**Michael J. Rudy, Ph.D.**

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**EMPLOYMENT**

**Assistant Research Professor 2022-Present** Department of Neurology

University of Colorado, Aurora CO

**EDUCATION**

**Postdoctoral Fellow 2018-2022**

University of Colorado Anschutz Medical Campus, Denver CO

Laboratory of Kenneth Tyler – Studying Enterovirus D68 and its role in acute flaccid myelitis

**Postdoctoral Fellow 2017-2018**

University of Rochester, Rochester NY

Laboratory of Chris Proschel – Studying the role of astrocytes in CNS injury and repair

**Ph.D. Toxicology 2013-2017**

Toxicology Ph.D. program at the University of Rochester in New York

Dissertation title “Early life iron deficiency affects interneuron progenitors and increases inhibitory tone in adult brain”

Notation on transcript recognizing completion of advanced teaching program

**M.S. Toxicology** **2011-2013**

University of Rochester, Rochester NY

**B.S. Biology 2005-2009**

University of Colorado at Colorado Springs, Colorado Springs CO

**TEACHING**

**Adjunct Professor of Pharmacology 2017**

St. John Fischer College, Rochester, NY

* Taught 47 lectures covering the rationale behind use of pharmacotherapeutic agents including relevant aspects of the physiology of microbial, viral, and mycotic pathogenic organisms as well as the molecular etiology of cancer origin and tumor development.
* Designed course syllabus, as well as writing and grading exams
* Kept office hours and designed active learning assessments

**Guest Lecturer for Biochemical Toxicology – Pharmacokinetics/pharmacodynamics 2015**

University of Rochester, Rochester NY

* Taught graduate students at the University of Rochester covering receptor theory, modifiers of receptor action, and receptor ligands/endocrine disruptors.
* Wrote and graded tests for these lectures

**Instructor for Anatomy and Physiology Lab I and II 2006-2008**

University of Colorado at Colorado Springs

* Taught for eight semesters. Course is a comprehensive study of the structure and function of the human body. Covers basic anatomical terminology, cells, tissues, and the following systems: integumentary, skeletal, muscle, nervous, sense organs, endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems.
* Wrote lesson plan for both lecture and lab portion
* Dissected necessary organ system on cadavers for the next weeks lecture
* Designed and graded tests to assess learning
* Designed worksheets and handouts for each week’s class
* Kept office hours to meet with students

**PUBLICATIONS**

“Gestational iron deficiency affects the ratio between interneuron subtypes in the cerebral cortex” **Michael J. Rudy**, Garrick Salois, Janine Cubello, Robert Newell, Margot Mayer-Proschel. Frontiers in Cell and Developmental Biology. Submitted April 2022

“Neutralizing antibody given after paralysis onset reduces the severity of paralysis compared to non-specific antibody treated controls in a mouse model of EV-D68 associated acute flaccid myelitis” **Michael J. Rudy**, Joshua Frost, Penny Clarke, Kenneth L. Tyler. Journal of Antimicrobial Agents and Chemotherapy. July 2022.

“Density analysis of Enterovirus D68 shows viral particles can associate with exosomes” **Michael J. Rudy**, Christina Coughlan, Alison M Hixon, Penny Clarke, Kenneth L Tyler. ASM Microbiology Spectrum. Jan 2022

“Extracellular vesicles released by human retinal pigment epithelium mediate increased polarised secretion of drusen proteins in response to AMD stressors” Miguel Flores-Bellver, Jason Mighty, Silvia Aparicio-Domingo, Kang V. Li, Cui Shi, Jing Zhou, Hannah Cobb, Patrick McGrath, German Michelis, Patricia Lenhart, Ganna Bilousova, Soren Heissel, **Michael J. Rudy**, Christina Coughlan, Andrew E. Goodspeed, S. Patricia Becerra, Stephen Redenti, M. Valeria Canto-Soler. Journal of Extracellular Vesicles. 2021.

“Understanding Enterovirus D68-Induced Neurologic Disease: A Basic Science Review” Hixon AM, Frost J, **Rudy MJ**, Messacar K, Clarke P, Tyler KL. Viruses Journal. 2019.

“Iron deficiency affects seizure susceptibility in a time- and sex-specific manner”. **Michael J Rudy**, Margot Mayer-Proschel. ASN Neuro Journal. 2017

