

Main menu

# UC DAVIS

## DEPARTMENT of NUTRITION

Search

Contact



## Carolyn M. Slupsky, Ph.D.

### Education

- B.Sc., Biochemistry, University of Alberta
- Ph.D., Biochemistry, University of Alberta

### Research Interests

Dr. Slupsky's research includes understanding the impact of diet on human health from the perspective of nutrition, the gut microbiome, and host-microbial co-metabolism. She uses a multi-disciplinary research approach that integrates metabolomics with clinical measures, global gene expression profiles, as well as microbial community analysis to understand the intimate link between our gut microbiome, metabolism, and health. In addition, she is looking into the implication of food processing, agricultural practices, and plant health status on the nutrient content and sensory aspects of the food we eat. These studies will provide novel insight on health management and food development, and usher us into the era of personalized nutrition.

Lab: <http://slupskylab.faculty.ucdavis.edu/>

### Position

**Professor**  
**Department of**  
**Nutrition/**  
**Department of Food**  
**Science &**  
**Technology**  
**Chair**  
**Graduate Group in**  
**Nutritional Biology**  
**Kinsella Endowed**  
**Chair in Food,**  
**Nutrition, and**  
**Health**  
**Nutritionist**  
**Agricultural**  
**Experiment Station**

### Contact

**Email:**  
[cslupsky@ucdavis.edu](mailto:cslupsky@ucdavis.edu)  
**Website:**  
 Slupsky Lab  
**Office:**  
 (530)-219-5757  
**Address**  
 3247 Meyer Hall One  
 Shields Avenue  
 Davis, CA 95616

### Selected Publications

Barouei J, Bendiks Z, Martinic A, Mishchuk D, Heeney D, Hsieh YH, Kieffer D, Zaragoza J, Martin R, Slupsky C, Marco ML (2017) "Microbiota, metabolome, and immune alterations in obese mice fed a high-fat diet containing type 2 resistant starch." *Mol Nutr Food Res* 61(11) 1700184. 2017 Nov. [[PubMed](#)]

Chin E, Godfrey K, Polek ML, Slupsky C (2017) "Metabolomic analysis of Citrus macrophylla subjected to Asian Citrus Psyllid (*Diaphorina citri* Kuwayama) feeding" *Arthropod Plant Inter* 11(6) 901-909.

Munblit D, Peroni DG, Boix-Amorós A, Hsu PS, Land BV, Gay MCL, Kolotilina A, Skevaki C, Boyle RJ, Collado MC, Garssen J, Geddes DT, Nanan R, Slupsky C, Wegienka G, Kozyrskyj AL, Warner JO. (2017) "Human milk and allergic diseases: An unsolved puzzle" *Nutrients* 9(8) E894. 2017 Aug 17. [[PubMed](#)]

Alexeev E, He X, Slupsky C, Lönnnerdal B (2017) "Effects of iron supplementation on growth, gut microbiota, metabolomics and cognitive development of rat pups" *PLoS One* 12(6): e0179713. 2017 Jun 29. [[PubMed](#)]

Slupsky CM, He X, Hernell O, Andersson Y, Rudolph C, Lönnnerdal B, West CE (2017) "Postprandial response of breast-fed infants and infants fed lactose-free vs regular infant formula - unexpected metabolic effects on amino acid metabolism. A randomized controlled trial" *Sci Rep* 7(1) 3640. 2017 Jun 16. [[PubMed](#)]

Smilowitz JT, Lemay DG, Kalenetra KM, Chin EL, Zivkovic AM, Breck MA, German JB, Mills DA, Slupsky C, Barile D (2017) "Tolerability and safety for the intake of bovine milk oligosaccharides extracted from cheese whey in healthy human adults" *J Nutr Sci* 6: e6. 2017 Feb 20. [[PubMed](#)]

