

The background of the cover is a photograph of the IENH building at dusk. The building is a modern, multi-story structure with a prominent glass facade that reveals the interior. The upper floors appear to be offices, while the ground floor is a large, open space, likely a gym or lab, filled with red exercise equipment. A wide, covered walkway with a blue metal railing runs along the side of the building. The sky is a deep blue, and the building's lights are on, creating a warm glow. The overall aesthetic is clean and professional.

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New Jersey Institute for Food,
Nutrition, and Health

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New Jersey Institute for Food, Nutrition, and Health
ANNUAL REPORT | 2019



New Jersey Institute for Food, Nutrition, and Health

2019 was very productive for IFNH. It was a year of expansion and growth. We created two new centers (Center for Nutrition, Microbiome, and Health; and Center for Food Systems Sustainability), two new programs (One Nutrition and Culinary Health), and has affiliated four cores (Analytical, Exercise, Clinical Research, and Microbiome). We expanded the External Advisory Board, adding members with important culinary and business expertise.



Highlights:

Partnering/Collaborating for Change Continued collaboration and partnership development is the key principle ensuring the growth and success of the institute.

First Annual Research Day In November 2019, IFNH hosted its annual Research Day, which was attended by over 100 participants, with IFNH leadership reporting, and members presenting their work. The day provided the institute with the opportunity to showcase our research.

Seed Grants Four successful 2-year grant proposals were funded together with the School of Environmental and Biological Sciences, to produce new data that will empower solid grant proposals and publications by 2021. Support for grant writing and grant application strategies was provided to IFNH members in an effort to help member investigators succeed in their funding efforts in this difficult financial research environment.

Advisory Boards An integral part of the institute are our boards. Our Internal Advisory Board exists to provide us with university-wide leadership and oversight, while our External Advisory Board provides feedback and counsel to the IFNH leadership team regarding the institute's performance from a community, state, national and international perspective from members with important culinary and business expertise.

Building Community While the institute is housed in a beautiful building, it is our community that provides the IFNH with its heart and soul that allows us to work towards changing lives. Departments at SEBS and other schools at Rutgers expand towards IFNH, for research and for interaction and synergy space. In the building, office, lab, classrooms, exercise and clinical space, as well as HARVEST, are sites where teams or members interact from their diverse disciplines to solve big problems faced by food production systems and human and animal nutrition. The research, educational activities, and workshops fostered by the IFNH centers reflect the complexity of the problems and multidisciplinary approach that will be needed to change the current trend of human diseases.

In 2020, we could see a vibrant IFNH expanding across Rutgers Departments and Campuses, linking disciplines to solve the major problems of food, nutrition, and health in New Jersey and the world.

IFNH

COLLABORATION . DISCOVERY . CHANGE

Maria Gloria Dominguez-Bello, Ph.D.
 Director, NJ Institute for Food, Nutrition, and Health
 Henry Rutgers Professor of Microbiome and Health
 Department of Biochemistry and Microbiology and
 Department of Anthropology



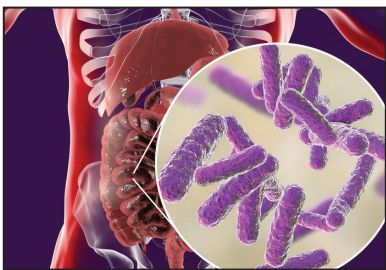
Research Centers

Nutrition, Microbiome, and Health

Director, Liping Zhao

The Center for Nutrition, Microbiome, and Health (CNMH) was established in 2018 by merging the previous Center for Digestive Health and the Program for Microbiome and Nutrition for Human Health. In its first year of operation, CNMH has achieved the following milestones:

