Curriculum Vitae

WILLIAM EDWARD FUNK

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APPOINTMENTS

2013 – present	Assistant Professor, Department of Preventive Medicine, Feinberg School of Medicine, Northwestern University, Chicago, IL
2014 – present	Faculty, Driskill Graduate Program in Life Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL
2011 – present	Associate Member, Robert H. Lurie Comprehensive Cancer Center, Northwestern University, Chicago, IL
2011 – present	Faculty Associate, Institute for Policy Research, Northwestern University, Evanston, IL
2011 – present	Faculty Affiliate, Department of Anthropology, Weinberg Collage of Arts and Sciences, Northwestern University, Evanston, IL
2010 – 2013	Research Assistant Professor, Department of Anthropology, Weinberg Collage of Arts and Sciences, Northwestern University, Evanston, IL
2008 – 2010	Visiting Scholar, US Environmental Protection Agency, Research Triangle Park, NC

EDUCATION

2009 – 2010	University of North Carolina, Chapel Hill Postdoctoral Fellow, Baity Air Engineering Laboratory, Department of Environmental Sciences and Engineering (Primary Advisor: Prof. David Leith), and Department of Epidemiology (Co-Advisor: Prof. Andrew Olshan)
2003 – 2009	University of North Carolina, Chapel Hill Ph.D., Department of Environmental Sciences and Engineering Thesis: Protein Adducts as Measures of Exposure in Epidemiological Research (Advisor: Prof. Stephen Rappaport)
2001 – 2003	San Francisco State University Master of Science (all but thesis), Department of Chemistry Thesis: Development of an Atmospheric Sampling Glow Discharge Ionization Mass Spectrometer for Direct Analysis of VOCs in the Atmosphere (Advisor: Prof. Peter Palmer)
1997 – 2001	San Francisco State University Bachelor of Science, Department of Chemistry Undergraduate Research: Evaluation of Mars Soil Analogs by Headspace Gas Chromatography: Simulations of the NASA Viking Lander Biology Experiments (Advisor: Prof. James Orenberg)

AREAS OF SPECIALIZATION

Exposome; adductomics; dried blood spot sampling; exposure biology; environmental health, exposure assessment; mass spectrometry; protein adducts; prenatal, pediatric, and children's health

HONORS AND AWARDS

2013 – 2014	UCSF Reach the Decision Makers Program Fellowship
2005 – 2009	UNC NIEHS Environmental Biostatistics Graduate Fellowship
2003	Graduate Student Distinguished Achievement Award; highest honor given to graduate students at San Francisco State University
2001 – 2002	GK-12 National Science Foundation Fellowship
2002	ARCS Foundation Distinguished Scientist Award
2001	US Department of Education GAANN Fellowship (*declined*)
2000	SFSU Summer Research Fellowship

PROFESSIONAL ACTIVITIES

Ad Hoc Journal Reviewer:

Aerosol Science and Technology
Journal of Toxicology & Environmental Health B
Indoor Air
Swiss Medical Weekly
Journal of Exposure Science and Environmental Epidemiology
Journal of Breath Research
Journal of Analytical Toxicology
BMC Clinical Pathology
Environmental Research
Therapeutics and Clinical Risk Management
Chemical Research in Toxicology
Advances in Public Health
Biomarkers
Air Quality
Atmosphere and Health
BMC Medical Research Methodology
Journal of the American Medical Association
Journal of Toxicology and Environmental Health A
Clinica Chimica Acta
International Journal of Environmental Research and Public Health
Environment International
Epidemiology
Analytical Chemistry
Chemoshere

Ad Hoc Grant Reviewer:

2017	NIH NIEHS Special Emphasis Panel on the subject of DNA and protein adducts, Bethesda, MD, Oct 6

2016 NIH NIEHS P42 Superfund Research Program Review Panel, Research Triangle Park, NC, Aug 31-Sep 2
2015 NIH NIEHS Children's Environmental Health & Disease Prevention Research Center-Special Review Panel, Bethesda, MD, May 12-14
2011 – present US Department of Justice, Basic Scientific Research to Support Forensic Science for Criminal Justice Purposes

Ad Hoc Scientific Technical Reviewer:
2016 US EPA Federal Insecticide, Fungicide, and Rodenticide Act Scientific Advisory Panel—Chlorpyrifos: Analysis of Biomonitoring Data, Washington DC, Apr 19-21
2011 – present Technical Reviewer, CDC National Birth Defects Prevention Center
2008 – present Technical Reviewer, US EPA, Office of Research and Development

Memberships/Administration:
2018 – present Organizing Committee Member, National Academy of Science, Engineering, and Medicine. Workshop on the Feasibility of Addressing Environmental Exposure Questions using Department of Defense Biorepositories, Washington DC, Jun 14-15, 2018.
2018 – present Member, Environmental Influences on Child Health Outcomes (ECHO), Biorepository and CPS Implementation Team
2017 – present Co-Lead Environmental Exposome Domain, ECHO PRO Measurement Core
2017 – present Member, ECHO, Biospecimens Working Group (BWG)
2017 – present Member, ECHO, BWG- Biospecimen Collection, Processing, and Storage/Novel Methodologies (CPS/NM) Working group
2017 – present Lead, ECHO, CPS/NM Blood Protocol Team
2017 – present Member, ECHO, Chemical Exposures Working Group
2016 – present Founding Member, Pacific Northwest National Laboratory Exposure Surveillance & Health Optimization (ESHO) Consortium
2015 Panelist, Northwestern Pathway to the Professoriate
2015 Member, National Children's Study Health Measurement Network Ad Hoc Biospecimens Working Group
2014 – present Member, Northwestern Center for Reproductive Science
2013 – present Member, American Society for Mass Spectrometry
2013 – present Member, Institute for Public Health and Medicine
2013 – present Member, NU Clinical and Translational Science Institute
2013 – present Member, Center for Behavior and Health & Center for Population Health Sciences
2013 – present Member, Chicago Mass Spectrometry Discussion Group
2013 – present Member, CARDIA Laboratory Subcommittee
2013 – present Member, Northwestern Program in Public Health Curriculum Committee
2013 – present Member, Northwestern Program in Public Health Executive Committee
2010 – 2011 UNC-UAE Indoor Air, Health, and Nutrition Study Steering Committee
2008 – present Member, North Carolina Center for Birth Defects research and Prevention
2006 – present Member, American Chemical Society
2002 Member, National Science Foundation GK-12 Advisory Committee

