**Name** Robert G. Nichols

**Business Address** 306 Wartik Building

Eberly College of Science

Center for Genomics

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**Education**

2014 – BS Toxicology, Pennsylvania State University, University Park, PA

2014 – Honors Toxicology, Pennsylvania State University, University Park, PA

Thesis*:* Activation of the Aryl Hydrocarbon Receptor Modulates the Gut Microbiome

2014 – BS Immunology and Infectious Disease, Pennsylvania State University, University Park, PA

2019 – PhD Molecular Toxicology, Pennsylvania State University, University Park, PA

2019 – Doctoral Minor Bioinformatics, Pennsylvania State University, University Park, PA

**Appointments**

Aug 2012-Jul 2014**The Pennsylvania State University**

**Department of Veterinary and Biomedical Sciences**

Undergraduate Research Assistant

Advisor: **Dr. Andrew Patterson**

Aug 2014-Dec 2019 **The Pennsylvania State University**

**Department of Veterinary and Biomedical Sciences**

Advisor: **Dr. Andrew Patterson**

Thesis Title: UNDERSTANDING THE EFFECTS OF ENVIORNMENTAL POLLUTANTS ON THE GUT MICROBIOME

Summer 2017**Weill Cornell Medicine**

**Medical College**

Big Data Coursework for Computational Medicine (BDC4CM) Summer Fellowship

Jan 2017-Jan 2019**The Pennsylvania State University**

**Department of Biochemistry and Molecular Biology**

  Big Data to Knowledge (B2D2K) pre-doctoral training program

Mentor: **Dr. Andrew Patterson**

Jan 2020 – present **The Pennsylvania State University**

**Eberly College of Science**

Post-doc for Emily Davenport

**HONORS AND AWARDS**

Society of Toxicology Graduate Student Travel Support Award- January 2019

Graduate Student Leadership Committee Travel Support (Society of Toxicology) – January 2019

**COMMITTEES, SOCIETIES, AND OTHER PROFESSIONAL ACTIVITIES**

2016- Society of Toxicology

2017-2019 Graduate Student Representative for the *In Vitro* and Alternative Methods Society of Toxicology Specialty Section

2017 Table Host for the 2017 *In Vitro* Toxicology Lecture and Luncheon

2018-2019 Member of the Graduate Student Leadership Committee for the Society of Toxicology

2018-2019 Member of the Communications Sub-Committee for the Graduate Student Leadership Committee

