

Cody R. Goodwin

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Currently, my research focuses on determining metabolic perturbations as disease biomarkers. The main platform for analyses utilizes multi-dimensional separations, coupling nanoliter flow rate ultra-performance liquid chromatography with ion mobility and high resolution mass spectrometry. Data is analyzed using multi-variate statistical analysis methods, which allows for an untargeted, or global, approach to metabolomic analyses.

We apply these methods to uncover the epigenetic effects of cocaine exposure, metabolic profiles of leukocytes to toxin exposure, and the metabolic effects of numerous other diseases.

Additionally, we are exploring new methods of drug discovery from unique microbial colonies using mass spectrometry based methods.

SPECIALTIES

Liquid chromatography separations
Gas phase structural separations
High resolution mass spectrometry
Metabolomics based studies
Waters G2 HDMS
nanoAcquity UPLC
Mass spectrometry data analysis software (MarkerLynx, XCMS, etc.)

EDUCATION

Vanderbilt University, Nashville, TN

Attended: August 2008 to present
Advisor: Prof. John A. McLean
Degree pursuing: Doctorate of Philosophy, Chemistry
GPA: 3.908

University of Central Florida, Orlando, FL

Attended: 2005 to 2008
Degree obtained: Bachelor of Science, Chemistry
GPA: 3.848

Okaloosa-Walton College, Niceville, FL

Attended: 2003-2005
Degree obtained: Associate of Arts
GPA: 3.909

Niceville Senior High School, Niceville, FL

Attended: 1999-2003
Degree obtained: High School Diploma
GPA: 4.79 weighted, 4.0 unweighted

TEACHING AND LEADERSHIP EXPERIENCE

Graduate Research Coordinator

Systems Biology and Bioengineering Undergraduate Research Experience
Vanderbilt University, 2010-present

Teaching Assistant

General Chemistry

Analytical Chemistry
Chemistry for Non-Science Majors
Vanderbilt University, 2008-2009

Teaching Assistant

General Chemistry
University of Central Florida, 2008

RESEARCH EXPERIENCE

Graduate Student

Structural Mass Spectrometry Laboratory
Mass Spectrometry Based Metabolomics
Natural Product Discovery Methods
Dr. John A. McLean
Vanderbilt University, 2008-present

Research Assistant

Environmental Chemistry Laboratory
Dr. Christian Clausen III and Dr. Cherie Geiger
University of Central Florida, 2006-2008

FELLOWSHIPS AND AWARDS

MSACL Young Investigator Award

Mass Spectrometry Applications to the Clinical Lab, 2012

Mitchum Warren Fellowship

Vanderbilt University, 2008-2010

Outstanding Undergraduate Seminar Award

University of Central Florida, 2008

American Institute of Chemists Outstanding Undergraduate Student Award

University of Central Florida, 2008

Florida Bright Futures Gold Seal Award

Florida Department of Education 2003-2008

Presidential Scholarship

Okaloosa Walton College, 2003-2005

PROFESSIONAL TRAINING

Small Molecule Training Course

Waters Corporation, Pleasanton, CA
December 6-10 2010

Metabolomics Short Course

ASMS, Denver, CO
June 5, 2011

SYNAPT G2-S Training Course

Waters Corporation, Beverly, MA
August 9, 2011

**Ultraperformance Liquid Chromatography
Gas Chromatography
Electron Transfer Dissociation
Ion mobility-Mass Spectrometry Training**

Waters Corporation, Onsite at Vanderbilt University, Nashville, TN
Dates Vary 2010-2011

PUBLICATIONS / BOOKS

Jeffrey R. Enders, Cody R. Goodwin, Christina C. Marasco, Kevin T. Seale, John P. Wikswo, and John A. McLean. Advanced structural mass spectrometry for systems biology: Pulling the needles from haystacks, *Current Trends in Mass Spectrometry*, August 2011.

Cody R. Goodwin, Larissa S. Fenn, Dagmara K. Derewacz, Brian O. Bachmann, John A. McLean. Structural Mass Spectrometry: Rapid Methods for Separation and Analysis of Peptide Natural Products. *Submitted to Journal of Natural Products*.

