



Artificial Intelligence to Improve Imaging

The FELIX program (named for Harry Potter's Felix Felicis, also called "Liquid Luck," a magical potion that makes the drinker lucky) focuses on developing new methods using artificial intelligence to detect smaller pancreatic cancer.

CT features of early pancreatic cancer can be subtle and missed by even experienced radiologists. The Felix program approach is to carefully analyze thousands of scans by hand and use this information to teach the computers how to detect pancreatic tumors when they are very small and maybe missed by a diagnostician.

Progress to date is promising, yielding sensitivities of more than 90% and specificities of more than 85% on pancreatic cancers that are of average size. Approximately 25% of pancreatic cancers detected on the scans by FELIX imaging were not previously detected by the radiologist.

Researchers are continuing to perfect the FELIX technology and training the computer to detect tumors one centimeter or less when life-saving surgery can be performed. A business plan is currently being developed to move the FELIX technology forward with the next step of incorporating it into standard imaging CT scan machines.

Cancer Wellness Center (Northbrook)

The Cancer Wellness Center is committed to offering high-quality, professional services for a population (cancer patients and their loved ones) that has a tremendous and immediate need for information and support. Unaddressed emotional distress can negatively impact functioning, quality of life, and adherence to treatment.

Grant money will be utilized to partially fund the following services: counseling programs, weekly support groups, the monthly Pancreatic Cancer Networking Group, educational programs, wellness programs, and outreach to provide psychosocial support, presentations, and activities for the pancreatic cancer community.

At the Origin – BNIP3 and What It Tells Us About Pancreatic Cancer Progression



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Dr. Macleod's study involves a gene known as BNIP3, which has been shown to be an early biomarker for pancreatic cancer. The doctor's recent research has shown that it can be an even earlier signifier than previously believed. In addition, Dr. Macleod is focused on the significance of BNIP3 in cachexia. This is a muscle weakening and wasting process which occurs during the late stages of pancreatic cancer. This phenomenon limits efficacy of cancer treatments and hastens a patient's decline. Dr. Macleod suggests that degradation of muscle feeds the tumor in some way, and finding an effective way to suppress cachexia through BNIP3 could be an important part of treatment plans to ensure pancreatic patients are strong enough to undergo treatment.

Dr. Macleod will ultimately be working with human samples, however, must first demonstrate various theories using mouse models, so as to confirm and support the next steps in the research process. Dr. Macleod's work could bring us closer to identifying early-detection mechanisms and treatments that could improve outcomes for pancreatic cancer patients.

Investigator: Kay Macleod, Ph.D.

Early and Effective – An Epigenetic Blood Test for Pancreatic Cancer

Drs. Bissonnette and He continue in their pursuit of creating an epigenetic blood test (liquid biopsy) that can be used to detect pancreatic cancer early enough to improve outcomes. In a liquid biopsy, a patient's blood sample is tested to detect fragments of tumor cell DNA that would be circulating in the bloodstream.

Detecting pancreatic cancer early is essential to reducing the death toll of this disease, and a blood test for epigenetic signatures will enable physicians to consider diagnosis, prognosis, and therapeutic planning all in one simple step. Epigenetics is the study of changes in organisms caused by modification of gene expression rather than alteration of the genetic codes. Basically, it's the study of biological mechanisms that will switch genes on and off. This is a new area of science. Dr. Chuan He is leading a study to advance our knowledge of epigenetic mechanisms in pancreatic cancer.

Thus far, Drs. Bissonnette and He have focused their work on analyzing the epigenetic marker 5hmC as a road map for identifying and proving a detection signature of pancreatic cancer. Dr. He has recently begun work looking at another biomarker known as methylC-seq as another potential tool for identifying early signs of pancreatic cancer.

Historically, the available tools to test for this biomarker were expensive and required a large blood draw. However, Dr. He expects a new analytical tool to be fully available in the next six months that is not only cheaper but also requires far less blood from the patient.

The developments thus far will hopefully strengthen Drs. He's and Bissonnette's re-application for a grant from the National Institutes of Health (NIH). Funding from the NIH will be crucial to the development of a clinically validated liquid biopsy.

Investigators: Marc Bissonnette, MD and Chuan He, Ph.D.

Targeting Oxidative Stress in ATM Deficient Pancreatic Ductal Adenocarcinoma

This study involves continuing research into genetic variants in the ATM gene, which have been previously associated with the risk of familial pancreatic cancer.

The understanding of the genetic basis of pancreatic cancer, particularly inherited susceptibility, is critical to improving patient outcomes through personalized risk assessment, clinical surveillance, interception, and targeted therapies. The investigators propose to develop a targeted, gene-specific approach for the treatment of patients with familial pancreatic cancer caused by inherited disease-causing genetic variants in the ATM gene. They previously identified ATM as a pancreatic cancer susceptibility gene. Individuals with an inherited disease-causing variant in the ATM gene have a high lifetime risk of developing pancreatic cancer (9.5% by age 80).

Requested support will be used for: 1) cell culture and molecular biology reagents, consumables, and supplies to generate cell lines and determine therapeutic responses, and 2) salary and benefits for a graduate student (25% effort) to conduct experiments and analyze data. PI (Dr. Nicholas Roberts) will provide study support and oversight. Salary and benefits for PI is not requested.

Investigator: Nicholas J. Roberts, Vet.M.B., Ph.D.

3D Analysis of the Aging Human Pancreas

This project involves CODA, a method of 3D examination and virtual reconstruction that allows for new types of analysis of human pancreatic tissue.

While age is one of the most important risk factors for the development of pancreatic cancer, the impact of age on the human pancreas remains largely unexplored. One purpose of this study is to achieve a better understanding of age-related changes in the pancreas cells, and the impact those changes have on the risk or incidence of cancer. Another is to amass knowledge and data to use in future 3D studies.

To support a new faculty member Ashley Lynn Kiemen, Ph.D. Candidate (degree completion expected in March of 2022) who works closely with Dr. Wood
Investigator: Laura Wood, MD, Ph.D.