JMU Chemistry & Biochemistry Seminar

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3:35 pm in ISAT 159

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and

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Title: Innovations in Mass Spectrometry Platform Technologies to Address Diverse Biological Research Hypotheses

Abstract
Mass spectrometry offers the most robust platform to discover and characterize new diagnostic, prognostic, and therapeutic biomarkers for ovarian cancer across all molecular classes. Moreover, a systems biology approach will allow the underlying biology of ovarian cancer to be understood. This presentation will discuss the challenges specific to the study of epithelial ovarian cancer (EOC) in humans and how these challenges have directed our thinking, in terms of the development of model organisms and mass spectrometry-based bioanalytical strategies. First, to augment the human model, we developed the domestic hen model of spontaneous EOC, which allowed us to longitudinally sample the rapid onset and progression of the disease in a controlled environment. Second, we developed bioanalytical tools to characterize structurally challenging analytes that are critical to a systems-level analysis. To increase the electrospray response of *N*-linked glycans, perform stable-isotope relative quantification, and semi-automated data analysis, we synthesized novel hydrophobic tagging reagents (INLIGHT^{TM}). Furthermore, we developed a novel ionization technique for tissue imaging of lipids and metabolites. This unique model organism has and continues to provide new insights into the biology of ovarian cancer; combined with other –OMICS data obtained through these novel bioanalytical approaches, we will understand the origin of ovarian cancer and ultimately translate that knowledge to humans. Novel HTS strategies using our new ionization method will also will also be presented.

Biography
David C. Muddiman is the Jacob and Betty Belin Distinguished Professor of Chemistry and Director, Molecular Education, Technology, and Research Innovation Center (METRIC) at North Carolina State University in Raleigh, NC. Prior to moving his research group to North Carolina State University in 2006, David was a Professor of Biochemistry and Molecular Biology and Founder and Director of the Proteomics Research Center at the Mayo Clinic College of Medicine in Rochester, MN. Prior to this appointment, David was an Associate Professor of Chemistry at Virginia Commonwealth University. It

was there that he began his professional career as an assistant professor with an adjunct appointment in the Department of Biochemistry and Molecular Biophysics and as a member of the Massey Cancer Center in 1997. These academic appointments followed a postdoctoral fellowship at Pacific Northwest National Laboratory in the Environmental Molecular Sciences Laboratory under Richard D. Smith from 1995-1997. David was born in Long Beach, CA in 1967 but spent most of his formative years in a small town in Pennsylvania. David received his B.S. in chemistry from Gannon University (Erie, PA) in 1990 and his Ph.D. in Analytical Chemistry from the University of Pittsburgh in 1995 under the auspices of David M. Hercules. Dr. Muddiman is Editor of *Analytical and Biological Chemistry* as well as on the Editorial Advisory Board of *Mass Spectrometry Reviews*, *Molecular and Cellular Proteomics*, *Rapid Communications in Mass Spectrometry*, and the *Journal of Chromatography B*. He also serves on the advisory board of the NIH Funded Complex Carbohydrate Research Center, University of Georgia and the Yale/NIDA Neuroproteomics Center, Yale University. Dr. Muddiman has served as a member of the ASMS Board of Directors and Treasurer of US-HUPO; he is currently the Past-President of US HUPO. His group has presented over 575 invited lectures and presentations at national and international meetings including 26 plenary/keynote lectures. His group has published over 250 peer-reviewed papers and has received six US patents. He is the recipient of the 2016 Graduate School Outstanding Graduate Faculty Mentor Award in the Mathematical, Physical Sciences, and Engineering, 2015 ACS Award in Chemical Instrumentation, 2010 Biemann Medal (American Society for Mass Spectrometry), 2009 NCSU Alumni Outstanding Research Award, the 2004 ACS Arthur F. Findeis Award, the 1999 American Society for Mass Spectrometry Research Award, and the 1990-1991 Safford Award for Excellence in Teaching (University of Pittsburgh). Dr. Muddiman’s research is at the intersection of innovative mass spectrometry technologies, systems biology, and model organisms for diseases and bioenergy, and is funded by the National Institutes of Health, the National Science Foundation, the Department of Energy, and The United States Department of Agriculture.