



# Neuronal Control of Appetite, Metabolism and Weight

May 9–13, 2017 | Tivoli Hotel and Congress Center | Copenhagen | Denmark

## Scientific Organizers:

**Lora K. Heisler**, University of Aberdeen, UK

**Scott M. Sternson**, HHMI/Janelia Research Campus, USA

## Joint with the meeting on *Gastrointestinal Control of Metabolism*

*Obesity, a condition that is becoming a leading cause of human morbidity and mortality, is among the global healthcare challenges of the 21st century. Obesity is primarily a result of the cumulative effect of increased food intake beyond the body's energetic requirements over time. Emerging research reveals critical integrative neuronal systems that control both energy and glucose homeostasis, which have encouraging implications for the future treatment of obesity. This symposium will fuse existing knowledge with the latest discoveries in the neural circuits underpinning nutrient sensation, satiety, food reward, developmental programming and glucoregulatory function. Furthermore, recent findings will be presented on the peripheral regulation of these neural circuits by gut and adipocyte-derived signals. The application of cutting-edge neuroscience approaches and the clinical relevance of basic science discoveries to obesity research will also be highlighted. Recent advances in emerging treatment options will be discussed, including surgical interventions and next-generation pharmacotherapies. In combination with a joint symposium on the "Gastrointestinal Control of Metabolism," this exciting program will bring together breaking research from both basic science and translational realms on the etiology and treatment of obesity and type 2 diabetes.*

## Session Topics:

- Nutrient Sensing and Gut Signaling (Joint)
- Workshop 1: Disorders and Diseases Associated with Weight Loss
- Interactions between Ingestive Signals and Reward Circuits
- Emerging Energy Homeostasis Neurocircuitry
- Signaling from Periphery to Brain to Modulate Energy Balance (Joint)
- Hypothalamic Signals Modulating Hunger and Complex Behavior
- Cutting Edge Approaches in Obesity Research
- Pharmacotherapies for Obesity and Type 2 Diabetes (Joint)
- Workshop 2: CNS Regulation of Adipose Tissue
- Programming Obesity: Early Environmental Influences

**Scholarship Application & Discounted Abstract Deadline: January 12, 2017**

**Abstract Deadline: February 9, 2017**

**Discounted Registration Deadline: March 9, 2017**



Note: Scholarships are available for graduate students and postdoctoral fellows and are awarded based on the abstract submitted.

Upper image courtesy of: National Institute on Drug Abuse, National Institutes of Health

Meeting Hashtag: #KSneuron

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# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Neuronal Control of Appetite, Metabolism and Weight (Z5)

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## Gastrointestinal Control of Metabolism (Z6)

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### TUESDAY, MAY 9

#### Arrival and Registration

### WEDNESDAY, MAY 10

#### Welcome and Keynote Session (Joint)

- \***Lora K. Heisler**, University of Aberdeen, UK
- \***Randy J. Seeley**, University of Michigan, USA
- Stephen O'Rahilly**, University of Cambridge, UK  
*Metabolic Disease: Lessons from Natural Human Variation*
- Klaus H. Kaestner**, University of Pennsylvania School of Medicine, USA  
*The Intestinal Stem Cell Niche – At the Base of It All*

#### Nutrient Sensing and Gut Signaling (Joint)

- \***Andrew Butler**, St. Louis University, USA
- \***Fiona M. Gribble**, University of Cambridge, UK
- Ronald M. Evans**, HHMI/The Salk Institute, USA  
*Gut Feelings: Systemic Reach of Intestinal FXR*
- Kristina Schoonjans**, École Polytechnique Fédérale de Lausanne – EPFL, Switzerland  
*Bile Acid Signaling in Metabolic Disease*
- Joshua Thaler**, University of Washington, USA  
*Short Talk: Prevention of Microglial Inflammatory Signaling Reduces Susceptibility to Diet-Induced Obesity*