- Two members of CNMH, Dr. Liping Zhao and Dr. Maria Gloria Dominguez-Bello led the efforts of developing a proposal titled *Preserving and Nurturing Our Healthy Microbiome* for the university-wide Rutgers Big Ideas initiative. This proposal was shortlisted for oral presentation in the Rutgers Big Ideas Symposium. The presentation attracted a large audience and was well received. The university is in the process of selecting 8-10 marquee proposals for the comprehensive capital campaign.
- Members of CNMH have initiated more than 10 collaborative projects. Two proposals are awarded with external competitive grants, one NIH R01 grant with Dr. Diana Roopchand as principal investigator and Dr. Liping Zhao and Dr. Ilya Raskin as co-investigators; one foundation grant with Dr. Kouichi Ito as principal investigator and Dr. Liping Zhao as one of the co-investigators.



Childhood Nutrition Research

Director, Daniel Hoffman

The mission of the Center for Childhood Nutrition Research (CCNR) is to improve the health of children by conducting research to better understand healthy growth and development, both locally and globally. Members of the CCNR accomplish this mission by executing multidisciplinary programs that integrate interdisciplinary research, nutrition education, and community outreach to better understand how the culture of health can be improved and taking steps at state and national levels to improve the health of children.



At present, the CCNR has 15 active members from a number of Rutgers schools including Nursing, Public Health, and Arts and Sciences as well as Environmental and Biological Sciences. We are key leaders in childhood nutrition research as seen in our leadership with the NJ Healthy Kids Initiative and supporting an active child study center where academics from across the university can conduct studies on childhood nutrition, growth, and development in the "Culture of Health Academy." In addition, there are active members at universities in Kenya, Brazil, and Mexico.

In 2019, the CCNR convened a leadership committee for strategic planning of the research agenda and funding for the center. Members of the CCNR, along with members of the Center for Nutrition, Microbiome, and Health, completed data collection on the microbiome and vitamin A deficiency in malnourished children in Brazil. As well, members of the CCNR and the newly formed Center for Food Systems Sustainability completed a pilot study on micronutrient deficiencies and nutrient-dense vegetables in Kenya, a model that will be replicated in the Culture of Health Academy. Finally, a fruitful collaboration between the CCNR and the Center for Human Nutrition, Exercise, and Metabolism integrated nutrition and fitness curricula to encourage physical activity among elementary school children in New Brunswick, NJ.

Food Systems Sustainability Director, James Simon

The Center for Food Systems Sustainability is the newest center to become active in IFNH. The vision of our new interdisciplinary center is to (i) become a leading national center of excellence in food systems research and innovation; (ii) become a leading national and international center linking health and nutrition with food and agriculture; (iii) design innovative technologies to address food security in urban, rural and peri-urban settings of the future; (iv) foster an interdisciplinary approach to environmental, economic and cultural sustainability from sociology and linguistics to computers and engineering to agriculture and forestry; and (v) position food systems as the epicenter to other scientific disciplines that need to be drawn in together to address the complex issues facing the planet. This center will focus on basic research that builds upon ensuring and developing novel and innovative food systems that lead to the availability, access, affordability and adoption in production of foods to increased consumption of safe and nutritious foods supporting the future agriculture. From urban indoor rooftop and vertical farming systems, to controlled environment and field cultivation, this center will pursue new opportunities and provide solutions to critical issues facing the environmental and economic sustainability of food systems.



Human Nutrition, Exercise, and Metabolism Director, Sue Shapses

The Center for Human Nutrition, Exercise, and Metabolism (NEX) is a new center at the IFNH, designed to examine how to optimize health, body composition, and metabolism through nutrition and novel techniques to improve muscle and bone strength, maximize growth, and delay loss of function associated with aging <https://ifnh.rutgers.edu/centers/nutrition-exercise-metabolism/>. Research is the primary focus in the center, which has state-of-the-art testing, performance equipment and clinical facilities to provide the ability to train and test various populations' body composition, metabolism, diet, and fitness. This includes pediatric, adolescent, college age, elderly, sedentary, athletes and obese individuals, in order to improve their health. This Center also provides community service that includes

testing for body composition, energy expenditure and fitness, with exercise, balance classes and nutrition education <https://ifnh.rutgers.edu/centers/nutrition-exercise-metabolism/testing-services.html>. Emphasis at the center is placed on an integration of nutrition, health, and fitness in order to influence public policy and mitigate disease states.

