SCIENTIFIC ORGANIZING COMMITTEE

Ian Brissette, PhD, New York State Department of Health

Liana Lianov, MD, MPH, FACPM, FACLM, American College of Lifestyle Medicine

Andrew Swick, MS, PhD, Metagenics

Derek Yach, MD, MPH, The Vitality Institute

Mireille Mclean, MA, MPH, The Sackler Institute for Nutrition Science

Julie Shlisky, PhD, The Sackler Institute for Nutrition Science

SPECIAL NEEDS

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The Sackler Institute for Nutrition Science at the New York Academy of Sciences is pleased to welcome you to our conference, **Nutrition and the Science of Disease Prevention: A Systems Approach to Support Metabolic Health**. This multidisciplinary program features leading scientists and researchers who will provide complementary perspectives on comprehending the multiple factors that affect metabolism. Importantly, speakers will discuss how systems-thinking provides a framework for prevention.

The goal of this conference is to foster cross-disciplinary dialogue, new collaborations, and innovative approaches to research and practice through active participation among speakers and attendees. Extensive time for questions and answers will be moderated following presentations, and a networking reception will provide additional time for further interactions. We hope to promote the importance of engaging a wide range of scientific communities through this event.

To disseminate knowledge and ideas exchanged by participants beyond the wall of the auditorium and past the event date, this conference will be archived online as an eBriefing, an open-access multimedia conference report, on the New York Academy of Sciences’ website. In addition, a video of the Keynote Presentation will be available on-line on our website.

If you are not already a member of the New York Academy of Sciences, we encourage you to become actively engaged with our community. For more information about the Academy’s diverse live and online programming and membership, please visit [www.nyas.org](http://www.nyas.org) or email customerservice@nyas.org.

We hope that this conference exceeds your expectations, stimulates exciting discussions, and leads to productive new collaborations. Please do not hesitate to address our staff with any questions, concerns, or suggestions.

**Mireille Mclean,**  
*Associate Director,*  
The Sackler Institute for Nutrition Science  
The New York Academy of Sciences
All faculty participating in this activity are required to disclose to the audience any significant financial interest and/or other relationship with the manufacture(s) of any commercial product(s) and/or provider(s) of commercial services discusses in his/her presentation and/or the commercial contributor(s) of this activity.

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<th>Faculty Name</th>
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<td>Brian Bennett, PhD</td>
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<td>Ian Brissette, PhD</td>
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<td>Kevin D. Hall, PhD</td>
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<td>Liana Lianov, MD, MPH, FACPIM, FACLM</td>
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<td>Mireille Mclean, MA, MPH</td>
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N/A = not available at time of printing.

An * after the speaker’s name indicates that the speaker intends to discuss unlabeled uses of a commercial product, or an investigational use of a product not yet approved for this purpose. The speaker will disclose this information during his/her presentation.
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<tr>
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<tr>
<td>8:30 AM</td>
<td>Registration &amp; Continental Breakfast</td>
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<td>9:00 AM</td>
<td>Welcoming Remarks</td>
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<td>Mireille Mclean, MA, MPH, Associate Director,</td>
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<td>The Sackler Institute for Nutrition Science</td>
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<td></td>
<td><strong>SESSION 1: THE BASIC SCIENCE OF OPTIMAL METABOLIC HEALTH</strong></td>
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<td>Facilitator: Andrew Swick, MS, PhD, Metagenics</td>
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<td>9:20 AM</td>
<td>Molecular Physiology of the Control of Body Weight</td>
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<td>Rudolph Leibel, MD, Columbia University</td>
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<td>9:50 AM</td>
<td>Systems Genetic Approaches to Gene/Diet Interactions</td>
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<td>Brian J. Bennett, PhD, University of North Carolina, Chapel Hill</td>
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<td>10:20 AM</td>
<td>Investigation of Gut Microbia Niches and their Relevance to Metabolic Health</td>
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<td>Anne McCartney, PhD, University of Reading</td>
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<td>10:50 AM</td>
<td>Session 1 Panel and Q&amp;A</td>
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<td>Panel Moderator: Andrew Swick, MS, PhD, Metagenics</td>
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<td>11:10 AM</td>
<td>Networking Coffee Break</td>
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<td>11:40 AM</td>
<td><strong>Keynote</strong></td>
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<td>11:45 AM</td>
<td><strong>Keynote Lecture: Systems Epidemiology Approach to Understanding Nutrition and Obesity and Diabetes</strong></td>
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<tr>
<td>12:15 PM</td>
<td><strong>Keynote Q&amp;A</strong></td>
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<td>12:30 PM</td>
<td><strong>Lunch</strong></td>
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<td><strong>SESSION 2: HOW NUTRITION FROM PHARMA TO LIFESTYLE CAN BUILD ON SYSTEMS SCIENCE TO ADDRESS COMPLEX ISSUES</strong></td>
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<tr>
<td>1:40 PM</td>
<td><strong>Nutrition and the Science of Disease Prevention: Systems Science for Complex Problems (via video)</strong></td>
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<tr>
<td>2:10 PM</td>
<td><strong>The Calculus of Calories: Mathematical Modeling of Human Energy Metabolism and Body Weight Dynamics</strong></td>
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<tr>
<td>2:40 PM</td>
<td><strong>Using Behavioral Science to Inform the Design of Food Policies</strong></td>
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3:10PM  Session 2 Panel and Q&A
Panel Moderator:
Liana Lianov, MD, MPH, FACPM, FA CLM,
Immediate Past President of the American College
of Lifestyle Medicine

