CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP160268

Project Title:
DNA damage-induced small non-coding RNAs: mechanism and their role in cancer development

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas Southwestern Medical Center

Lay Summary:

DNA damage generated spontaneously or induced by environmental agents, when is not appropriately repaired, is the basis for the initiation of most tumors due to the activation and deregulation of genes promoting cancer and/or the loss of function of tumor-suppressing genes. Therefore, proper DNA repair after DNA damage is crucial for the prevention of cancer development. DNA damage is known to trigger a conserved DNA damage response from fungi to man that can detect the damage, delay cell proliferation and repair the damage. Understanding how this process occurs and how it is regulated will provide mechanistic insights into future design of cancer prevention and therapeutic approaches. We recently discovered that DNA damage triggers the production of a novel class of small non-coding RNAs (RNAs that do not encode for proteins) that is specifically induced after DNA damage. We showed that the production of this type of small RNAs contribute to the normal DNA damage response and DNA repair. These results uncovered a novel mechanism in the DNA damage response process. Importantly, a similar process was later also discovered in human cells and the altered regulation of components in this pathway is correlated with certain types of cancer and patient survival. In this study, we plan to study how DNA damage triggers the production of small RNAs and how these small RNAs function to facilitate the DNA repair process. In addition, we will investigate the involvement of this pathway in cancer development. Together, our proposed studies will establish a new mechanism in the DNA damage response and will potentially lead to identification of new cancer targets and new insights into cancer development.