

Curriculum Vitae

Nathaniel W. Snyder, Ph.D., M.P.H.

Assistant Professor

Drexel University, A.J. Drexel Autism Institute
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EDUCATION

University of Pennsylvania, Philadelphia, PA 2013
Perelman School of Medicine, Department of Pharmacology
Ph.D., Pharmacology
Mentor: Dr. Ian A. Blair, Ph.D.

University of Pennsylvania, Philadelphia, PA 2014
M.P.H, Generalist Track
Mentor: Dr. Hillary Nelson, Ph.D., M.P.H

University of Maryland: College Park 2009
Department of Chemistry and Biochemistry, College Park, MD
B.S., Biochemistry

PROFESSIONAL APPOINTMENTS

Assistant Professor, 2014-Present
A.J. Drexel Autism Institute (primary appointment)
Department of Occupational and Environmental Health (secondary appointment)
Department of Pharmacology (secondary appointment)
Drexel University School of Public Health, Philadelphia, PA

Adjunct Faculty, 2014-Present
Center of Excellence in Environmental Toxicology,
University of Pennsylvania Perelman School of Medicine, Philadelphia, PA

Postdoctoral Fellow, 2014
Laboratory of Dr. Ian A. Blair, Department of Pharmacology,
University of Pennsylvania Perelman School of Medicine, Philadelphia, PA

Other positions

Teaching Assistant, 2012
Pharmacology, Dr. David Manning
University of Pennsylvania Perelman School of Medicine, Philadelphia, PA

Policy Intern, 2009
CEO: Sharon Terry, Supervisor: Andria Cornell
Genetic Alliance, Washington, DC

Trainee, 2007-2009
Laboratory of Dr. Tsan "Sam" Xiao, Laboratory of Immunology
National Institutes of Health: NIAID, Bethesda, MD

Teaching Assistant, 2008-2009
Organic Chemistry, Dr. Dan Steffek,
University of Maryland: College Park, College Park, MD

Intern, 2004-2005
Laboratory of Dr. Kim Lewers, Agricultural Research Service
United States Department of Agriculture, Beltsville, MD

PUBLICATIONS

Peer-Reviewed Journal Articles (23)

1. Covarrubias AJ, Aksoylar HI, Yu J, Snyder NW, Worth AJ, Iyer SS, Wang J, Ben-Sahra I, Byles V, Polynne-Stapornkul T, Espinosa EC, Lamming D, Manning BD, Zhang Y, Blair IA, Horng T. Akt-mTORC1 signaling regulates Acly to integrate metabolic input to control of macrophage activation. *Elife*. 2016 Feb 19;5PubMed PMID: [26894960](#).
2. Kawalekar OU, O'Connor RS, Fraietta JA, Guo L, McGettigan SE, Posey AD Jr, Patel PR, Guedan S, Scholler J, Keith B, Snyder N, Blair I, Milone MC, June CH. Distinct Signaling of Coreceptors Regulates Specific Metabolism Pathways and Impacts Memory Development in CAR T Cells. *Immunity*. 2016 Feb 16;44(2):380-90. PubMed PMID: [26885860](#).
3. Bedi KC Jr, **Snyder NW**, Brandimarto J, Aziz M, Mesaros C, Worth A, Wang L, Javaheri A, Blair IA, Margulies K, Rame JE. Evidence for Intramyocardial Disruption of Lipid Metabolism and Increased Myocardial Ketone Utilization in Advanced Human Heart Failure. *Circulation*. 2016 Jan 27;PubMed PMID: [26819374](#).
4. Wang Q, Zhang S, Guo L, Busch CM, Jian W, Weng N, **Snyder NW**, Rangiah K, Mesaros C, Blair IA. Serum apolipoprotein A-1 quantification by LC-MS with a SILAC internal standard reveals reduced levels in smokers. *Bioanalysis*. 2015 Nov;7(22):2895-911. PubMed PMID: [26394123](#); PubMed Central PMCID: [PMC4737526](#).
5. **Snyder NW**, Mesaros C, Blair IA. Translational metabolomics in cancer research. *Biomark Med*. 2015 Sep 1;PubMed PMID: [26329905](#).
6. Worth AJ, Basu SS, Deutsch EC, Hwang WT, **Snyder NW**, Lynch DR, Blair IA. Stable isotopes and LC-MS for monitoring metabolic disturbances in Friedreich's ataxia platelets. *Bioanalysis*. 2015 Aug;7(15):1843-55. PubMed PMID: [26295986](#).