**RESEARCH MENTORING DATES PROGRAM**

Taylor P. Purks Summer of 2016 SROP

**Conference and Meeting Presentations**

1. R. G. Nichols, L. Zhang, and A.D. Patterson (Nov 2015), “The Use of 16S and Whole Genome Sequencing to Complement Metabolomic Research” Illumina Users Group Meeting. University Park PA. [Presentation]
2. R. G. Nichols, L. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (March 2016), “Metagenomics Analysis of the Mouse Gut Microbiota Following Exposure to the Environmental Contaminant and AHR Agonist 2,3,7,8-Tetrachlorodibenzofuran” Society of Toxicology Annual Meeting. New Orleans LA. [Poster]
3. R. G. Nichols, L. Zhang, and A.D. Patterson (Nov 2016), “The Use of 16S and Whole Genome Sequencing to Complement Metabolomic Research” Microbiome Initiative Networking Event. University Park, PA. [Poster]
4. R. G. Nichols, L. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (March 2017), “Combining Bioinformatics and Metabolomics to Investigate how a Specific FXR antagonist can Modulate Non-Alcoholic Fatty Liver Disease” Society of Toxicology Annual Meeting. Baltimore, MD [Poster]
5. R. G. Nichols, L. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (April 2017), “Metagenomics Analysis of the Mouse Gut Microbiota Following Exposure to the Environmental Contaminant and AHR Agonist 2,3,7,8-Tetrachlorodibenzofuran” Spring Health and Environment Lecture. University Park, PA. [Poster]
6. R. G. Nichols, L. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (May 2017), “Combining Bioinformatics and Metabolomics to Investigate how a Specific FXR antagonist can Modulate Non-Alcoholic Fatty Liver Disease” Summer Symposium in Molecular Biology. University Park, PA [Poster]
7. R. G. Nichols, (Jan 2018), “Metabolomics and Microbiome Data Integration Through Network Analysis” Pennsylvania State University Microbiome Center Weekly Meeting. University Park, PA [Presentation]
8. R. G. Nichols, L. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (Feb 2018), “Combining Bioinformatics and Metabolomics to Investigate how a Specific FXR antagonist can Modulate Non-Alcoholic Fatty Liver Disease” BMMB Graduate Student Recruitment Event. University Park, PA [Poster]
9. R. G. Nichols,J. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (March 2018), “Metatranscriptomic and Metabolomic Investigation of Dietary 2,3,7,8-Tetrachlorodibenzofuran Exposure in Mice” Society of Toxicology Annual Meeting. San Antonio, TX [Poster]
10. R. G. Nichols (April 2018), “The Effect of AHR Agonists on the Intestinal Microbiome” Biomedical Big Data to Knowledge Spring Retreat. University Park, PA [Presentation]
11. R. G. Nichols (Oct 2018) “Using the Microbiome to Better Understand the Effects of Xenobiotics on the Host” Guest Lecture for Pennsylvania State University Genomics Course. University Park, PA [Presentation]
12. R. G. Nichols (Jan 2019) “Lecture 1” and “Lecture 2” VBSC 230 The Science of Poisons’. University Park, PA [Presentation]
13. R. G. Nichols, J. Zhang, P.B. Smith, G.H. Perdew, and A.D. Patterson (March 2019) “Incorporating Bacterial Metatranscriptomics to Validate Metabolic Changes Seen After Dietary 2,3,7,8-Tetrachlorodibenzofuran Exposure in Mice” Society of Toxicology Annual Meeting. Baltimore, MD [Poster]
14. L. Zhang, R. G. Nichols, D.J. Ehresman, P.B. Smith, E. Hatzakis, B.D. Bagley, S.C. Chang, J.L. Butenhoff, J.M. Peters and A.D. Patterson (March 2019) “Perfluorooctane Sulfonate Alters Gut Microbiota-Host Metabolic Homeostasis in Mice” Society of Toxicology Annual Meeting. Baltimore, MD [Poster]

