Research Ideas

# pharmaceutical & Life Science

# The Impact of Emotion on Drug Effecacy

The purpose of this research is to demonstrate the impact, emotions have on the effectiveness of drugs. By quantifying the aspects of emotions relative to drug treatments it may be possible to create tailored programs that include behavioral health to improve clinical effectiveness.

# Neural endocrine immune system networks

The purpose of this research project is to better understand the energetic-biochemical interactions that occur between the brain, endocrine and immune systems in order to characterize common interaction patterns that lead to better health outcomes.

# Geographic & Demographic Hotspots of Chronic Disease

# Off-Label Drug Combination to Improve Treatment Effecacy

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# Neural endocrine immune system networks

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## Aims

### Develop an integrated Neuroendocrine Immunology data warehouse.

### Develop a data mining process that uncovers and records common interaction patterns

### Develop a configuration algorithm that extracts pathogenic patterns, their common components, and features.

## Benefits

### Can be used for pharmaceutical supplement and drug development

### Can be used for diagnostic preventive screening in community-based primary care

## Funding

### Pharmaceutical companies (preventive supplements for metabolite replacement)

### Diagnostic laboratory companies (preventive screening)

## Next Steps

### Establish technology platform – Complete

### Acquire datasets needed – Complete

### Develop integrated data warehouse – In Progress

### Setup laboratory @ University of Costa Rica – Liberia

### Identify graduate research assistants (GRA)

### Develop laboratory automation tools and algorithms

### Identify priority condition & disease

### Develop a comprehensive research plan & conduct research

# The impact of environmental & Social Stress on Health

The purpose of this research project is to demonstrate the ability to estimate population health risk due to environmental & social factors so that different intervention strategies can be tested for improved outcomes. This work depends on a form of modeling known as complex dynamic systems modeling which uses multiple models each representing different parts of the problem with interconnected variables that create feedback loops. The components of the system model are the population, disease progression, social behavioral, environmental and intervention models.

the development of a multi-model workflow

emble learning the uses multiple machine learning processes to predict a single outcome.

better understand the energetic-biochemical interactions that occur between the brain, endocrine and immune systems due to environmental stressors and climate change.

## Aims

### Develop an integrative ordinal severity allostatic load index from clinical and social measures that characterizes neuroendocrine immunological disfunction severity.

### Identify and map environmental and social factors linked to pathways that influence neuroendocrine immunological disfunction.

### Demonstrate the influence of environmental and social factors on the development and progression of various cancers in identified geographic locations.

## Benefits

### Provides geographic specific information to drive risk mitigation and policy changes.

# Smartphone Cardiovascular Screening Technology

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# Comparative Analysis of HealthCare Systems

Investigation focused on understanding the broad differences between the US vs. Costa Rican healthcare systems relative to outcomes and cost.

## Benefit

### Quantitatively highlight the value of prevention over throughput efficiency to reduce long-term costs and improve population health.

### Identify the key components and processes that support the most effective delivery system.

## Funding

### State Local Government Health & Social Service grants, partnership, or consulting.

### Government consulting contractors trying to win state contracts (e.g. IBM, Gainwell, Conduent, etc.)

### Managed Care Organizations (MCO) trying to win state contracts (e.g. Molina, etc.)

## Next Steps

### Step 1

# SDOH influence on Allostatic Load Relative to COVID 19

The purpose of this project is to investigate the role societal stressors on allostatic load and its relationship to COVID 19 transmission in disadvantaged populations.

Investigation of the contribution that changes in mood can have on physiological response such as blood pressure, inflammatory markers, etc.

## Aims

## Benefits

### Low-cost minimal training non-invasive treatments

### Many community-based delivery settings

## Funding

### University funded public health educational programs

### State Local Government Health & Social Service grants, partnership, or consulting

## Next Steps

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# Health & Wellness Program Effectiveness

Investigate the clinical effectiveness of wellness program components and component configuration relative to individual characteristics. On arrival to the wellness center, the individual would provide a saliva sample and fill out a questionnaire. On departure, the questionnaire and saliva sample would be provided. These measurements would be used to estimate the before and after clinical effect of their program. Additionally, the data would be used to extract characteristics that form natural groups of individuals.

## Benefits

### This research can be used to create more effective programs by personalizing program configurations based on individual characteristics and desires.

### Can be used to inform clinical effectiveness of existing program components so that existing components can be improved, and new components added.

## Funding

### Wellness centers such as Bodhi Tree

### Local government social services programs (i.e., community health & wellness)

## Next Steps

### Develop a questionnaire that is appropriate for this type of research (one possibility is to build on and sub-set PSI).

### Investigate lab techniques and equipment needed to analyze saliva samples.

**Platform Accomplishments:**

**References:**

[1] C. Procaccini, V. Pucino, V. De Rosa, G. Marone, and G. Matarese, “Neuro-Endocrine Networks Controlling Immune System in Health and Disease,” *Front. Immunol.*, vol. 5, 2014, Accessed: May 24, 2022. [Online]. Available: https://www.frontiersin.org/article/10.3389/fimmu.2014.00143