7. **Snyder NW**, Golin-Bisello F, Gao Y, Blair IA, Freeman BA, Wendell SG. 15-Oxoicosatetraenoic acid is a 15-hydroxyprostaglandin dehydrogenase-derived electrophilic mediator of inflammatory signaling pathways. *Chem Biol Interact.* 2015 Jun 5;234:144-53. PubMed PMID: [25450232](#); PubMed Central PMCID: [PMC4414684](#).
8. Wang W, **Snyder N**, Worth AJ, Blair IA, Witze ES. Regulation of lipid synthesis by the RNA helicase Mov10 controls Wnt5a production. *Oncogenesis.* 2015 Jun 1;4:e154. PubMed PMID: [26029828](#).
9. Cossette C, Gravel S, Reddy CN, Gore V, Chourey S, Ye Q, **Snyder NW**, Mesaros CA, Blair IA, Lavoie JP, Reiner CR, Rokach J, Powell WS. Biosynthesis and actions of 5-oxoicosatetraenoic acid (5-oxo-EET) on feline granulocytes. *Biochem Pharmacol.* 2015 May 29; PubMed PMID: [26032638](#).
10. Worth AJ, Gillespie KP, Mesaros C, Guo L, Basu SS, **Snyder NW**, Blair IA. Rotenone Stereospecifically Increases (S)-2-Hydroxyglutarate in SH-SY5Y Neuronal Cells. *Chem Res Toxicol.* 2015 May 18;28(5):948-54. PubMed PMID: [25800467](#).
11. Aird KM, Worth AJ, **Snyder NW**, Lee JV, Sivanand S, Liu Q, Blair IA, Wellen KE, Zhang R. ATM Couples Replication Stress and Metabolic Reprogramming during Cellular Senescence. *Cell Rep.* 2015 May 12;11(6):893-901. PubMed PMID: [25937285](#); PubMed Central PMCID: [PMC4431925](#).
12. Mesaros C, Worth AJ, **Snyder NW**, Christofidou-Solomidou M, Vachani A, Albelda SM, Blair IA. Bioanalytical techniques for detecting biomarkers of response to human asbestos exposure. *Bioanalysis.* 2015 May;7(9):1157-73. PubMed PMID: [26039812](#).
13. Wang Q, Rangiah K, Mesaros C, **Snyder NW**, Vachani A, Song H, Blair IA. Ultrasensitive quantification of serum estrogens in postmenopausal women and older men by liquid chromatography-tandem mass spectrometry. *Steroids.* 2015 Apr;96:140-52. PubMed PMID: [25637677](#); PubMed Central PMCID: [PMC4369926](#).
14. **Snyder NW**, Tomblin G, Worth AJ, Parry RC, Silvers JA, Gillespie KP, Basu SS, Millen J, Goldfarb DS, Blair IA. Production of stable isotope-labeled acyl-coenzyme A thioesters by yeast stable isotope labeling by essential nutrients in cell culture. *Anal Biochem.* 2015 Apr 1;474:59-65. PubMed PMID: [25572876](#); PubMed Central PMCID: [PMC4413507](#).
15. **Snyder NW**, Basu SS, Worth AJ, Mesaros C, Blair IA. Metabolism of propionic acid to a novel acyl-coenzyme A thioester by mammalian cell lines and platelets. *J Lipid Res.* 2015 Jan;56(1):142-50. PubMed PMID: [25424005](#); PubMed Central PMCID: [PMC4274062](#).
16. Worth AJ, Basu SS, **Snyder NW**, Mesaros C, Blair IA. Inhibition of neuronal cell mitochondrial complex I with rotenone increases lipid β -oxidation, supporting acetyl-coenzyme A levels. *J Biol Chem.* 2014 Sep 26;289(39):26895-903. PubMed PMID: [25122772](#); PubMed Central PMCID: [PMC4175330](#).

