

Lipids and Metabolic Diseases II Inaugural Symposium of Big Ten Academic Alliance Lipids November 10, 2016

Dear Colleagues,



On behalf of the organizing committee and the members of the Rutgers community of lipid researchers, I am pleased to welcome you to the inaugural symposium of the Big Ten Academic Alliance Lipids entitled *"Lipids and Metabolic Diseases II"*. The organizing committee has brought together a renowned group of scientists from Big Ten schools who will share their knowledge, results, and insights into how lipids relate to metabolic diseases. I hope you find the presentations and posters, which are designed to facilitate your interaction with other scientists, informative and enjoyable.

The Rutgers Center for Lipid Research (RCLR) is a center of the New Jersey Institute for Food, Nutrition, & Health that promotes intra- and inter-institutional and multidisciplinary research in 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. Our research utilizes model organisms, cells, and tissues, and state-of-the-art instrumentation. We foster interaction among faculty, postdoctoral associates, and students that leads to productive collaborations. We hold monthly research meetings; postdoctoral associates and students have the opportunity to 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. In the end, the goal of the RCLR is to extend our research findings to address lipid-based diseases, thereby promoting optimum health.

We are particularly pleased that Rutgers University has joined the Big Ten Academic Alliance. Being a member of the Big Ten goes far beyond athletics and getting beat up on the gridiron. The faculty, postdoctoral associates/fellows, and graduate/undergraduate students performing research involved with lipids can take advantage of the opportunities afforded to Big Ten member institutions. An infrastructure is set up for collaborative research agreements between Big Ten Schools, students can visit another Big Ten campus for up to a year to take classes and/or conduct research, there is an interlibrary loan program, and all schools have access to a high speed fiber optic network for accessing data.

In closing, I want to convey my appreciation to the organizing committee for their support in bringing this symposium to fruition.

Sincerely,

George M. Carman, Ph.D. Director, Rutgers Center for Lipid Research

Lipids and Metabolic Diseases II Rutgers Center for Lipid Research Symposium, November 10, 2016

Organizing Committee

Dawn Brasaemle George M. Carman, Chair Peter Gillies Loredana Quadro Judith Storch Judy Keller, Conference Coordinator

Sponsors











New Jersey Institute for Food, Nutrition, and Health







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Lipids and Metabolic Diseases II Inaugural Symposium of Big Ten Academic Alliance Lipids November 10, 2016

Program

- 8:30 am Registration and Poster Setup
 9:00 am Welcome and Introduction
 Richard L. Edwards, Chancellor, Rutgers University, New Brunswick
 Robert M. Goodman, Dean, School of Environmental and Biological Sciences
 George M. Carman, Director, Rutgers Center for Lipid Research
- 9:15 am Earl Harrison (Ohio State) Beta-apocarotenoids: Oxidative Cleavage Products of Dietary Carotenoids That Are Potent Antagonists of Retinoid Receptors

Discussion

9:45 am Judith Storch (Rutgers) Mechanism of Cholesterol Transport by Niemann-Pick C Proteins

Discussion

10:15 am **Catharine Ross** (Penn State) N-3 Fatty Acids in Prevention and Reversal of "Lean Nonalcoholic Fatty Liver Disease (NAFLD)"

Discussion

- 10:45 am Coffee Break
- 11:15 am Brandon Davies (Iowa) Regulators of Lipoprotein Lipase: The Awkwardly Named Keepers of The Fat Gate

Discussion

11:45 am **David Bernlohr** (Minnesota) Uncoupling Lipid Metabolism from Inflammation in Macrophages

Discussion

- 12:15 pm Lunch Posters: Loredana Quadro (Rutgers University)
- 2:00 pm Introduction: Dawn Brasaemle (Rutgers University)
- 2:05 pm James Ntambi (Wisconsin) Role of Monounsaturated Fatty Acids in Metabolic Regulation

Discussion

2:35 pm **Concetta DeRusso** (Nebraska) Small Molecule and Omics Tools Trained on Fatty Acid Transport and Trafficking Link FATP2 to Lipotoxicity

Discussion

- 3:05 pm Coffee Break
- 3:30 pm **Kimberly Buhman** (Purdue) Intestinal Triglyceride Metabolism: Storage and Secretion

Discussion

4:00 pm **Christoph Benning** (Michigan State) Regulation of Cellular Quiescence and Lipid Droplet Formation in Microalgae

Discussion

- 4:30 pm Future Activities of Big Ten Academic Alliance Lipids
- 5:00 pm Reception

Lipids and Metabolic Diseases II Rutgers Center for Lipid Research Symposium, November 10, 2016

Speakers





 β -apocarotenoids: Oxidative Cleavage Products of Dietary Carotenoids That Are Potent Antagonists of Retinoid Receptors