**CONFERENCE PRESENTATIONS**

* American Society for Virology Meeting “*Monoclonal antibody improves paralysis outcome in a delayed-treatment mouse-model of Enterovirus D68-induced paralysis*” Oral Presentation via Zoom - 2021
* Rocky Mountain Virology Meeting “*Enterovirus D68 particles can associate with exosomes*” Oral Presentation via Zoom -2020
* American Society for Virology “*Differences in particle density between ancestral and modern EV D68 strains*” Oral presentation via Zoom - 2020
* International Symposium on Neurovirology “*Enterovirus D68 exists as a naked and membrane bound form*” poster presentation – 2019 Atlanta, GA
* Rocky Mountain Virology Meeting “*Enterovirus D68 exists as a naked and membrane bound form*” poster presentation – 2019 Pingree Park, CO
* Society of Toxicology annual meeting *"Embryonic Iron Deficiency Permanently Alters Neural Composition: A Mechanism to Explain Some of the Long-Term Consequences of Early Life Iron Deficiency".* Poster presentation – 2016 New Orleans, LA
* American Society for Neurochemistry "*Embryonic Iron Deficiency Shifts the Inhibitory/Excitatory Balance of the Adult Brain".* Poster presentation – 2016 Denver, CO
* Department of Environmental Medicine and Toxicology retreat “*Adult cortical excitability is decreased by gestational iron deficiency*”. Platform presentation – 2015 Rochester, NY
* Prenatal Programming and Toxicology: Environmental Stressors in Disease and Implications for Human Health *"Embryonic iron deficiency alters adult neural structure".* Poster presentation – 2014 Boston, MA
* Toxicology Seminar *“Plant and Mushroom Toxins: Dire Consequences vs. Medical Benefits”.* Presentation for faculty and students at University of Rochester – 2014 Rochester, NY
* Genesee Valley Education Partnership presentation *“Edible vs. Toxic Wild Plants of New York State”.* Presentation for high school students at GVEP – 2014 Mt. Morris, NY
* Science Teachers Association of New York State (STANYS) annual meeting *“I shouldn’t be alive: Wild Onion vs. Death Camas”.* Presentation for science teachers – 2013 Rochester, NY
* Wilderness Medicine Interest Group *“Wild edible, medicinal, and toxic plants of New York”.* Lecture to medical students at Strong Memorial Hospital – 2013 Rochester, NY
* Toxicology Seminar *“Embryonic iron deficiency impairs neural development: Identification of a possible mechanistic link between iron regulated signaling and neuronal specification”.* Presentationfor faculty and students at the University of Rochester – 2013 Rochester, NY

**RESEARCH**

**Postdoctoral research – University of Colorado:** Enterovirus D68 (EV-D68) is an emerging pathogen which causes a biennial respiratory disease and is associated with a rapid-onset muscle-weakness and limb paralysis in children (termed “acute flaccid myelitis”). Moreover, the number of confirmed EVD-68 cases is increasing in a near exponential manner with three outbreaks of disease occurring within the last 8 years. My research focuses on understanding how EV-D68 is gaining access to the CNS to cause paralysis. I made the novel discovery that EV-D68 viral particles can adhere to the exterior surface of a small extracellular vesicle known as an exosome; and this exosome associated viral form appears to increase the infectivity of virus in nervous tissue. Additionally, I discovered three unique and infectious densities of virus, one of which is far more evident in modern strains compared to ancestral strains. The exosome field is currently burgeoning as more and more roles are being discovered for a vesicle which was once thought to simply remove trash from the cell. My research adds a novel and exciting role for exosomes, as a trojan horse for viral particles, to this growing field of study.

**Postdoctoral research - University of Rochester:** My postdoctoral research focuses on the role which reactive astrocytes play in spinal cord injury. By harvesting embryonic rat astrocytes and adding specific growth factors and hormones at key developmental time points in vitro, I can specifically direct glial restricted precursors to become type II astrocytes which may promote recovery following crushing injury in a rat spinal cord injury model.

**Graduate research, University of Rochester:** My graduate research focused on how gestational iron deficiency affects the expression patterns of key transcription factors during critical windows of neurodevelopment. I tracked how changes in early-patterning-genes led to a perturbation of the ratio between major interneuron subtypes in the adult neocortex using IHC, PCR, and genetic reporter mice. I further showed how these changes disrupt the excitatory/inhibitory balance of the adult brain and demonstrated a reasonable mechanistic link between early life iron deficiency and Sonic Hedgehog Signaling defects.

**Familiarity with many lab techniques including:**

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| • TCID50 viral plates | • Western blot | • Mouse colony management |
| • Density gradients | • ELISA | • Rodent timed matings |
| • Ultracentrifugation | • Confocal microscopy | • Genotyping |
| • Immunohistochemistry | • Cryotome sectioning | • Cheek and tail bleeds |
| • In situ hybridization | • Microdissection | • Rodent survival surgery |
| • Quantitative PCR | • Cell culture | • Use of genetic reporter mice |

**Accomplished in statistical analysis**: Experience with data transformation, non-normal distribution, heteroscedastic data, uneven sample sizes, censored data, and repeated measures on data sets with up to three independent variables.

**AWARDS**

**Weiss Toxicology Scholar and $500 Travel Award 2015**

Presented for leadership and excellence in neurotoxicology research

**Awarded $750 Travel Award** **2015**

**GRANTS**

**Awarded New York Stem Cell Training Grant**  **2015-2016**

Issued by the New York State Department of Health to fund basic science involving stem cells.

**SERVICE AND LEADERSHIP**

URBEST Graduate 2017

Chair of Toxicology Student Meeting 2016 -2017

Member of Toxicology Outside Speaker Committee 2014-2015

Graduate Mentor for incoming graduate students 2014-2015

Training and mentoring many undergraduate students in lab 2012-2022

**COURSE HIGHLIGHTS**

* General Biology, Molecular Biology, Cell Biology, Genetics, Cell and Molecular Physiology, Virology, Immunology, Advanced Immunology
* Human Cell Physiology, Cell and Molecular Physiology, Pharmacology, Biochemical toxicology, Organ Systems Toxicology, Neurotoxicology, Forensic Toxicology, Pathology
* General Chemistry I and II, Organic Chemistry I and II, Biochemistry I and II, Advanced Biochemistry
* Human Nutrition, Advanced Nutrition, Human Anatomy and Physiology, Pathways to Human Disease, Molecular Basis of Disease

**TECHNICAL SKILLS**

Familiar with PC and MAC operating systems

Familiar with many software programs including: Microsoft Powerpoint, Publisher, Word, Excel, Paint.net; Adobe Photoshop; Endnote; Image J; JMP (SAS) v.12 for statistical analysis; Blackboard; and Examsoft.

Experience with web design