Michael H. Lumpkin, Ph.D., DABT

Senior Toxicologist

CONTACT

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Golden, CO

EDUCATION

Ph.D., Toxicology, 2002
University of Georgia, Athens, GA

B.S., Biochemistry, 1994
University of Georgia, Athens, GA

PROFESSIONAL AFFILIATIONS

- Member, Society of Toxicology, 2003-Present
- Councilor, Risk Assessment Specialty Section of the Society of Toxicology, 2014-2016
- President, Southeastern Regional Chapter of the Society of Toxicology, 2011-2013

REGISTRATIONS & CERTIFICATIONS

- Diplomate, American Board of Toxicology
- 40 Hour HAZWOPER
- 8 Hour HAZWOPER Supervisor
- Former Firefighter I (NFPA 1001), National Board on Fire Service Professional Qualifications

INTRODUCTION

Dr. Michael Lumpkin is a board-certified toxicologist with more than 20 years of experience in chemical dose response assessment, exposure assessment, COVID-19 pandemic response risk mitigation, dose reconstruction, chemical emergency response, product safety assessments, and risk communication. He has led teams of environmental scientists responding to chemical accidents and industrial emissions sources to determine real-time levels of chemicals in the environment and support incident commanders and other stakeholders in understanding the associated health impacts. He has coauthored numerous peer- reviewed hazard and risk assessments for USEPA and ATSDR. He has provided critical reviews and analyses of toxicology data for numerous compounds, including petrochemicals, formaldehyde, PAHs, perchlorates, pesticides, metals, solvents, and inhaled dust. Michael has developed, critiqued and applied PBPK models for volatile organic compounds (VOCs), metals, pesticides and bioterrorism agents for USEPA, CDC and DOD, for use in regulatory standard support and emergency planning. He has designed and performed occupational exposure reconstructions for VOCs and diisocyanates using laboratory and infield simulations. He has developed novel occupational exposure limits for pharmaceutical and industrial chemicals. Michael has served on ad hoc federal grant review committees and as a peer reviewer for toxicology journals and has lectured in graduate courses and emergency responder seminars for inhalation toxicology and risk assessment. He is a member of the Society of Toxicology and is certified as a Diplomate of the American Board of Toxicology.

EMPLOYMENT

Senior Toxicologist | 2014 – Present, CTEH, LLC, Golden, CO

Senior Toxicologist | 2010- 2014, ENVIRON International Corporation, Arlington, VA

Senior Toxicologist | 2004- 2010, Syracuse Research Corporation (Now SRC, Inc.), N. Syracuse, NY

Toxicologist | 2002- 2004, Clayton Group Services, Kennesaw, GA

RELEVANT EXPERIENCE

Incident Response

Led a team of scientists on a multi-year project providing toxicological and risk communication support to address chemical vapor exposures to workers at the U.S. Department of Energy Hanford nuclear site.

Designed and implemented air monitoring studies of oil and gas well pads in Colorado to assess public health risks and support science-based regulatory decision making and community risk communication.

Served as lead toxicologist for teams responding to dozens of gasoline and crude oil pipeline releases, chemical warehouse fires, mercury spills, train derailments, and a petroleum refinery tank failure, including

interaction with client environmental health professionals and members of the unified command.

Conducted air monitoring for multiple HazMat train derailments, petroleum pipeline releases, and industrial and natural gas well fires across the U.S.

Developed and taught a seminar on inhalation toxicity for Firefighters, EMTs, refinery workers, and National Guardsmen.

Provided toxicological and public health information to residents following a crude oil pipeline spill into the Yellowstone River in Montana.

Provided toxicological support to railroad HazMat managers and emergency room attending physicians following railroad worker chemical exposures.

Responded to and reported on health risk outcomes from a small-scale industrial chemical spill at a major aircraft manufacturing facility. The final risk assessment and communication report successfully allayed concerns within the exposed workforce for future health risks.