Earl Harrison received his bachelor's degree in chemistry and master's degree in nutrition at Cornell University. He received his PhD from Columbia University where he worked on vitamin A metabolism in the laboratory of Dewitt Goodman. He was a USPHS postdoctoral fellow in the laboratory of Christian de Duve at the Rockefeller University. He was Professor of Biochemistry at the Medical College of Pennsylvania, Research Leader at the USDA Beltsville Human Nutrition Research Center, and is currently Dean's Distinguished Professor of Human Nutrition and Professor in the Biochemistry Program at The Ohio State University. He has served on the NIH's Nutrition Study Section and the National Diabetes, Digestive and Kidney Diseases Advisory Council. His laboratory works on the transport, metabolism and function of dietary vitamin A and carotenoids. These investigations use analytical chemistry, biochemistry, and molecular biology techniques and are carried out using isolated proteins, cells in culture, animal models, and investigations in human subjects.



Judith Storch

RUTGERS

Mechanism of Cholesterol Transport by Niemann-Pick C Proteins

The Storch lab studies cellular lipid transport mechanisms, focusing on lipid-binding proteins at the structural and functional levels. The laboratory uses biochemical, biophysical, molecular, cell biological, genetic, and physiological techniques to better understand how lipids are transported and targeted in cells. Judy obtained an M.S. in Human Nutrition and a Ph.D. in Physiology and Biophysics from Columbia University, where she studied the role of lipids in regulating membrane fluidity. She did postdoctoral research at the Harvard Medical School, where her interests in intracellular lipid transport began. She was an Assistant and Associate Professor in the Nutrition Department at the Harvard School of Public Health before joining the faculty of Rutgers University in 1992, where she is currently Distinguished Professor in the Nutritional Sciences Department. She has served as Associate Editor for the Journal of Nutrition, and is currently the Executive Editor of Biochimica et Biophysica Acta-Molecular and Cell Biology of Lipids. She is the recipient of the American Society for Nutrition Osborn and Mendel Award.



A. Catherine Ross



N-3 Fatty Acids in Prevention and Reversal of "Lean Nonalcoholic Fatty Liver Disease (NAFLD)"

Catharine Ross received her undergraduate education at the University of California at Davis and M.S. (Nutrition) and Ph.D. (Biochemistry, Molecular and Cell Biology) degrees from Cornell University.

She was a postdoctoral fellow in the Department of Medicine, Columbia University from 1976-78. From 1978-94, she taught and conducted research at the Medical College of Pennsylvania in Philadelphia. In1994, she joined the Pennsylvania State University, University Park, as Professor of Nutrition and occupant of the Dorothy Foehr Huck Chair. Her research has focused on vitamin A nutrition and lipid and lipoprotein metabolism, and on the role of micronutrient nutrition in immune function. Dr. Ross served as Editor-in-Chief of the Journal of Nutrition from 2004 to 2013. She is a Fellow of the American Society for the Advancement of Science, the American Society for Nutritional Sciences, and a member of the National Academy of Science. Currently, she serves on the Food and Nutrition Board, Institute of Medicine (Health and Medicine Division, HMD); the FDA Food Advisory Committee; and an HMD committee to revise the food package for the Women, Infants and Children (WIC) supplementary feeding program.



Brandon S. Davies

THE UNIVERSITY OF IOWA

Regulators of Lipoprotein Lipase: The Awkwardly Named Keepers of The Fat Gate

Brandon S. Davies an Assistant Professor in the Department of Biochemistry at the University of Iowa and a member of the Fraternal Order of Eagles Diabetes Research Center. He received his bachelor's degree from the University of Utah, and did graduate work in the laboratory of Jasper Rine at the University of California, Berkeley studying the regulation of ergosterol metabolism in *Saccharomyces cerevisiae*. His postdoctoral work was done with Stephen Young at the University of California, Los Angeles where he worked to understand the critical role of GPIHBP1 (a GPI-anchored protein of capillary endothelial cells) in the metabolism of triglyceride-rich lipoproteins. At the University of Iowa, Dr. Davies has continued to investigate the regulation of dietary fat delivery to specific tissues, the mechanisms of lipoprotein trafficking, and the interactions of LPL-GPIHBP1 complexes with regulators of triglyceride metabolism.

David Bernlohr



UNIVERSITY OF MINNESOTA

Uncoupling Lipid Metabolism from Inflammation in Macrophages

David Bernlohr carried out his PhD work at the University of Illinois in Champaign-Urbana and did postdoctoral work at The Johns Hopkins School of Medicine. At the University of Minnesota, he is the Distinguished McKnight University Professor and Head of the Department of Biochemistry, Molecular Biology and Biophysics in the College of Biological Sciences and Medical School. He is the Director of the Institute on the Biology of Aging and Metabolism and holds the Cargill Chair in Systems Biology. The Bernlohr laboratory studies inflammation and obesity as determinants in the development of Type 2 diabetes and atherosclerosis. His laboratory utilizes a combination of metabolomic, proteomic and molecular genetic approaches towards an understanding of oxidative stress, mitochondrial function and lipid signaling in adipocytes and macrophages. His work has profiled the role(s) of fatty acid binding proteins in cellular metabolism and their contributions to inflammation and metabolic disease. More recently his work has emphasized the covalent modification of proteins by reactive lipids and their influence on mitochondrial metabolism, signaling and gene expression.



