The Secrets of Healthy Aging: Semi-Automated Discovery of Natural Senolytics

Chaganti, Tesko (School: Canton High School)

As populations around the world grow older and pandemics ravage global health, the burdens of age-related diseases, such as arthritis, heart disease, and cancer, are increasingly prevalent. A primary driver of these age-related diseases is cellular senescence, a process where cells stop dividing. Senescent cells accumulate in the body as humans age and can cause inflammation, tissue/organ dysfunction, tumor formation, and other negative effects. The removal of senescent cells has benefits, such as the alleviation of age-related disease and possibly the reversal of natural aging itself. Existing drugs that can eliminate senescent cells, termed “senolytics”, are either unselective or barely available in natural foods. As aging and age-related disease is a problem all humans will face, it is essential to ensure the widespread accessibility of senolytic drugs. Thus, the discovery of novel senolytic drugs that are highly abundant in natural sources is of crucial need. Yet, drug discovery remains an incredibly expensive and painstaking process, leading to the unaffordability of modern drugs. A novel automated drug discovery pipeline was developed to efficiently screen over 70,000 natural compounds, focusing on their drug-like and pharmacokinetic properties, natural food abundance, and crucially, their ability to inhibit proteins essential for the survival of senescent cells. This automated screening resulted in the discovery of 11 novel potential senolytic drugs that are highly abundant in natural foods without compromising selectivity. These drug candidates could present a solution for numerous life-threatening diseases, saving billions of lives, while being accessible to all, irrespective of socioeconomic barriers.

Awards Won:
Fourth Award of $500