Five research teams at OHSU have been awarded Cancer Early Detection And Research seed grants. CEDAR, a new center in the Knight Cancer Institute, is working to understand the biology of the progression from normal tissue to pre-malignancy to cancer. The center is seeking to develop new diagnostic technologies, find ways discriminate lethal from non-lethal disease, and ultimately identify therapies to treat early tumors.

The awards, up to $120,000 each, aim to cultivate outstanding translational research, assist in the generation of preliminary data, and lead to national funding. Awardees include young scientists and senior investigators who assembled multi-disciplinary teams to explore new areas and ideas with high potential for impact in patient care:

Risk Stratification of Early Melanomas by Deep Histopathological Analysis

Noah Hornick, Erik Burlingame, Young H. Chang, Guillaume Thibault, Eric Smith, Tracy Pawlitschek, Kevin White, Sancy Leachman

Melanoma's propensity to metastasize is what makes it the deadliest form of skin cancer. Determining the likelihood that a cancer will metastasize at the time of diagnosis is therefore central to the design of a treatment plan; more aggressive cancer needs more aggressive treatment. The research herein proposed will apply sophisticated machine learning tools to the analysis of standard biopsy slides used to diagnose melanoma, in an effort to find features that can be used to separate cancers that are likely to metastasize from those that are not. If successful, this technology could be easily and inexpensively applied to existing biopsy samples at diagnosis, improving treatment with minimal additional cost.

Target and biomarker identification through mapping of signaling networks that control the evolution of premalignant epithelial lesions

John L. Muschler, Emek Demir

We hypothesize that advanced mapping of the diverse regulatory pathways controlling the evolution of pre-malignant lesions will identify vulnerabilities in these lesions that can be targeted for early intervention, and identify biomarkers that can be used to assess risks in premalignant lesions. Preliminary data generated using powerful animal models of pre-malignancy, coupled to targeted gene modifications, have already identified several potent and novel regulatory pathways controlling the evolution of pre-cancerous lesions. We propose here to develop workflows for the efficient and robust mapping of the critical signaling networks controlling pre-malignant disease evolution, exploiting our preliminary results and unique animal models. This will be achieved by bringing together experts in cancer cell biology, animal modeling of cancers, and computer-based bioinformatic analyses of signaling networks built on gene activity and protein composition data, and computational network mapping.

Harnessing Circulating Hybrid Cell Biology and Ultrasensitive Single Cell Imaging Technology for Early Detection of Pancreatic Cancer

Young H. Chang, Summer Gibbs, Brett Sheppard, Tania Vu, Melissa Wong

Non-invasive assays that can identify cancer at the earliest possible stage represent the holy grail of the early detection quest. We have identified a novel circulating tumor cell – the circulating hybrid cell (CHC) – in the peripheral blood of cancer patients. CHCs hold high potential as a non-invasive biomarker to detect high risk early disease states and to monitor the progression of early stage to late stage pancreatic cancer. We will use a new molecular-sensitive single cell profiling methodology, along with protein functional tissue array studies, to establish a panel of CHC-based biomarkers that distinguishes early pancreatic disease from late stage cancer. Successful identification of CHC-based biomarkers will enable next step design of a CHC-based platform technology to monitor early to late stages of disease along the cancer continuum.

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