

CHENGHAO ZHU

📍 404 RUSSELL PARK APT 2 ▪ DAVIS, CALIFORNIA 95616 📞 530.750.9372 ✉ CHHZHU@UCDAVIS.EDU

POST-DOC RESEARCHER

RESEARCH INTEREST

Interested in using computational methods to (1) study the relationship between diet, disease and health, and (2) improve the efficiency when doing (1)

EDUCATION

PH.D. IN NUTRITIONAL BIOLOGY ▪ 2019
University of California, Davis, Davis CA

M.S. in Food Science ▪ 2013
University of California, Davis, Davis CA

B.S. in Applied Biological Science ▪ 2012
Zhejiang University, Hangzhou, China

SPECIALTIES

Metabolomics Lipidomics Proteomics Microbiome RNA-seq ChIP-seq
HDL Composition and Function
Bioinformatics | Data Science
R | Python | BASH | JavaScript | Vuejs | Flask | MySQL
Software and Web Development

PROFESSIONAL EXPERIENCE

Department of Nutrition, University of California, Davis

Post-doctoral Scholar

June 2019-Present

- Analyzing multi -omics data from various human studies and writing manuscripts.
- Developing a circulating extracellular RNA-seq data processing pipeline.
- Developing and maintaining several R packages for -omics data analysis.
- Training graduate student for data analysis skills.

Graduate Student Researcher

January 2015–June 2019

- Conducted a human study looking at the effect of fast food vs Mediterranean diet to human HDL lipidome, glycoproteome, HDL anti-inflammatory function, metabolome and microbiome.
- Conducted a human study looking at the effect of chicken egg consumption vs yolk free substitute on HDL composition (lipidome and proteome) and function, as well as host metabolome and gut microbiome in postmenopausal women.
- Currently working on the data analysis of a pilot study that looks at the HDL glycoproteome and function on Alzheimer disease patients.
- Currently working on the data analysis of a study that looks at iLNS supplement on infant HDL lipidome composition and function in Ghana.

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SOFTWARE DEVELOPMENT

- exceRNApipeline (www.github.com/zhuchcn/exceRNApipeline): an data processing pipeline for extracellular RNA-seq in human, based on snakemake.
- HTSet (www.github.com/zhuchcn/HTSet): R package for storing, handling, analyzing, and visualizing high through-put experiment data, such as metabolomics and proteomics.
- ShinyMetabase (www.github.com/zhuchcn/ShinyMetabase): an application for metabolomics data analysis, visualization, statistical analysis, and network analysis, based on R and the shiny framework.

Teaching Assistant/Graduate Grader

January 2015–December 2018

- BIS2A, Introduction to Biology (Department of Microbiology, UC Davis)
- BIS 102, Structure and Function of Biomolecules (Department of Molecular and Cellular Biology)
- EXB110, Exercise Metabolism (Department of Neurobiology, Physiology, and Behavior)
- NUT10, Discoveries and Concepts in Nutrition (Department of Nutrition, UC Davis)
- NUT11, Current Topics and Controversies in Nutrition (Department of Nutrition, UC Davis)
- NUT117, Experimental Nutrition (Department of Nutrition, UC Davis)
- CHE2B, general chemistry (Department of Chemistry, UC Davis)

USDA-ARS – Western Human Nutrition Research Center, Davis, CA

Biological Science Technician

Biological Science Research Assistant

April 2012–December 2014

- Worked on a human study of carotenoid metabolism in which we are assessing the postprandial response to Gari, a traditional African cassava food, in TRL (triacylglycerol-rich-lipoprotein) fraction of plasma.
- Assessed the absorption, dose-response, and tissue distribution of the provitamin A carotenoid beta-cryptoxanthin in the Mongolian gerbil, an appropriate animal model for human carotenoid metabolism
- Analyzed beta-cryptoxanthin and its metabolites, including beta-apo-10-carotenal and beta-ionone, using four LC methods, one GC-MS method, and four extraction methods, for their identification in 14 biological tissues, blood, urine, feces, tangerines, and animal feed
- Tested the effects of numerous traditional African processing and cooking methods on the beta-carotene and cyanide concentration and carotenoid bioaccessibility in beta-carotene-biofortified cassava, collaborating with the Robert Mondavi Institute for Wine and Food Science
- Processed and analyzed breast milk samples for a study conducted in the Philippines evaluating the meal and time effect of beta-carotene and vitamin A consumption.
- Served as laboratory manager; provided training sessions to educate new laboratory members concerning safety procedures and laboratory techniques, such as plasma and tissue extraction and HPLC analysis
- Completed a human study of carotenoid metabolism to assess the postprandial plasma response of lycopene from grapefruit or beta-cryptoxanthin from tangerines