**Peer Reviewed Publications**

1. L. Zhang, R.G. Nichols, J. Correll, I.A. Murray, N. Tanaka, P.B. Smith, T.D. Hubbard, A. Sebastian, I. Albert, E. Hatzakis, F.J. Gonzalez, G.H. Perdew and A.D. Patterson (2015). Persistent Organic Pollutants Modify Gut Microbiota-Host Metabolic Homeostasis in Mice Through Aryl Hydrocarbon Receptor Activation. Environmental Health Perspectives, 123, 679-688. doi:10.1289/ehp.1409055. PMID 25768209 [133 Citations]
2. L. Zhang, E. Hatzakis, R.G. Nichols, R. Hao, J. Correll, P.B. Smith, C.R. Chiaro, G.H. Perdew and A.D. Patterson (2015). Metabolomics Reveals that Aryl Hydrocarbon Receptor Activation by Environmental Chemicals Induces Systemic Metabolic Dysfunction in Mice. Environmental Science & Technology, 49, 8067-8077. doi: 10.1021/acs.est.5b01389. PMID 26023891 [52 Citations]
3. F. Li, X.W. Yang, K.W. Krausz, R.G. Nichols, W. Xu, A.D. Patterson and F.J. Gonzalez (2015). "Modulation of colon cancer by nutmeg." Journal of Proteome Research 14: 1937-1946. PMID 25712450 [29 Citations]
4. C. Jiang, C. Xie, F. Li, L. Zhang, R.G. Nichols, K.W. Krausz, J. Cai, Y. Qi, Z.Z. Fang, S. Takahashi, N. Tanaka, D. Desai, S.G. Amin, I. Albert, A.D. Patterson and F.J. Gonzalez (2015). Intestinal farnesoid X receptor signaling promotes nonalcoholic fatty liver disease. The Journal of Clinical Investigation*, 125*, 386-402. doi:10.1172/JCI76738. PMID 25500885 [288 Citations]
5. L. Zhang, C. Xie, R.G. Nichols, S.H.J. Chan, C. Jiang, R. Hao, P.B. Smith, J. Cai, M.N. Simons, E. Hatzakis, C. D. Maranas, F. J. Gonzalez and A. D. Patterson. (2016). Farnesoid X Receptor Signaling Shapes the Gut Microbiota and Controls Hepatic Lipid Metabolism. mSystems*, 1*, e00070-00016. doi:10.1128/mSystems.00070-16 [ 34 Citations]
6. I.A. Murray, R.G. Nichols, L. Zhang, A.D. Patterson and G.H. Perdew (2016). "Expression of the aryl hydrocarbon receptor contributes to the establishment of intestinal microbial community structure in mice." Scientific Reports 6: 33969. PMID 27659481 [19 Citations]
7. K.H. Huang, R.G. Nichols, I. Albert, A. Sebastian, A.D. Patterson, and A.C. Ross, (2017). Gut microbiota increased by omega-3 fatty acids is negatively correlated with hepatic lipid metabolism-associated genes in mice with high carbohydrate diet-induced steatosis. The FASEB Journal *31*, 654.653-654.653. [2 Citations]
8. T.D. Hubbard, I.A. Murray, R.G. Nichols, K. Cassel, M. Podolsky, G. Kuzu, Y. Tian, P. Smith, M.J. Kennett, A.D. Patterson, and G.H. Perdew. (2017). Dietary broccoli impacts microbial community structure and attenuates chemically induced colitis in mice in an Ah receptor dependent manner. Journal of Functional Foods *37*, 685-698. [23 Citations]
9. Y. Tian, R.G. Nichols, J. Cai, A.D. Patterson, and M. Cantorna (2017). Vitamin A deficiency in mice alters host and gut microbial metabolism leading to altered energy homeostasis. The Journal of Nutritional Biochemistry *54*, 28-34. [15 Citations]
10. G. Li, C. Xie, S. Lu, R.G. Nichols, Y. Tian, L. Li, D. Patel, Y. Ma, C.N. Brocker, T. Yan, K.W. Krausz, R. Xiang, O. Gavrilova, A.D. Patterson, and F.J. Gonzalez (2017). Intermittent Fasting Promotes White Adipose Browning and Decreases Obesity by Shaping the Gut Microbiota. Cell Metabolism *26*, 672-685.e674. [107 Citations]
11. R.G. Nichols, J. Cai, I. A. Murray, I. Koo, P.B. Smith, G.H. Perdew, A. D. Patterson (2018). Structural and Functional Analysis of the Gut Microbiome for Toxicologists. Current Protocols of Toxicology. [2 Citations]
12. Y. Tian, R.G. Nichols, P. Roy, W. Gui, P.B. Smith, J. Zhang, Y. Lin, V. Weaver, J. Cai, A.D. Patterson, M. Cantorna (2018). Prebiotic Effects of White Button Mushroom (Agaricus bisporus) Feeding on Succinate and Intestinal Gluconeogenesis in C57BL/6 Mice. Journal of Functional Foods. [8 Citation]
13. P. Pathak, C. Xie, R. G. Nichols, J.M. Ferrel, S. Boehme, K.W. Krausz, A.D. Patterson, F.J. Gonzalez, J.Y.L. Chaing (2018). Intestine farnesoid X receptor agonist and the gut microbiota activate G-protein bile acid receptor-1 signaling to improve metabolism. Hepatology. [70 Citations]
14. Y. Tian, J. Cai, W. Gui, R.G. Nichols, I. Koo, J. Zhang, A. Mallappa, and A.D. Patterson (2018). Berberine Directly Impacts the Gut Microbiota to Promote Intestinal Farnesoid X Receptor Activation. Drug Metabolism and Disposition, dmd.118.083691. [6 Citations]
15. L. Sun, C. Xie, G. Wang, Y. Wu, Q. Wu, X. Wang, J. Liu, Y. Deng, J. Xia, B. Chen, S. Zhang, C. Yun, G. Lian, X. Zhang, H. Zhang, W. H. Bisson, J. Shi, X. Gao, P. Ge, C. Liu, K.W. Krausz, R. G. Nichols, J. Cai, B. Rimal, A.D. Patterson, X. Wang, F.J. Gonzalez and C. Jiang (2018) Gut microbiota and intestinal FXR mediate the clinical benefits of metformin. Nature Medicine *24*. [81 Citations]
16. J. Cai, R.G. Nichols, I. Koo, Z.A. Kalikow, L. Zhang, Y. Tian, and J. Zhang (2018). Multiplatform Physiologic and Metabolic Phenotyping Reveals Microbial Toxicity. mSystems *3*, 1-14.
17. M.T., Cantorna; Y.D., Lin; J., Arora; S., Bora; Y., Tian; R.G., Nichols; A.D., Patterson (2019) Vitamin D Regulates the Microbiota to Control the Numbers of RORγt/FoxP3+ Regulatory T Cells in the Colon. *Frontiers in immunology* **2019**, *10*, 1772, doi:10.3389/fimmu.2019.01772.
18. Q., Liu; J., Cai; R.G., Nichols; Y., Tian; J., Zhang; P.B., Smith; Y., Wang; C., Yan; A.D. Patterson (2019) A Quantitative HILIC–MS/MS Assay of the Metabolic Response of Huh-7 Cells Exposed to 2,3,7,8-Tetrachlorodibenzo-p-Dioxin. *metabolites* **2019**, *9*, doi:doi:10.3390/metabo9060118
19. R.G., Nichols; J., Zhang; J., Cai; I.A., Murray; I., Koo; P.B., Smith; G.H., Perdew; A.D., Patterson (2020) Metatranscriptomic Analysis of the Mouse Gut Microbiome Response to the Persistent Organic Pollutant 2,3,7,8-Tetrachlorodibenzofuran. *Metabolites* **2020**, *10*, 1-19.