PATENTS

Funk, W., McDade, T, Unger, A. Minimally-Invasive Collection System for Collecting Biological Samples for Quantifying Heavy Metals, Other Toxicants, Pathogens, and Biomarkers. US provisional

patent application number: 62/340261 submitted 2016 (U.S. Patent Pending).

Funk, W., McDade, T. *Detection of Heavy Metals in Dried Blood*. US patent application number: 61/803674 submitted 2013 (U.S. Patent Pending).

McDade, T., **Funk, W.**, Seifer, D. *Anti-Mullerian Hormone Detection in Whole Blood*. US patent application number: 61601195 submitted 2012 (U.S. Patent Pending).

PUBLICATIONS (Student authors are underlined)

Buckley, J., Woodruff, T., Barrett, E., Beamer, P., Bennett, D., Bloom, M., Fennel, T., Fry, R., **Funk, W.**, Hamra, G., Hecht, S., Iyer, R., Karagas, M., Lyall, K., Pellizzari, E., Signes-Pastor, A., Starling, A., Wang, A., Watkins, D. Opportunities for Evaluating Chemical Exposures and Child Health: The Environmental influences on Child Health Outcomes (ECHO) Program. *The Journal of Exposure Science and Environmental Epidemiology*. In preparation.

White, L., Sandler, D., Montgomery, N., Iyer, R., **Funk, W**. Characterization of the Cys34 Breast Cancer Adductome. *Cancer Epidemiology, Biomarkers & Prevention*. In preparation.

Kuzawa, C., Georgiev, A., Montgomery, N., Iyer, R., **Funk, W.** Protein Adducts as Biomarkers of Oxidative Stress during Pregnancy in the Cebu Longitudinal Health and Nutrition Survey. Reproduction. In preparation.

Funk, W., Kuzawa, C., Montgomery, N., Iyer, R., Wang, C. Greenland, P. Protein Adducts as Biomarkers of Cardiovascular Health. The International Journal of Cardiology. In preparation.

Funk, W., Chen, J., Montgomery, N., Xiang, A., McConnell, R., Chow, T., Jo, H. Protein Adducts in Newborn Dried Blood Spots are Associated with Exposure to PM2.5 and Ozone During Pregnancy. *Environmental Health Perspectives*. In preparation.

Xiang, A., Montgomery, N., Chen, J., McConnell, R., Chow, T., Jo, H., **Funk, W.** Association Between Protein Adducts During Pregnancy, Maternal Gestational Diabetes, and Childhood Obesity. *Pediatric Research*. In preparation.

Funk, W., Breton, C., Montgomery, N., Farzan, S., Howe, C., Chavez, T., Bebronsian, L., Bastain, T., Chen, J. Use of Protein Adducts in Cord Blood Samples Collected at Birth as Exposure Biomarkers During Pregnancy. *Biomarkers*. In preparation.

Funk, W., Sobus, J., White, L., Sandler, D., Pleil, J., Montgomery, N., Iyer, R, Chen, J. Analysis of Within- and Between-Person Variance in Protein Adduct Profiles. *Biomarkers*. In preparation.

Montgomery, N., Iyer, R., **Funk, W.** A Targeted Multiplexed Adduct (MAP) Assay for quantifying HSA-Cys^{34} Adducts in Epidemiological Research. *Environmental Science and Technology*. In preparation.

Jacobson, T., Kler, J., Hernke, M., **Funk, W.**, Braun, R. Direct human health risks of environmentally relevant elevations in atmospheric carbon dioxide. *Environmental Health Perspecitves*. In preparation.

Funk, W., Ladror, D., Pleil, J., Iyer, R., Montgomery, N., Chen, J. A Systematic Review of Exposure Biomarkers in Dried Blood Spots. *Analytica Chimica Acta*. In preparation.

Jo, H., Eckel, S., X. Wang, X., Chen, J., Cockburn, M., Molshatzki, N., Lurmann, F., **Funk, W.**, Xiang, A., McConnell, R. Sex-specific Associations of Autism Spectrum Disorder with Residential Air Pollution Exposure in a Large Southern California Pregnancy Cohort. *Environmental Pollution*. Under review.

Zhang, J., Wang, G., He, W., Lin, C., Costello, C., Losh, M., Berry-Kravis, **Funk, W**. Expression and Characterization of Human Fragile X Mental Retardation Protein Isoforms and Interacting Proteins in Human Cells. *Proteomic Insights.* Resubmission under review.

Jacob, S., Cornell, E., Kwa, M., **Funk, W.**, Xu, S. Cosmetics and Cancer: Adverse Event Reports Submitted to the Food and Drug Administration. *Journal of the National Cancer Instuitute Cancer Spectrum*. 2018, 2 (2), 1-7.

Pleil, J., Wallace, A., Stiegel, M**., Funk, W.** Human biomarker interpretation: the importance of intra-class correlation coefficients (ICC) and their calculations based on mixed models, ANOVA, and variance estimates. *Journal of Toxicology and Environmental Health, Part B: Critical Review.* 2018, 21(3), 161-180.

