

Charlotte A. Love, Ph.D.

Scientific Consultant & Expert Witness, Raptor Pharm & Tox, Ltd

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Summary

Dr. Love is an award-winning toxicologist recognized with multiple awards for her research at national and international scientific meetings and by the National Institutes of Health (NIH). She has over seven years of toxicology experience across academic and federal government research settings, including the University of North Carolina at Chapel Hill and the National Toxicology Program at the National Institute of Environmental Health Sciences (NIEHS). She holds a Ph.D. in Toxicology and Environmental Medicine from UNC Chapel Hill, where she also completed postdoctoral training.

Dr. Love's expertise and publication record spans inhalation and respiratory toxicology—including e-cigarette and vaping products (nicotine, cannabinoids, and melatonin), combustion and thermal degradation products, and nanomaterials—as well as PFAS, reproductive and developmental toxicology, and pharmaceutical preclinical safety assessment. Her doctoral research produced some of the first mechanistic characterizations of the respiratory toxicology of cannabinoid vaping products, including primary chemical analysis of commercial CBD and Δ^8 -THC products and identification of previously undocumented oxidation products and their biological effects. She has also authored multiple reviews synthesizing current knowledge of cannabinoid vaping products. Additionally, she has experience in hazard identification, dose-response assessment, and mechanistic analysis through mode-of-action and adverse outcome pathway frameworks, as well as in the chemical characterization of complex mixtures. Her training in computational toxicology and statistical analysis further supports critical evaluation of scientific study designs, analyses, and overall study quality.

Dr. Love has published 15 peer-reviewed articles, including 5 as first author and review articles synthesizing complex toxicological evidence across rapidly evolving fields. She has also served as a peer reviewer for scientific journals and has taught at the undergraduate and graduate levels across toxicology, biochemistry, biology, and statistics. She currently provides scientific consulting and expert witness support at Raptor Pharm & Tox, Ltd.

Education

2025	Ph.D., Toxicology & Environmental Medicine, The University of North Carolina at Chapel Hill, Chapel Hill, NC
2019	B.A., Biology with a Minor in Environmental Studies, Graduated with Honors, Grinnell College, Grinnell, IA

Employment History

2026-Present	Scientific Consultant & Expert Witness, Raptor Pharm & Tox, Ltd. Durham, NC
2025-2026	Postdoctoral Research Associate, Marsico Lung Institute, The University of North Carolina at Chapel Hill, Chapel Hill, NC
2020-2025	Graduate Research Assistant, Center for Environmental Medicine, Asthma and Lung Biology, The University of North Carolina at Chapel Hill, Chapel Hill, NC
2019-2020	Postbaccalaureate Intramural Research Training Award (IRTA) Fellow, National Toxicology Program Labs, National Institute of Environmental Health Sciences, Durham, NC
Spring 2019	Teaching Assistant for Molecules, Cells, and Organisms (BIO 251), Biology Department, Grinnell College, Grinnell, IA
Fall 2018	Teaching Assistant for Introduction to Biochemistry (BCM 262), Biochemistry Department, Grinnell College, Grinnell, IA
Summer 2018	Undergraduate Research Assistant, Department of Pharmacology and Toxicology, Rutgers University, Piscataway, NJ
Summer 2017	Undergraduate Research Assistant, Aquatic Toxicology Lab, Gulf Coast Research Laboratory, The University of Southern Mississippi, Ocean Springs, MS
2016-2017	Teaching Assistant for Applied Statistics (MAT 209), Statistics Department, Grinnell College, Grinnell, IA

Awards and Honors

2025-2026	T32 Institutional Research Training Grant Trainee, UNC Marisco Lung Institute, National Heart Lung and Blood Institute (NHLBI), National Institutes of Health
2023-2025	F31 Ruth L. Kirschstein Predoctoral Individual National Research Service Award, National Heart Lung and Blood Institute (NHLBI), National Institutes of Health
2024	Graduate Student Poster Presentation Competition 2nd Place, North Carolina Society of Toxicology Annual Meeting
2024	Best Poster Presentation Senior Graduate Student, UNC Curriculum in Toxicology and Environmental Medicine Annual Retreat
2023	Inhalation and Respiratory Specialty Section Student Award Honorable Mention, Society of Toxicology Annual Meeting
2023	Leon Golberg Memorial Travel Award (UNC Travel Award for the Society of Toxicology Annual Meeting)
2021-2022	T32 Institutional Research Training Grant Trainee, UNC Curriculum in Toxicology & Environmental Medicine, National Institute of Environmental Health Sciences (NIEHS), National Institutes of Health
2022	Graduate Student Platform Presentation Competition 1st Place, North Carolina Society of Toxicology Annual Meeting
2022	Leon Golberg Memorial Travel Award (UNC travel award for the Society of Toxicology Annual Meeting)
2021	Best Oral Presentation Award, International Society for Aerosols in Medicine Annual Congress
2020	James C. Bradford Memorial Best Poster Award, Society for Birth Defects Research and Prevention Annual Meeting
2019	Pfizer Society of Toxicology Undergraduate Student Travel Award, Society of Toxicology Annual Meeting
2015-2019	Trustee Honor Scholarship (competitive merit scholarship), Grinnell College
2017	Environmental Studies Grant (competitive undergraduate grant for summer research), Grinnell College

