Thesis Project Portfolio

Predictive Model for Baseline Serum Estradiol Concentration of Female Laboratory Mice

(Technical Report)

Disparities in Female Hormone Research and Therapy

(STS Research Paper)

An Undergraduate Thesis

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Samiyah Syeda

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Department of Biomedical Engineering

Table of Contents

Executive Summary

Recent advancements in biomedical research highlight the need for inclusivity, especially in understanding the physiological and hormonal nuances between genders. A technical study on developing a predictive model for baseline serum estradiol concentration in female laboratory mice and supplementary research that examines the implications of gender disparities in clinical research participation was done. Together, these studies aim to enhance the accuracy and inclusivity of health research, addressing the historical oversight of female physiological dynamics in biomedical studies.

The technical research focused on establishing a predictive model for the baseline concentration of estradiol in female mice, a key hormone in reproductive health. By utilizing vaginal cytology and blood samples analyzed with E2 ELISA techniques, the study sought to refine methodologies for predicting estradiol levels, contributing to more equitable research practices and improving the applicability of future studies related to female health. The results highlighted the establishment of a Lasso Regression Model correlating estradiol concentrations with the estrous cycle stages of the mice. Despite challenges in achieving high accuracy, the study successfully outlined baseline estradiol concentrations and emphasized the need for refined methodologies in future work.

This research project explores the historical and contemporary landscape of gender disparities in clinical research. It investigated the roles of various stakeholders, including regulatory bodies, researchers, and patients, in shaping health research practices and outcomes. The study revealed how these disparities have hindered comprehensive understanding and treatment of women's health issues, particularly through case examples where the exclusion of female subjects led to misdiagnoses and suboptimal therapeutic outcomes. It concluded that

bridging these gaps requires concerted efforts from all actors in the research ecosystem to prioritize equity and inclusivity.

Together, these two studies underscore the need for a paradigm shift towards more inclusive and representative methodologies in biomedical research. By integrating insights from both studies, there is a clear path forward to enhance the precision of health research and ensure universally applicable findings, ultimately leading to more equitable healthcare outcomes for all genders. The journey involves not only technical innovations but also systemic changes in the culture and policies governing health research.