

Purification and Characterization of Microbial Enzymes that Alter Metabolism and Physiology of the Human Host

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Shah lab focuses on enzymes involved in a variety of metabolic pathways found in human microbiome and in various human tumors. A description is below:

1. Human Microbiome: Human microbiome produces many unexplored metabolites (small molecules). These metabolites can have variety of functions. These include: 1. Metabolites produced by one microbe that can either be beneficial or detrimental to another microbe of human microbiome or to the host. 2. Different microbes can join forces to make a particular metabolite which can influence host metabolism and physiology.

Metabolites produced by the microbiome are generated by enzymes. The enzymes can either arise from one single continuous metabolic pathway or can come from multiple metabolic pathways. These can be in the form of two or more pathways merging from two different microbes. Understanding the metabolic pathways and enzymatic activities can enable development of tools to engineer a beneficial microbiome.

2. Cancer Biology: A tumor can enhance its growth in two ways: (i) It can exploit certain inherent metabolites (generally produced by human host) to their advantage. Certain types of cancers are highly dependent on such metabolites. (ii) By modifying the outcome of a particular enzymatic reaction that produces a metabolite. For example, a mutation in an enzyme can change the output of the enzymatic activity and now will produce a completely different metabolite as an end product, which will be utilized prominently by cancer cells to their advantage or this metabolite can have detrimental effect to the human host. Understanding the basic nature of these enzyme catalyzed reactions can help in developing tools to combat different types of cancers.