Assessed likely health impacts of perchlorate, lead, and corner exposures following accidental releases into municipal drinking water systems and school water supplies.

COVID-19 Pandemic Risk Mitigation

Served as the lead on-set COVID-19 subject matter expert at Netflix's Ozark: Season 4 to oversee infection risk mitigation strategies, oversee daily PCR testing program for over 400 workers, and provide cast and crew with state-of-the-science COVI-19 risk education.

Traveled to more than a dozen paper product manufacturing sites experiencing COVID-19 outbreaks to identify infection risk gaps and to educate workers on COVID-19 state-of-the -science for testing and disease transmission.

Provided COVID-19 PCR testing strategy, infection transmission risk reduction, and environmental diagnostic testing consulting to petrochemical corporate EHS and pandemic incident commanders in the U.S. Gulf of Mexico, Europe, and Asia.

PBPK Modeling and Pharmacokinetic Analysis

Developed a rodent and human model for inhalation of benzo[a]pyrene for use in regulatory dosimetry and risk assessment.

Developed rodent models for drinking water disinfection byproducts during pregnancy, and halogenated hydrocarbons for use in human health risk assessment.

Developed prototype inhalation models for bioterrorism agents (anthrax and tularemia) in nonhuman primates capable of predicting internal doses deposited in the lungs and distributed through the lymphatic and circulatory systems.

Developed preliminary PBPK models for inhaled polycyclic aromatic hydrocarbons (PAHs).

Reviewed, critiqued and applied PBPK models for a variety of organic compounds including:

- Applied PBPK and benchmark dose models for acrylonitrile, dichloromethane and 1,4-dioxane in support of cancer and non-cancer dose-response chapters of USEPA IRIS toxicological reviews.
- Provided review and critique of PBPK models in support of USEPA IRIS assessments (vinyl acetate, carbon tetrachloride, tert-amyl methyl ether and n-butanol) and ATSDR toxicological profiles (benzene, ethylene glycol, vinyl chloride, phenol, perchlorate and diazinon).
- Provided analysis and interpretation of human pharmacokinetic data, including implications for drug safety, to pharmaceutical and dietary supplement manufacturers.
- Provided critical review and comparison of human pharmacokinetic data sets for combination oral contraceptive products.

Chemical Product Stewardship

Updated an international guidance document on classifying hazards of petroleum products in compliance with GHS standards.

Provided toxicological support to a polystyrene manufacturer's investigation of customer-reported occupational dermatitis incidents.

Developed a novel occupational exposure limit for a reaction product formed during manufacture of flexible medical tubing. Developed novel occupational exposure limits for cancer chemotherapy, anti-hypertensive, and testosterone-based drug products.

Developed a novel occupational exposure limit for a manufacturing by-product compound using "read across" methodology. Developed multiple OSHA/GHS-complaint Safety Data Sheets (SDSs) for chemical and food products.

Performed California Proposition 65 Safe Harbor analyses for a variety of consumer products.

Chemical Toxicity Value Derivation

Provided updated dose-response assessments to clients based on newly available data for metals, VOCs and aldehydes.

Developed evidence-based assessment of perchlorate drinking water standard and research priorities, presenting finding to an EPA SAB, at national scientific meetings, and to a major trade association.

Provided critical comments pertaining to interpretation of toxicokinetic mode of action and dose-response data for carcinogen toxicity assessments such as formaldehyde and PAHs.

Co-authored toxicokinetics and dose-response chapters, including dose-response modeling of toxicity data to derive reference doses and concentrations, and cancer potency factors, for numerous USEPA IRIS toxicological reviews and peer-reviewed provisional toxicity value documents for solvents, metals and aldehydes.

Authored toxicity chapters and derived non-cancer minimal risk levels for numerous ATSDR toxicological profiles for VOCs, metals and pesticides.

