Symposium and Training V: ^{13}C in Metabolic Research

Thursday, May 8, 1997

Presented by
The Mary Nell and Ralph B. Rogers
Magnetic Resonance Center
and
The National Center for Research Resources in association with

UT SOUTHWESTERN MEDICAL CENTER

Program Objective

The goal of this symposium was to provide an introduction to ^{13}C NMR isotopomer analysis and to present current applications of ^{13}C NMR or ^{13}C mass spectrometry to metabolic studies. ^{13}C mass spectrometry was again included in the program because we believe that investigators using ^{13}C mass spec and ^{13}C NMR would benefit from insights provided by the alternative technology. As usual, the Symposium was followed by a reception for visiting faculty and a dinner for all participants which allowed interaction between attendees and faculty.

In our earlier symposia the communication between attendees and faculty was quite good if the topic was general NMR, physiology, clinical issues, etc. However, we were dissatisfied with the quality of discussion and degree of interaction in the areas in which the Facility can contribute uniquely. Therefore, we reorganized the program in 1997. Our target audience was faculty, fellows, and students who are using or considering ^{13}C NMR or ^{13}C mass spectrometry for metabolic studies. We added a training session which was an introduction to ^{13}C NMR isotopomer analysis, factors in experimental design and interpretation, and analysis of ^{13}C NMR spectra. We also included the audience in a works in progress session in which attendees showed one or two spectra from their own labs and discussed interpretation.

In the afternoon session, the guest faculty reviewed current applications of ^{13}C for metabolic research. The reception and dinner provided a more casual atmosphere for contact between the attendees and speakers. After dinner, Dr. Bernard Landau discussed his scientific and ethical concerns regarding the use of radioactive tracers in human volunteers, particularly ^{14}C. Among the topics he reviewed was the distinction between tracer half life and the biological half life of the radioactive substrate which may be unexpectedly long if the compound is incorporated in tissue stores. His superb presentation generated a great deal of discussion which was occasionally rather pointed. Dr. Landau concluded that the moral obligation of an experimentalist is to minimize exposure of patients and volunteers to radiation. In response, one participant questioned how any radioisotope experiments can be ethically justified since stable isotope methods are now available. Another attendee questioned the liability of an institution which knowingly generates "second hand radiation" i.e. exhaled $^{14}CO_2$ to which visitors and employees may be unknowingly exposed.

Guest Speakers

Maren Laughlin, PhD, Assistant Professor of Surgery and Physiology, George Washington University, Washington, D.C.

Robert Wolfe, PhD, Chief of Metabolism and Professor of Biochemistry, Shriners Burns Institute, University of Texas Medical Branch at Galveston, Galveston, Texas

Rolf Gruetter, PhD, Assistant Professor of Radiology, University of Minnesota Medical School, Minneapolis, MN

Paul A. Keifer, Ph.D., Senior NMR Applications Chemist, Varian NMR Instruments, Palo Alto, CA

Bernard Landau, MD, PhD Professor of Medicine and Biochemistry, Case Western Reserve University, Cleveland, OH

UT Southwestern Speakers

Craig R. Malloy, MD, Professor of Radiology and Internal Medicine, and Director of the Southwestern Biomedical Magnetic Resonance Facility at the Mary Nell and Ralph B. Rogers Magnetic Resonance Center, University of Texas Southwestern Medical Center, Dallas, Texas

A. Dean Sherry, PhD, Professor of Radiology at the University of Texas Southwestern Medical Center and Professor of Chemistry at the University of Texas at Dallas

F. Mark Jeffrey, D. Phil., Assistant Professor of Radiology, University of Texas Southwestern Medical Center, Dallas, Texas

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Program Schedule

7:45 p.m.	**On Site Registration**
	TRAINING: INTRODUCTION TO ^{13}C NMR ISOTOPOMER ANALYSIS FOR METABOLIC STUDIES
8:15 p.m.	**Designing the Question and the Experiment** Craig R. Malloy, MD
9:00 p.m.	**Cardiac Metabolism by ^{13}C NMR: Kinetics and the Non-Steady State Experiment** A. Dean Sherry, PhD
9:45 p.m.	**Hepatic Metabolism and Complex Pathways by ^{13}C NMR: The Steady- State Experiment** F. Mark Jeffrey, D. Phil.
10:30 p.m.	**Break**
10:45 p.m.	**Participants' Presentations and Discussion**
12:00 p.m.	**Adjourn**

	SYMPOSIUM: ^{13}C NMR AND ^{13}C MASS SPECTROMETRY IN METABOLIC RESEARCH
1:00 p.m.	**Magnesium Regulation in Erythrocytes Studied by ^{13}C NMR** Maren Laughlin, PhD
2:00 p.m.	**^{13}C Studies by Mass Spectroscopy** Robert Wolfe, PhD
3:00 p.m.	**Break**
3:30 p.m.	**Analysis of Metabolic Pathways by ^{13}C NMR *In Vivo*** Rolf Gruetter, PhD
4:30 p.m.	**Quantitative Analyses of High Resolution NMR Spectra** Paul A. Keifer, PhD
5:30 p.m.	**Wine and cheese reception**
6:30 p.m.	**Buffet dinner**
7:30 p.m.	**The Human Radiation Experiments: The Future for Radioisotopes in Clinical Investigations** Bernard Landau, MD, PhD

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