MicroRNAs as Therapeutic Targets in Cancer

“This discovery provides new strategies to eliminate resistant cancer stem cells with microRNAs that selectively target and eliminate them while effectively reversing the chemo resistance associated with existing therapeutic treatments.”
— Jingfang Ju, Ph. D., Associate Professor, Department of Pathology, Stony Brook University; and Co-director, Translational Research Laboratory, Stony Brook University Medical Center

Background:
MicroRNAs (miRNAs), small, non-coding single-stranded RNAs with the potential to regulate more than 30 percent of the human protein coding genes, are associated with a wide array of biological processes and human disease pathologies, including cancer. To date, thymidylate synthase (TS) and Dihydrofolate reductase (DHFR) are the major targets of cancer chemotherapy, making the TS and DHFR inhibitors, TDX and MTX, the most widely used therapeutic agents by clinicians. However, increased DHFR levels in certain types of cancer reportedly are associated with drug resistance, requiring vital new therapeutic compounds that target DHFR inhibitors.

Technology Description:
The SUNY Stony Brook Translational Research Facility, co-directed by Dr. Jingfang Ju, has identified novel therapeutic and diagnostic targets that can be used to diagnose and properly treat colon cancer and osteosarcoma otherwise found to be chemo-resistant. This technology utilizes microRNA 215 and 192 to identify, target and effectively down regulate DHFR and TS thus rendering the tumor more responsive to Methotrexate and 5-FU treatment. Professor Ju’s discovery will enable clinicians to employ a prognostic screen to tailor chemotherapy to colon cancer patients and provide the safest and most efficient mode of treatment.

Patents / Publications:
• Patent Pending in US and Europe
• Song B, et al. Molecular mechanism of chemo resistance by miR-215 in osteosarcoma and colon cancer cells Molecular Cancer 2010

Advantages
This technology:
• Provides an acute therapeutic treatment that is readily reversible without permanently degrading its targets.
• Describes a novel approach to selectively kill cancer stem cells by inhibiting unique cancer biomarkers and subsequently eliminating them with existing chemotherapeutic agents.
• Presents a new method of diagnosing cancer in a subject by determining the level of microRNA expression.

Applications
• Gene/Cell therapy
• Cancer therapeutics
• Diagnostics

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