CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP180882

Project Title:
Developing a Clinically Relevant Drug Testing Platform

Award Mechanism:
High Impact/High Risk

Principal Investigator:
Yun, Kyuson

Entity:
The Methodist Hospital Research Institute

Lay Summary:

Despite significant advances in detection and treatment of cancer in the last hundred years, most highly malignant cancers remain incurable. A major contributing factor to this failure is the use of suboptimal experimental platform, namely the established cell lines, for drug discovery and validation. Recent studies indicate that human cancers grow in a complex ecosystem that consists of cancer cells and non-cancer cells that constantly communicate and affect each other's behavior, including responses to anti- cancer treatments. Established cancer cell lines (human cancer cells cultured on plastic dishes for decades) cannot model these complex interactions that affect tumor growth and therapy response. The need for more clinically relevant experimental systems has driven the development of patient-derived xenograft (PDX) models for the past decade. However, PDX models have significant limitations as well. For example, establishing PDX models is very expensive and time-consuming and importantly, many patient tumors cannot generate PDX models.

To develop an experimental platform that is more cost- and time- efficient than PDX models but more clinically relevant than established cancer cell lines, we developed an innovative tumor slice culture system. This technology allows intact human tumor tissues (the entire tumor ecosystem) to be kept alive outside of the human body for 2-3 weeks. We can use them as surrogates for patient tumors to test anti-cancer treatments. The immediate goal of this study is to validate that our tumor slice system can accurately predict therapy response in patients by: 1) correlating therapy responses in tumor slices to those of matching PDX models and patients, and 2) testing treatment responses from fresh lung, breast, and colon cancer patient tissues directly from patients (without PDX generation). Our long-term goal is to develop this system into a diagnostic instrument that can guide treatment decisions in the clinic.