Dose Reconstruction

Designed and performed a simulation of a carbon dioxide pipeline release onto enclosed residential structure to understand the time course of indoor changes in carbon dioxide and oxygen levels and implications for sheltering in place versus evacuating following a pipeline release.

Designed and performed an in-the-field dose reconstruction for methylene chloride exposure to consumers using a paint stripper.

Designed and managed a laboratory dose reconstruction assessment of inhalation and dermal exposure to diisocyanates and other VOCs under simulated occupational conditions.

Analyzed air sampling and exposure factor data to determine allowable PCB exposures in public school students.

Derived dose estimates of asbestos fiber exposure for a variety of industrial settings.

Pharmaceutical Product Development

Provided interpretation of human pharmacokinetic data in support of an FDA new drug application. Authored safety assessments of surgical implant devices in support of FDA approval for conduct of human trials.

Dietary Supplement Safety Assessment

Developed a framework for client to use in study design and data interpretation for developing product-specific safety assessments. Performed safety assessments for multiple dietary supplement products.

Helped client interpret pharmacokinetic data and design human clinical trials for assessing safety of high-cocao flavanol content supplements.

Designed and monitored preclinical rodent toxicity studies for dietary supplement product ingredients. Advised dietary supplement client on technical responses to alleged injury outbreak, including management of technical meetings with FDA and CDC investigators, and technical briefing of U.S. congressional staff.

Litigation Support

Provided expert deposition testimony for cases involving occupational or bystander exposures to ammonia, chlorine gas, pesticides, methacrylates, petroleum, and methylene chloride gas, ethanol/drug pharmacokinetics and risk- based environmental health litigation.

Provided risk-based analysis, expert reports, and expert deposition testimony regarding health impacts related to offsite groundwater VOC migration from a municipal landfill and residential pesticide exposures.

Contributed to health impact assessment and expert report development in cases involving public exposures to bisphenol A, coal ash wastes, contraceptive hormones, landfill odors, as well as occupational exposures to Naturally Occurring Radioactive Materials (NORM), asbestos, 1,3-butadiene, diisocyanates, mixed VOCs and World Trade Center dust.

Analyzed the effect of pharmaceutical incipients on gastrointestinal absorption and cellular effects of an osteoporosis medication.

Performed exposure modeling to compare disease risks over time in students and workers exposed to PCBs from aging lighting systems in a major metropolitan public school system.

Assisted with future projections of population- level blood PCB levels based on NHANES data.

PUBLICATIONS

Peer-Reviewed Publications

1. Perez, A, Lumpkin M, 2023. Critical endpoints of PFOA and PFOS exposure for regulatory risk assessment in drinking water: Parameter choices impacting estimates of safe exposure levels. Regul Tox Pharm. 138: 105323.
2. Campbell, J, Franzen A, Van Landingham C, Lumpkin M, Crowell S, Meredith C, Loccisano A, Gentry R, Clewell C. 2016. Predicting lung dosimetry of inhaled particle borne benzo[a] pyrene using physiologically based pharmacokinetic modeling. Inhal Toxicol. 28: 520-535.
3. Rodricks J and Lumpkin M. 2013. DMAA as a Dietary Ingredient. JAMA Intern Med. 173:594-595.
4. Rodricks J, Lumpkin M, Schilling B. 2013. Pharmacokinetic data distinguish abusive versus dietary supplement uses of 1,3-dimethylamylamine. Ann Emerg Med. 61:718-719.
5. Faroon O, Roney N, Taylor J, Ashizawa A, Lumpkin MH, Plewak, DJ. 2008. Acrolein environmental levels and potential for human exposure. Toxicol Ind Health. 24:543- 564.
6. Faroon O, Roney N, Taylor J, Ashizawa A, Lumpkin MH, Plewak, DJ. 2008. Acrolein health effects. Toxicol Ind Health. 24:447-490.
7. Fisher J, Lumpkin M, Boyd J, Mahle D, Bruckner J, El-Masri H. 2003. PBPK Modeling on the Metabolic Interactions of Carbon

Tetrachloride and Tetrachloroethylene. Environ Toxicol Pharmacol 16:93-105.