#### Workshop 1: Disorders and Diseases Associated with Weight Loss (Z5)

- \***Thomas Alexander Lutz**, University of Zürich, Switzerland
- \***Petra Kotzbeck**, Medical University of Graz, Austria
- Yong Xu**, Baylor College of Medicine, USA  
*5-HT Neurons and Eating Disorders*
- Manon Duquette**, Université Lille 2 - INSERM, France  
*A Role for Tanycyte Exocytosis in the Central Control of Energy Homeostasis?*
- Christian Stockmann**, PARCC – Paris Cardiovascular Research Center, France  
*The Role of Vascular Endothelial Growth Factor-A in the Context of Cancer Cachexia and Chemotherapy*
- Kevin G. Murphy**, Imperial College London, UK  
*Investigating Disorders Associated with Weight Loss*
- Serge Luquet**, Université Paris Diderot, France  
*Palatability Can Drive Feeding Independent of AgRP Neurons*
- Christin Kosse**, Francis Crick Institute, UK  
*Functional Properties of GAD65 Neurons in the Lateral Hypothalamus*
- Yunlei Yang**, SUNY Upstate Medical University, USA  
*Deciphering Anorexigenic Septohypothalamic Feeding Circuits*

#### Workshop 1 (Z6)

- \***Timo D. Müller**, Institute for Diabetes and Obesity, Germany
- Anne-Charlotte Jarry**, Paris Diderot University, France  
*Neuromedin U Blocks Gastric Emptying through Vagal-Dependent Mechanisms and Improves Oral Glucose Tolerance*
- Geke Aline Boer**, University of Copenhagen, Biomedical Institute, Denmark  
*Acute Reduction of GIP: Effects on Lipid and Bone Metabolism*
- Emily C. Bruggeman**, University of Texas Southwestern Medical Center, USA  
*Ghrelin Receptor Deletion Increases Morbidity and Mortality in a Prader-Willi Syndrome Mouse Model*
- Natalia Petersen**, University of Copenhagen, Denmark  
*"Tailoring" the Intestinal Epithelium for Type 2 Diabetes Treatment: Modulation of L-Cell Differentiation*
- Hai-Bin Ruan**, University of Minnesota, USA  
*Diet- and Microbiota-Sensitive Intestinal O-GlcNAc Signaling Controls Enteroendocrine Cell Development and Function*
- Sara Lind Jepsen**, University of Copenhagen, Denmark  
*Somatostatin Regulates GLP-1 Secretion through the Somatostatin Receptor Subtype 2*

#### Interactions between Ingestive Signals and Reward Circuits (Z5)

- \***Matt Carter**, Williams College, USA
- \***Agatha A. van der Klaauw**, University of Cambridge, UK
- Michael A. Cowley**, Monash University, Australia  
*Leptin Receptor Expressing Neurons of the Dorsomedial Hypothalamus Play a Limited Role in Regulating Food Intake but a Critical Role in Regulating Metabolism*
- Suzanne Lee Dickson**, Sahlgrenska Academy, Gothenburg University, Sweden  
*Brain Ghrelin Signaling and Food Reward Behavior*
- Christian Lüscher**, University of Geneva, Switzerland  
*Feeding Circuits that Can Override Metabolic Needs*
- Claire J. Foldi**, Monash University, Australia  
*Short Talk: CNS Reward Pathways in Anorexia Nervosa: Insights from a Rat Model*

#### Gut Bacteria as Cause and Treatment of Metabolic Diseases (Z6)

- \***Gilles Mithieux**, INSERM, France
- Fredrik Bäckhed**, University of Gothenburg, Sweden  
*Microbial Signaling from the Gut and Resulting Effects on Host Metabolism*
- Martin J. Blaser**, New York University School of Medicine, USA  
*Effects of the Early Life Microbiota on the Development of Metabolic Illnesses*

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**Karine Clément**, INSERM/Sorbonne Universite, France  
*Microbiome as Therapy*

**Edna A. Trujillo**, University of Wisconsin-Madison, USA  
*Short Talk: Metabolite Profiling of Plasma and Cecum Elucidates the Impacts of Host Genetics and Environment on the Gut Microbiota*