Jody May, Cody R. Goodwin, John A. McLean. Gas-Phase Ion Mobility-Mass Spectrometry and Tandem IM-MS Strategies for Metabolism Studies and Metabolomics. Invited chapter Bioanalytical Methods, *Encyclopedia of Drug Metabolism & Drug Interactions*. *Submitted*.

Christina C. Marasco, Cody R. Goodwin, Kevin T. Seale, Danny Winder, Nicole Schramm-Sapyta, John A. McLean, John P. Wikswo. Systems Level View of Cocaine Addiction: the Interconnect of Immune and Nervous Systems. In preparation for *Experimental Biology and Medicine*.

ORAL PRESENTATIONS

Cody R. Goodwin, Structural Mass Spectrometry for Characterizing Complex Biological Systems, Aegis Sciences Symposium, Vanderbilt University, Nashville, TN (November 7, 2011) INVITED ORAL.

Cody R. Goodwin, Christina C. Marasco, Jeffrey R. Enders, John P. Wikswo, Nicole Schramm-Sapyta, John A. McLean, Analysis of Rat Leukocyte Metabolomic Response to Cocaine Stimulation using Ion Mobility-Mass Spectrometry, 5th Annual Conference on Cellular Information Processing, Santa Fe, NM (August 10-14, 2011). POSTER

Jeffrey Enders; Christina Marasco; Cody Goodwin; Jody May; Kevin Seale; John Wikswo; John A. Mclean, Development of a Platform for Online Acquisition of Empirical Systems Biology Data, 5th Annual Conference on Cellular Information Processing, Santa Fe, NM (August 10-14, 2011). POSTER

Ayeeshik Kole, Erica L. Curtis, Jeffrey R. Enders, Todd R. Graham, P. Anthony Weil, Kevin T. Seale, John A. McLean, John P. Wikswo, Methods towards elucidating real-time α -factor induced yeast peptide secretion, 5th Annual Conference on Cellular Information Processing, Santa Fe, NM (August 10-14, 2011). POSTER

Alexandra Garza, Christina Marasco, Cody Goodwin, Jeffrey Enders, Kevin Seale, John A. McLean, John P. Wikswo, Leukocyte Metabolic Profiling and Motion Quantization for Dual Indication of Toxin Response, 5th Annual Conference on Cellular Information Processing, Santa Fe, NM (August 10-14, 2011). POSTER

Cody Goodwin, Larissa S. Fenn, Ruth McNees, Nicole M. Lareau, Brian O. Bachmann, John A. McLean. Ion Mobility-Mass Spectrometry Driven Natural Product Discovery. 4th Annual q-bio Conference on Cellular Information Processing, Santa Fe, NM. August 2010 POSTER

Cody Goodwin, Larissa S. Fenn, Brian O. Bachmann, John A. McLean. New Avenues in Natural Product Discovery using Ion Mobility-Mass Spectrometry. 58th Annual American Society for Mass Spectrometry conference, Salt Lake City, UT. May 2010 POSTER

Jeffrey R. Enders, Cody Goodwin, Chrissy Marasco, Jody May, Kevin Seale, John Wiksw, John McLean. Temporal Analysis of Biological Fluid for the Analysis of Cellular Signaling and Response Using Ion Mobility-mass Spectrometry Analyses . Chemical and Biological Defense Science & Technology conference, Orlando, FL (November 2010). POSTER

Cody Goodwin, Larissa Spell Fenn, Ruth McNees, Brian O. Bachmann, John A. McLean. Ion Mobility-Mass Spectrometry Driven Natural Product Discovery. Quantitative Understanding in Biology (q-bio) Annual Conference, Santa Fe, NM (August 2010). POSTER

Jeffrey R. Enders, Chrissy Marasco, Cody Goodwin, Kevin Seale, John Wiksw, John McLean. Characterizing the *Saccharomyces cerevisiae* respiratory oscillation exometabolome by ion mobility-mass spectrometry. Quantitative Understanding in Biology (q-bio) Annual Conference, Santa Fe, NM (August 2010). POSTER

Cody Goodwin, Larissa Fenn, Brian O Bachmann, John A. McLean, New Avenues in Natural Product Discovery using Ion Mobility-Mass Spectrometry, 58th American Society for Mass Spectrometry Annual Conference, Salt Lake City, UT (May 2010). POSTER