**Reviews**

1. Nichols, R. G**.** Hume, N. E. Smith, P. B. Peters, J. M. & Patterson, A. D. (2016). Omics Approaches to Probe Microbiota and Drug Metabolism Interactions. Chemical Research in Toxicology, acs.chemrestox.6b00236. doi: 10.1021/acs.chemrestox.6b00236. PMID 27782392 [6 Citations]
2. Zhang, L. Nichols, R. G. & Patterson, A. D. (2017). The aryl hydrocarbon receptor as a moderator of host-microbiota communication. Current Opinion in Toxicology*, 2*, 30-35. doi: 10.1016/j.cotox.2017.02.001 [14 Citations]
3. R.G., Nichols; J.M., Peters; A.D., Patterson(2019) Interplay Between the Host, the Human Microbiome, and Drug Metabolism. *Human Genomics* **2019**, *13*, 27, doi:10.1186/s40246-019-0211-9. [4 Citations]

**Publications in Progress**

1. J. Zhang, R.G. Nichols, I. Koo, Q. Liu, Y. Tian, J. Cai, A. Vijay, P.B. Smith, and A.D. Patterson. (2019) Comprehensive Metabolomic, Lipidomic and Microbiomic Profiling of the Mice Exposed to Persistent Organic Pollutants Identifies Targets for Hepatic Lipogenesis. *[Awaiting Submission]*