

## IFSH Seminar Series

Monday, October 17, 2016

1:00 – 2:00 PM

Building 91, Room 216

### **Magdi Mossoba, Ph.D.**

Center for Food Safety and Applied Nutrition  
Office of Regulatory Science  
U.S. Food and Drug Administration

## **“Application of FT-NIR Spectroscopy to Evaluate the Authenticity of Extra Virgin Olive Oil”**

### **Biosketch**

Dr. Magdi Mossoba is a Research Chemist/Infrared Spectroscopist at the Senior Biomedical Research Service (SBRS), Center for Food Safety and Applied Nutrition (CFSAN), Office of Regulatory Science, Division of Analytical Chemistry, Spectroscopy and Mass Spectrometry Branch. He received his Ph.D. in Chemistry from Georgetown University. He was a Postdoctoral Fogarty Fellow at The National Cancer Institute, NIH, and a Research Fellow at the University of Maryland Cancer Center, before joining FDA in 1984. Dr. Mossoba’s research interests include the application of infrared spectroscopy, hyphenated infrared techniques, and infrared chemical imaging to food safety and to the detection of food adulteration, as well as the optimization and validation of mid-infrared and near-infrared methods for the rapid determination of trans fat and related lipid constituents. His research is documented in 115 peer-reviewed journal articles.

### **Abstract**

For the first time, a recently developed FT-NIR spectroscopic methodology in conjunction with partial least squares (PLS1) analysis was applied to commercial products labeled extra virgin olive oil (EVOO) purchased in College Park, MD, US, to rapidly evaluate whether they are authentic, potentially mixed with refined olive oil (RO) or other vegetable oil(s), or of lower quality. This methodology involved calculating the FT-NIR Index, analyzing five fatty acid (FA) markers according to published information and an AOCS Standard Procedure, and predicting the concentration of RO and the nature and concentration of other edible oils using gravimetrically prepared mixtures with EVOO and PLS1 calibration models. The following mixtures with EVOO were evaluated: edible oils high in linoleic acid (OH-LA) or high in oleic acid (OH-OA), palm olein (PO), and RO. The FT-NIR Index provided an estimate of total volatiles characterized by the carbonyl overtone absorbing near 5269  $\text{cm}^{-1}$ . A low index value negatively reflected on the purity and/or quality of EVOOs. Of the 88 commercial products labeled EVOO that were analyzed, 29 (33.0%) satisfied the three published FT-NIR requirements identified for authentic EVOO products which included the purity test based on the limits established for OH-LA, OH-OA, PO, and/or RO contents. The remaining 59 samples (67.0%) did not meet one or more of the criteria established for authentic EVOO. If assessments had been based strictly on whether the FA composition was within the established range set by the International Olive Council (IOC), less than 10% would have been identified as non-EVOOs.