8. Lumpkin MH, Bruckner JV, Campbell JL, Dallas CE, White CA, Fisher JW. 2003. Plasma Binding of Trichloroacetic Acid in Mice, Rats, and Humans under Cancer Bioassay and Environmental Conditions. Drug Metab Disp 31(10):1203- 1207.
9. Yu KO, Naarayanan L, Mattie DR, Godfrey RJ, Todd PN, Sterner TR, Mahle DA, Lumpkin MH, Fisher JW. 2001. The Pharmacokinetic of Perchlorate and its Effect on the Hypothalamus/Pituitary-Thyroid Axis. Toxicol Appl Pharmacol 181(2):148-159.

PRESENTATIONS, ABSTRACTS AND SYMPOSIUM PROCEEDINGS

1. Drechsel D, Lumpkin M, McMullin T. 2023. Metal Exposure Associated with Use of Soil and Fertilizer Products in a Commercial Greenhouse Setting with Comparison to Proposition 65 Safe Harbor Levels. Presented at the 62nd Meeting of the Society of Toxicology in Nashville, TN.
2. Drechsel D, Simoneau T, Lumpkin M. 2023. Formaldehyde Off-Gassing from Bed Sheets and Pillowcases: A Simulation Study. Presented at the 62nd Meeting of the Society of Toxicology in Nashville, TN.
3. Bamber A, Lumpkin M, McMullin T. 2022. A Novel Approach to Characterize Exposures and Health Risks to Communities Surrounding Oil and Gas Operations in Colorado: Utilizing Real-Time Handheld Air Quality Monitoring and Analytical Air Sampling Methods. Presented at the 61st Meeting of the Society of Toxicology in San Diego, CA.
4. Lumpkin M, Bamber A, McMullin T. 2022. Use of Benzene Measurements to Evaluate the Role of Setback Distances to Protect Public Health from Oil and Gas Wellpad Emissions in Colorado. 2022. Presented at the 61st Meeting of the Society of Toxicology in San Diego, CA.
5. Sams R, Shea S, Lumpkin M, Kind J, Britt, A. 2019. Progress in Addressing Workers' Concern Related to Chemical Vapors at the Hanford Site - 19054a. Site presentation at WM2019 Conference in Phoenix, Arizona.
6. Lumpkin M. 2014. Inhalation Toxicology for First Responders. Training seminar provided to firefighters, national guardsmen, and emergency medical technicians at multiple fire departments across North Dakota.
7. Lumpkin M, Crowell S, Franzen A, Gentry R, Kaden D, Meredith C, Potts, R. 2014. Development of a PBPK Model for Inhaled Benzo[a]pyrene in Rats and Humans. The Toxicologist 138:1. Presented at the 53rd Meeting of the Society of Toxicology in Phoenix, AZ.
8. Schlosser P, Lumpkin M, Morris J. 2013. Extension of a Nasal Dosimetry Model for Acetaldehyde to Account for Vasodilation. The Toxicologist 132:1. Presented at the 52st Meeting of the Society of Toxicology in San Antonio, TX.