- Moran-Ramos S, He X, Chin EL, Tovar AR, Torres N, Slupsky CM, Raybould HE (2017) "Nopal feeding reduces adiposity, intestinal inflammation and shifts the cecal microbiota and metabolism in high-fat fed rats" *PLoS One* 12(2): e0171672. 2017 Feb 14. [\[PubMed\]](#)
- Reverri EJ, Slupsky CM, Mishchuk DO, Steinberg FM. Metabolomics reveals differences between three daidzein metabolizing phenotypes in adults with cardiometabolic risk factors. *Mol Nutr Food Res*. 2016 Jul 1. [\[PubMed\]](#)
- Lo YC, Chien SC, Mishchuk DO, Slupsky CM, Mau JL. Quantification of Water-Soluble Metabolites in Medicinal Mushrooms Using Proton NMR Spectroscopy. *Int J Med Mushrooms*. 2016;18(5):413-24. [\[PubMed\]](#)
- Spevacek AR, Smilowitz JT, Chin EL, Underwood MA, German JB, Slupsky CM. Infant Maturity at Birth Reveals Minor Differences in the Maternal Milk Metabolome in the First Month of Lactation. *J Nutr* 2015;145(8):1698-708. [\[PubMed\]](#)
- Chen SY, Yu HT, Kao JP, Yang CC, Chiang SS, Mishchuk DO, Mau JL, Slupsky CM. Consumption of vitamin D2 enhanced mushrooms is associated with improved bone health. *J Nutr Biochem* 2015;26(7):696-703. [\[PubMed\]](#)
- He X, Slupsky CM. Metabolic fingerprint of dimethyl sulfone (DMSO<sub>2</sub>) in microbial-mammalian co-metabolism. *Journal of proteome research*. 2014 Dec 5;13:5281-92. [\[PubMed\]](#)
- Chen SY, Yu HT, Kao JP, Yang CC, Chiang SS, Mishchuk DO, Mau JL, Slupsky CM. An NMR metabolomic study on the effect of alendronate in ovariectomized mice. *PLoS one*. 2014;9:e106559.[\[PubMed\]](#)
- Chin EL, Mishchuk DO, Breksa AP, Slupsky CM. Metabolite signature of *Candidatus Liberibacter asiaticus* infection in two citrus varieties. *Journal of agricultural and food chemistry*. 2014 Jul 16;62:6585-91.[\[PubMed\]](#)
- Warden CH, **Slupsky C**, Griffey SM, Bettaieb A, Min E, Le A, Fisler JS, Hansen S, Haj F, Stern JS. Brown Norway chromosome 1 congenic reduces symptoms of renal disease in fatty Zucker rats. *PLoS One*. 2014 Jan 31;9(1):e87770. [\[PubMed\]](#)
- He X, Mishchuk DO, Shah J, Weimer BC, Slupsky CM. Cross-talk between *E. coli* strains and a human colorectal adenocarcinoma-derived cell line. *Scientific reports*. 2013;3:3416. [\[PubMed\]](#)
- He X, Marco ML, Slupsky CM. Emerging aspects of food and nutrition on gut microbiota. *Journal of agricultural and food chemistry*. 2013 Oct 9;61:9559-74. [\[PubMed\]](#)
- Smilowitz JT, O'Sullivan A, Barile D, German JB, Lonnerdal B, Slupsky CM. The human milk metabolome reveals diverse oligosaccharide profiles. *The Journal of nutrition*. 2013 Nov;143:1709-18. [\[PubMed\]](#)
- Harris C, Chohanadisai W, Mishchuk DO, Satre M, Slupsky CM, Rucker RB. Dietary pyrroloquinoline quinone (PQQ) alters indicators of plasma antioxidant potential, inflammation, and mitochondrial-related metabolism in human subjects. *J Nutr Biochem*. 2013 Dec;24(12):2076-84. [\[PubMed\]](#)
- Tso V, Sydora BC, Foshaug RR, Churchill TA, Doyle J, Slupsky CM, Fedorak RN. (2013) Metabolomic profiles are gender, disease, and time specific in the interleukin-10 gene-deficient mouse model of inflammatory bowel disease. *PLoS ONE* 8, e67654. [\[PubMed\]](#)
- O'Sullivan A, He X, McNiven EM, Haggarty NW, Lonnerdal B, Slupsky CM. Early diet impacts infant rhesus gut microbiome, immunity, and metabolism. *J Proteome Res*. (2013) 12, 2833-2845. PMID: 23651394 [\[PubMed\]](#)
- O'Sullivan A, He X, McNiven EM, Hinde K, Haggarty NW, Lonnerdal B, Slupsky CM. Metabolomic phenotyping validates the infant rhesus monkey as a model of human infant metabolism. *J Pediatr Gastroenterol*. (2013) *Nutr* 56, 355-363. PMID: 23201704 [\[PubMed\]](#)

