CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP160819

Project Title:
Quantitative mapping of intracellular protein-protein interactomes in healthy and cancerous cells

Award Mechanism:
High Impact/High Risk

Principal Investigator:
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Entity:
Texas Agrilife Research

Lay Summary:

Cells can become cancerous when the function of certain proteins becomes dysregulated. These proteins carried out their molecular function by binding to other intracellular partners. To date, understand how this network of interactions change when proteins become dysregulated is a challenge because we currently lack the technologies that would permit to probe interactions networks directly inside cells. In this proposal, we will develop a radically novel technology that addresses this challenge. It consists of delivering proteins modified with affinity labels directly inside cells. Affinity labels can leave a chemical trace on the protein's interaction partners and these partners can then analyzed and quantified. This novel technology is only now feasible because of the recent progress we have made in finding efficient means of introducing proteins into live cells (something that was challenging until recently). Building on this success, we propose that our approach is plausible and of great potential impact. In particular, by mapping protein interaction networks inside cells and by monitoring how these networks change under various stimuli, we expect that this new platform will lead to powerful ways of monitoring the molecular causes of cancers. In addition, we envision that this technology will be useful to decipher physiological versus pathological interaction networks. This in turn should contribute to the identification of new drug targets (by comparing non-cancerous and cancerous cells) and to a better understanding of how anti-cancer drugs impact intracellular protein-protein interactions (by comparing cell treated with or without drugs). Finally, it should be useful as a prognosis tool by identifying protein-protein interactions that can be used as predictive markers for drug resistance.