Panelists:
Patricia L. Mabry, PhD, National Institutes of Health
Kevin D. Hall, PhD, National Institutes of Health
Christina A. Roberto, PhD, Harvard T.H. Chan
School of Public Health

3:30 PM  Closing Remarks

3:45 PM  Reception

4:45 PM  Adjourn

The New York Academy of Sciences requests that you do not take
photographs or make audio or video recordings of the conference
presentations, or present unpublished data on any open-access
websites, unless specific permission is obtained from the speaker.
**BIOS**

**SCIENTIFIC ORGANIZING COMMITTEE MEMBERS**

**Ian Brissette, PhD, New York State Department of Health**

Ian Brissette, PhD is a Research Scientist at the New York State Department of Health and Director of the Bureau of Chronic Disease Evaluation and Research. His Bureau is responsible for maintaining several priority public health surveillance systems and oversees performance measurement and evaluation of chronic disease prevention programs administered by the Department. Dr. Brissette has worked as a research scientist and program evaluator in the NYS Department of Health since 2003. His expertise is in the application of social science theories and research methods to the practice of public health. Prior to joining the NYS Department of Health, he was a faculty member at the Psychology Department at Rutgers University in New Brunswick. Ian received his PhD in Health Psychology from Carnegie Mellon University and completed post-doctoral training at the Cancer Institute of New Jersey.

**Liana Lianov MD, MPH, FACPM, FACLM, American College of Lifestyle Medicine**

Dr. Liana Lianov serves as the immediate past president on the board of the American College of Lifestyle Medicine (ACLM) and as a senior medical consultant for the MediCal Managed Care program at the California Department of Health Care Services (DHCS). Her company HealthType™ develops innovative interventions to promote and support healthy lifestyles. She recently completed two terms on the board of regents of the American College of Preventive Medicine (ACPM). She also chaired a national multi-year task force and expert working group to advance prevention and widespread implementation of lifestyle medicine (focused on nutrition and physical activity) to treat chronic diseases. Dr. Lianov is the lead faculty for a new lifestyle medicine course that will be launched by ACLM and ACPM in 2015. She was awarded the 2015 Distinguish Service Award by ACPM. Dr. Lianov is board certified in internal medicine and preventive medicine/public health and completed a psychiatry fellowship.
Andrew Swick, MS, PhD, Metagenics