Current Professional Memberships

2022-Present

Society of Toxicology

Publications (Peer-reviewed Journal Articles)

1. **Love, C. A.**, Kim, H. Y., Rager, J., Tallman, K., Schichlein, K., Porter, N., & Jaspers, I. (2026). Transcriptomic and functional responses of human airway cells to vaped $\Delta 8$ -THC and its oxidation product $\Delta 8$ -THCQ. *Scientific Reports*, 16, Article 22216.
2. Schichlein, K. D., **Love, C. A.**, Fields, L. M., Kim, H. H., Guhr, T. N., Nagy, S. G., ... & Jaspers, I. (2026). An open-source 3D-printable on-plate aerosol delivery array (OPADA) for *in vitro* aerosol research. Accepted for publication in the *American Journal of Respiratory Cell and Molecular Biology*.
3. **Love, C. A.**, Porter, N. A., Kim, H. Y. H., & Jaspers, I. (2025) Cannabinoid vaping products: Regulation, composition, toxicological effects, and emerging research. *Chemical Research in Toxicology*, 38(12), 2028-2040.
4. **Love, C. A.**, Kim, H. H., Tallman, K. A., Clapp, P. W., Schichlein, K.D., Porter, N. A. & Jaspers, I. (2025). Vaping-induced oxidation of CBD causes adduction of TOP2A and interferes with cellular proliferation. *American Journal of Respiratory Cell and Molecular Biology*, 73(5), 755-768.
5. Schichlein, K. D., Kim, H. Y. H., **Love, C. A.**, Guhr Lee, T. N., Esther Jr, C. R., Porter, N. A., Rebuli, M. E., Ehrmann, B. M., Clapp, P. W. & Jaspers, I. (2024). Melatonin vapes contain potential contaminants and alter the human bronchial epithelial transcriptome. *Chemical Research in Toxicology*, 37(12), 1919-1923.
6. Ghosh, A., Payton, A., Gallant, S. C., Rogers Jr, K. L., Mascenik, T., Hickman, E., **Love, C. A.**, Schichlein, K. D., Smyth, T. R., Kim, Y. H., Rager, J. E., Gilmour, M. I., Randell, S. H., & Jaspers, I. (2024). Burn pit smoke condensate-mediated toxicity in human airway epithelial cells. *Chemical Research in Toxicology*, 37(5), 791-803.
7. Rogers, K., WaMaina, E., Barber, A., Masood, S., **Love, C.**, Kim, Y. H., Gilmour, M. I., & Jaspers, I. (2024). Emissions from plastic incineration induce inflammation, oxidative stress, and impaired bioenergetics in primary human respiratory epithelial cells. *Toxicological Sciences*, 199(2), 301-315.
8. **Love, C. A.**, Kim, H. Y. H., Tallman, K. A., Clapp, P. W., Porter, N. A., & Jaspers, I. (2023). Vaping-induced cannabidiol (CBD) oxidation product CBD quinone forms protein adducts with KEAP1 and activates KEAP1-Nrf2 genes. *Chemical Research in Toxicology*, 36(4), 565-569.
9. Schichlein, K. D., **Love, C. A.**, Conolly, M. P., Kurz, J. L., Hickman, E. D., Clapp, P. W., & Jaspers, I. (2023). Vaping product exposure system (VaPES): a novel *in vitro* aerosol deposition system. *Inhalation Toxicology*, 35(13-14), 324-332.
10. Jaspers, I., & **Love, C. A.** (2023). Weed, sex and influenza. *ERJ Open Research*, 9(6).

11. **Love, C. A.**, Schichlein, K. D., Clapp, P. W., & Jaspers, I. (2022). Cannabinoid vaping products present novel challenges for assessment of respiratory health effects. *Toxicological Sciences*, 188(1), 1-3.
12. Fish, E. W., Mendoza-Romero, H. N., **Love, C. A.**, Dragicevich, C. J., Cannizzo, M. D., Boschen, K. E., ... & Parnell, S. E. (2022). The pro-apoptotic Bax gene modifies susceptibility to craniofacial dysmorphology following gastrulation-stage alcohol exposure. *Birth Defects Research*, 114(19), 1229-1243.
13. Cope, H. A., Blake, B.E., **Love C. A.**, McCord, J., Elmore, S. A., Harvey, J. B., Chappell, V. A., & Fenton, S. E. (2021). Latent, sex-specific metabolic health effects in CD-1 mouse offspring exposed to PFOA or HFPO-DA (GenX) during gestation. *Emerging Contaminants*, 7, 219-235.
14. Escobar, Y. N. H., Morrison, C. B., Chen, Y., Hickman, E., **Love, C. A.**, Rebuli, M. E., ... & Jaspers, I. (2021). Differential responses to e-cig generated aerosols from humectants and different forms of nicotine in epithelial cells from non-smokers and smokers. *American Journal of Physiology-Lung Cellular and Molecular Physiology*, 320(6), L1064-L1073.
15. Fournier, S. B., Kallontzi, S., Fabris, L., **Love, C.**, & Stapleton, P. A. (2019). Effect of gestational age on maternofetal vascular function following single maternal engineered nanoparticle exposure. *Cardiovascular Toxicology*, 1-13.