Ladror, D., Pitt, B., **Funk, W**. Quantification of Cotinine in Dried Blood Spots as A Biomarker of Exposure to Tobacco Smoke. *Biomarkers.* 2017, 22 (7), 1-16.

Funk, W., Pleil, J., Sauter, D., McDade, T., Holl, J. Use of Dried Blood Spots for Estimating Children's Exposures to Toxic Metals in Epidemiological Research. *Environmental and Analytical Toxicology,* 2015; S7:002.

Pleil, J., Beauchamp, J., Miekisch, W., **Funk, W**. Adapting Breath Biomarker Technologies to Adverse Outcome Pathways (AOPs) Research: Current Thoughts on Using *In Vivo* Discovery for Developing *In Vitro* Target Methods. *Journal of Breath Research,* 2015; 9, 039001.

Pleil, J., Sobus, J., Stiegel, M., **Funk, W**. Estimating Geometric Mean, Geometric Standard Deviation, Confidence Intervals, and Exceedance Levels of Log-Normally Distributed Environmental and Biomonitoring Data from Disparate Publication Information. *Journal of Toxicology and Environmental Health Research, Part B: Critical Reviews,* 2014; 17 (6), 341-368.

Funk, W., Pleil, J., Boundy, M., Nash, D., Trent, C., Yeatts, K., Davidson, C., Sadig, M., Leith, D. Assessment of Indoor Air Quality in the United Arab Emirates. *Journal of Environmental Protection*, 2014; 5, 709-722.

Zhang, Z., Lin, S., **Funk, W.**, Hou, L. Environmental Chemicals and Telomere Length in Human Studies. *Occupational and Environmental Medicine*, 2013; 70(10), 743-749.

Funk, W., McGee, J., Olshan, A., Ghio, A. Quantification of Arsenic, Lead, Mercury, and Cadmium in Newborn Dried Blood Spots. *Biomarkers*, 2013; 18(2), 144-147.

Rappaport, S., He, L., Grigoryan, H., **Funk, W.**, Williams, E. Adductomics: Characterizing Exposures to Reactive Electrophiles. *Toxicology Letters*, 2012; 13;213(1), 83-90.

McDade, T., Woodruff, T., Huang, J., **Funk, W.**, Prewitt, M., Kondapalli, L., Garcia, C. Quantification of Anti- Müllerian Hormone (AMH) in Dried Blood Spots: Validation of a Minimally-Invasive Method for Assessing Ovarian Reserve. *Human Reproduction*, 2012; 0(0), 1-6.

Yeatts, K., El-Sadig, M., Ali, Campbell, A., Reeves, L., Chan, Ng, S., Boundy, M., **Funk, W**., Leith, D., Popkin, B., MacDonald Gibson, J., Rusyn, E., Olshan, A. Environmental Research Challenges and Successes in the Arabian Gulf Region. *Environmental Health Perspectives*, 2012; 120(5), 632-636.

Yeatts, K., Sadig, M., Leath, D., Maskiri, F., Kalsbbek, W., Rusyn, I., Zoubeidi, T., Chan, R., Kassab, M., **Funk, W.**, Boundy, M., MacDonald, J., Olshan, A. Indoor Air Pollutants and Health in the United Arab Emirates. *Environmental Health Perspectives*, 2012; 120(5), 687-694.

Li, H., Grigoryan, H., **Funk, W.**, Lu, S., Rose, S., Williams, E., Rappaport, S. Profiling Cys^{34} Adducts of Human Serum Albumin by Fixed-Step Selected Reaction Monitoring. *Cellular and Molecular Proteomics,* 2011; 10(3), 1-14.

Funk, W., Li, H., Iavarone, A., Williams, E., Riby, J., Rappaport, S. Enrichment of Cysteinyl Adducts of Human Serum Albumin. *Analytical Biochemistry*, 2010; 400(1), 61-68.

Swanson, K., Kado, N., **Funk, W.**, Pleil, J., Madden, M., Ghio, A. Release of the Pro-Inflammatory Markers by BEAS-2B Cells Following In Vitro Exposure to Biodiesel Extracts. *The Open Toxicology Journal*, 2009; 3(8), 8-15.

Funk, W., Waidyanatha, S., Chaing, S., Rappaport, S. Hemoglobin Adducts of Benzene Oxide in Neonatal and Adult Dried Blood Spots. *Cancer Epidemiology Biomarkers & Prevention*, 2008; 17(8), 1896-1901.

Sobus, J., Pleil, J., Madden, M., **Funk, W.**, Hubbard, H., Rappaport, S. Identification of Surrogate Measures of Diesel Exhaust Exposure in a Controlled Chamber Study, *Environmental Science & Technology*, 2008; 42(23), 8822-8828.

Pleil, J., **Funk, W.**, Rappaport, S. Residual Indoor Contamination from World Trade Center Rubble Fires as Indicated by Polycyclic Aromatic Hydrocarbon Profiles. *Environmental Science & Technology*, 2006; 40 (4), 1172 -1177.

CONFERENCE PROCEEDINGS AND PRESENTATIONS (Student authors are underlined)

Montogomery, N., Iyer, R., **Funk, W.** Protein Adducts as Measures of Exposure Throughout Childhood Development. Poster presented at the 14th Annual Lewis Landsberg Research Day Symposium. Chicago, IL, Apr 5, 2018.

Iyer, R. Montogomery, N., Miller, G., **Funk, W**. Applying Protein Adductomics to Identify Biomarkers of Socioeconomic Status. Poster presented at the 14th Annual Lewis Landsberg Research Day Symposium. Chicago, IL, Apr 5, 2018.

Funk, W. Application of Adductomics for Investigating Associations Between the Environment and Children's Health. Invited Keynote Address presented at the Global Experts Meeting on Toxicology. Singapore, Nov 13, 2017.