Dr. Swick has broad experience in metabolism and nutrition research and expertise in relevant cell and animal models, clinical study design and translational research. He joined Metagenics as Vice President of Nutritional Science in 2013 and is responsible for science and innovation across Obesity, Cardiometabolic, Digestive Health, CNS/Cognition and Foundational Health. Prior to that, Dr. Swick was an associate professor and Director of Obesity and Eating Disorders Research at the University of North Carolina Nutrition Research Institute. Before joining the University of North Carolina, Dr. Swick was Senior Director of Cardiovascular and Metabolic Diseases at Pfizer Global Research and Development working on target validation, biomarker discovery, animal models and translational research in diabetes and obesity. Dr. Swick was responsible for the delivery of more than a dozen unique pharmacotherapies to clinical development, spanning multiple molecular mechanisms. He is an elected member of several professional organizations and currently serves on the New York Academy of Sciences Obesity, Diabetes and Nutrition Related Diseases Working Group and the Nutrition Research Foundation Scientific Advisory Board.

Dr. Swick earned a Ph.D. in Nutritional Sciences from the University of Wisconsin, an M.S. in Nutrition from the University of Nebraska and a B.S. in Animal Science from the University of Florida. In addition, he received postdoctoral training at Johns Hopkins University Medical Center and the University of North Carolina Lineberger Cancer Research Center.

Derek Yach, MD, MPH, The Vitality Institute

Derek Yach has focused his career on advancing global health. He is currently the Executive Director of the Vitality Institute. Prior to that he was Senior Vice President of Global Health and Agriculture Policy at PepsiCo where he supported portfolio transformation and led engagement with major international groups as well as new African initiatives at the nexus of agriculture and nutrition. He has headed global health at the Rockefeller Foundation, been a Professor of Global Health at Yale University, and is a former Executive Director for Noncommunicable Diseases and Mental Health of the World Health Organization (WHO). At WHO, Dr. Yach served as cabinet director under Director-General Gro Harlem Brundtland, where he led the development of WHO’s Framework Convention on Tobacco Control and the Global Strategy on Diet and Physical Activity.
Yach established the Centre for Epidemiological Research at the South African Medical Research Council. He has authored or co-authored over 200 articles covering the breadth of global health, regularly publishes blog posts, and is cited by the Huffington Post, The New York Times and The Economist. Dr. Yach serves on several advisory boards including those of the Clinton Global Initiative, the New York Academy of Sciences, and the World Economic Forum. He is Chairman of the Board of Cornerstone Capital and Chairman of the World Economic Forum Global Agenda Council on Ageing. His degrees include an MBChB from the University of Cape Town, BSc (Hons Epi) from the University of Stellenbosch; an MPH from the Johns Hopkins Bloomberg School of Public Health; and a DSc (Honoris Causa) from Georgetown University. He lives in Connecticut, USA and is an avid swimmer.

Mireille Mclean, MA, MPH, The Sackler Institute for Nutrition Science
Mireille Seneclauze Mclean is Associate Director of the Sackler Institute for Nutrition Science at the New York Academy of Sciences. Prior to this, she spent 10 years working for several international NGOs, defining and implementing programs in nutrition, health, food security and sanitation for vulnerable population groups in South East Asia, Africa and the Middle East. She also worked as a Senior Project Coordinator at the Bureau of Public Health in Paris, France, focusing on tuberculosis control. She holds an MA in Development Economics and International Development from the University of Sussex and a Master of Public Health from the University of Liverpool.

Julie Shlisky, PhD, The Sackler Institute for Nutrition Science
Julie joined the Sackler Institute in 2014 after her post-doctoral fellowship at the New York Obesity Research Center where she examined postprandial energy expenditure in overweight and obese adolescents. She earned her doctorate in Nutritional Science from Penn State in spring 2012 where she conducted a 6-month diet and physical activity lifestyle intervention investigating an energy-restricted diet on body composition, metabolic parameters and bone health in premenopausal women. Julie provided the nutrition education component of the study to participants and has fulfilled course work necessary for the dietetic internship, needed to become registered dietitian. She brings experience from industry and the laboratory to her position at the Academy, having worked in a research and development at DuPont after her undergraduate education in molecular biology.
KEYNOTE SPEAKER