Rutgers Lipid Research Director, George M. Carman

The Rutgers Center for Lipid Research (RCLR) promotes multidisciplinary research on the biochemical, biophysical, cellular and molecular mechanisms involved in lipid metabolism, and extending this information to the underpinnings of lipid-based diseases such as obesity, lipodystrophy, diabetes, and heart disease. RCLR has 34 members (137 including students and postdocs) spread across the university, its medical schools, and outside Rutgers. Members have national and international recognition who are supported by federal grants and publish in high quality journals. RCLR fosters interaction among faculty, postdoctoral associates, and students. We hold monthly research meetings; postdoctoral associates and students present their research and receive constructive feedback in a warm and friendly atmosphere. We also have an active seminar series that brings renowned scientists to Rutgers for interactions with RCLR members and the university community. Year achievements include the *Lipids in Health and Disease* symposium (7 speakers), the seminar program (7 speakers), and monthly meetings (14 speakers). The RCLR sent 10 representatives to the Big Ten Academic Alliance Lipid Symposium (founded by RCLR in 2016) in Minnesota. Supporters of the RCLR include Agilent, Avanti Polar Lipids, BBA-Lipids, BODYBIO, Cayman Chemicals, Genesis Biotechnology Group, Nestlé Skin Health, NeuroLipid Foundation, MilliporeSigma, and Research Diets.



Collaborative Initiatives and Programs

NJ Healthy Kids Initiative Principal Investigators Daniel Hoffman and Arnold Rabson

The New Jersey Healthy Kids Initiative (NJHKI) is a partnership between two preeminent institutes at Rutgers–New Jersey Institute for Food, Nutrition, and Health and Child Health Institute of New Jersey. The Initiative was launched with a \$3 million grant from the Robert Wood Johnson Foundation. The mission of NJHKI is to improve child health by conducting evidence-based research, education, practice, and programs in nutrition, physical activity, and culinary literacy. In 2019, NJHKI hosted 2 symposia: *The Healthy Child: Nutrition and Fitness Education for Lifelong Health* and *Big Data and Technology in Child Health*; received \$275,000 in grant funding from Wholesome Wave and The Mushroom Council; partnered with 3 schools from 2 districts to implement the Culture of Health school program; developed “healthy smoothie” recipes for Horizon Blue Cross Blue Shield that are being distributed at venues and events across New Jersey; and co-hosted a summit titled, *A Congressional Conversation: Hunger in New Jersey*. NJHKI team members have produced 2 published abstracts, 1 book chapter, 3 media interviews, 1 podcast, 2 webinars, 8 scientific and clinical presentations, have been highlighted and quoted in 3 articles in the lay literature; and have been invited to provide their expertise on local, state, national, and international committees and councils, such as the New Jersey WIC Advisory Council and the Healthy Kids Healthy Futures New Jersey stakeholder group.



Culinary Health Program

Director, Peggy Policastro

The Culinary Health Program, under the direction of Dr. Peggy Policastro, RDN, embraces the intersection of culinary literacy, nutritional adequacy, and healthy lifestyles. The program encompasses three main areas: culinary literacy and nutrition expertise to IFNH centers, Menus of Change University Research Collaborative (MCURC), and IFNH Student Ambassadors. The Culinary Health Program collaborates with researchers to develop test diets and culinary literacy trials for research protocols. In partnership with Rutgers Dining Services, the Culinary Health Program joins forces with 46 universities across the country in the Menus of Change University Research Collaborative (MCURC), which uses the campus dining halls as living laboratories. Serving 6.7 million meals/year, dining halls, a diner, a market, food trucks, and cafes provide a plethora of data that can be used for research purposes across disciplines. The Culinary Health Program includes the IFNH Student Ambassadors, who support peer-to-peer nutritional education across the university and into the community, and at the same time, receive continual professional development (research, posters, conference attendance, interview techniques).