Ladror, D., **Funk, W.** Application of Adductomics for Investigating Biomarkers Associated with Ovarian Cancer. Paper presented at the American Society for Mass Spectrometry 64th Conference on Mass Spectrometry and Allied Topics. San Antonio, TX, Jun 8, 2016.

Ladror, D., **Funk, W.** Application of Adductomics for Investigating Biomarkers Associated with Ovarian Cancer. Poster presented at the 12th Annual Lewis Landsberg Research Day Symposium. Chicago, IL, Apr 7, 2016.

Pleil, J., **Funk, W.** *Human Biomonitoring and In Vitro Testing Applications for Covert Threat Analysis and Security Applications*. Paper presented at the 2016 Pittcon Conference and Exposition. Atlanta, GA, Mar 27, 2016.

Funk, W., Zhang, J., Ladror, D., Losh, M., Berry-K ravis, E. Quantification of Fragile X Mental Retardation Protein in Dried Blood Spot Samples: Validation of a Minimally-Invasive Method to Screen for Fragile X Syndrom in Community-Based Research. Paper presented at the 2nd International Conference on the *FMR1* Premutation. Sitges, Barcelona, Spain, Nov 2, 2015.

Funk, W., Ladror, D. (substitute presenter). *Protein Adducts in Dried Blood Spot Samples as Exposure Biomarkers in Epidemiological Research*. Invited symposium talk presented at the 2015 American Chemical Society Conference. Boston, MA, Aug 17, 2015.

Ladror, D., **Funk, W.** *Quantification of cotinine in plasma and dried blood spots using nano-chip LC-MS*. Poster presented at the 11th Annual Lewis Landsberg Research Day Symposium. Chicago, IL, Apr 2, 2015.

Zhang, J., Losh, M., **Funk, W.** *Expression and Mass Spectrometric Characterization of Human Fragile X Mental Retardation Protein*. Poster presented at the 11th Annual Lewis Landsberg Research Day Symposium. Chicago, IL, April 2, 2015.

Funk, W. *Nano-scale fingerprinting of human blood protein adducts for exposure assessments.* Invited symposium talk presented at the 2015 Pittcon Conference and Exposition. New Orleans, LA, Mar 9, 2015.

Funk, W., Angevine, K., Amsden, L., McDade, T. *Challenging the Precision of the "Gold Standard" Methods with Whatman #903 Filter Paper: Analysis of Environmental Chemicals in Dried Blood Spots*. Poster presented at the National Children's Study Expanded Steering Committee Meeting. Washington, DC, Mar 21, 2013.

Funk, W., Sauter, D., Olshan, A., McDade, T., Ghio, A. *Development of a Method for Assessing Prenatal Exposures to Heavy Metals using State-Archived Dried Blood Spots.* Poster presented at PPTOX III: Environmental Stressors in the Developmental Origins of Disease: Evidence and Mechanisms. Paris, France, May 16, 2012.

Funk, W., McDade, T. Woodruff, T., Huang, J. Prewitt, M., Kondapalli, L., Gracia, C. *Quantification of Anti-Müllerian Hormone (AMH) in Dried Blood Spots: Validation of a Minimally-Invasive Method for Assessing Ovarian Reserve*. Poster presented at the 2011 Oncofertility Consortium Conference, Chicago, IL, Sep 14, 2011.

Yeatts, K., Olshan, A., El-Sadig, M., **Funk, W.**, Leith, D., Ng, S., Zoubedi, T., Al-Maskari, F., Chan, R., Couper, D., Rusyn, I., MacDonald, J. *Indoor Air Exposures and Health in the United Arab*

Emirates. Poster presented at the 3rd Annual North American Congress of Epidemiology, Montreal, Quebec, Canada, Jun 24, 2011.

Funk, W. *Measuring Metals in Newborn Dried Blood Spots.* Paper presented at the CDC National Birth Defects Prevention Study Annual Meeting, Atlanta, GA, Jan 25, 2011.

Rappaport, S., Li, H., **Funk, W.**, Gregoryan, H., Demireva, M., Williams, E., Iavarone, A., Lu, S., Rose, S., Van Der Laan, M. *Using Human Serum Albumin to Perform Adductomics in Populations of Interest*. Paper presented at the XII International Congress of Toxicology, Barcelona, Spain, Jul 22, 2010.

Li, H., **Funk, W.**, Grigoryan, H., Demireva, M., Williams, E., Iavarone, A., Riby, J., Lu, S., Rose, S., Van Der Laan, M., Rappaport, S. *Measuring Adducts of Human Serum Albumin as Biomarkers of Exposure to Toxic Substances*. Poster presented at the 58th ASMS Conference on Mass Spectrometry and Allied Topics, Salt Lake City, UT, May 24, 2010.

Funk, W., Nash, D., Trent, C., Yeatts, K., Davidson, C., Boundy, M., Leith, D. *Assessment of Indoor Air Quality in the United Arab Emirates*. Paper presented at the AAAR Specialty Conference: Air Pollution and Health, San Diego, CA, Mar 26, 2010.

Rappaport, S., **Funk, W.**, Chaing, S. *Protein Adducts in Dried Blood Spots as Measures of Carcinogen Exposure*. Paper presented at the International Society for Environmental Epidemiology and International Society of Exposure Analysis, Pasadena, CA, Oct 13, 2008.

Funk, W., Rappaport, S., Waidyanatha, S., Chaing, S. *Exposure Biomarkers in Newborn Dried Blood Spots*. Poster presented at the International Conference on Prenatal Programming and Developmental Toxicity, Tórshavn, Faroe Islands, May 21, 2007.