**Frank Hu, MD, PhD, Harvard T.H. Chan School of Public Health**

Dr. Frank Hu is Professor of Nutrition and Epidemiology at Harvard T.H. Chan School of Public Health and Professor of Medicine, Harvard Medical School and Brigham and Women’s Hospital. Dr. Hu is Co-director of the Program in Obesity Epidemiology and Prevention at Harvard. He also serves as Director of Boston Nutrition and Obesity Research Center (BNORC) Epidemiology and Genetics Core. Dr. Hu received his MD from Tongji Medical College in China and a PhD in Epidemiology from University of Illinois at Chicago. Dr. Hu’s research is mainly focused on nutritional and lifestyle epidemiology and prevention of obesity, type 2 diabetes, cardiovascular disease as well as gene-environment interactions. Dr. Hu has published >500 original papers and reviews and a textbook on Obesity Epidemiology (Oxford University Press 2008). Dr. Hu is the recipient of the Kelly West Award for Outstanding Achievement in Epidemiology by American Diabetes Association in 2010. He has served on the Institute of Medicine (IOM) Committee on Preventing the Global Epidemic of Cardiovascular Disease, the AHA/ACC Obesity Guideline Expert Panel, and the 2015 Dietary Guidelines Advisory Committee, USDA/HHS. Dr. Hu is serving on the editorial board of Lancet Diabetes & Endocrinology, Diabetes Care, and Clinical Chemistry.

SPEAKERS

**Brian J. Bennett, PhD, University of North Carolina**

Dr. Brian J. Bennett, researches the role of the human diet and nutrition as it relates to heart disease. He explores genetic components of chronic metabolic diseases, such as cardiovascular disease and obesity, through integrative genetic studies, also called “systems genetics.” Dr. Bennett’s laboratory examines the relationship among many types of data such as genetic variants, gene expression levels and metabolite levels and how these interact to increase susceptibility to cardiovascular disease. Dr. Bennett is motivated to use these methods to investigate the effects of specific dietary components on metabolic diseases. Dr. Bennett completed his Bachelor of Science in Exercise Science at Ithaca College in 1995. He then earned his Master of Science in Nutritional Sciences at University of New Hampshire in
1997 and his Ph.D. in Nutritional Sciences at University of Washington in 2006. Dr. Bennett conducted his post-doctoral work in Genetics at the University of California, Los Angeles until 2011 when he joined the Department of Genetics at the University of North Carolina, Chapel Hill.

**Kevin D. Hall, PhD, National Institutes of Health**

Dr. Kevin Hall is a tenured Senior Investigator at the National Institute of Diabetes & Digestive & Kidney Diseases, one of the National Institutes of Health in Bethesda MD, where his main research interests are the regulation of food intake, macronutrient metabolism, energy balance, and body weight. Dr. Hall’s laboratory performs experiments in humans and rodents and develops mathematical models and computer simulations to help design, predict, and interpret the experimental data. Dr. Hall is the recipient of the NIH Director’s Award, the NIDDK Director’s Award, the Lilly Scientific Achievement Award from The Obesity Society, the Guyton Award for Excellence in Integrative Physiology from the American Society of Physiology, and his award-winning Body Weight Simulator (bwsimulator.niddk.nih.gov) has been used by more than a million people to help predict how diet and physical activity dynamically interact to affect human body weight.

**Rudolph Leibel, MD, Columbia University**

I am interested in the molecular physiology and genetics of body weight regulation and diabetes in humans and rodents. My associates and I have cloned and characterized a number of genes in the pathways regulating body weight and modifying diabetes susceptibility. We participated in the molecular cloning and characterization of the leptin and leptin receptor genes, and have continued to pursue the molecular physiology of the “leptin axis” in body weight regulation recently focusing on the molecular physiology of the FTO locus in mice and humans. We identified the macrophage as the major source of cytokines in adipose tissue. During the past 5 years I have worked with associates at Columbia to develop techniques for creating IPS cells from skin biopsies of patients segregating for monogenic forms of diabetes and obesity. We have succeeded in making such cells from MODY, Wolfram, T1D, Bardet-Biedl and Prader-Willi patients, and in showing that beta cells and neurons derived from these iPSCs cells recapitulate the anticipated seminal phenotypes of the patients from whom they were derived. I am Co-Director of the Naomi Berrie
Diabetes Center, the NY Obesity Research Center and the Columbia Diabetes Research Center have served on the NIDDK Council, and continue to serve on the NIH CORP committee. I am a member of the Institute of Medicine of the National Academy of Sciences.