One Nutrition Program

Director, Joshua Miller

The concept of One Nutrition is an offshoot of the concepts of ‘One Medicine’, ‘One Health’, and ‘Planetary Health’ –interdisciplinary approaches based on the recognition that human health, animal health, and the health of our shared ecosystems are interdependent. Similarly, One Nutrition is based on the recognition that food and nutrition are not only essential to human and animal health, but that human and animal nutrition are interdependent and dependent on a healthy environment. It also recognizes that integrative basic and clinical nutrition research is necessary for establishing responsible public policy that is evidence-based and effective in promoting healthy eating and nutritional awareness. A major focus of the One Nutrition program in the last several years has been on pilot grant projects designed to promote interdisciplinary collaborations between principal investigators across different schools and programs at Rutgers. Eight grants of \$20,000 were awarded in 2016 and 2017, with the work completed in 2019 (links to the grant titles and awardees can be found here: <https://ifnh.rutgers.edu/one-nutrition/>). So far, work based on the pilot grants has produced 11 manuscripts (published, submitted or in preparation), as well as one awarded grant from the U.S. Department of Defense and two other grants under review at NIH and NSF.



Services

Culture of Health Academy

Within IFNH, the Center for Childhood Nutrition Research hosts the Culture of Health Academy (CHA) in collaboration with the Department of Psychology. CHA is primarily an educational research program with the primary mission of providing early education to children in the preschool ages. Secondarily is the educational and research mission of providing high quality and validated nutrition and health curricula with a parallel research program that is open to all disciplines across the university. Notably, CHA is an operational laboratory with a teaching kitchen that serves academic research across the university and has been instrumental in obtaining external funding. For example, the Robert Wood Johnson Foundation funded New Jersey Healthy Kids Initiative collaborates with CHA and participated in a number of culinary literacy activities. In Fall 2018, CHA installed two aerotower gardens, providing the center with many herbs and vegetables that have been used as additions to snacks and lunches, as well as ingredients in cooking lessons.



Strength Training and Conditioning

Health and fitness programs are designed to increase lean muscle, decrease weight, enhance physical function, improve balance, strengthen bones, and lower the risk of falling. In diabetic patients, strength training improves blood glucose control. Our classes are conducted in small groups,

tailored to individual needs and abilities, and last about 30 minutes. We use state-of-the-art equipment and expertise to assess fitness and body composition, and customize an exercise program for optimal health benefits for all individuals regardless of age or fitness status. All fitness levels and abilities are welcome.

HARVEST Dining

As you enter the light-filled lobby the first thing you encounter is the sights, sounds, and smells of HARVEST, the dining venue developed as a showcase for the mission and principals of the institute.

The credo behind the menu concept, "eat well, live well," developed by Rutgers chef Ian Keith, is to create dishes that are focused on whole, minimally processed food, with "from scratch" culinary techniques that develop flavor without additives, chemicals, sugars, and artificial enhancers found in most processed foods.

Classically trained chefs work closely with Rutgers dining services food buyers to source local, sustainable, whole foods, and artisan products that are raised and produced responsibly. HARVEST meats and seafood, used thoughtfully in the plant- and grain-centric menu, are hormone and antibiotic free. This approach aligns cutting-edge culinary trends in the more forward-thinking restaurant and food service sector, from fine dining to fast food.



Technical Cores

Analytical

Director, Harini Sampath

IFNH houses an Agilent 7890 gas chromatography unit coupled to 5977B MSD for analysis of short-chain and long-chain fatty acids. We have the capacity to quantify fatty acids from 2-26 carbons long and also separate long-chain lipids into different classes, including triglycerides, diacylglycerols, free fatty acids, cholesterol esters, and total phospholipids. Possible additional separations include phosphatidylcholine, phosphatidylinositol, phosphatidylserine, phosphatidylcholine, sphingomyelin, and cardiolipin.

