Innovator Award Program

The ISB innovator Award Program provides one year of seed funding for ISB researchers, excluding faculty, to develop big ideas.

Program Objectives:

- Stimulate creativity and out-of-the-box thinking across ISB staff
- Drive cross-disciplinary team science across research domains
- Generate preliminary data to de-risk ideas and become competitive for federal grants
- Train junior scientists in grant writing, project management, and leadership
- ROIs as publications, patent applications, grants, new technologies and software, and partnerships

Program Metrics:

	PROJECTS FUNDED	PATENTS FILED	PAPERS PUBLISHED	NEW GRANT IDEAS	PARTNERSHIPS CREATED	SOFTWARE PRODUCTS	NEW TECHNOLOGIES
2017	3	1	6	5	7	-	3
2018	4	1	9	8	9	1	1
2019	3	2	1	5	8	2	1
2020	3	-	2	2	5	1	1
2021	3	◄ IN PROGRESS ►					
TOTAL	16	4	18	20	29	4	6

Project Scope and Target Areas:

- Technological advancements in single cell analyses
- Advancements in cancer and infectious disease
- Development of novel bioinformatics analysis pipelines
- Advancements in combating antibiotic resistance
- Role of the gut microbiome in body weight management
- Development of educational software for use in high school programs

Intangible Benefits:

- Recognition of rising stars at ISB (increased morale), celebrated in a ISB-wide event, on social media and the ISB website
- Increased visibility for ISB and quality of research in our organization to attract new federal, foundation and philanthropic funding
- Development of ISB scientists for career advancement and scientific impact

In-Progress Project Award High-Level Summaries:

JOINT SPATIAL MOLECULAR AND METABOLIC FUNCTION PROFILING IN SINGLE TISSUE SECTION AT SINGLE CELL SENSITIVITY *(Tang, 2021).* This project seeks to develop an affordable novel methodology to evaluate metabolic reprogramming that happens in cancer cells in order to adjust and improve cancer therapies accordingly.

DISCERNING THE COMBINATORIAL REGULATORY CIRCUITRY OF MICROGLIAL DIFFERENTIATION IN ALZHEIMER'S DISEASE USING PROBABILISTIC BOOLEAN NETWORKS *(Tercan, 2021).* This project seeks to define altered brain microglial states in Alzheimer's disease (AD), identify the transcriptional regulators that drive those states, and create strategies to intervene and correct cell states to treat AD.

MULTIPARAMETER PROFILING OF EXOSOMES FROM BODY FLUIDS TO DETECT AND DETERMINE SITE OF INFECTION *(Lu/Lausted, 2021).* This project seeks to develop a novel technology to analyze circulating extracellular vesicles (EVs) in order to determine the organ systems that are infected by given pathogens, using Lyme disease as a test model but applicable to COVID-19 and other infectious diseases.

Completed Project Award High-Level Summaries:

INCORPORATING HEALTH-RELATED SOCIAL NEEDS (HRSN) AND SOCIAL DETERMINANTS OF HEALTH (SDOH) DATA WITH ELECTRONIC HEALTH RECORDS (EHR) DATA TO PROMOTE POPULATION HEALTH *(Piekos / Dai, 2020, Cost $15.1K).* Developed software to extract Social Determinants of Health (SDoH) and Health Related Social Needs (HRSN) from electronic medical records in order to determine their contribution to disease - applied initially to COVID-19 but with broad applicability for future research.

EXPLORING STABILITY AND CHANGE IN EDUCATION DATA *(Howsmon / Eklund, 2020, Cost $20K).* Created new ways of analyzing and visualizing education data in order to identify gaps in existing data and identify strategies to fill those gaps to create more informative data and lead to improved educational outcomes.

DEVELOPMENT OF 3'DCDP-DAG PRODRUG FOR ANTIVIRAL TREATMENT *(Luo, 2020, Cost $52.1).* Explored the mechanisms to inhibit the replication of the SARS-CoV-2 virus in order to prevent disease. Several lessons were learned relating to endogenous molecular competitors, transport systems and cytotoxic profiles that deemed the original strategy unfeasible.