17. **Snyder NW**, Basu SS, Zhou Z, Worth AJ, Blair IA. Stable isotope dilution liquid chromatography/mass spectrometry analysis of cellular and tissue medium- and long-chain acyl-coenzyme A thioesters. *Rapid Commun Mass Spectrom*. 2014 Aug 30;28(16):1840-8. PubMed PMID: [25559454](#); PubMed Central PMCID: [PMC4286313](#).
18. Lee JV*, Carrer A*, Shah S*, **Snyder NW**, Wei S, Venneti S, Worth AJ, Yuan ZF, Lim HW, Liu S, Jackson E, Aiello NM, Haas NB, Rebbeck TR, Judkins A, Won KJ, Chodosh LA, Garcia BA, Stanger BZ, Feldman MD, Blair IA, Wellen KE. Akt-dependent metabolic reprogramming regulates tumor cell histone acetylation. *Cell Metab*. 2014 Aug 5;20(2):306-19. PubMed PMID: [24998913](#); PubMed Central PMCID: [PMC4151270](#). Co-first authors (*)
19. Snyder GA, Deredge D, Waldhuber A, Fresquez T, Wilkins DZ, Smith PT, Durr S, Cirl C, Jiang J, Jennings W, Luchetti T, **Snyder N**, Sundberg EJ, Wintrode P, Miethke T, Xiao TS. Crystal structures of the Toll/Interleukin-1 receptor (TIR) domains from the Brucella protein TcpB and host adaptor TIRAP reveal mechanisms of molecular mimicry. *J Biol Chem*. 2014 Jan 10;289(2):669-79. PubMed PMID: [24275656](#); PubMed Central PMCID: [PMC3887195](#). *No relation to Snyder, GA.
20. **Snyder NW**, Revello SD, Liu X, Zhang S, Blair IA. Cellular uptake and antiproliferative effects of 11-oxo-eicosatetraenoic acid. *J Lipid Res*. 2013 Nov;54(11):3070-7. PubMed PMID: [23945567](#); PubMed Central PMCID: [PMC3793611](#).
21. **Snyder NW**, Khezam M, Mesaros CA, Worth A, Blair IA. Untargeted metabolomics from biological sources using ultraperformance liquid chromatography-high resolution mass spectrometry (UPLC-HRMS). *J Vis Exp*. 2013 May 20;PubMed PMID: [23711563](#); PubMed Central PMCID: [PMC3711276](#).
22. Snyder GA, Cirl C, Jiang J, Chen K, Waldhuber A, Smith P, Römmler F, **Snyder N**, Fresquez T, Dürr S, Tjandra N, Miethke T, Xiao TS. Molecular mechanisms for the subversion of MyD88 signaling by TcpC from virulent uropathogenic Escherichia coli. *Proc Natl Acad Sci U S A*. 2013 Apr 23;110(17):6985-90. PubMed PMID: [23569230](#); PubMed Central PMCID: [PMC3637702](#). *No relation to Snyder, GA.
23. Liu X, Zhang S, Arora JS, **Snyder NW**, Shah SJ, Blair IA. 11-Oxoeicosatetraenoic acid is a cyclooxygenase-2/15-hydroxyprostaglandin dehydrogenase-derived antiproliferative eicosanoid. *Chem Res Toxicol*. 2011 Dec 19;24(12):2227-36. PubMed PMID: [21916491](#); PubMed Central PMCID: [PMC3242474](#).

