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.

- Target Audience
- Purpose and Content
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 13C for imaging carbohydrate metabolism.

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**Wednesday Morning, May 6, 2015**

**Part 1: Conventional 13C: Infusion Studies**

07:30 AM  **Breakfast & Registration**

08:30 AM  13C 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 13C 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**

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**
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<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Affiliation</th>
<th>Institution</th>
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<tbody>
<tr>
<td>03:00 PM</td>
<td>13C as a Tracer of Metabolism: Practical Challenges</td>
<td>Craig Malloy, MD</td>
<td>UT Southwestern Medical Center</td>
<td>UT Southwestern Medical Center</td>
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<td>03:20 PM</td>
<td>Gluconeogenesis and the Overworked Liver</td>
<td>Shawn Burgess, PhD</td>
<td>UT Southwestern Medical Center</td>
<td>UT Southwestern Medical Center</td>
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<td>03:40 PM</td>
<td>Pentose Phosphate Pathway</td>
<td>Eunsook Jin, PhD</td>
<td>UT Southwestern Medical Center</td>
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<td>04:00 PM</td>
<td>Measuring Hepatic Glycolysis and Gluconeogenesis Simultaneously Using Hyperpolarized Dihydroxyacetone</td>
<td>Matthew Merritt, PhD</td>
<td>UT Southwestern Medical Center</td>
<td>UT Southwestern Medical Center</td>
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<td>04:30 PM</td>
<td>Reception</td>
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<tr>
<td>07:30 AM</td>
<td>Breakfast &amp; Registration</td>
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<td>08:30 AM</td>
<td>Metabolic Outliers in Human Disease</td>
<td>Ralph DeBerardinis, MD, PhD</td>
<td>UT Southwestern Medical Center</td>
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<td>09:15 AM</td>
<td>Glucose Delivery, Uptake and Metabolism by 1H: GlucoCEST and GlycoCEST</td>
<td>Peter van Zijl, PhD</td>
<td>Johns Hopkins University School of Medicine</td>
<td>Johns Hopkins University School of Medicine</td>
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<td>10:00 AM</td>
<td>Break</td>
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<td>10:30 AM</td>
<td>Challenges of Conventional 13C MRS in Humans</td>
<td>Robin de Graaf, PhD</td>
<td>Yale University</td>
<td>Yale University</td>
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<td>11:15 AM</td>
<td>Introduction to Hyperpolarization and Liver Applications</td>
<td>Dan Spielman, PhD</td>
<td>Stanford University</td>
<td>Stanford University</td>
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<td>12:00</td>
<td>Lunch</td>
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<td>01:00 PM</td>
<td>Metabolism in Cancer</td>
<td>Matthew Vander Heiden, MD, PhD</td>
<td>Massachusetts Institute of Technology</td>
<td>Massachusetts Institute of Technology</td>
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<td>01:45 PM</td>
<td>Tumor Imaging Using Hyperpolarized 13C MR</td>
<td>Tiago Rodrigues, PhD</td>
<td>University of Cambridge</td>
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<td>03:00 PM</td>
<td>Energy Substrate Metabolism in Normal and Failing Hearts</td>
<td>Fabio Recchia, MD, PhD</td>
<td>Temple University School of Medicine</td>
<td>Temple University School of Medicine</td>
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<td>03:45 PM</td>
<td>Expanding the Applications of Hyperpolarized 13C Imaging - Practical Considerations</td>
<td>Charles Cunningham, PhD</td>
<td>University of Toronto</td>
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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.