Invited Lectures & Workshops

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| 2025 | “Analysis of Transcriptomic Data and Co-Modulated Patterns of Gene Expression”, invited lecture for ENVR 730 Computational Toxicology and Exposure Science, UNC Chapel Hill. |
| 2022 | “What Science Teachers Need to Know About E-Cigarettes and Cannabinoid Products”, interactive lecture given at workshop held at UNC Chapel Hill for NC science teachers. |
| 2019 | “Engineered nanomaterials and pregnancy: how <i>in utero</i> exposure can disrupt the cardiopulmonary system setting the stage for lifelong health consequences”, Grinnell College Biology Department Seminar. |

Abstracts

- **Love, C. A.**, Nagy, S. G., Schichlein, K. D., Metiva, J. J., Schoenfish, M. H., & Olivier, K. N. Epithelial tolerance of aerosolized liposomal nitric oxide prodrug MD3 in a primary human airway model of *Mycobacterium abscessus* infection. Poster presentation to be delivered at the North American Cystic Fibrosis Conference, Atlanta, GA, October 2026.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Clapp, P. W., Porter, N. A., & Jaspers, I. CBD oxidation product CBD quinone adducts TOP2A and inhibits cell cycle progression and cellular proliferation. Poster presentation delivered at the North Carolina Society of Toxicology annual meeting, RTI, RTP, NC, October 2024.

- **Love, C. A.**, Kim, H. H., Soerianto, W.S., Tallman, K. A., Clapp, P. W., Porter, N. A., & Jaspers, I. Aerosolized commercial CBD and Δ 8-THC vaping products generate cannabinoid quinones and alter primary human airway cell function. Poster presentation delivered at the Society of Toxicology annual meeting, Salt Lake City, UT, March 2024.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Porter, N. A., Clapp, P. W. & Jaspers, I. Vaping-derived Δ 8-THC quinones form cysteine adducts and alter the respiratory epithelium transcriptome. Platform presentation delivered at the European Respiratory Society International Congress, Milan, Italy, September 2023.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Porter, N. A., Clapp, P. W. & Jaspers, I. Quinones generated from vaping CBD and Δ 8-THC in the presence of pro-oxidant impurities alter the human lung cell transcriptome. Poster presentation delivered at the Society of Toxicology annual meeting, Nashville, TN, March 2023.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Porter, N. A., Clapp, P. W. & Jaspers, I. Vaping induced CBD oxidation product CBD quinone forms protein adducts with Keap1 and activates the Keap1-Nrf2 pathway in airway epithelial cells. Platform presentation delivered at the North Carolina Society of Toxicology annual meeting, Durham, NC, October 2022.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Porter, N. A., Jaspers, I. & Clapp, P. W. Vaping-Induced CBD and Δ 8-THC Oxidation Products Adduct Proteins and Impair Proliferation in Human Lung Cells. Platform presentation delivered at the Society of Toxicology annual meeting, San Diego, CA, March 2022.
- **Love, C.**, Cope, H. A., Blake, B., Phan, T., Brooks, A., Li, J., Hobbie, K., Chappell, V. A. & Fenton, S. A. Comparative Evaluation of Murine Mammary Gland Development and Transcriptomic Profiles following *In Utero* Exposure to PFOA and GenX. Poster presentation delivered at the Society of Toxicology annual meeting, San Diego, CA, March 2022.
- **Love, C. A.**, Kim, H. H., Tallman, K. A., Porter, N. A., Jaspers, I. & Clapp, P. W. Cannabidiol (CBD) in e-cigarette liquid adducts to cellular proteins, induces inflammation, and impairs cilia motility in bronchial epithelial cells. Platform presentation delivered at the International Society for Aerosols in Medicine Annual Congress, virtual, May 2021.
- **Love, C. A.**, Cope, H.A., Blake, B.E., Phan, T.P., Brooks, A., Li, J., Hobbie, K., & Fenton, S.E. Comparative evaluation of murine mammary gland developmental abnormalities and transcriptomic profiles following in utero exposure to PFOA and GenX. Poster presentation delivered at the Society for Birth Defects Research and Prevention Annual Meeting, virtual, June 2020.
- **Love, C. A.**, Szilagyi, J.T., D'Errico, J.N., Fournier, S.B., Brinker, A., Aleksunes, L.M., Buckley, B. and Stapleton, P.A. Gestational Exposure to Inhaled Nano-sized Titanium Dioxide Impairs Fetal Nutrition. Poster presentation delivered at the Society of Toxicology annual meeting, Baltimore, MD, March 2019.

In addition, I am a peer-reviewer for the following journals:

- Chemical Research in Toxicology