The Role of Syk Protein Kinase in Stress Granule Dynamics of Cancer Cells

Cooper, Sarah

Syk, spleen tyrosine kinase, consists of two Src homology 2 (SH2) domains and a single catalytic domain that mediates downstream signaling cascades. Recently, Syk has been shown to be recruited to stress granules, which are non-membranous puncta composed of non-translating mRNA that are formed in a cell when it is exposed to environmental stresses. The storage of mRNA in the form of stress granules (SGs) halts mRNA activity as a survival mechanism to prevent environmental stresses from inducing the cell into apoptosis. The method of recruitment and Syk's role in the SGs are unknown. In this project, Syk's biological role within SGs was investigated in MCF7 breast cancer cells using immunofluorescence microscopy, western blotting, MTT assay, and analog-sensitive kinase experimentation. The results showed that Syk protein-kinase is recruited to SGs through its interaction with Grb7 protein. Also, once Syk is recruited to the SG, it was determined that Syk's catalytic activity is responsible for SG clearance. A third experiment demonstrated that Syk's role in the clearance of SGs increases cell proliferation and promotes cancer cell survival. Understanding this biological function of Syk can aid in the development of new therapeutic cancer treatments. We hypothesize that if Syk were inhibited, the cancer cells would be unable to clear the SGs and be forced to succumb to apoptosis.

Awards Won:
Third Award of $1,000