



USF TECHNOLOGY TRANSFER  
**BIOPARTNERING**

**Microbiome**



## USF Microbiomes Institute

The USF Microbiomes Institute is an initiative to integrate interdisciplinary researchers and departments from the University of South Florida (USF), USF Health, Moffitt Cancer Center, and business entities with a special working focus on microbiomes studies in soil, water, plant, animals, food and human health.

Composed of several working groups such as Education and Training, Data Analysis, Infrastructures, Core Facilities, and Scientific programs, the institute integrates academics with industry, promoting partnerships with colleges and departments to share experiences and enhance the research and knowledge in the microbiome field.

### Ongoing Activities

- **Microbiome in aging of Gut and Brain (MiaGB) Consortium: Biomarker Discovery**  
The Microbiome in aging Gut and Brain (MiaGB) is a multi-university collaborative consortium project, which is focused to determine risk of age-related cognitive decline and dementia based on the microbiome of our oral cavity and gut.
- **Food for Mood Program: Personalized Food for Brain Health**  
The “Food for Mood” program aims to design innovative functional foods to improve and preserve brain health. The overall goals of this project are to bring the science in the form of clinically proven foods for improving brain health and preserving it longer during aging.
- **Microbiome in Personalized Diet (MoPED) Study: Personalized Nutrition**  
Ongoing research study to determine the impact of diets we on the gut microbiome and health. This study uses a patent-pending microbiome screening scheme to determine which diets have beneficial versus detrimental effects on the personalized microbiome, that can impact short- and long-term aging health.
- **Personalized Probiotic Yogurt Study: Personalized Nutrition**  
This study produced patent-pending formulations to mix the probiotics, prebiotics, and postbiotics in both cow milk, as well as in plant-based milk(s) customize yogurt drinks based on personalized microbiome signature combined with MoPED study results.
- **Microbiome-ketogenic Diet in TBI Patients Study: Food as Medicine**  
This study is testing the efficacy of a ketogenic diet in patients with severe traumatic brain injury (TBI) to enhance recovery in the intensive care unit by modulating microbiome and inflammation.
- **USF Metropolitan Food Project (MFP)**  
A Transdisciplinary Research and Multifaceted Education Project that Improves Biodiversity, Food Security, Nutrition, and Health. It's aims is to improve food security, nutrition, and health for USF and the entire Tampa Bay/Gulf Coast communities.

# USF Microbiomes Institute

## Core Facilities and Services

*USF Microbiomes Institute services are provided to research groups within USF and to other universities and are available to other companies and clients in the US and internationally.*

<https://health.usf.edu/medicine/microbiome>

- **Microbiome Study Planning and Implementation Core**

- Helps in study design
- Provide SOPs
- Microbiome sample collection kit
- Adoptable for any microbiome sample collection (oral, nasal, stool, urine, and skin)
- Compatible for microbiome, metabolomics (including metabolon) and FMTs
- Can be shipped out and in

- **Microbiome Biorepository Core (Funded by NHLBI/NIH) for Blood, Biofluids and Bio samples**

High quality, highly systematic, and efficient system for the storage of human and animal (scientific use) origin samples including blood, fecal samples, body fluid swabs, DNA to be used in different disease conditions including Alzheimer's Disease, Diabetes, Viral Infections, Infectious Disease.

- Collection, storage, processing of the human and animal origin samples according to the global biobanking standards.
- Designing, optimization and making available the research protocols, questionnaires and consent formats for specific collection, shipping, and record keeping.
- Maintenance of the basic clinical data elements for all samples in database like Redcap.
- Round-the-clock monitoring of freezers with adequate backup and disaster recovery protocols in place.
- An efficient inventory system that offers a rapid query and retrieval of requested specimens
- De-identification of clinical specimens to guarantee privacy and an efficient barcoding system to track the life history of the specimens.
- Processing and preservation methods that offer specimens with high analytical performance and reproducibility

# USF Microbiomes Institute

## Core Facilities and Services

- **Metagenomics and Bioinformatics Core. Metagenomic sequencing and Microbiome Analysis.**
  - DNA and RNA extraction and prepare and sequence samples with the Illumina Nextseq 1000 /2000 platform. We also perform bioinformatics analyses on sequencing data.
  - Sample collection, microbial genomic DNA extraction.
  - DNA, RNA, Protein quantification using Nanodrop, Qubit 3 fluorometer.
  - Provide study design input like number of samples required to provide a sufficient statistical power, selection of appropriate sequencing method (16S amplicon profiling or metagenome sequencing)
  - Total bacteria quantitation by 16S rRNA quantitative PCR
  - 16R amplicon, ITS amplicon, transcriptome sequencing, miRNA sequencing, shotgun metagenomic sequencing.
  - Microbiome analysis.
  - Pathway analyses.
- **Antiaging Screening Preclinical Studies Core. Preclinical studies and testing of anti-aging therapeutics.**
  - Aging modeling.
  - Animal Functional & Pharmacological Studies.
  - Cell & Tissue-based Studies.
  - Drug & Compound Delivery.
  - Prebiotics, Probiotics and humanized FMTs delivery.
  - Breeding of specialized mouse strains.
  - In vivo therapeutics efficacy & safety testing.
  - Hematopoietic & immune cell analysis.
- **Microbiome Research for Advance Therapeutics. Measures to restore the altered or dysbiotic microbiome.**
- **Targeted Microbial Metabolomics Core (upcoming).**