Funk, W., Rappaport, S., Clark, M., Pleil, J. *Measurement of Polycyclic Aromatic Hydrocarbons (PAHs) Associated with Fine Particulate Matter to Estimate Statewide Cumulative Exposures in North Carolina.* Poster presented at the Society for Toxicology 46th Annual Conference, Charlotte, NC, Mar 26, 2007.

Rappaport, S., **Funk, W.**, Waidyanatha, S., Chaing, S. *Assessment of Protein Adducts in Dried Blood Spots*. Paper Presented at The Use of Newborn Blood Spots in Environmental Research: Opportunities and Challenges Meeting, Chapel Hill, NC, Feb 20, 2007.

Funk, W., Waidyanatha, S., Rappaport, S. *The Use of Dried Blood Spots for Measuring 1,4-Benzoquinone Adducts in Albumin as a Biomarker of Exposure to Benzene*. Poster presented at the Society for Toxicology 45th Annual Conference, San Diego, CA, Mar 8, 2006.

Smith, J., Olsen, C., Gontz, A., Benedict, L., Bopp, R., Pleil, J., **Funk, W.**, Rappaport, S. *Conducting Environmental Forensics in Dynamic, Highly Urbanized Estuarine Systems: Lessons Learned from Investigating the Impact of the World Trade Center Attack on the Sediments of New York Harbor*. Paper presented at the Geological Society of America 41nd Annual Meeting, Camp Hill/Harrisberg, PA, Mar 22, 2006.

Trautman, R., Stubbs, J., Swett, D., Quach, D., **Funk, W.**, Shem, D. *Dynamic Partnerships: Making a Difference in Chemistry Education via an NSF GK-12 Partnership Between the San Francisco Unified*

School District and San Francisco State University. Paper presented at the 18th Biennial Conference on Chemical Education, Iowa State University, Ames, IA, Jul 18, 2004.

Funk, W., & Palmer, P. *Atmospheric Sampling Glow Discharge Ionization / Ion Trap Mass Spectrometry for Direct Monitoring of VOCs in Air: Simulation and Experimentation*. Poster presented at the 51st ASMS Annual Conference on Mass Spectrometry and Allied Topics, Montréal, Quebec, Jun 8, 2003.

Funk, W., & Palmer, P. *The Development of an Atmospheric Sampling Glow Discharge Ion Trap Mass Spectrometry System for Monitoring VOCs in Air*. Poster presented at the San Francisco State University Research Scholarship Forum, San Francisco State University, San Francisco, CA, Dec 19, 2001.

Palmer, P. Fan, X., Remigi, C., Nies, B., & **Funk, W.** *Analysis of VOCs in Air via Direct Sampling Ion Trap Mass Spectrometry: The Quest for Part-Per-Trillion Level Detection Limits*. Paper presented at the ASMS Asilomar Conference on Mass Spectrometry: Real-World Challenges and New Developments in Environmental Mass Spectrometric Measurements, Pacific Grove, CA, Oct 20, 2001.

INVITED LECTURES & COLLOQUIA

Funk, W. *Investigating Links Between Enviromental Exposures and Human Health.* Presentation given at the Program on Plastics, Ecosystems, and Public Health Symposium. Institute for Sustainability and Energy, Northwestern University. Jan 10, 2019.

Funk, W. *Protein Adducts as Exposure Biomarkers: The State of the Science*. Invited seminar to be presented at Institute for Exposomic Research, Icahn School of Medicine at Mount Sinai. New York, NY, Mar 28, 2019.

Funk, W. *Protein Adducts as Exposure Biomarkers: The State of the Science*. Invited seminar presented at the National Institute for Environmental Studies. Tsukuba, Japan, Oct 19, 2018.

Funk, W. *Protein Adducts as Exposure Biomarkers in Epidemiological Research*. Invited seminar presented at the National Institutes of Health- National Institute of Environmental Health Sciences. Research Triangle Park, NC, Sept 6, 2018.

Funk, W. *Protein Adducts as Exposure Biomarkers: The State of the Science*. Presentation given at the National Academy of Science, Engineering, and Medicine. Workshop on the Feasibility of Addressing Environmental Exposure Questions Using Department of Defense Biorepositories, Washington, DC, Jun 14-15, 2018.

Funk, W. *Application of Adductomics for Investigating Associations Between the Environment and Children's Health.* Invited seminar presented at the University of Illinois Rockford Health Science Campus, College of Pharmacy. Rockford, IL, Feb 20, 2018.

Funk, W. *An Update: New Approaches Using Dried Blood Spot Sampling to Assess Environmental Risk factors in Pediatric Research.* Invited webinar presented to the Division of Environmental Health, Keck School of Medicine, University of Southern California. Los Angeles, CA, Aug 8, 2017.

Funk, W. *Identifying Links Between the Environment and Health*. Lecture given in the Department of Communication Sciences and Disorders, Northwestern University, Evanston, IL, May 18, 2017.

Funk, W. *New Approaches Using Dried Blood Spot Sampling to Assess Environmental Risk factors in Pediatric Research.* Invited seminar presented in the Division of Environmental Health, Keck School of Medicine, University of Southern California. Los Angeles, CA, Jan 27, 2017.

Funk, W. *Adductomics: A New Approach for Investigating Associations Between the Environment and Health.* Presentation given to the Chicago Medical Directors Club. Chicago, IL, Nov 3, 2016.

Funk, W. *New Approaches for Investigating Children's Exposures to Environmental Toxicants.* Lecture given in the Department of Environmental Sciences and Engineering at the University of North Carolina, Chapel Hill, NC, Oct 18, 2016.

Funk, W. *New Approaches for Investigating Children's Exposures to Environmental Toxicants.* Invited seminar presented in the Department of Epidemiology at the University of Illinois at Chicago. Chicago, IL, Oct 14, 2016.