Nkiruka Arinze, Michal Kliman, Larissa S. Fenn, Sevugarajan Sundarapandian, Cody Goodwin, John A. McLean, A critical comparison of positively and negatively charged peptide ion structures using ion mobility-mass spectrometry, 58th American Society for Mass Spectrometry Annual Conference, Salt Lake City, UT (May 2010). POSTER

Cody Goodwin, Michal Kliman, Larissa Fenn, Brian O. Bachmann, John A. McLean Structural Determination of Cyclic Peptide Natural Products Using IM-MS and MD. 36th Annual Federation of Analytical Chemistry and Spectroscopy Societies conference, Louisville, KY (October 2009). POSTER

Larissa Fenn, Cody Goodwin, John A. McLean, Structural Characterization of Natural Products from Complex Biological Mixtures using Ion Mobility-Mass Spectrometry, 36th Annual Federation of Analytical Chemistry and Spectroscopy Societies conference, Louisville, KY (October 2009). ORAL

Cody Goodwin, Michal Kliman, Larissa Fenn, Brian O. Bachmann, John A. McLean. Structural Characterization of Cyclic Peptide Natural Products Using Ion Mobility-Mass Spectrometry. Vanderbilt Institute of Chemical Biology Retreat (August 2009). POSTER

L.S. Fenn, C. Goodwin, B.O. Bachmann, J.A. McLean, Structural characterization of natural products from complex biological mixtures using ion mobility-mass spectrometry, to be presented at 36th Annual Federation of Analytical Chemistry and Spectroscopy Societies conference, Louisville, KY (October 2009). POSTER AND ORAL

Michal Kliman, Jeffrey R. Enders, Cody R. Goodwin, John A. McLean. Dynamic Laser Patterning for Biomolecular Imaging MALDI – Mass Spectrometry. Vanderbilt Institute for Chemical Biology 2009 Retreat, Nashville, TN, United States (August 2009). POSTER

Cody R. Goodwin, Anthony P. Gies, Larissa S. Fenn, John A. McLean, David M. Hercules. MALDI-IM-TOF-MS and CID Fragmentation Studies of Polyurethanes. 60th Southeast Regional Meeting of the American Chemical Society, Nashville, TN, United States (November 2008). POSTER

PROFESSIONAL AFFILIATIONS

American Chemical Society

Member since 2009

American Society of Mass Spectrometry

Member since 2010

Biomedical Engineering Society

Member since 2010

The Access Fund

Southeastern Climbers Coalition Division

Member since 2011

EMPLOYMENT HISTORY (Non-Academic)

Flowrider Instructor

Adrenalina
Orlando, FL, 2006-2008

Senior Spa Attendant

Serenity by the Sea
Sandestin, FL, 2002-2005

Bellhop

Hilton Sandestin
Sandestin, FL, 2000-2002

Framer

Greg Goodwin Construction, Inc.
Niceville, FL, 1998-2005.

COMPETITIVE SPORTS

Trail Running

2010 Frogtown Trail Challenge 10 mile run, **4th place overall, 1st place Male 25-29** (1:24)

2010 Montrail Fall Creek Falls ½ Marathon Trial Run, **4th place overall** (1:32)

2010 Big South Fork 17.5 mi Trail Race, **11th place overall, 2nd place 25-29** (2:19)

2010 Tashka Trail 50k, **2nd place overall, 1st place 50 and under** (4:17:36)

Adventure Racing

2010 Columbia Muddy Buddy Nashville, **2nd place overall, 1st place Male 46-55** (45:33)

2010 Merrell Oyster Urban Adventure Race Nashville, **1st place overall, 1st place Men full**

2011 Merrell Oyster Urban Adventure Race Nashville, **1st place overall, 1st place Men full**

2011 Red River Gorge American Classic "The Fig IX", **6th place overall, 1st place Men 3's**

Climbing

2011 24 Hours of Horseshoe Hell, **3rd place Intermediate Team, 19th place Overall Team** (71 routes individual, average lead 5.10a, 142 routes team total, average lead 5.10a)

REFERENCES

John A. McLean

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John P. Wikswo

Gordon A. Cain University Professor
A.B. Learned Professor of Living State Physics
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Professor of Biomedical Engineering
Professor of Molecular Physiology and Biophysics
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VIIBRE fellow
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