Published Conference Proceedings

1. Worth AJ, Basu SS, **Snyder NW**, Blair IA, editors. Rotenone causes alterations to lipid metabolism in SH-SY5Y cells. ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY; 2014: AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA.
2. Mesaros C, **Snyder N**, Blair IA, editors. Overview of oxidative stress in toxicology. ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY; 2014: AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA.

3. Worth AJ, Basu SS, Mesaros CA, **Snyder NW**, Blair IA, editors. Metabolic profiling of pesticide-induced mitochondrial dysfunction by liquid chromatography mass spectrometry. ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY; 2013: AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA.
4. Mesaros CA, **Snyder NW**, Vachani A, Blair IA, editors. Metabolomics of asbestos exposure. ABSTRACTS OF PAPERS OF THE AMERICAN CHEMICAL SOCIETY; 2013: AMER CHEMICAL SOC 1155 16TH ST, NW, WASHINGTON, DC 20036 USA.
5. Rame J, Bedi K, **Snyder N**, Brandimarto J, Mesaros C, Birati E, Blair I, Margulies K. (226)-Myocardial Lipid Metabolism in the End-Stage Failing: Heart: Evidence for an Energy-Starved State. The Journal of Heart and Lung Transplantation. 2015;34(4):S89-S90.
6. Bedi KC, **Snyder NW**, Brandimarto J, Mesaros C, Blair IA, Margulies KB, Rame J. Dysregulation of the Small Organic Carnitine Transporter and Carnitine in Heart Failure. Circulation Research. 2014;115(Suppl 1):A202-A.
7. **Snyder N**, Bedi KC, Javaheri A, Mesaros C, Margulies K, Blair I, Rame J. Short Chain Acyl-CoA Intermediates in the Failing Heart: Further Evidence of an Energy Starved State. Circulation. 2014;130(Suppl 2):A20178-A.
8. Snyder G, Deredge D, Waldhuber A, Fresquez T, Smith P, Duerr S, Cirl C, Jiang J, Jennings W, Luchetti T. Development of microbial-derived inhibitory peptides using structural studies of microbial TIR proteins TcpB, TcpC and host adapters TIRAP and MyD88.(INM9P. 449). The Journal of Immunology. 2014;192(1 Supplement):189.2-.2.
9. M.D. VerMilyea, C. Mesaros, **N.W. Snyder**, I.A. Blair, C.B. Coutifaris, Is there an increase in non-voc leachates from disposable sterile IVF culture plasticware over time?, Fertility and Sterility, Volume 100, Issue 3, Supplement, September 2013, Page S252, ISSN 0015-0282, <http://dx.doi.org/10.1016/j.fertnstert.2013.07.1190>
10. Revello SD, **Snyder NW**, Liu X, Zhang S, Arora JS, Blair IA. Abstract LB-10: Distribution and potency of anti-proliferative arachidonic acid metabolites. Cancer Research. 2012;72(8 Supplement):LB-10-LB-.
11. **Snyder NW**, Revello SD, Liu X, Zhang S, Arora JS, Blair IA. Abstract LB-9: Cyclooxygenase-2/15-prostaglandin dehydrogenase derived endogenous canonical NF- κ B inhibitors. Cancer Research. 2012;72(8 Supplement):LB-9-LB-.
12. Snyder G, Jiang J, Chen K, Fresquez T, Smith P, **Snyder N**, Luchetti T, Cirl C, Miethke T, Tjandra N. Structural studies of Toll like receptor signaling adaptors. The Journal of Immunology. 2010;184(Meeting Abstracts 1):136.45.

