10th Annual Course on Isotope Tracers in Metabolic Research: Principles and Practice of Kinetic Analysis – Oct 30th – Nov 3rd

Sponsored by NIDDK and organized on behalf of the NIH-sponsored
Mouse Metabolic Phenotyping Centers (MMPC)

October 30 – November 3rd, 2017
Homewood Suites by Hilton® Nashville Vanderbilt * Course Location
2400 West End Avenue - Nashville, Tennessee 37203 (615-340-8000)

The tenth annual course provides basic introductory and comprehensive information on performing metabolic studies using tracers labeled with radioactive or stable isotopes, in humans and in animals. The course is designed for beginners as well as those with experience who wish to expand their capabilities to more sophisticated problems. The faculty is well-versed in a variety of applications and methodologies. Techniques will be presented for investigating whole body metabolism, for metabolite balance across organs, intracellular flux rates and pathway regulation. The basic aspects of modeling will be considered, as well as specific applications to the study of carbohydrate, fat, protein metabolism and energy balance. Theoretical and practical matters related to sample analysis by mass spectrometry and NMR will be discussed, including detailed numerical examples of calculations involved in determining isotopic enrichment and basic kinetic parameters. Advanced lectures will discuss in more detail the use of positional and mass isotopomer analysis for intracellular flux rates and various aspects of protein and amino acid metabolism. Course material will be available for download from http://www.mmpc.org/shared/tracers.aspx In addition to organized sessions, individual attendees will have ample opportunities for personal interaction with faculty members in the form of one-on-one mentoring sessions to discuss their research projects in more depth.

Faculty (*Co Directors)

*Henri Brunengraber; Case Western Reserve U.
Gary Cline, Yale U.
Melanie Cree Green, U. of Colorado
Joanne Kelleher, Mass. Inst. Tech.
Maren Laughlin, National Inst. Health
*Owen McGuinness, Vanderbilt U.
Matthew Merritt, U. of Florida
Elizabeth Parks, U. of Missouri
Stephen Previs, Merck
Michelle Puchowicz, Case Western Reserve U.
Jamey Young, Vanderbilt U.
*Robert R. Wolfe, U. Arkansas

Program Outline

Monday
Basic characteristics of radioactive, stable isotope tracers.
General principles of mass spectrometry.
Isotopic enrichment using GC-MS.
Methods of mass spectrometry analysis.
Measurement of specific activity.

Tuesday
Tracer kinetics (single pool models).
Oxidation and synthesis rates.
Glucose metabolism (clamp studies).
Lipid metabolism (basic kinetics).

Wednesday
Pathway fluxes using NMR isotopomer analysis.
Methods in protein metabolism.

Thursday
Energy expenditure with doubly labeled water.
Synthesis rates with deuterated water: proteins, fatty acids sterols, glucose, nucleic acids.
Mass isotopomer distribution analysis: polymer synthesis, multiple flux pathways, TCA cycle, anaplerosis.

Friday
Pathway discovery via association of isotopomer analysis and metabolomics.
Inherently difficult problems.

For additional information on this course please contact: Amanda Zetans (isotope.tracer@vanderbilt.edu) (615-343-1065)