### Poster Session 1

#### THURSDAY, MAY 11

##### Emerging Energy Homeostasis Neurocircuitry (Z5)

\***Qingchun Tong**, University of Texas Medical School at Houston, USA

\***Matthew R. Hayes**, University of Pennsylvania, USA

**Sabrina Diano**, Yale University School of Medicine, USA  
*Mitochondrial Control of the Melanocortin System*

**Martin G. Myers, Jr.**, University of Michigan, USA  
*LepRb Signaling and the Regulation of Transcription*

**Joseph T. Bass**, Northwestern University, USA  
*Identification of an SCN-AgRP Circadian Neurocircuit Regulating Obesity and Systemic Metabolism*

**Lori M. Zeltser**, Columbia University, USA  
*Gene X Environment Interactions that Promote Anorexia-Like Behavior*

**Ali Guler**, University of Virginia, USA  
*Short Talk: Dopamine Signaling in the SCN Regulates Circadian Consumption of High-Fat Diet*

**Mathias Treier**, Max-Delbrueck-Center for Molecular Medicine, Germany  
*Short Talk: Identification of the Hypothalamic Circuit Maintaining Food Foraging*

##### Stem Cells, Gut–Pancreas Development I (Z6)

\***Praveen Sethupathy**, Cornell University, USA

**Fiona M. Gribble**, University of Cambridge, UK  
*The Biology of Enteroendocrine Cells*

**Heiko Lickert**, Institute of Diabetes and Regeneration, Germany  
*Dissecting Intestinal Stem Cell Lineage Decisions*

**James M. Wells**, Cincinnati Children's Hospital Research Foundation, USA

*Human Pluripotent Stem Cell-Derived Gastrointestinal Organoids as New Models to Study Metabolic and Digestive Diseases*

**Lori Sussel**, University of Colorado Denver, USA  
*Loss of Beta Cell Identity Related to Diabetes*

**John Furness**, University of Melbourne, Australia  
*Short Talk: Diversity of Enteroendocrine Cells between Species and Regions Studied at a Cellular and Subcellular Level*

**Sandra Guilmeau**, Institut Cochin, France  
*Short Talk: Contribution of ChREBP in Intestinal GLP-1 Production*

##### Signaling from Periphery to Brain to Modulate Energy Balance (Joint)

\***Suzanne M. Appleyard**, Washington State University, USA

\***David Olson**, University of Michigan, USA

**Jeffrey M. Friedman**, Rockefeller University, USA  
*Neural Control of Food Intake, Locomotion and Glucose Metabolism*

**Randy J. Seeley**, University of Michigan, USA  
*How the Gut Regulates Metabolic Status*

**Ivan E. de Araujo**, Yale University School of Medicine, USA  
*What Does Sugar Do to the Brain? Circuit Logic for Sugar Sensing*

**Céline E. Riera**, Cedars-Sinai Medical Center, USA  
*Short Talk: The Sense of Smell Impacts Metabolic Health and Obesity*

### Poster Session 2

#### FRIDAY, MAY 12

##### Hypothalamic Signals Modulating Hunger and Complex Behavior (Z5)

\***Clemence Blouet**, University of Cambridge, UK

\***J. Nicholas Betley**, University of Pennsylvania, USA

**Scott M. Sternson**, HHMI/Janelia Research Campus, USA  
*Motivational Mechanisms Controlling Hunger*

**Garret D. Stuber**, University of North Carolina at Chapel Hill School of Medicine, USA

*Lateral Hypothalamic Circuits for Feeding and Reward*

**Tamas L. Horvath**, Yale School of Medicine, USA  
*Appetite Circuits in the Regulation of Complex Behavior*

**Roger D. Cone**, University of Michigan, USA  
*Melanocortins: From Pharmacology to Pharmacotherapy*

**Tatiana Korotkova**, Max Planck Institute for Metabolism Research, Germany

*Short Talk: Gamma Oscillations Organize Top-Down Signaling to Hypothalamus and Enable Food-Seeking*

