CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP130276

Project Title:
The mTOR-dependent nuclear transport in cancer

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas M.D. Anderson Cancer Center

Lay Summary:

Accumulation of cellular mass is a fundamental biological process known as cell growth and its deregulation is common in human cancers. Nutrients control cell growth by determining a rate of anabolic processes in cells. In response to environmental cues, the nutrient-sensing mTOR (mammalian Target Of Rapamycin) pathway coordinates the balance between anabolic and catabolic cellular processes. The protein kinase mTOR is a central component of this essential and highly conserved pathway. Our study indicates that mTOR in association with the nuclear pore component regulates the nutrient-dependent nuclear import of ribosomal proteins. It is a novel function of mTOR and we believe that the nuclear envelope mTOR complex plays a role in ribosomal biogenesis and contributes to cell growth regulation. Ribosomal biogenesis is a hallmark of cell growth because it determines a rate of cellular protein synthesis. Building of ribosomes is a major energy consuming process in cells and it is tightly regulated. Ribosomal biogenesis is regulated by expression of ribosomal proteins and ribosomal RNA and also by the nuclear transport because assembly of ribosomes takes place at the distinct nuclear location site known as nucleolus. Oncogenic transformation of cells associates with a dramatic seven-fold increase in nuclear import of proteins. Our study by identifying a novel mechanism in regulation of the nuclear import of ribosomal proteins carries a new approach in suppression of tumor growth.