine, to giving all care, including cancer care. It discussed how telemedicine developed in order to overcome social, economic, and physical barriers to healthcare. It explored the different actors in the telemedicine network who have made the technology successful and how the system has adapted to large-scale events such as the COVID-19 pandemic.

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Thesis Prospectus