**Marcelo O. Dietrich**, Yale University, USA  
*Short Talk: Behavioral Ontogeny of Hypothalamic Neurons*

##### Controversies in Obesity/Diabetes Treatment: Surgery vs. Devices vs. Medicines – What Does the Future Hold? (Z6)

\***Ruth E. Gimeno**, Eli Lilly & Company, USA

**Jens Juul Holst**, University of Copenhagen the Panum Institute, Denmark

*The Role of the Gut in the Development of Type 2 Diabetes*

**Tricia M. Tan**, Imperial College London, UK  
*Triple Gut Hormones as Therapy*

**David E. Cummings**, University of Washington, USA  
*Metabolic Surgery: Mechanisms and Use of "Bariatric" Operations to Treat Type 2 Diabetes*

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**Niels Vrang**, Gubra, Denmark

Short Talk: *The Effect of FXR, PPAR- $\alpha/\delta$  and GLP-1 Agonism on Liver Disease in Diet-Induced Obese and Biopsy-Confirmed Mouse Models of NASH*

**Wendy M. McKimpson**, Columbia University, USA

Short Talk: *Foxo1-Expressing Cells in the Gut as a Source of Insulin for Diabetes Treatment*

**Makoto Fukuda**, Baylor College of Medicine, USA

Short Talk: *Gut Hormone GIP Drives Hypothalamic Pathogenesis of Obesity*

### Workshop 2 (Z6)

\***Lene Jessen**, Zealand Pharma, Denmark

**Maria H. Hauge**, Copenhagen University, Denmark

*Gq and Gs Signaling Acting in Synergy to Control GLP-1 Secretion*

**Youngjung R. Kim**, Columbia University, USA

*Pyruvate Kinase as a Novel Metabolic Regulator of Beta Cell Loss in Diabetes*

**Alyce M. Martin**, Flinders University, Australia

*Gut Serotonin Is a Signaling Nexus between the Gut Microbiome and Host Metabolism*

**Louise Olofsson**, University of Gothenburg, Sweden

*Role of the Gut Microbiota in Diet-Induced Hypothalamic Inflammation*

**Anette Christ**, University of Massachusetts Medical School, USA

*Long-Term Epigenetic Re-Programming of Myeloid Precursor Cells in a Hyperlipidemic Environment*

**Nadja Gebert**, Leibniz Institute on Aging, Germany

*Age and Diet Affect the Intestinal Crypt Proteome*

**Jonathan D. Douros**, Duke University, USA

*Increased Glucose-Dependent Insulinotropic Polypeptide (GIP) Secretion and Signaling Improves Beta-Cell Function following Vertical Sleeve Gastrectomy (VSG)*

### Cutting-Edge Approaches in Obesity Research (Z5)

\***Jeffrey M. Zigman**, University of Texas Southwestern Medical Center, USA

\***Daniela Cota**, Neurocentre Magendie, France

**Stephen Liberles**, Harvard Medical School, USA

*Molecular and Genetic Analysis of the Vagus Nerve*

**Andres Lozano**, University of Toronto, Toronto Western Hospital, Canada

*Deep Brain Stimulation to Treat Obesity or Anorexia*

**Kevin L. Grove**, Novo Nordisk and Oregon National Primate Research Center, USA

*Obesity-Related Genes in the Rhesus Macaque*

**John N. Campbell**, Beth Israel Deaconess Medical Center, USA

Short Talk: *A Molecular Census of Arcuate Hypothalamus and Median Eminence Cell Types*

### Stem Cells, Gut-Pancreas Development II (Z6)

\***Lori Susse**, University of Colorado Denver, USA

**Andrew B. Leiter**, University of Massachusetts Medical School, USA

*Differentiation of Enteroendocrine Cells*

**Praveen Sethupathy**, Cornell University, USA

*Microbiota, MicroRNAs, and Intestinal Stem Cell Function*

**Susumu Seino**, Kobe University Graduate School of Medicine, Japan

*Beta-Cell Glutamate Signaling Is Critical for Incretin-Induced Insulin Secretion*

**William L. Holland**, University of Texas Southwestern Medical Center, USA

Short Talk: *Glucagon Receptor Inhibition Restores Functional Beta Cell Mass and Reverses Hyperglycemia in Type-1 Diabetic Mice*