Liana Lianov MD, MPH, FACPM, FACLM, American College of Lifestyle Medicine

Dr. Liana Lianov serves as the immediate past president on the board of the American College of Lifestyle Medicine (ACLM) and as a senior medical consultant for the MediCal Managed Care program at the California Department of Health Care Services (DHCS). Her company HealthType™ develops innovative interventions to promote and support healthy lifestyles. She recently completed two terms on the board of regents of the American College of Preventive Medicine (ACPM). She also chaired a national multi-year task force and expert working group to advance prevention and widespread implementation of lifestyle medicine (focused on nutrition and physical activity) to treat chronic diseases. Dr. Lianov is the lead faculty for a new lifestyle medicine course that will be launched by ACLM and ACPM in 2015. She was awarded the 2015 Distinguish Service Award by ACPM. Dr. Lianov is board certified in internal medicine and preventive medicine/public health and completed a psychiatry fellowship.

Patricia L. Mabry, PhD, National Institutes of Health, Office of Disease Prevention

Dr. Mabry is a Senior Advisor for Disease Prevention in the Office of Disease Prevention (ODP) at the National Institutes of Health (NIH). She leads two of the Office’s six strategic priorities: 1) develop a tool to deeply characterize NIH investments in prevention research and 2) promote the use and development of the best methods for prevention research. Dr. Mabry was a Senior Advisor in the NIH Office of Behavioral and Social Sciences Research (OBSSR) for over eight years, and served as Acting Deputy Director her last year. There, Dr. Mabry facilitated the adoption of systems science methods by behavioral and social scientists. She led funding announcements in transdisciplinary research, methodology and measurement, and systems science and produced the annual Institute on Systems Science and Health (ISSH). From 2009-2014, she co-led Envision, a network of computational modeling teams focused on policy interventions to combat obesity. Before joining the federal government Dr. Mabry
Anne L. McCartney, PhD, University of Reading, Reading UK

Associate Professor Anne McCartney obtained her PhD in Microbiology from the University of Otago, Dunedin, NZ in 1996. In 1997 she joined the Gut Microbiology group of the Institute of Food Research, Reading, UK to investigate the infant gut microbiota. In 1999 Dr. McCartney transferred to the University of Reading as a founding staff member of the Food Microbial Sciences Unit. Anne’s research interests include the importance and impact of diet on the gastrointestinal ecosystem and the host in general, including the application of functional foods (probiotics, prebiotics, and synbiotics). Her research group is actively investigating the function/activity of the gut microbiota associated with clinical outcomes. In collaboration with colleagues at University of Westminster, London and Imperial College London, metagenomics (functional and compositional) and transcriptomics (functional and population dynamics) are being employed to examine microbial utilization of dietary components in vitro.

Christina A. Roberto, PhD, Harvard T.H. Chan School of Public Health

Christina A. Roberto, PhD is an Assistant Professor of Social & Behavioral Sciences and Nutrition at the Harvard School of Public Health. She is a psychologist and epidemiologist whose research aims to identify, understand, and alter the environmental and social forces that promote unhealthy eating behaviors linked to obesity and eating disorders. Christina is principal investigator of the Psychology of Eating and Consumer Health (PEACH) lab, which uses diverse research methods to study current food policy issues including menu labeling, front-of-package food labeling, food and diet industry marketing, and policies to reduce sugary drink consumption. In her work, she draws upon the fields of psychology, marketing, behavioral economics, and public health to answer research questions that can provide policymakers and institutions with science-based guidance.
Molecular Physiology of the Control of Body Weight

Rudolph Leibel, MD, Columbia University

In evolutionary terms, body fat is critical to reproductive integrity and survival in circumstances of restricted and intermittent access to food. Powerful regulatory systems, integrated in the hypothalamus, control energy intake and expenditure in response to perturbations of body fat, with homeostatic responses being more powerful in response to weight (fat) loss than gain. The physical and molecular substrates for these processes include specific cell bodies and neuropeptides, as well as peripheral signals “reporting” acute and chronic changes in the status of energy stores. These are the basis for what is often referred to as body weight “set point”, a misnomer in that regulatory forces are, as noted, asymmetrical in favor of defense of body fat. Understanding the details of these processes is critical to the devising of more effective preventive and therapeutic interventions for obesity.