Funk, W. *Investigating Environmental Causes of Chronic Diseases and Cancers*. Presented at the Northwestern Medicine George Westinghouse Scholars program, Northwestern University. Chicago, IL, Jul 19, 2016.

Funk, W. *Protein adducts as exposure biomarkers throughout childhood development.* Presented at the Analytical and Environmental Sciences Seminar Series, King's College London. London, UK, Feb 3, 2016.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease: From Biomarker Discovery to Population-Based Research*. Lecture presented in the Department of Environmental and Occupational Health, University of Pittsburgh. Pittsburgh, PA, Mar 5, 2015.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease: From Biomarker Discovery to Population-Based Research*. Lecture presented at the Institute for Public Health and Medicine (IPHAM) seminar series, Feinberg School of Medicine, Northwestern University. Chicago, IL, Nov 20, 2014.

Funk, W. *Application of Adductomics to Investigate Environmental Risk Factors Associated with Congenital Heart Defects Using Newborn Dried Blood Spots.* Talk presented at the North Carolina Center for Birth Defects Research and Prevention. Chapel Hill, NC, Nov 7, 2014.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease: From Biomarker Discovery to Population-Based Research.* Lecture presented at the United States Environmental Protection Agency. Research Triangle Park, NC, Nov 6, 2014.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease: From Biomarker Discovery to Population-Based Research.* Lecture presented at the University of North Carolina, Department of Environmental Sciences and Engineering. Chapel Hill, NC, Nov 6, 2014.

Funk, W. *Adductomics: A New Approach for Investigating Links Between the Environment and Human Health.* Lecture presented in the Cells to Society colloquium series, Institute for Policy Research, Northwestern University. Evanston, IL, Mar 24.

Funk, W. *Emerging Science for Investigating Environmental Causes of Disease*. Lecture presented in the Department of Environmental Sciences & Engineering, Gillings School of Global Public Health, University of North Carolina. Chapel Hill, NC, Oct 22, 2013.

Funk, W., Sauter, D., Olshan, A., McDade, T. *Development of a Method for Assessing Prenatal Exposures to Arsenic using State-Archived Dried Blood Spots.* Invited paper presented at the 225th National American Chemical Society Conference. New Orleans, LA, Apr 8, 2013.

Funk, W. *Emerging Technologies for Investigating Environmental Causes of Disease*. Lecture presented in the Department of Environmental & Molecular Toxicology, North Carolina State University. Raleigh, NC, Feb 21, 2013.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease*. Lecture presented in the Department of Environmental and Occupational Health Sciences, University of Washington. Seattle, WA, Jan 10, 2013.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease*. Lecture presented in the Department of Environmental Health Sciences, University of Massachusetts. Amherst, MA, Dec 12, 2012.

Funk, W. *New Approaches for Investigating Environmental Causes of Disease*. Lecture presented in the Department of Environmental and Occupational Health, Texas A&M. College Station, TX, Nov 19, 2012.

Funk, W. *Exposure Biology and the Human Exposome: A Novel Approach for Investigating Environmental Causes of Disease*. Lecture presented in the Geisel School of Medicine, Dartmouth University. New Haven, NH, Oct 2, 2012.

Funk, W. *Exposure Biology and the Human Exposome: A Novel Approach for Investigating Environmental Causes of Autism*. Lecture given at the A.J. Drexel Autism Institute. Philadelphia, PA, Sep 7, 2012.

Funk, W. *Exposure Biomarkers*. Lecture given in the Department of Preventive Medicine, MPH Program, Northwestern University. Chicago, IL, May 24, 2012.

Funk, W. *Emerging Science for Discovering Environmental Causes of Disease*. Seminar presented in the Department of Civil and Environmental Engineering, Northwestern University. Evanston, IL, Apr 20, 2012.

Funk, W. *The Use of Dried Blood Spots for Quantifying Heavy Metal Exposures and Assessing Oxidative Stress.* Colloquium presented at the University of Illinois at Chicago. Chicago, IL, Nov 28, 2011.

Funk, W. *Minimally- Invasive Measures of Environmental Toxin Exposure Using Dried Blood Spots*. Paper presented at the Chicago Core on Biomarkers in Population-Based Aging Research. Chicago, IL, Oct 25, 2011.

Funk, W., Leith, D. *UAE National Strategy for Environmental Health- Indoor Air Monitoring*. UAE Executive Council Summit, University of North Carolina. Chapel Hill, NC, Dec 3, 2008.

Funk, W. *Measuring Protein Adducts in Dried Blood Spots as Exposure Biomarkers*. Lecture given in the Department of Environmental Sciences & Engineering. University of North Carolina. Chapel Hill, NC, Nov 2, 2008.

Funk, W. *Protein Adductomics: Protein Adduct Profiles as Molecular Fingerprints of Carcinogen Dose*. Presentation given at the Tornqvist laboratory at the University of Stockholm. Stockholm, Sweden, Sep 18, 2008.

Funk, W. *Protein Adducts as Biomarkers of Carcinogen Dose*. Lecture given in the School of Public Health, University of California. Berkeley, CA, Apr 23.

Funk, W. *New Techniques Using Protein Adducts as Exposure Biomarkers.* Colloquium given to the Department of Environmental Sciences & Engineering, University of North Carolina. Chapel Hill, NC, Mar 5, 2008.

Funk, W. *Chemistry Demonstrations for High School Teachers*. Presentation given at the San Francisco Unified School District Chemistry Meeting. San Francisco, CA, Dec 12, 2008.