# Technologies

## Isolation and Cultivation of Lung Microbiome and Use Thereof

USF Tech ID# 19A099

### Overview:

Chronic lung diseases such as asthma, COPD, cystic fibrosis or lung transplant patients critically depend on a beneficial lung microbiome as part of the healing process and/or to revert their chronic lung disease. Hence the favorable modulation of lung microbiota obtained from healthy donors may impact the host immune response to reduce progression of lung diseases. Since the microbiome of the lung has relatively less bacterial biomass when compared to the lower gastrointestinal tract it is difficult to obtain sufficient quantities of lung microbiome samples for direct clinical analysis.

Researchers at the University of South Florida have developed a procedure for the isolation and cultivation of lung microbiome from patients with chronic lung diseases. Bronchoalveolar lavage was used to isolate and subsequently cultivate and amplify the lung microbiome from patients based on three different media that allow the growth of aerobic and fastidious anaerobic lung bacteria. This novel procedure to isolate, cultivate, and amplify the lung microbiome of patients to sufficient quantities can have several application, including microbiome testing in a clinical laboratory setting, antibiotic sensitivity testing, drug resistance testing, and amplification and transplantation of naturally occurring lung microbiome.

- Novel method for treatment of various chronic lung diseases
- Help screen lung microbiome of healthy donors
- Amplification of an otherwise limited resource

## Microbiome Based Precision Nutrition Model

USF Tech ID# 21B150

### Overview:

The gut microbiome, the community of microorganisms living in the human gut, has been associated directly and indirectly with human health. Different individuals can have entirely unique microbiota, which are significantly influenced by their diet. Following a diet that promotes the growth of healthy microbes can improve digestion and contribute to overall gut health.

USF researchers have developed a model of testing the existing gut microbiome and identifying suitable diets for individuals that can increase beneficial bacteria and metabolic activities of the microbiome to promote a healthier gut microbiome, to reduce conditions like leaky gut and inflammation, and to improve aging-related brain health and overall health. This model consists of a pipeline and battery of tests including microbiome signature tests, ex-vivo fecal microbiome culture tests, along with in-vitro intestinal epithelial permeability test and *Caenorhabditis elegans* aging health span studies.

## Technologies

### A Human Origin Probiotics- Lactobacillus Rhamnosus HL-200 to Reduce Leaky Gut by Metabolizing Ethanolamine

USF Tech ID# 21B140

#### Overview:

Leaky gut syndrome is a key source of chronic inflammation, and both are the root cause of several human conditions, including inflammatory bowel disease, cancer chemotherapy side effects, diabetes, obesity, CVDs, and aging-related disorders including dementia and others. Leaky gut syndrome is caused due to the reduced capacity to metabolize ethanolamine resulting in ethanolamine accumulation and increasing ARID3a-miR101a-3p activation to reduce tight junctions (Tjp1).

The researchers discovered a novel human-origin probiotics called Lactobacillus rhamnosus HL-200 which restores ethanolamine metabolizing capacity and reverse leaky gut and inflammation by restoring ARID3a/miR101a/Tjp1 axis.

### Development of a Novel Fermented Probiotic to Reduce Cancer Treatment-related Accelerated Aging

USF Tech ID# 23T113

#### Overview:

Probiotics impact human health by modulating the gut microbiome and its metabolites. Many studies have elucidated the beneficial effects of probiotics on metabolism, but their effects on aging remain elusive.

Researchers at USF performed a multi-step screen of 36 human-origin lactobacilli and bifidobacteria that were previously isolated from the infant gut. 4 fermented bacterial stains which demonstrated beneficial anti-aging effects in *Caenorhabditis elegans* and production of beneficial polar metabolites and lipids were selected to develop a novel probiotic fermented milk (PFM). Future studies of the researchers aim to optimize and test PFM for human consumption and determine the effects of PFM on accelerated aging biology in cancer survivors.

# Why Work With USF and the Technology Transfer Office?

*USF Technology Transfer is committed to being the office of choice for our industry partners and envisions a future where every technology is given the opportunity to make a global impact.*

- USF ranked 11th among American public universities and 23rd among all universities worldwide in generating new US Patents in CY 2021, according to the National Academy of Inventors (NAI) and Intellectual Property Owners Association (IPO). On a global scale, this is the 10th year USF has ranked in the top 25.
- USF facilitated the formation of 11 new startup companies in FY 2022 (ranking USF in the top 15 percent nationally for facilitating University startups).
- USF executed 99 options & licenses in FY 22 (ranking USF in the top 12 percent for executed agreements). These agreements represent companies that have contracted with USF to further develop research into commercial products and to help bring USF's innovation into the marketplace.
- USF Tampa was ranked #19 among the "Best Universities for Technology Transfer, 2017" by the prestigious Milken Institute.
- USF's innovation and economic development efforts generate more than \$582 million in statewide impact.



# USF Technology Wheel



## Categories

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USF Tech Transfer has over 250 technologies in the medical space. To learn more about how we can partner, please contact: [ttinfo@usf.edu](mailto:ttinfo@usf.edu)





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