Systems Genetic Approaches to Gene/Diet Interactions

Brian J. Bennett, PhD, Department of Genetics, University of North Carolina Chapel Hill, Nutrition Research Institute, University of North Carolina Chapel Hill

Science has been revolutionized by the advent of high-throughput technologies of the -omic scale. Nutrigenomics aims to identify genetic and dietary interactions that affect gene expression. A goal of nutrigenomics is to identify novel gene x diet interactions that increase susceptibility to disease. Nutrigenomics approaches can incorporate multiple scales of data, such as mRNA, measures of microbial diversity and metabolite levels, to identify these novel interactions. Our current research is aimed at developing a nutrigenomic platform. To accomplish this, we employ a systems-genetic approach to elucidate the genetic and dietary factors affecting cardiovascular susceptibility. We have initiated a set of studies across genetically diverse mouse strains to understand basal and diet-induced changes in choline metabolism, focused on trimethylamine N-oxide (TMAO) and betaine metabolism. Initial results thus far demonstrate that choline metabolites vary by genetic background, are affected by diet and that dietary challenges
elicit a genetic x diet interaction that may involve the microbiome. We have extended these studies using the Diversity Outbred (DO) mouse panel recently developed by the Jackson Laboratory to identify a novel locus regulating TMAO levels in mice. Overall, these studies offer a proof a principle for an approach to nutrigenomic studies.

**Investigation of Gut Microbiota Niches and Their Relevance to Metabolic Health**

**Anne L. McCartney, PhD, University of Reading, Reading UK**

The gut microbiota is an important component of human systems biology and intrinsically associated with host health. Recent research has demonstrated that focusing solely on the faecal/colonic bacterial population is short-sighted, particularly in relation to metabolic health. An extensive study investigating the caecal microbiota (including bacterial and bacteriophage populations) highlighted differences between the caecal bacteria of patients presenting ‘normal’ colonoscopies compared to IBD patients. Furthermore, the caecal microbiota was found to be different within the ‘normal’ patient group: that is, ‘normal’ with no complications compared to ‘normal’ with complications. Diverse and distinctive bacteriophage populations were observed in caecum samples, with numerous Myoviridae, Podoviridae and Siphoviridae present, and a bacterium–bacteriophage combination (Klebsiella pneumoniae subsp. pneumoniae–Siphoviridae) was recovered. This work also generated a unique collection of facultatively anaerobic caecal isolates which, together with our in-house collection of faecal isolates, has been utilized for in vitro studies examining microbial utilization of dietary methylamines, including trimethylamine N-oxide (TMAO). TMAO was rapidly reduced to trimethylamine by members of the human gut microbiota in pure-culture and mixed-batch-culture experiments, supporting the hypothesis of ‘metabolic retroversion’ of dietary TMAO. Statistically significant different metabolic profiles were seen for caecal and faecal Enterobacteriaceae isolates in the presence of TMAO, with caecal isolates producing higher TMA and acetate levels, and lower lactate levels than faecal isolates. Taken together these initial data indicate the importance of microbial activity in the upper gastrointestinal tract and, thus, the need to study microbial activity in the small intestine/caecum/proximal colon.