ORAL PRESENTATIONS

Invited Talks

1. Analysis of human meconium to study prenatal exposures and metabolism. Center of

- Excellence in Environmental Toxicology, University of Pennsylvania. Philadelphia, PA. 2015.
2. LC-MS and prenatal metabolism from population to bench. Clinical and Pharmaceutical Solutions through Analysis (CPSA). Langhorne, PA. 2015
 3. Basic and translational opportunities in platelet metabolism using mass spectrometry. University of Pennsylvania Annual Trauma Research Symposium. Philadelphia, PA. 2015.
 4. Disposition, bioactivity and metabolism of 11-oxo-EET. University of Pittsburgh. Freeman lab presentation. Pittsburgh, PA. 2013.

Competitively Applied for and Accepted Talks

1. Simultaneous targeted quantification and untargeted metabolomics of meconium steroid content. ASMS Annual Meeting St. Louis, MO. 2015.
2. Environmental exposures, metabolism, and autism. Neurobiology of Disease in Children Symposium, Young Investigators Symposium. Columbus, OH. 2014.
3. Acyl-coenzyme A thioesters for pesticides, Parkinson's, and metabolism. ACS Annual Meeting. San Francisco, CA. 2014.
4. Stable isotope labeling in cell culture of short-, medium- and long-chain acyl-coenzyme A thioesters for SID-LC-MS/MS analysis. ASMS Annual Meeting. Baltimore, MD. 2014.
5. Disposition, coenzyme A thioester formation, and saturation of bioactive oxo-eicosatetraenoic acids. ACS Annual Meeting. Indianapolis, IA. 2013.
6. COX-2/15-PGDH derived anti-proliferative canonical NF- κ B inhibitors, Biomedical Graduate Student Symposium. Philadelphia, PA. 2012. **2nd Place Best Oral Presentation.**

Poster and Other Presentations

1. Loss of Acot2-mediated thioesterase activity in heart mitochondria leads to sex specific cardiac function abnormalities. Erin Seifert (presenter), Nathaniel Snyder, Cynthia Moffat, Nadan Wang, Lauren Anderson-Pullinger. Gordon Conference 2015, Lipid Dynamics and Lipidomics. July 26-31.
2. Simultaneous stable isotope dilution targeted and untargeted steroid analysis with Girard P derivatization on a QExact high resolution mass spectrometer. Alexander J. Frey, **Nathaniel W. Snyder**. ASMS, Annual Meeting. St. Louis, MO. 2015
3. High sensitivity detection of exogenous and endogenous analytes by electron capture atmospheric pressure chemical ionization mass spectrometry. **Nathaniel W. Snyder**. Prenatal Programming and Toxicity (PPTOX IV). Boston, MA. 2014.
4. Metabolism and protein adduction of a cyclooxygenase-2/15-prostaglandin dehydrogenase derived product from arachidonic acid. **Nathaniel W. Snyder**, et al.

ASMS Annual Meeting. Minneapolis, MN. 2013.

5. Cyclooxygenase-2/15-prostaglandin dehydrogenase derived endogenous canonical NF- κ B inhibitors **Nathaniel W. Snyder**, et al. ACS Annual Meeting. Philadelphia, PA. 2012. **2nd Place TOXI Division Poster Award.**
6. Distribution and potency of anti-proliferative arachidonic acid metabolites. Sonia D. Revello, **Nathaniel W. Snyder**, et al. AACR Annual Meeting. Chicago, IL. 2012
7. Uptake and Effects of Novel Cyclooxygenase-2/15-Prostaglandin Dehydrogenase Derived Anti-proliferative Oxidized Lipids. **Nathaniel W. Snyder**, et al. Winter Eicosanoid Conference. Baltimore, MD. 2012.
8. LC-MS/MS based methodology for identifying cyclooxygenase-2-derived anti-proliferative oxidized lipids. Sumit J. Shah, Xiaojing Liu, Suhong Zhang, Jasbir S. Arora, **Nathaniel W. Snyder**, and Ian A. Blair. ASMS Annual Meeting. Denver, CO. 2011
9. Cyclooxygenase-2-mediated formation of anti-proliferative oxidized lipids. **Nathaniel W. Snyder**, et al. ACS/AACR: Inflammation as a Cause of Cancer. San Diego, CA. 2011.
10. Structural investigation of tcpC, a bacterial homolog of MyD88. **Nathaniel W. Snyder**, Greg Snyder (no relation), Tsan Xiao. NIH: Intramural Research Symposium. Bethesda, MD. 2008.