O'Sullivan A, Willoughby RE, Mishchuk D, Alcarraz B, Cabezas-Sanchez C, Condori RE, David D, Encarnacion R, Fatteh N, Fernandez J, Franka R, Hedderwick S, McCaughey C, Ondrush J, Paez-Martinez A, Rupprecht C, Velasco-Villa A, Slupsky CM. Metabolomics of cerebrospinal fluid from humans treated for rabies. *J Proteome Res.* (2013) 12, 481–490. PMID: 23163834 [\[PubMed\]](#)

O'Sullivan A, Willoughby RE, Mishchuk D, Alcarraz B, Cabezas-Sanchez C, Condori RE, David D, Encarnacion R, Fatteh N, Fernandez J, Franka R, Hedderwick S, McCaughey C, Ondrush J, Paez-Martinez A, Rupprecht C, Velasco-Villa A, Slupsky CM. Metabolomics of cerebrospinal fluid from humans treated for rabies. *J Proteome Res.* 2013 Jan 4;12(1):481–90. [\[PubMed\]](#)

O'Sullivan A, He X, McNiven EM, Hinde K, Haggarty NW, Lönnerdal B, Slupsky CM. Metabolomic Phenotyping Validates The Infant Rhesus Monkey As A Model of Human Infant Metabolism. *J Pediatr Gastroenterol Nutr.* 2012 Nov 27. [\[PubMed\]](#)

O'Sullivan A, Willoughby RE, Mishchuk D, Alcarraz B, Cabezas-Sanchez C, Condori RE, David D, Encarnacion R, Fatteh N, Fernandez J, Franka R, Hedderwick S, McCaughey C, Ondrush J, Paez-Martinez A, Rupprecht C, Velasco-Villa A, Slupsky CM. Metabolomics of cerebrospinal fluid from humans treated for rabies. *J Proteome Res.* 2013 Jan 4;12(1):481–90. [\[PubMed\]](#)

Zhang X, Breksa AP 3rd, Mishchuk DO, Fake CE, O'Mahony MA, Slupsky CM. Fertilisation and pesticides affect mandarin orange nutrient composition. *Food Chem.* 2012 Sep 15;134(2):1020–4. [\[PubMed\]](#)

Slisz AM, Breksa AP 3rd, Mishchuk DO, McCollum G, Slupsky CM. Metabolomic analysis of citrus infection by 'Candidatus Liberibacter' reveals insight into pathogenicity. *J Proteome Res.* 2012 Aug 3;11(8):4223–30. [\[PubMed\]](#)

Stephens NS, Siffledeen J, Su X, Murdoch TB, Fedorak RN, Slupsky CM. Urinary NMR metabolomic profiles discriminate inflammatory bowel disease from healthy. *J Crohns Colitis.* 2013 Mar;7(2):e42–8. [\[PubMed\]](#)

McNiven EM, German JB, Slupsky CM. Analytical metabolomics: nutritional opportunities for personalized health. *J Nutr Biochem.* 2011 Nov;22(11):995–1002. [\[PubMed\]](#)

Ye Z, Mishchuk DO, Stephens NS, Slupsky CM. Dextran sulfate sodium inhibits alanine synthesis in caco-2 cells. *Int J Mol Sci.* 2011;12(4):2325–35. [\[PubMed\]](#)

Davis VW, Bathe OF, Schiller DE, Slupsky CM, Sawyer MB. Metabolomics and surgical oncology: Potential role for small molecule biomarkers. *J Surg Oncol.* 2011 Apr;103(5):451–9. [\[PubMed\]](#)