9. Lumpkin M, Gentry P, Greene T, Shipp A, Cirone T. 2012. Reassessment of the Critical Effect of Perchlorate Toxicity in the Human Thyroid to Inform on Drinking Water Regulations. The Toxicologist 126:1. Presented at the 51st Meeting of the Society of Toxicology in San Francisco, CA.
10. Lumpkin, M. 2011. Dose Reconstruction Inside and Out. Presented at the Fall Meeting of the Georgia Local Lumpkin, M. 2011. Dose Reconstruction Inside and Out. Presented at the Fall Meeting of the Georgia Local Section of the American Industrial Hygiene Association in Atlanta, GA.
11. Lumpkin M. 2009. Developing Mechanistic Models for Risk Assessment of Biothreat Agents. Presented at the EPA-CDC Workshop on State-of-the-Science of the Determination and Application of Dose-Response Relationships in Microbial Risk Assessment. Centers for Disease Control in Atlanta, GA.
12. Lumpkin M, Diamond G, Massulik S, Coleman P. 2009. PBBK/BD Model of Francisella Tularensis in Rhesus Monkeys. The Toxicologist 108:1. Presented at the 48th Meeting of the Society of Toxicology in Baltimore, MD.
13. Diamond G, Lumpkin M, Rhoades J, Massulik S, Coleman P. 2008. Modeling Inhaled Microbes in Primates to Inform Discussions on "Acceptable Risk." Presented at the 2008 Annual Meeting of the Society for Risk Analysis in Boston, MA.
14. Lumpkin M, McClure PR, Diamond, G, Schlosser P, Cooper, GS. 2008. Assessment of Dichloromethane PBTK Model Performance in the Rat. The Toxicologist 102:1. Presented at the 47th Meeting of the Society of Toxicology in San Diego, CA.
15. Lumpkin MH, Diamond GL, Kedderis GL, Odin MA, White JR, Teuschler LK, Rice GE, Reid, JB, Lipscomb JC. 2006. A Physiologically Based Pharmacokinetic Model of Trihalomethanes in the Pregnant Rat: Identification of Key Data Needs. The Toxicologist 90:1. Presented at the 45th Meeting of the Society of Toxicology in San Diego, CA.
16. Keys DA, Lumpkin MH, Bruckner JV, Fisher JW. 2005. Incorporation of Trichloroacetic Acid Plasma Binding in Human and Mouse in Trichloroethylene Risk Assessment. The Toxicologist 84:1-S. Presented at the 44th Meeting of the Society of Toxicology in New Orleans, LA.
17. Lumpkin MH, Runnion V, Leickfield R, Paul S, Harbison R. 2005. Simulation and Assessment of Occupational Exposures to Isocyanates and VOCs During Application of a Urethane Product Suite Under Worst-Case Conditions. The Toxicologist 84:1-S. Presented at the 44th Meeting of the Society of Toxicology in New Orleans, LA.
18. Lumpkin MH, Dahlstrom DL. 2004. Mold by the Numbers: The Strengths and Weaknesses of the Scientific Literature to Provide Mycotoxin-related IAQ Risk Assessment. Presented May 10, 2004 at