AWARDS

Academic Honors

University President Scholarship Recipient	2005-2009
B.S. with University Honors earned at University of Maryland: College Park	2009

Professional Honors

Intramural Research Trainee Assistantship (NIH:NIAID)
Best Poster (2nd Place) ACS:Toxicology Division 2012 Annual Meeting
Best Oral Presentation (2nd Place) BGSA 2012 Intramural Symposium
Best Poster Co-author ACS:Toxicology Division 2013 Annual Meeting
Neurobiology of Disease in Children Symposium Young Investigator Award 2014 Annual Meeting

PROFESSIONAL MEMBERSHIPS

American Chemical Society	2009-Present
American Society for Mass Spectrometry	2011-Present
American Association for Cancer Research	2011-2013
American Society for Pharmacology and Experimental Therapeutics	2013-Present
Endocrine Society	2014-Present

Student Associations

Biomedical Graduate Student Association Executive Board member	2012-2013
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Graduate and Professional Student Assembly Representative- Research Council 2012-2013

SERVICE

University Service

Faculty Search Committee 2014-2015.

Drexel University College of Medicine, Department of Microbiology and Immunology.

Chair: Garth Ehrlich, PhD

Successful: Joris Beld, PhD

Faculty Search Committee 2015-ongoing.

Drexel University College of Medicine, Department of Microbiology and Immunology.

Chair: Garth Ehrlich, PhD

Ongoing

Faculty Search Committee 2015-ongoing.

Drexel University, Dornsife School of Public Health, Department of Environmental and Occupational Health

Chair: Jerry Fagliano, PhD, MPH

Ongoing

Guest Lecturer, September 2015

Pharmacokinetics I&II

Graduate Pharmacology 512

Course Director: Joanne Mathiasen, PhD

Professional Service

Ad hoc reviewer, BMC Bioinformatics.

2015-2016

Ad hoc reviewer, Journal of visualized experiments.

2015

Ad hoc reviewer, Steroids

2015-2016

Community Service

Deveraux Foundation observation for high-functioning autistic individual seeking lab manager position.

FUNDING

Active

Drexel University start-up funding

2014-2017

K22 (Snyder)

09/01/2015-08/31/2018

9.0 calendar

NIH

\$149,750

Prenatal biomarkers of exposure and individual susceptibility to endocrine disrupting compounds

The goal of this proposal is to support a new investigator in overcoming major challenges in quantification of exposure and metabolism in the prenatal environment.

Pending

R21 (Snyder)
1.8 calendar

04/01/2016-03/31/2018

NIH

\$150,000

Lipidomics of meconium in neurodevelopment

This research will use cutting edge analytical technology to quantify the lipid composition of meconium in relation to development of autism spectrum disorder. Since meconium begins accumulation around the 12th week of gestation and is passed as the first bowel movements of a newborn, meconium will provide a window into the early origins of autism. This will facilitate understanding of the causes of autism and other developmental disorders of prenatal origin.

Completed

Commonwealth Universal Research Enhancement Grant 01/01/2015-12/31/2015
0.6 calendar

PA State Tobacco Settlement Funds

\$62,500

Metabolic Control of Neurogenesis via Histone Acetyltransferase Tip60

Pilot studies to develop stable isotope labeling from nutritional and exogenous chemical sources in drosophila as a model for mechanistic studies of altered neurogenesis.

Wharton Innovation Fund

2013-2014

Pharmacology Training Grant T32-GM-008076

2009-2013