Transcriptomic Comparison of Lupus Murine Models and SLE Patients to Assist Drug Trial Design

(Technical Report)

Fighting Crime and Mental Illness: Allies of Healthcare Reform in the United States

(STS Research Paper)

An Undergraduate Thesis Portfolio
Presented to the Faculty of the
School of Engineering and Applied Science
In Partial Fulfillment of the Requirements for the Degree
Bachelor of Science in Biomedical Engineering

by

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May 5, 2020

Preface

How can healthcare resources be more effectively allocated? Due to limited and misallocated resources, and to the high costs of healthcare, many patients go untreated.

In 60 years, only one new drug for the treatment of systemic lupus erythematosus (SLE) has been approved by the FDA. To assist SLE drug trial design, abnormal signaling pathways and cellular subsets were analyzed between three strains of preclinical mice and human SLE patients with gene co-expression network and differential expression analysis. The results revealed a uniquely preserved interferon producing cell signature in the BXSB.yaa mouse strain, preserved transcription regulation pathways in the MRL/lpr strain, and partial preservation of the innate immune response in the NZB/W mouse strain. A predictive model was designed to match the mice to subsets of lupus patients, as defined by clinical characteristics. The supervised model matches the clusters formed from the unsupervised model with 0.838 sensitivity and 0.695 specificity.

Mental health advocates in the U.S. seek to improve access to mental health care among populations at risk of incarceration. In part because of the scarcity of such services and deinstitutionalization, prisons now hold more mentally ill persons than hospitals. Advocacies strive for systemic reform through services and training, seek short-term expedients outside of prisons and aggregate distinct participants to reduce incarceration rates of the mentally ill.

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