the American Industrial Hygiene Conference and Exposition in Atlanta, Georgia.

PEER-REVIEWED REPORTS

1. Lumpkin M, Plewak D. 2009. Toxicological Profile for 1,3-Butadiene (Update, Draft for Peer Reviewer Comment). Prepared for the Agency for Toxic Substances and Disease Registry.
2. Bosch S, Lumpkin M, Plewak D. 2009. Toxicological Review of Tert Amyl Methyl Ether (TAME, CAS No. 994-05-8) in Support of Summary Information on the Integrated Risk Information System (IRIS). (Internal EPA review). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
3. Lumpkin M, Odin M. 2009. Draft provisional toxicity values for 4,6-Dinitro-o-cresol (CASRN 534-52-1). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
4. Lumpkin M, Odin M. 2009. Draft provisional toxicity values for methyl acetate (CASRN 72-20-9). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
5. Lumpkin M, Odin M. 2009. Draft provisional toxicity values for 2-methoxyethanol (CASRN 109- 86-4) and 2-methoxyethanol acetate (CASRN 110-49-6and 32718-56-2). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
6. McClure P, Llados F, Osier M, Plewak D, Lumpkin M, Ellis B. 2008. Toxicological Review of Dichloromethane (Methylene Chloride) (CAS No. 79-09-2) in Support of Summary Information on the Integrated Risk Information System (IRIS). (Internal EPA review). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
7. Lumpkin M, Odin M, Carlson-Lynch H. 2008. Draft provisional toxicity values for 2-methoxyethanol (CASRN 109-86-4). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
8. Lumpkin M, Odin M. 2008. Draft provisional toxicity values for Diethylene Glycol Monoethyl Ether (CASRN 111- 90-0). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
9. Lumpkin M, Chappell L, McClure P. 2007. Toxicological Profile for Boron (Update, Draft for Public Comment). Prepared for the Agency for Toxic Substances and Disease Registry.
10. Lumpkin M, Swarts S, Plewak D. 2007. Toxicological Profile for Acrolein (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.
11. Lumpkin M, Odin M, Carlson-Lynch H. 2007. Draft provisional toxicity values for hydroquinone (CASRN 123- 31-9). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
12. Lumpkin M, Odin M, Klotzbach J. 2007. Draft provisional toxicity values for p-chloroaniline (CASRN 106-47-8). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.
13. Stickney J, Llados F, Lumpkin M, Odin M. 2007. Toxicological review of 1,4-dioxane (CASRN 123-91-1) in Support of Summary Information on the Integrated Risk Information System (IRIS). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
14. Stickney J, Citra M, Lumpkin M. 2006. Toxicological profile for vinyl chloride (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.
15. Stickney J, Llados F, Lumpkin M, Odin M. 2006. Toxicological Review of 1,4-Dioxane (CAS No. 123-91-1) in Support of Summary Information on the Integrated Risk Information System (IRIS). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
16. McClure P, Llados F, Osier M, Plewak D, Lumpkin M, Ellis. 2006. Toxicological review of dichloromethane (methylene chloride) (CASRN 79-09-2) in Support of Summary Information on the Integrated Risk Information System (IRIS). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
17. Osier M Llados F Plewak D Lumpkin M Odin M (2006) Toxicological review of cerium (stable, CASRN 7440-45-1) and compounds in Support of Summary Information on the Integrated Risk Information System (IRIS). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
18. McDougal A, Wohlers D, Lumpkin M, McClure P. 2006. Toxicological Review of Mirex (CAS No. 2385-85-5) in Support of Summary Information on the Integrated Risk Information System (IRIS). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, DC.
19. Fransen M, Lumpkin M, Rhodes J, McClure P. 2006. Toxicological Review of Acrylonitrile (CAS No. 107-13-1) in Support of Summary Information on the Integrated Risk Information System (IRIS). (Internal EPA review). Prepared for the IRIS Program, National Center for Environmental Assessment, U.S. EPA, Washington, D.C.
20. Llados F, Garber K, Paikoff S, Lumpkin M. 2006. Toxicological profile for Phenol (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.
21. Lumpkin M, Odin M. 2006. Draft provisional toxicity values for bifenox (CASRN 42576-02-3). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.

22. Wohlers D, Lumpkin M, Coley C, Hard C. 2006. Toxicological profile for diazinon (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.

23. Klotzbach J, Lumpkin M, Odin M. 2006. Draft provisional toxicity values for bis(2-ethylhexyl)phthalate (CASRN 117- 81-7). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.

24. Lumpkin M, Odin M. 2006. Draft provisional toxicity values for 1,1-dimethylhydrazine (CASRN 57-14-7). Prepared for the Superfund Technology Support Center, National Center for Environmental Assessment, U.S. EPA, Cincinnati, OH.

25. Lumpkin M, Ingerman L, Plewak J, Moilanen L, Beblo D, Walters J. 2005. Toxicological Profile for Bromoform and Dibromochloromethane (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.

26. Bosch S, Citra M, Quinones-Rivera A, Lumpkin M, Rhoades J, Llados F. 2005. Toxicological Profile for Alpha-, Beta-, Gamma-, and D elta-Hexachlorocyclohexane (Update, Final). Prepared for the Agency for Toxic Substances and Disease Registry.