### Poster Session 3

#### SATURDAY, MAY 13

#### Pharmacotherapies for Obesity and Type 2 Diabetes (Joint)

\***Malcolm J. Low**, University of Michigan, USA

\***Roger A. Adan**, Brain Center Rudolf Magnus, Netherlands

**Daniel J. Drucker**, Lunenfeld-Tanenbaum Research Institute, Canada

*The Control of Gut Hormone Activity: Role of Dipeptidyl Peptidase-4*

**Matthias H. Tschöp**, Helmholtz Zentrum München and Technische Universität München, Germany

*Gut Peptide Combination Therapy to Treat Obesity*

**Lora K. Heisler**, University of Aberdeen, UK

*Modifying CNS 5-HT Circuits to Reverse Obesity and Type 2 Diabetes*

**Ruth E. Gimeno**, Eli Lilly & Company, USA

*Current and Emerging Targets for Obesity Treatment*

**Tamer Coskun**, Eli Lilly & Company, USA

Short Talk: *Confirming Efficacy of Celastrol and Withaferin A in a Diet-Induced Obese (DIO) Mouse Model*

**Shamina M. Rangwala**, Janssen, Johnson & Johnson, USA

Short Talk: *Gdf15-Mediated Mechanisms of Food Intake Reduction and Weight Loss*

### Poster Session 4

#### Workshop 2: CNS Regulation of Adipose Tissue (Z5)

\***Kate Ellacott**, University of Exeter Medical School, UK

\***Mads Tang-Christensen**, Novo Nordisk A/S, Denmark

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**Justin J. Rochford**, University of Aberdeen, UK

*Inhibition of Gamma Synuclein Directly Alters Adipocyte Mitochondrial Function and Lipid Metabolism*

**Barbara Cannon**, Stockholm University, Sweden

*Peripheral and Central Regulation of UCP1-Dependent Thermogenesis*

**Miguel López**, Universidad de Santiago de Compostela, Spain

*Hypothalamic AMPK: A Canonical Regulator of Energy Balance*

**Sangho Yu**, Pennington Biomedical Research Center, USA

*Preoptic Leptin Function Modulates Diet-Induced Weight Gain*

**Claire H. Feetham**, University of Manchester, UK

*Prolactin-Releasing Peptide Neurons Project from Dorsomedial to Paraventricular Hypothalamic Nucleus to Affect Energy Expenditure*

**Pablo B. Martinez de Morentin**, Rowett Institute of Nutrition and Health, UK

*Raphe Pallidus Serotonin Cells Modulate Brown Adipose Tissue Thermogenesis*

**SUNDAY, MAY 14**

Departure

### Programming Obesity: Early Environmental Influences (Z5)

\***Michael Krashes**, NIDDK, National Institutes of Health, USA

\***Alicja A. Skowronski**, Columbia University, USA

**Elinor L. Sullivan**, Oregon National Primate Research Center, USA

*Maternal Metabolic and Dietary Environmental Influences on Offspring Metabolic Health and Behavior*

**John Speakman**, Institute of Genetics and Developmental Biology, CAS, China

*The Impact of Maternal Diet on Hypothalamic Remodeling during Development and Subsequent Susceptibility to High Fat Diets in the Mouse*

**Jens C. Brüning**, Max Planck Institute for Metabolism Research, Germany

*Effect of Insulin on Brain Development and Metabolic Programming*

### Novel Aspects of Gut Function (Z6)

\***John Furness**, University of Melbourne, Australia

**Thue W. Schwartz**, University of Copenhagen, Denmark

*Nutrient and Gut Microbiota Metabolite Sensing through GPCRs in the GI Tract*

**Gilles Mithieux**, INSERM, France

*Central Regulation of Metabolism Initiated by Intestinal Gluconeogenesis*

**Tony K.T. Lam**, Toronto General Research Institute, Canada

*Gut Nutrient Sensing*

### Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z5)

### Meeting Wrap-Up: Outcomes and Future Directions (Organizers) (Z6)