James Ntambi



Role of Monounsaturated Fatty Acids in Metabolic Regulation

James M. Ntambi is a Professor of Biochemistry and Steenbock Professor of Nutritional Sciences at the University of Wisconsin-Madison. He received his B.S. and M.S. degrees in Biochemistry and Chemistry from Makerere University Kampala, Uganda and his PhD in Biochemistry and Molecular Biology from the Johns Hopkins University School of Medicine. Ntambi has made distinguished contributions to the field of nutritional biochemistry and his pioneering work on the genetic regulation of the stearoyl-CoA desaturase has led to many new insights into the importance of this enzyme in metabolism and in disease states such as obesity, diabetes, atherosclerosis, inflammation and cancer. Ntambi has published more than 180 peer reviewed papers. He has received numerous awards including the Federal Republic of Germany DAAD fellowship, Fulbright Fellowship, Nutritional Sciences Osborne and Mendel award, the Steenbock Career Development award, the NIH/Forgarty International Biomedical Research award, the Fulbright research award, the Arthur J. Maurer Extra Mile Award, excellence in international activities award, the distinguished chancellor's teaching award and the American Society for Biochemistry and Molecular Biology Exemplary Contribution to Education award. Ntambi is also involved in international research and teaching effort and student and faculty exchange programs between Makerere University Uganda and the University of Wisconsin-Madison. He is also a member of the Uganda National Academy of Sciences.

Concetta DeRusso



Lincoln®

Small Molecule and Omics Tools Trained on Fatty Acid Transport and Trafficking Link FATP2 to Lipotoxicity

Dr. Concetta DiRusso is The George Holmes University Professor of Biochemistry at the University of Nebraska-Lincoln where she leads a research program focused on advancing our understanding of the impact of nutritional fatty acids on human health in obesity and starvation, and in the bioproduction of algal lipids for use as fuels. Dr. DiRusso's research programs are supported by external grants from federal agencies including the National Institutes of health, the National Science Foundation, the United States Department of Agriculture, and the Department of Energy and from private organizations such as the American Heart Association. She has an excellent record as an outstanding teacher and mentor known for her efforts to broaden participation in science, having received the UNL Chancellor's Award for Outstanding Contributions to the Status of Women and recognition for her efforts with undergraduates by the UNL Parents Association and the UNL Teaching Council. Dr. DiRusso served as a Jefferson Science Fellow at the United State Agency for international Development in the Bureau for Global Health, Office of HIV/AIDS as a nutrition technical adviser to PEPFAR.



Kimberly Buhman

PURDUE UNIVERSITY

Intestinal Triglyceride Metabolism: Storage and Secretion

Kimberly K. Buhman received her Ph.D. in Nutritional Biochemistry at Purdue University. She is currently an Associate Professor of Nutrition Science at Purdue University, and her research interests are in mechanisms of dietary fat absorption as it relates to metabolic disease. Her research group has highlighted the role of a dynamic pool of triacylglycerol, stored in cytoplasmic lipid droplets within the absorptive cells of the small intestine, in response to dietary fat. In addition, they have identified specific proteins that regulate the dynamics of this process. Dr. Buhman was awarded the E.L.R. Stokstad Award for recognition of outstanding fundamental research in nutrition by the American Society of Nutrition in 2013. At Purdue University, Dr. Buhman is a co-founder of the Purdue Lipids Club which, meets biweekly and includes investigators and students from across campus interested in lipids for sharing of new knowledge and building new research relationships. In addition, Dr. Buhman is co-chairing a 2017 FASEB Summer Research Conference on Molecular, Physiological and Therapeutic Studies of Intestinal Lipid Transport and Metabolism.



Christoph Benning



Regulation of Cellular Quiescence and Lipid Droplet Formation in Microalgae

Christoph Benning has been working for over 20 years on different aspects of lipid metabolism in photosynthetic organisms. His lab discovered novel proteins involved in the biosynthesis of polar lipids of the photosynthetic membrane, the transfer of membrane lipid precursors from the ER to the chloroplast, and proteins involved in lipid remodeling as adaption to abiotic stresses. His lab discovered a transcription factor governing the biosynthesis of storage lipids in plant embryos with biotechnological applications. Recently, he has applied genomic and genetic approaches to identify key regulatory factors and enzymes required for triacylglycerol biosynthesis and turnover in microalgae. Christoph Benning also has extensive experience as a journal editor. He is currently the Editor-in-Chief of *The Plant Journal*.