McNiven EM, German JB, Slupsky CM. Analytical metabolomics: nutritional opportunities for personalized health. *J Nutr Biochem.* 2011 Nov;22(11):995–1002. [\[PubMed\]](#)

Zhang X, Breksa AP 3rd, Mishchuk DO, Slupsky CM. Elevation, rootstock, and soil depth affect the nutritional quality of mandarin oranges. *J Agric Food Chem.* 2011 Mar 23;59(6):2672–9. [\[PubMed\]](#)

Moroz J, Turner J, Slupsky C, Fallone G, Syme A. Tumour xenograft detection through quantitative analysis of the metabolic profile of urine in mice. *Phys Med Biol.* 2011 Feb 7;56(3):535–56. Epub 2011 Jan 6. [\[PubMed\]](#)

Slupsky CM, Steed H, Wells TH, Dabbs K, Schepansky A, Capstick V, Faught W, Sawyer MB. Urine metabolite analysis offers potential early diagnosis of ovarian and breast cancers. *Clin Cancer Res.* 2010 Dec 1;16(23):5835–41. Epub 2010 Oct 18. [\[PubMed\]](#)

Wang H, Tso VK, Slupsky CM, Fedorak RN. Metabolomics and detection of colorectal cancer in humans: a systematic review. *Future Oncol.* 2010 Sep;6(9):1395–406. Review. [\[PubMed\]](#)

Sekar Y, Moon TC, Slupsky CM, Befus AD. Protein tyrosine nitration of aldolase in mast cells: a plausible pathway in nitric oxide-mediated regulation of mast cell function. *J Immunol.* 2010 Jul 1;185(1):578–87. Epub 2010 May 28. [\[PubMed\]](#)

Slupsky CM (2010) "NMR-based analysis of metabolites in urine provides a rapid diagnosis and etiology of pneumonia." *Biomark Med* 4: 195 –197. [[PubMed](#)]

Slupsky CM, Rankin KN, Fu H, Chang D, Rowe BH, Charles PGP, McGeer A, Low D, Long R, Kunimoto D, Sawyer MB, Fedorak RN, Adamko DJ, Saude EJ, Shah SL, Marrie TJ (2009) "Determination of the etiology of pneumonia through urinary metabolomics." *J Proteome Res* 8, 5550 – 5558. [[PubMed](#)]

Slupsky CM, Cheypesh A, Chao D, Fu H, Rankin KN, Marrie TJ, Lacy P (2009) "Differences in the metabolic response to pneumonia caused by *Streptococcus pneumoniae* or *Staphylococcus aureus*." *J Proteome Res* 8, 3029 – 3036. [[PubMed](#)]

Takeda I, Stretch C, Barnaby P, Bhatnager K, Rankin K, Fu H, Weljie A, Jha N, Slupsky CM (2009) "Understanding the human salivary metabolome." *NMR Biomed* 22: 577 – 584. [[PubMed](#)]

Mahadevan S, Shah SL, Marrie TJ, Slupsky CM (2008) "Analysis of Metabolomic Data using Support Vector Machines." *Anal Chem* 80, 7562–7570. [[PubMed](#)]

Murdoch TB, Fu H, Martin S, Sydora B, Fedorak RN, Slupsky CM (2008) "Urinary metabolic profiles reveal progression of inflammatory bowel disease in interleukin-10 gene deficient mice." *Anal Chem* 80, 5524–5531. [[PubMed](#)]

McGrath BM, McKay R, Dave S, Seres P, Weljie AM, Slupsky CM, Hanstock CC, Greenshaw AJ, Silverstone PH (2008) "Acute dextro-amphetamine administration does not alter brain myo-inositol levels in humans and animals: MRS investigations at 3T and 18.8T." *Neurosci Res* 61, 351 – 359. [[PubMed](#)]

Slupsky CM, Rankin KN, Wagner J, Fu H, Chang D, Weljie AM, Saude EJ, Lix B, Adamko DJ, Shah S, Greiner R, Sykes BD, and Marrie TJ (2007) "Investigations of the effects of gender, diurnal variation, and age in human urinary metabolomic profiles." *Anal Chem* 79, 6995 – 7004. [[PubMed](#)]