TEACHING RECORD

2013 – present	Course Director, PH 303 Environmental Health Sciences, Program in Public Health, Feinberg School of Medicine, Northwestern University, Chicago, IL. *Course evaluations available on request
2015	Instructor, Introduction to Life Science Research, Driskill Graduate Program in Life Sciences, Feinberg School of Medicine, Northwestern University, Chicago, IL.
2005, 2006	Instructor, Pre-Pharmacy Chemistry Review, School of Pharmacy, University of North Carolina, Chapel Hill, NC.
2002 – 2003	Instructor, Inorganic and Organic Chemistry, HealthPath Program, San Francisco State University, San Francisco, CA.
2001 – 2003	NSF GK-12 Fellow, Chemistry, San Francisco State University/San Francisco Unified School District, San Francisco, CA.
2001 - 2003	Instructor, Chemistry, Student Enrichment Office, San Francisco State University, San Francisco, CA.
2001	Teaching Assistant, General Chemistry Laboratory, Department of Chemistry & Biochemistry, San Francisco State University, San Francisco, CA.

SHORT COURSES/TRAINING

Funk, W. *Collection and Handling of Dried Blood Spots with Pediatric Populations*. Training given to the MOMFIT team, Feinberg School of Medicine, Chicago, IL, Mar 31; Apr 5, 2018.

Funk, W. *Collection and Handling of Dried Blood Spots for Environmental Exposure Assessment*. Training given at the United States Environmental Protection Agency, Research Triangle Park, Nov 6, 2014.

Funk, W. *Collection and Handling of Dried Blood Spots for Genetic Screening*. Training given at the University of North Carolina, Chapel Hill, NC, Jul 21-24, 2010; School of Communications, Northwestern University, Evanston, IL, Jul 15, 2011 & Jan 14, 2013.

Funk, W. *UAE National Strategy for Environmental Health: Assessment of Indoor Air Quality.* Training provided to 40 research staff members on passive air quality measuring devices in the United Arab Emirates; Al Ain, Apr 23-27, 2009 and Al Ain/Abu Dhabi/Dubai, Sep 25 - Oct 11, 2009.

ADVISING AND MENTORING

Program Advising:

2013 – present	PhD/MPH Student Advisor, Northwestern Program in Public Health
2016 – present	Research Mentor, Northwestern Center for Reproductive Science

Postdocs:

2017 – 2018	Sarvesh Iyer, PhD, Postdoctoral Fellow (Primary Advisor)
2017 – present	Nathan Montgomery, PhD, Postdoctoral Fellow (Primary Advisor)
2017	Mark Athanason, PhD, Postdoctoral Fellow (Primary Advisor)
2014 – 2016	Daniel Labror, PhD, Postdoctoral Fellow (Primary Advisor)
2014 – 2015	Jiang Zhang, PhD, Postdoctoral Fellow (Primary Advisor)
2013	Ranjith Munigunti, Postdoctoral Fellow (Primary Advisor)
2011 – 2012	Dana Sauter, PhD, Postdoctoral Fellow (Primary Advisor)

Graduate Students and Undergraduates:

2018 – present	Tyler Jacobson, Undergraduate, University of Michigan (Research Advisor)
2017 – present	Jiexi Chen, MS Enviromental Engineering, Northwestern (Primary Advisor)
2017	Kate Roever, Undergraduate, Emory University (Summer Research Advisor)
2017	Morgan Hoke, PhD/MPH Student (CE Advisor)
2017	Moira Anna Kyweluk, PhD/MPH Student (CE Advisor)
2016	Megan McCabe, Undergraduate (Summer Research Advisor)
2015	Kelsey Wiles, PhD Student (DGP Laboratory Rotation Research Advisor)
2015	Sarah Morimoto, Undergraduate (IPR Summer Research Fellowship Advisor)
2014	Sarah Taylor, PhD/MPH Student (CE Advisor)
2014	Valerie Nubbe, Undergraduate (IPR Summer Research Fellowship Advisor)
2014	Kelly McKinnon, PhD Student (DGP Laboratory Rotation Research Advisor)
2014	Kathryn Pillischafske, Undergraduate (Research Advisor)
2013 – 2015	Amber Kofman, PhD/MPH Student (MPH CE and FE Advisor)
2012	Claire Stingley, Undergraduate (Summer Research Advisor)
2012	Gabija Revis, Undergraduate (Summer Research Advisor)
2011	Omar Jamil, Undergraduate (Summer Research Advisor)

RESEARCH SUPORT

Current Research Support

12/1/16-11/30/18 1R21CA219028-01 Phillips (PI)
National Institutes of Health / National Cancer Institute
Incorporating Biomarkers of Prognosis and Cardiovascular Disease Risk in the Fit2Thrive Physical Activity Promotion Intervention for Breast Cancer Survivors
We will explore potential mediators (i.e. SCT constructs, adherence, PA) and/or moderators (i.e. demographics, disease characteristics) of these effects. MOST is an innovative, multi-phase framework adapted from engineering that uses highly efficient factorial experiments to evaluate individual, and combined, effects of intervention components to determine which ones can be reduced, eliminated or replaced to improve efficiency.
Role: Co-I

9/1/17-8/31/19(NCE) R56ES028121-01 Xiang (PI)
National Institutes of Health / National Institute of Environmental Health Sciences
Effects of air pollution and gestational diabetes on autism
This proposal will apply adductomics using state archived dried blood spot samples to investigate associations between air pollution, gestational diabetes, and autism. Pilot data collected in this study will be used as preliminary data for an R01 submission in collaboration with researchers at Kaiser Permanente and the University of Southern California.
Role: Subcontract PI
Total Award of NU Subcontract: $102,504

7/1/17-6/30/21 AHA Strategically Focused Children's Research Network Center Marino (PI)
American Heart Association
Early Life Origins of Cardiovascular Health: Healthier, Earlier
This proposal is a population, clinical, and epigenetic study on cardiovascular health in children.
Role: Co-I