Posters

The combination of ACAT inhibition and ApoA1 overexpression enhances atherosclerosis regression

Amengual, Jaume (New York University)

FXR regulates lipocalin 13: potential mechanism in regulating inflammation Armstrong, Laura (Rutgers University)

Patterns of acyl chain flux liking fatty acid biosynthesis and triglyceride synthesis in Coccomyxa subellipsoidea C169 under abiotic stress Black, Paul (University of Nebraska)

Novel mouse model of obesity-driven liver cancer Caviglia, Jorge Matias (Columbia University)

Stress inducing browning of white adipose tissue Chang, Joseph (Rutgers University)

A peptide analog of low density lipoprotein receptor epidermal growth factor-like repeat A neutralizes PCSK9 and lowers cholesterolemia in non-human primates Costet, Philippe (Merck)

Molecular control of the delivery of dietary fat Davies, Brandon (University of Iowa)

Phosphorylation of the Nem1-Spo7/Pah1 phosphatase cascade by Pkc1 protein kinase C Dey, Prabuddha (Rutgers University)

Niclosamide ethanolamine-induced mild mitochondrial uncoupling improves liver function and dyslipidemia in lysosomal acid lipase-deficient mice Guo, Jingjing (Rutgers University)

The dephosphorylation of diacylglycerol kinase by alkaline phosphatase in yeast Haddad, Daniel (Rutgers University)

The effect of phosphatidate phosphatase and diacylglycerol kinase enzymes on catalase enzymatic activity

Hazaveh, Sara (Rutgers University)

Engineering beta-carotene producing probiotics to ameliorate vitamin A deficiency (VAD) in mice Honarbakhsh, Maryam (Rutgers University)

Exogenous n-3 fatty acids reverse the progression of high carbohydrate diet-induced steatosis in mice

Huang, Neil (The Pennsylvania State University)

Optimizing neurometabolic function in metabolic disorders by addressing epigenetics with phospholipids

Kane, Edward (Neurolipids Research Foundation)

Vitamin A deficiency, β -apocarotenoid and mitochondrial PKC δ in mammalian embryonic development

Kim, Youn-Kyung (Rutgers University)

Targeted α -particle therapy of triple negative breast cancer using 'sticky' liposomes Linz, Thomas (Rutgers University)

Membrane activity of phase-separating liposome-anchored GALA Locke, Trevan (Rutgers University)

Fatty acids and food webs: estimating predator-prey relationships in salt marshes Lopez-Duarte, Paola (Rutgers University)

Overexpression of a lipid transfer protein in *Arabidopsis* enhances resistance to trichothecene mycotoxins McLaughlin, John (Rutgers University)

General control nonderepressible 2 (GCN2) kinase regulates body composition and antioxidant defenses during dietary methionine restriction Pettit, Ashley (Rutgers University)

Fatty acids and food webs: quantifying trophic enrichment factors in blue crab Pincin, Jennifer (Rutgers University)

Phosphorylation of yeast Dgk1 diacylglycerol kinase by casein kinase II Qiu, Yixuan (Rutgers University)

Addressing the epigenetics of neuroinflammation with resolvins and phospholipids Rossetti-Cartaxo, Annette (Atlantic Health Chambers Center for Well Being)

Mitochondrial DNA damage and metabolic regulation Sampath, Harini (Rutgers University)

Triggered ligand clustering on lipid nanoparticles for selective targeting and killing of untargetable cancer cells: the case for 'sticky patches' Sempkowski, Michelle (Rutgers University)

Effects of dietary fat levels and types on vitamin D hydroxylases and bone in aging female mice

Shapses, Sue (Rutgers University)

Liposomal cisplatin with triggered intratumoral release for selective and effective treatment of triple negative breast cancer Stras, Sally (Rutgers University)

Regulation of the yeast Nem1-Spo7 protein phosphatase complex by protein kinase A Su, Wen-Min (Rutgers University)

Cholesterol depletion by pravastatin inhibits the fetoprotective function of the placental efflux transporter BCRP

Szilagyi, John (Rutgers University)

HNF4 factors redundantly control dietary lipid assimilation

Verzi, Michael (Rutgers University)

Exercise reduces high-fat diet induced colon inflammation but does not influence MUC2 expression

Wisniewski, P.J. (Rutgers University)

Metabolic change in skeletal muscle secondary to liver fatty acid-binding protein ablation Hu, Heli (Rutgers University)

Fgf15 gene and its effects on bile acid homeostasis Yang, Hyeon Jeong (Rutgers University)

CRISPR/Cas-mediated gene editing in human iPSC-derived macrophage reveals Iysosomal acid lipase function in human macrophages Zhang, Hanrui (Columbia University)

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