Slupsky CM, Spyropoulos L, Booth VK, Crump MP, and Sykes BD (2007) "Probing nascent structures in peptides using natural abundance <sup>13</sup>C NMR relaxation and reduced spectral density mapping." *Proteins* 67, 18 – 30. [[PubMed](#)]

McGrath BM, Greenshaw AJ, McKay R, Slupsky CM, and Silverstone PH (2007) "Unlike lithium, anticonvulsants and antidepressants do not alter rat brain myo-inositol." *Neuroreport* 18, 1595 – 1598. [[PubMed](#)]

McGrath BM, Greenshaw AJ, McKay R, Slupsky CM, and Silverstone PH (2006) "Lithium treatment alters regional rat brain myo-inositol concentrations at 2 and 4 weeks: An Ex Vivo MRS study at 18.8 Tesla." *NeuroReport* 17, 1323 – 1326. [[PubMed](#)]

Saude EJ, Slupsky CM, and Sykes BD (2006) "Optimization of NMR analysis of biological fluids for quantitative accuracy." *Metabolomics* 2, 113 – 123.

Weljie AM, Newton J, Mercier P, Carlson E and Slupsky CM (2006) "Targeted profiling: Quantitative analysis of <sup>1</sup>H-NMR metabolomics data." *Anal Chem* 78, 4430 – 4442. [[PubMed](#)]

Graether SP, Slupsky CM, and Sykes BD (2006) "Effect of a mutation on the structure and dynamics of an  $\alpha$ -helical antifreeze protein in water and ice." *Proteins* 63, 603 – 610. [[PubMed](#)]

### **Selected Publications (Non-peer reviewed)**

Slupsky CM, Breksa AP, Hilf M. Metabolites may reveal attack strategy of the microbe causing HLB. *Citrograph* 4 (1), 40–42. (2013)

Chin E, Slupsky CM (2013) Applications of metabolomics in food science: Food composition, quality, sensory and nutritional attributes. In *Metabolomics in Food and Nutrition*. Weimer B, and Slupsky CM, eds. Woodhead, Cambridge, U.K. [[More](#)]

Sotelo J, Slupsky CM (2013) Metabolomics using nuclear magnetic resonance (NMR). In Metabolomics in Food and Nutrition. Weimer B, and Slupsky CM, eds. Woodhead, Cambridge, U.K. [\[More\]](#)

O'Sullivan A, Avizonis D, German JB, Slupsky CM Software Tools for NMR Metabolomics. In Encyclopedia of nuclear magnetic resonance. Harris RK, and Wasylshen R, eds. Wiley Interscience, Chichester, U.K. DOI: 10.1002/9780470034590. emrstm1232. 2011, Dec 15. [\[More\]](#)

Slupsky CM, and Sykes BD. The structural basis of regulation by EF-hand calcium binding proteins. In Calcium as a cellular regulator. Carifoli E, and Klee CB, eds. Oxford University Press, New York. pp 73 - 99. (1999) [\[More\]](#)

Sykes BD, Audette G, Gagné SM, Li M, Slupsky CM, and Tsuda S. NMR studies of the calcium-induced structural changes that trigger muscle contraction. In Biomacromolecules: From 3D-structure to Applications. 34<sup>th</sup> Hanford Symposium on Health and the Environment. Ornstein RL, ed. Batelle Press, Columbus Ohio. pp 11 - 19. (1996) [\[More\]](#)

Sykes BD, Slupsky CM, Wishart DS, Sönnichsen FD, and Gagné SM. On the use of NMR in complex biological systems: NMR studies of calcium sensitive interactions amongst muscle proteins in NMR as a Structural Tool for Macromolecules: Current Status and Future Directions. Nageswara-Rao BD, and Kemple MD, eds. Plenum Press, New York, pp 275-284. (1996) [\[More\]](#)

Slupsky CM, and Sykes BD. Muscle Proteins. In Encyclopedia of nuclear magnetic resonance. Grant DM, and Harris RK, eds. Wiley Interscience, Chichester, U.K. pp. 3188 - 3200. (1996) [\[More\]](#)