

Exploring the Role of Brown Fat in Humans

February 25-26, 2014



National Institutes of Health
Lister Hill Auditorium, Building 38A, Bethesda, MD



NIH National Institute of
Diabetes and Digestive
and Kidney Diseases

Day 1: Tuesday, February 25, 2014

- 7:30 a.m. **Registration (Lister Hill Auditorium, NIH Campus)**
8:15 a.m. **Opening Remarks**
Griffin Rodgers, Director of NIDDK, NIH
Meeting Overview
Carol Haft and Maren Laughlin, NIDDK, NIH
Aaron Cypess, Joslin Diabetes Center, Harvard University
Houchun Harry Hu, Children's Hospital, Los Angeles

Session I: Physiological Functions and Clinical Relevance of Human BAT: the 2013 Perspective *Kong Chen (Moderator)*

- 8:30 a.m. **Six Years with Adult Human Brown Adipose Tissue and Many More to Come**
Jan Nedergaard, Stockholm University, Sweden
- 9:00 a.m. **Treating Metabolic Disease through Pharmacological Activation of Human BAT**
Aaron Cypess, Joslin Diabetes Center, Harvard University
- 9:30 a.m. **Fat Depots and Bone: the Role of Human BAT**
Miriam Bredella, Massachusetts General Hospital
- 10:00 a.m. **Brown and Beige Fat: Basic Biology and Novel Therapeutic Opportunities**
Bruce Spiegelman, Dana Farber Cancer Institute, Harvard Medical School
- 10:30–11 a.m. **Break**

Session II: Measuring Human BAT Activity: Pushing the Limits of PET/CT *Richard Wahl (Moderator)*

- 11:00 a.m. **Does Cold-Activated Brown Fat Contribute Significantly to Daily Energy Expenditure?**
Otto Muzik, Wayne State University School of Medicine
- 11:15 a.m. **Novel Approaches to Investigating Fatty Acid Metabolism in Human BAT**
Kirsi Virtanen, University of Turku and Turku University Hospital, Finland
- 11:30 a.m. **The Norepinephrine Transporter: A Novel Target for Imaging Brown Adipose Tissue**
Yu-Shin Ding, New York University School of Medicine
- 11:45 a.m. **Insight into the Functional Organization of Human BAT**
Igal Madar, Johns Hopkins University School of Medicine

12:00 p.m. **Imaging of Brown Fat Metabolism using Hyperpolarized Carbon-13 MRI**
Lanette Friesen-Waldner, University of Western Ontario, London

12:15–2:00 p.m. **Poster Session and Lunch Buffet in Atrium**

Session III: Classical and Inducible Brown, Beige, Brite, B/B Fat in Humans
Barbara Cannon (Moderator)

2:00 p.m. **Deciphering Brown Adipogenesis from a Progenitor and Inductive Signaling Perspective**
Yu-Hua Tseng, Joslin Diabetes Center, Harvard Medical School

2:30 p.m. **Pharmacological Approaches to Induce Brown and Beige Fat Cell Development**
Shingo Kajimura, University of California, San Francisco

3:00 p.m. **The Role of FGF21 in Brown Fat**
Alexei Kharitonov, Lilly Research Laboratories, Indianapolis

3:20 p.m. **Brown Fat Dynamics: Elucidation of Molecular Drivers Based on the Innate Expertise of a Hibernator**
Sandra L. Martin, University of Colorado School of Medicine, Aurora

3:40–4:00 p.m. **Break**

Session IV: Measuring Human BAT Mass and Activity: Emerging Approaches
Houchun Harry Hu (Moderator)

4:00 p.m. **Brown Adipose Tissue Quantification Using Magnetic Resonance Imaging**
E. Brian Welch, Vanderbilt University Medical Center

4:15 p.m. **Brown Adipose Tissue Perfusion: From Mice to Men**
Marielle Scherrer-Crosbie, Massachusetts General Hospital

4:30 p.m. **Detecting BAT Mass and Thermogenic Activity by Using Nonlinear ¹H MRI and Hyperpolarized ¹²⁹Xe Gas MRI**
Rosa Tamara Branca, University of North Carolina, Chapel Hill

4:45 p.m. **Passive and Active Microwave Radiometry for Non-Invasive Detection of Human Brown Fat**
Fred Sterzer, MMTC, Inc.

5:00 p.m. **Peptide Probes for Targeted Brown Adipose Tissue Imaging**
Mikhail G. Kolonin, University of Texas Health Science Center, Houston

5:20 p.m. **Adjournment**

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Day 2: Wednesday, February 26, 2014

7:30–8:00 a.m. **Registration (Lister Hill Auditorium, NIH Campus)**

Session V: Human BAT as a Therapeutic Target
Rebecca Brown (Moderator)

8:00 a.m. **Effect of Ambient Temperature on Human Brown Fat Activity and Recruitment**
Wouter van Marken Lichtenbelt, Maastricht University Medical Center, Netherlands

8:30 a.m. **Exploring the Roles of Brown Fat in Children**
Vicente Gilsanz, Children's Hospital Los Angeles

9:00 a.m. **Signal Transduction Pathways Converging to Promote “Brown(ing)” Adipocytes**
Sheila Collins, Sanford-Burnham Medical Research Institute

9:30 a.m. **Brown Adipose Tissue Improves Glucose Metabolism and Whole Body Insulin Sensitivity in Humans**
Maria Chondronikola, University of Texas Medical Branch, Galveston

9:50–10:15 a.m. **Break**

10:15 a.m. **Acute Cold Exposure Elicits Increases in BAT Oxidative Metabolism in Individuals with Type 2 Diabetes**
Denis Blondin, Université de Sherbrooke

10:35 a.m. **Autologous Matrix Assisted Cell Transplantation as a Strategy for the Expansion of Human BAT**
Andreas Stahl, UC Berkeley

Session VI: Human BAT Research: Future Directions
Houchun Harry Hu and Aaron Cypess (Moderators)

11:00 a.m. **Open Floor Discussion of Research Gaps and Opportunities**

- What are the potential physiological roles for adult human BAT/beige/brite cells?
- What technologies, in addition to imaging or temperature detection, are needed to assess the role(s) of adult human BAT?
- Is there more to be learned from the mouse regarding the role(s) of adult human BAT?
- Are epidemiologic studies of human BAT needed?
 - Impact of climate and environment
 - Impact of exercise and diet

- Impact of age, gender, body composition, genetics
- Unique populations

12:00–1:30 p.m. **Poster Session and Lunch Buffet**

Session VII: Novel Role(s) of Human BAT: Thinking Outside the Box

Eric Ravussin (Moderator)

- 1:30 p.m. **Hope for a Therapy Based on Thermogenic Drugs and BAT**
Eric Ravussin, Pennington Biomedical Research Center, Louisiana State University System
- 2:00 p.m. **Does hBAT Play a Role in Non-Shivering Thermogenesis?**
Kong Chen, NIDDK, NIH
- 2:30 p.m. **Insights from Understanding CNS Pathways in Regulating the Sympathetic Outflow to BAT**
Shaun Morrison, Oregon Health and Science University
- 3:00 p.m. **Brown Adipose Tissue and Sleep Regulation**
Éva Szentirmai, Washington State University, Spokane
- 3:20 p.m. **Does Sarcoplipin and Muscle Based Thermogenesis Compensate in BAT Deficient Mammals?**
Muthu Periasamy, Ohio State University, Columbus
- 3:40 p.m. **Closing Remarks**
- 4:00 p.m. **Adjournment**