Clinical Research

Director, Sue Shapses

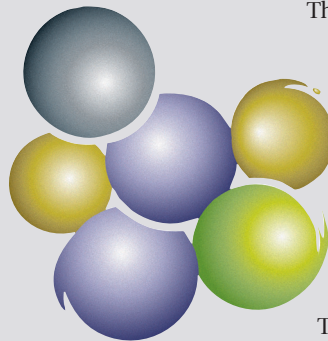
The clinical facilities within the Center for Human Nutrition, Exercise, and Metabolism are ideal for research protocols that require patient interviews, blood draws, or other human sample collection, or group interventions with counseling by a qualified clinical researcher. Some assessments include resting metabolic rate, and bone and body composition using state-of-the-art instruments that can assess diet, exercise, or other interventions. There are measurement rooms, a phlebotomy room, exam and interview rooms, and larger clinical space for groups to accommodate both medical and nutrition studies.

Exercise

Director, Peter Kokkinos

The Center for Human Nutrition, Exercise, and Metabolism has appropriate space and state-of-the-art testing and exercise equipment, along with highly trained staff to assess cardiorespiratory (VO₂ max) and muscular fitness for all ages, including athletes and individuals with chronic disease.

These tests are used to customize an individual's exercise program and optimize performance and health benefits. In addition, the information can be used as a basis for further research that would lead to a better understanding of exercise implementation to large and diverse communities, ultimately leading to more favorable health outcomes for all.



Microbiome

Director, Yan Lam

The Rutgers Center for Microbiome Analysis serves as a sequencing core facility for IFNH and the broader Rutgers research community for generating preliminary data for grant applications and supporting ongoing microbiome projects. Nearly 2,000 samples have been sequenced and analyzed to support various grant applications and publications.

**New Jersey Institute for Food,
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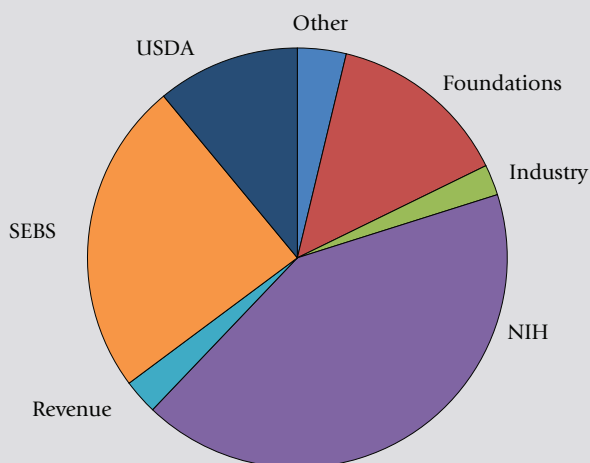
61 Dudley Road
New Brunswick, NJ 08901-8520



158K
VISITORS per year

IFNH Visitors:

HARVEST	150,000
Student Health Clinic	6,026
Training & Conditioning	1,684
Total	157,710



2019 IFNH Funding Sources:

NIH	2.6M
SEBS	1.5M
Foundations	872K
USDA	684K
Industry	147K
Revenue	168K
Other	233K
Total Funding	6.2M

IFNH Founding Principles

The institute is guided by the following organizational principles and core values:

Mission: Become a hub for interdisciplinary research in food, nutrition, and health at Rutgers University.

Core Values: The IFNH key core values that frame its activities are academic interdisciplinarity, and community responsibility.

Emergent Properties: As a dynamic interdisciplinary organization, it exceeds the sum of its parts, with the transformative value arising from its emergent properties not feasible in conventional organizations.

IFNH.RUTGERS.EDU