4/1/16-4/30/19(NCE) 1 R21 ES026776-01 Funk (PI)
Protein Adducts as Measures of Exposure Throughout Childhood Development
National Institutes of Health / National Institute of Environmental Health Sciences
This proposal will first map the childhood adductome from before birth throughout childhood development. We will then compile an inventory of identified adducts that will be targeted using a multiplexed assay with dried blood spot samples.
Role: PI
Total Award: $424,875

6/1/16-5/31/21 R01 HD075957-01A1 Newman (PI)
How Randomly Distributed Vouchers Affect Biology and Health
National Institutes of Health / National Institute of Child Health and Human Development
This proposal seeks support to examine how a randomly distributed housing voucher affects biology and health in poorer black, white and Latino families distributed across Cleveland, Dallas, Denver and Seattle using DBS sampling to measure heavy metal exposures.
Role: Co-I

9/26/16-9/25/22 U24 RFA-OD-16-004 Cella/Gershon (Co-PI)
Environmental Influences on Child Health Outcomes (ECHO) PRO Measurement Core
National Institutes of Health / National Institute of Environmental Health Sciences
The role of the Northwestern ECHO PRO is to serve as a central core for all 35 ECHO pediatric cohort centers. The ECHO PRO oversees all measurements, including enhancing existing or

developing new assessments of exposures and outcomes. As the Co-director of the Environmental Exposome domain my primary role is to advice on biomarker methods. My laboratory will also assist with developing biomarker assays that can be used by NIH CHEAR biomarker cores.
Role: Co-Lead Environmental Exposome Domain

ECHO PRO Research Project
Title: Development of Exposure Biomarker Assays using DBS Samples
Role on project: Lead
Total costs for project period: $124,829
Project period: 9/1/18-8/31/19

Pending Grant Support

7/1/19-6/30/23 Effects of Air Pollution and Gestational Diabetes on Autism (R01) Xiang (PI)
National Institutes of Health / National Institute of Environmental Health Sciences
This proposal will apply adductomics using state archived dried blood spot samples to investigate associations between air pollution, gestational diabetes, and autism. Pilot data collected in this study will be used as preliminary data for an R01 submission in collaboration with researchers at Kaiser Permanente and the University of Southern California.
Role: NU PI
Total Award of NU Subcontract: $226,057

Completed Research:
9/1/17-8/31/18 UG3/UH3 RFA-OD-16-003 Gilliland/Breton (Co-PI)
Environmental Influences on Child Health Outcomes (ECHO) Pediatric Cohort
National Institutes of Health / National Institute of Environmental Health Sciences
This proposal will investigate multiple pollutants (air pollution, metals) in relation to respiratory disease and obesity/metabolic disease, from birth until early adulthood, using two study populations. The Funk laboratory will serve as the central lab for this study, and will measure exposure biomarkers including toxic metals and protein adducts.
Role: Subcontract PI
Total Award of NU Subcontract: $122,743

3/26/18-6/30/18 Funk (PI)
NUCATS Pilot Study Voucher
Application of Adductomics for Investigating Associations Between Environmental Exposures and Children's Health
This pilot project applies high-resolution mass spectrometry and new custom search software to identify protein adduct features associated with pregnancy, SES, and multiple adverse health outcomes.
Role: PI
Total Award: $3,440

1/6/14-1/5/15 Funk (PI)
NUCATS Dixon Translational Research Grant: Young Investigator Award
Protein Adduct Profiles as Early Detection Biomarkers of Ovarian Cancer
The focus of this study is to apply adductomics to identify potential early detection biomarkers of ovarian cancer. This project is being conducted in collaboration with the Northwestern Ovarian Cancer Early Detection and Prevention Program.
Role: PI

Total Award: $19,000

10/20/15-4/20/15 Funk (PI)
NUCATS Pilot Study Voucher
Quantification of Fragile X Mental Retardation Protein (FMRP) in Dried Blood Spots
FMRP is an important protein biomarker for the fragile X syndrome (FXS). Current clinical assays are predominantly antibody-based methods, i.e., ELISA assay, which lacks analytical specificity. Our study aims to characterization human FMRP proteoforms and to develop a method to quantify FMRP in DBS samples.
Role: PI
Total Award: $2,500

1/21/15-6/21/15 Pitt (PI)
Heinz Foundation
Quantification of Heavy Metals, Cotinine, and Protein Adducts in Dried Blood Spots
This study focuses on the development of assays for quantifying environmental toxicants in DBS samples, as well as cotinine as a biomarker of tobacco smoke. These assays will be applied to assess newborn exposures to hydraulic fracking pollution in the state of Pennsylvania.
Role: Subcontract PI
Total Award of NU Subcontract: $30,000

12/12-8/31/12 5U01AG027669 Buxton (PI)
National Institutes of Health / National Institute on Aging
Evaluation of Health Benefits of Workplace Policies and Practices- Phase II
This study involved quantification of concentrations of inflammatory cytokines in 2,230 dried blood spot samples to evaluate the association between inflammation and workplace practices.
Role: Co-I

9/28/10-11/30/12 HHSN267200700027C Funk/McDade (Co-PI)
National Children's Study: Greater Chicago Study Center
Analysis of Environmental Chemicals in Dried Blood Spots
The goal of this project is to develop assays to identify environmental toxicants present in infant and child blood samples using dried blood spots for sample collection.
Role: Co-PI
Total Award: $266,229

12/1/08-12/1/13 U50/CCU422096-01 Olshan (PI)
North Carolina Center for Birth Defects Research and Prevention, Centers for Disease Control
The North Carolina Center for Birth Defects Research and Prevention
This project seeks to identify environmental and genetic causes of birth defects, and to design and implement pilot studies to measure environmental exposures in newborn dried blood spots.
Role: Co-I