

Glucose Rediscovered: New Methods to Image Carbohydrate Metabolism



May 6- 7, 2016

Each year the Advanced Imaging Research Center and The National Center for Research Resources (recently dissolved and reorganized under the National Institute of Biomedical Imaging and Bioengineering) host a symposium on a topic relevant to work being carried out at the Center. The purpose of the symposium is to provide information on research activities and training opportunities.

Faculty, research staff, undergraduate, graduate, and postdoctoral students are all encouraged to attend. Past participants have included those from academia and industry around the country. Each symposium is devoted to training in which the latest developments at the Center are discussed.

There will be no poster presentations. Instead, all attendees are encouraged to submit a one page abstract on a primary research interest (instructions are available on the registration page). These abstracts, along with speaker abstracts, will be distributed in a booklet at the meeting registration desk. The intent of the booklet is to outline attendee research interests and expertise to augment Investigator interaction.

Faculty, research staff, and undergraduate, graduate and postdoctoral students are encouraged to attend. Past participants have included those from academia and industry around the country. Instead of poster presentations, all attendees are encouraged to submit a one page abstract on a primary research interest (instructions are available on the registration page). These abstracts, along with speaker abstracts, will be distributed in a booklet at the meeting registration desk. The intent of the booklet is to outline attendee research interests and expertise to augment Investigator interaction.

Target Audience

This Symposium is intended for physicians, scientists and students with an interest in using standard and advanced methods for imaging glucose metabolism and related processes.

Purpose and Content

Interest in glucose metabolism has been re-awakened by recent scientific advances in cancer biology, pathogenesis of diabetes, and other diseases. Simultaneously, technical advances in MRI and PET have expanded our ability to image or otherwise monitor key processes related to glucose metabolism. These methods, all available at UT Southwestern, offer new approaches to high-impact diseases. The ability to image carbohydrate metabolism is important in current clinical practice and additional information about the complexities of these pathways will yield new clinical insights.

The Symposium was designed around two themes. First, our current knowledge of glucose metabolism in cancer, heart disease and diabetes will be presented with an emphasis on basic pathophysiology. Second, current and advanced methods for imaging glucose metabolism and related processes will be reviewed by authorities in the field. Techniques to analyze and image glucose uptake, glycolysis, glycogen storage, gluconeogenesis, insulin release, and other pathways will be presented. These are just a few examples of recent advances in this exciting field. This Symposium is supported by the National Institute of Health - National Institute of Biomedical Imaging and Bioengineering (NIH-NIBIB: EB015908) and by the University of Texas Southwestern Medical Center.

Educational Objectives

Many diseases are caused by or are associated with perturbations in glucose metabolism. Upon completion of the Symposium, attendees should be able to:

- Describe disturbances of glucose metabolism in cancer and other diseases
- Explain the mechanism and utility of PET measurements of glucose metabolism
- Describe the mechanism of CEST (chemical exchange saturation transfer) imaging of cancer.
- Explain the potential of hyperpolarized ^{13}C for imaging carbohydrate metabolism.

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Wednesday Morning, May 6, 2015

Part 1: Conventional ^{13}C : Infusion Studies

07:30 AM ***Breakfast & Registration***

08:30 AM ^{13}C as a Tracer of Metabolism: Historical Perspectives, Insights & Opportunities

Dean Sherry, PhD
UT Southwestern Medical Center

09:00 AM Metabolic Compartments in the Brain: What does ^{13}C NMR Teach us?

Isaac Marin-Valencia, MD
UT Southwestern Medical Center

09:30 AM Integrating MR and GCMS to Characterize the Interplay Between Tumor Biology and Metabolism

Chris Hensley, BS
UT Southwestern Medical Center

10:00 AM ***Break***

Part 2: Hyperpolarization Around the Country

10:30 AM Monitoring of Reactions and Kinetics using Rapid Injection, in-vitro Dissolution DNP

Christian Hilty, PhD
Texas A&M University

11:00 AM The Road to Imaging the Warburg Effect

James Bankson, PhD
MD Anderson Cancer Center

11:30 AM Hyperpolarization in the Clinic

Kayvan Keshari, PhD
Memorial Sloan Kettering Cancer Center

12:00 ***Lunch***

Wednesday Afternoon, May 6, 2015

01:15 PM Imaging Chemical Exchange: Basic Principles and Methods

Elena Vinogradov, PhD
UT Southwestern Medical Center

02:00 PM PET Imaging of Cancer Metabolism – Opportunities enabled by the Cyclotron and Radiochemistry Program at UT Southwestern

Xiankai Sun, PhD
UT Southwestern Medical Center

02:45 PM ***Break***

- 03:00 PM ^{13}C as a Tracer of Metabolism: Practical Challenges
 UT Southwestern Medical Center
 Craig Malloy, MD
- 03:20 PM Gluconeogenesis and the Overworked Liver
 UT Southwestern Medical Center
 Shawn Burgess, PhD
- 03:40 PM Pentose Phosphate Pathway
 UT Southwestern Medical Center
 Eunsook Jin, PhD
- 04:00 PM Measuring Hepatic Glycolysis and Gluconeogenesis Simultaneously Using Hyperpolarized Dihydroxyacetone
 UT Southwestern Medical Center
 Matthew Merritt, PhD
- 04:30 PM **Reception**

Thursday Morning, May 7, 2015

07:30 AM **Breakfast & Registration**

Morning Session 1: Carbohydrates and Metabolism

- 08:30 AM Metabolic Outliers in Human Disease
 UT Southwestern Medical Center
 Ralph DeBerardinis, MD, PhD
- 09:15 AM Glucose Delivery, Uptake and Metabolism by 1H: GlucoCEST and GlycoCEST
 Johns Hopkins University School of Medicine
 Peter van Zijl, PhD

10:00 AM **Break**

Morning Session 2: Monitoring ^{13}C in Patients

- 10:30 AM Challenges of Conventional ^{13}C MRS in Humans
 Yale University
 Robin de Graaf, PhD
- 11:15 AM Introduction to Hyperpolarization and Liver Applications
 Stanford University
 Dan Spielman, PhD

12:00 **Lunch**

Thursday Afternoon, May 7, 2015

Afternoon Session 1: Cancer

- 01:00 PM Metabolism in Cancer
 Massachusetts Institute of Technology
 Matthew Vander Heiden, MD, PhD
- 01:45 PM Tumor Imaging Using Hyperpolarized ^{13}C MR
 University of Cambridge
 Tiago Rodrigues, PhD

02:30 PM **Break**

Afternoon Session 2: The Heart

- 03:00 PM Energy Substrate Metabolism in Normal and Failing Hearts
 Temple University School of Medicine
 Fabio Recchia, MD, PhD
- 03:45 PM Expanding the Applications of Hyperpolarized ^{13}C Imaging - Practical Considerations
 University of Toronto
 Charles Cunningham, PhD

04:30 PM **Discussion and Adjourn**

Discussion of Off-Label Use

Because this course is meant to educate the physicians with what is currently in use and what may be available in the future, there may be “off-label” use discussed in the presentations. Speakers have been requested to inform the audience when off-label use is being discussed.