CENTRAL DOGMA–THE DEVELOPMENT OF AN INTERACTIVE GAMING PIPELINE THAT TEACHES CRITICAL STEM CONCEPTS DIRECTLY TO THE CLASSROOM *(Valenzuela, 2019, Cost $41K).* Developed an online game that introduces and teaches core concepts in biology. Expands the toolbox of educators to create enthusiasm and engagement of the next generation of STEM professionals.

INTEGRATING GENETICS, BLOOD PROTEOMICS AND THE GUT MICROBIOME TO UNDERSTAND TRANSITIONS FROM HIGH TO LOWER WEIGHTS *(Diener / Qin, 2019, Cost $45.2K).* Developed an analytical pipeline for big data and applied it to understand how the gut microbiome contributes to weight loss. Seeded new research directions to improve weight management and control obesity.

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Completed Project Award High-Level Summaries (continued):

DEVELOPMENT OF A MASSIVELY PARALLEL SINGLE-CELL CHIP-SEQ TECHNOLOGY *(Shao, 2019, Cost $27.7K).* Developed a new method to detect protein-DNA interactions and how they affect gene regulation in a single cell. Provides a new tool for a broad range of researchers studying gene regulation in disease (e.g. cancers) or any basic research settings.

ONE DAY OF HIV INFECTION ONE CELL AT A TIME *(Lopez Garcia, 2018, Cost $45.5K).* Analyzed the gene expression of macrophages infected with *Mycobacterium tuberculosis*. Provides an understanding into how the immune system responds to tuberculosis, generating insights into improved therapeutic strategies.

MODEL-DRIVEN DISCOVERY OF CENTRAL LIGAND-RECEPTOR PAIRS THAT MAINTAIN THE DRUG RESISTANCE OF A TUMOR CELL ECOSYSTEM COMMUNITY *(Su, 2018, Cost $26.5K).* Identified molecular mechanisms underlying treatment resistance in melanoma. Provides the basis to explore new treatments for melanoma and potentially can generalize to the treatment of other cancers.

HIGH-THROUGHPUT ARTIFICIAL NEURAL NET ARCHITECTURE FOR HEALTH USING PD3 CLOUDS *(Earls, 2018, Cost $25K).* Developed a new computational platform for high-throughput training and generation of deep learning on high dimensional biological data. Contributes new tools to derive important insights from the exploding 'big data' generated in medical research today.

EPITOPE-TARGETED PEPTIDES AS IMMUNOTHERAPEUTICS TO COMBAT ANTIBIOTIC-RESISTANT BACTERIA *(Idso, 2018, Cost $33K).* Developed an all-new class of antibiotics. Provides a powerful new medical tool for the treatment of pathogens that have become antibiotic resistant and leave few options for treatment of serious infections.

HIGH-THROUGHPUT ANALYSIS OF REGULATORY INTERACTIONS IN MYCOBACTERIUM TUBERCULOSIS *(Peterson, 2017, Cost $35K).* Developed a new method to understand how genes are regulated in Mycobacterium Tuberculosis. Contributes to a greater understanding of how the bacteria that causes tuberculosis can adapt and become resistant to treatment.

DETECTION AND SEQUENCE OF DOUBLE MINUTE CHROMOSOMES *(Lausted, 2017, Cost $35K).* Developed a new method to detect and study a type of DNA that exists outside the chromosome. Provides a new tool for cancer research and is potentially applicable to many other types of disease research as well.

A NOVEL TECHNIQUE TO MONITOR SINGLE-CELL TRANSCRIPTOME OVER TIME USING BARCODING *(Zhou, 2017, Cost $43.5K).*Developed a new single-cell technology to trace cancer drug resistance and cancer cell immune responses. Provides a new cellular research tool that can generalize to develop improved treatment strategies across many diseases.