**Coauthor: Lesley Hoyles, University of Westminster, London, UK**
KEYNOTE LECTURE

Systems Epidemiology Approach to Understanding Nutrition and Obesity and Diabetes

**Frank Hu, MD, PhD, Dept. of Nutrition, Harvard T.H. Chan School of Public Health**

Traditional epidemiology has made important contributions to the identification of key nutritional and lifestyle risk factors for chronic disease. Technical advances that now allow high-throughput measurements of genomic, transcriptomic, proteomic, and metabolomic traits in combination with more sophisticated bioinformatics provide epidemiologists an unprecedented opportunity to unlock the full potential of their approach. “Systems Epidemiology” can enhance biological understanding of metabolic pathways and identify novel biomarkers and intervention targets (Cornelis and Hu, Curr Nutr Rep. 2013 Dec;2) System-level tools applied to obesity and type 2 diabetes have revealed new pathways that are potentially modified by diet and thus offer additional opportunities for nutritional investigations. Moving forward, harnessing the resources of existing large, prospective studies within which biological samples have been archived and diet and lifestyle have been measured will enable systems-level data to be integrated, the outcome of which will be improved personalized optimal nutrition for prevention and treatment of disease.


**Patricia L. Mabry, PhD, National Institutes of Health, Office of Disease Prevention, Bethesda, MD**

Traditional methods have contributed greatly to our understanding of nutritional factors and their contribution to various diseases. However the field of nutrition science is complex; a large number of factors interact to produce an outcome of interest. For example, the following are among the important factors contributing to the potency of a nutrient: the genetic makeup of the host; the quality, quantity of the food or nutrient; the bioavailability of the nutrient which may be affected by conditions associated with growing, harvesting, storing and preparing food for consumption; whether a given food is consumed in combination with other foods; and the composition of the host microbiome at the time food is consumed. The ability of traditional methods to examine reciprocal relationships such as between dietary...
intake, sedentary behavior and manifestation of disease, is limited. The objective of this presentation is to introduce the audience to cutting-edge systems science methods that can help advance nutrition research by offering complementary approaches to traditional methods. This presentation will begin with an explanation of what systems science methods are and a rationale for how systems science methods can benefit nutrition research. Examples of agent-based modeling in obesity research and system dynamics modeling to inform food policy decisions will be shown. Finally, a summary of systems science related activities at the National Institutes of Health, and funding opportunities for this kind of research will be provided.

The Calculus of Calories: Mathematical Modeling of Human Energy Metabolism and Body Weight Dynamics

Kevin D. Hall, PhD, National Institute of Diabetes & Digestive & Kidney Diseases (NIDDK), National Institutes of Health (NIH), Bethesda, Maryland

Setting realistic goals for people with obesity is an important part of any weight loss program and policymakers need to make decisions about whether a proposed intervention will cost-effectively contribute to reversing the obesity epidemic. Quantifying the likely impact of an intervention is facilitated by translating between changes in the calories eaten or expended per day and body weight. Unfortunately, the usual methods for making this translation were recently revealed to be highly inaccurate and have led to misleading conclusions about the energy gap underlying the obesity epidemic as well as incorrect predictions about the intervention magnitude required to prevent and reverse obesity. Mathematical models of human metabolism and body weight change have now been developed that correct the deficiencies of the previously standard calculations. These new models provide accurate predictions of body weight dynamics resulting from interventions in both individuals and populations. In this presentation, I will describe some insights obtained from these models such as how obesity prevalence would likely be affected by policy changes such as a soda tax. I will also describe how mathematical models can be used interpret the relationship between the changing food environment, food waste, and the genesis of the obesity epidemic.
Using Behavioral Science to Inform the Design of Food Policies

Christina A. Roberto, PhD, Harvard T.H. Chan School of Public Health

Poor diet and obesity are worldwide public health problems. There is growing consensus that public health policies have an important role to play in improving the world’s diet. However, we currently lack a strong scientific evidence base for many policy proposals. In this talk, I will discuss ways in which the behavioral sciences can inform the design of effective food policies.
ACKNOWLEDGMENT OF SUPPORT

Bronze sponsor of this event and presenter of the upcoming podcast:

Metagenics

Genetic Potential Through Nutrition

The Metagenics Healthcare Institute for Clinical Nutrition is a website for all healthcare providers with roots in traditional, functional and integrative medicine. Improving patient outcomes and reducing healthcare utilization are increasingly important metrics—for providers and patients—in today’s world. The roles that clinical nutrition and lifestyle medicine play in achieving those goals are now more significant than ever. The Metagenics Healthcare Institute for Clinical Nutrition is a site that offers educational tools, current updates in clinical research and links to leading academic institutions; all to help the provider keep abreast of the constantly changing events that shape healthcare today.
Early childhood is recognized as a critical time for healthy growth and development, building the basis for future attainments of every child. Therefore, scaling up interventions to support adequate nutritional intake and appropriate care practices, and optimizing the synergistic impact of such strategies, is of utmost importance. What is the global state of knowledge and experience on integrating these interventions? What are some opportunities for integration and for overcoming barriers? The papers presented in this Annals volume explore the relevance and effectiveness of an integrated approach from several dimensions, including the theoretical construct, timing and pathways to outcomes, indicators for achievements, and the required delivery mechanisms at the community and institutional levels for implementation and scaling up.

To view this open access volume provided by The Sackler Institute for Nutrition Science and The Mathile Institute for the Advancement of Human Nutrition, visit www.nyas.org/ChildHealth.

To browse the entire Annals library, please visit www.nyas.org/Annals.

Technology and Innovation in Agriculture, Food, and Nutrition Conference Series eBriefings and Podcasts

Food Safety Considerations for Nutrition Science
www.nyas.org/foodsafety-eB

Consumer Behavior and Food Science Innovations for Optimal Nutrition
www.nyas.org/FoodInnov-eB

Frontiers in Agricultural Sustainability: Studying the Protein Supply Chain to Improve Dietary Quality
www.nyas.org/ProteinSupply-eB
www.nyas.org/Protein-Podcast

Additional Sackler Institute eBriefings

Early-Life Influences on Obesity: From Pre-Conception to Adolescence
www.nyas.org/EarlyObesity-eB

Shaping the Developing Brain: Spotlight on Nutrition and Brain Development
www.nyas.org/DevelopingBrainNutrition-eB

2014 Annual Report
A Global Research Agenda for Nutrition Science

In collaboration with the World Health Organization (WHO), the Sackler Institute developed a global agenda for nutrition science research. The resulting report, *A Global Research Agenda for Nutrition Science* (2013), is a culmination of a two-year process, which identified gaps in nutrition science research that will drive the development and implementation of roadmaps for critical nutrition science research and interventions. To learn more, visit [www.nutritionresearchagenda.org](http://www.nutritionresearchagenda.org) and visit the additional resources provided below.

View the *eBriefing* from the launch event and *Annals* volume

[www.nyas.org/NutritionAgenda-eB](http://www.nyas.org/NutritionAgenda-eB)  |  [www.nyas.org/Annals-1332](http://www.nyas.org/Annals-1332)

Global Research Agenda Podcast Series

- **A Research Agenda for Nutrition Science: Why and How?**  
  [www.nyas.org/AgendaWhy-Podcast](http://www.nyas.org/AgendaWhy-Podcast)
- **A Research Agenda for Nutrition Science: Mobilizing the Community**  
  [www.nyas.org/AgendaCommunity-Podcast](http://www.nyas.org/AgendaCommunity-Podcast)
- **A Research Agenda for Nutrition Science: Activating the Agenda**  
  [www.nyas.org/ActivatingAgenda-Podcast](http://www.nyas.org/ActivatingAgenda-Podcast)

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The New York Academy of Sciences, in partnership with The Mortimer D. Sackler Foundation, established The Sackler Institute for Nutrition Science to create a coordinated effort to support and disseminate nutrition science research. The Sackler Institute is dedicated to advancing nutrition science research and knowledge, mobilizing communities, and translating this work into the field. The Sackler Institute is generating a coordinated network across sectors, disciplines, and geographies that promotes open communication; encourages exchange of information and resources; nurtures the next generation of scientists; and affects community intervention design and public policy changes. Visit us online at www.nyas.org/SacklerInstitute.

Membership to the New York Academy of Sciences

Membership to the New York Academy of Sciences enables you to attend future Academy events for free or at reduced registration rates. We encourage you to join and become active members of our community and to build networks and exchange ideas with leaders like yourself. For more information about the Academy’s diverse live and online programming and Academy membership, please visit www.nyas.org or email customerservice@nyas.org. Information on our programming in the field of nutrition can be found at www.nyas.org/SacklerInstitute.