

Systems Biology of Signaling in Molecular Networks and Diseases

Over the past few decades, a large amount of information is collected regarding the function of individual signaling molecules in human cells. Targeting the activity of different enzymes has been a strategy for the development of novel therapeutics. However, curative treatments for some of the most common human diseases such as cancer, neurodegenerative and psychiatric brain disorders are still unknown. This is because the pathology of such complex disorders results from the failure of a highly sophisticated biological system and not just a single molecule or a specific pathway. So, to understand the pathology and to move towards more effective treatments, systems/computational biology approaches are needed to be developed, to study the orchestrated function of complex molecular networks in human cells.

The goal of this research of the aCASP Lab is computational understanding and modeling of communication and signaling mechanisms in normal and abnormal cells, to identify those critical molecules within human cells whose dysfunction prohibits proper cellular functions. Improper function of cells results in the development of some prevalent complex human disorders, ranging from neurodegenerative and psychiatric brain disorders such as schizophrenia, Alzheimer, depression and bipolar mood disorder, to different types of cancer, metabolic disorders such as diabetes, obesity and cardiovascular diseases, etc. By identifying the critical molecules, effective medications can be developed accordingly, to target these molecules for the treatment of patients suffering from these diseases.