CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP120311

Project Title:
Regulation of Cyclooxygenase-2 (COX-2) Gene Expression by Noncoding RNAs in Cancer

Award Mechanism:
Individual Investigator

Principal Investigator:
Janowski, Bethany A

Entity:
The University of Texas Southwestern Medical Center

Lay Summary:

Cancer cells can change how much of an important protein is made, and make proteins that are not found in normal cells. Understanding how cancer cells can make too much of a protein that allows cancer cells to grow faster than normal cells is crucial for designing anti-cancer agents. Protein production is usually thought to be controlled by other proteins that bind to specific regions within a gene. In cancer cells, chemical changes can alter the gene to make too much or too little of proteins that control cell growth. Over the past few years RNA, another cellular molecule, has been shown to play an important role in controlling when genes make proteins. This proposal describes a new concept for how RNA can work. My research suggests that, like proteins, RNA can associate with the controlling regions of genes and directly turn them on or off. A better understanding of how this occurs would change our view of how cancer-causing genes are controlled inside cells and provide new insights into drug design and action. I am focusing on how too much of the cyclooxygenase 2 (COX-2) protein is made in cancer cells. How COX-2 protein contributes to tumor progression is complex and the not well understood. Design of therapeutic agents requires a clear understanding of how the gene COX-2 turned on in normal versus cancer cells. I have shown that RNA molecules can dramatically increase COX-2 production in cells. Increasing levels of COX-2 is not a goal for therapy, but this unexpected discovery will provide insights into how this extremely important gene functions during cancer and change how scientists approach therapy. I will study the mechanism of this increased production in lung and colorectal cancer cells. These cancers were chosen because the importance of COX-2 is well appreciated. The data I obtain will also apply to other cancers and the principles I uncover can be applied to the study of other cancer causing genes.