Zhejiang University – Institute of Crop Science

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Hangzhou, China

Biological Science Research Assistant

Jun 2009 – July 2011

- Worked on an experiment investigating the response of five rice MADS-BOX genes to different nitrogen forms, including nitrate, amino acid and ammonium, by testing RNA amount via PCR
- Processed samples and identified T-DNA-mediated insertional 4-CL gene mutants from those rice (*Oryza sativa*) samples purchased from SIGnAL (Salk Institute of Genomic Analysis Laboratory) for a research project that was focused on the renewable energy utilization from rice straw

PUBLICATIONS

- **Zhu C.**, Sawrey-Kubicek L., Bardagjy A., Houts HE., Tang X., Sacchi R., Randolph J., Steinberg FM., Zivkovic AM., Whole egg consumption increases plasma choline and betaine without affecting TMAO levels or gut microbiome in overweight postmenopausal women (accepted by *Nutrition Research*)
- **Zhu C.**, Sawrey-Kubicek L., Beals E., Rhodes CH., Houts HE., Sacchi R., Zivkovic AM., Human gut microbiome composition and tryptophan metabolites were changed differently by fast food and Mediterranean diet in four days *Nutrition Research*, 2020.
- **Zhu C.**, Wong M., Li Q., Sawrey-Kubicek L., Beals E., Rhodes CH., Sacchi R., Lebrilla CB., Zivkovic AM. Site-Specific Glycoprofiles of HDL-Associated ApoE are Correlated with HDL Functional Capacity and Unaffected by Short-Term Diet. *J. Proteome Res*, 2019.
- **Zhu C.**, Sawrey-Kubicek L., Beals E., Hughes R.L., Rhodes C.H., Sacchi R., Zivkovic A.M. The HDL lipidome is widely remodeled by fast food vs. Mediterranean diet in 4 days. *Metabolomics*, 2019.
- Sawrey-Kubicek L., **Zhu C.**, Bardagjy A.S., Rhodes C.H., Sacchi R., Randolph J., Zivkovic A.M., Steinberg F.M. Whole egg consumption without weight loss or carbohydrate restriction increases the cholesterol efflux capacity of high density lipoproteins in overweight postmenopausal women. *Am J Clin Nutr*. 2019.
- Kailemia M.J., Wei W., Nguyen K., Beals E., Sawrey-Kubicek L., Rhodes C., **Zhu C.**, Sacchi R., Zivkovic A.M., Lebrilla C.B. Targeted Measurements of O-and N-Glycopeptides Show That Proteins in High Density Lipoprotein Particles Are Enriched with Specific Glycosylation Compared to Plasma. In *Journal of proteome research*, 2017.
- La Frano M. R., **Zhu C.**, Burri B. J. Assessment of tissue distribution and concentration of β -cryptoxanthin in response to varying amounts of dietary β -cryptoxanthin in the Mongolian gerbil. *Br J Nutr*. 111:968-78. 2014.
- **Zhu C.**, Cai Y., Gertz, E, La Frano M.R., Burnett D.J., Burri B.J. (2015) Effects of red palm oil-supplemented and biofortified gari on the carotenoid and retinyl palmitate concentrations of triacylglycerol-rich plasma of women. *Nutr Res*. doi:10.1016/j.nutres.2015.08.003
- **Zhu C.**, La Frano M.R., Burri B.J. (2013). Effects of common African processing, cooking, and storage methods on β -carotene and cyanide retention in biofortified cassava (*Manihot esculenta*). Article being reviewed by Food Research International.
- **Zhu C.**, Gertz E.R., Cai Y., Chang J.S.T., Burri B.J. Beta-cryptoxanthin is better absorbed than lycopene or beta-carotene from citrus fruit. *Nutr Res*. 2016 Jul;36(7):679-88. doi: 10.1016/j.nutres.2016.03.005.
- Burri B.J., La Frano M.R., **Zhu C.**, Absorption, metabolism, and functions of β -cryptoxanthin. *Nutr Rev*. 2016 Feb;74(2) 69-82. doi:10.1093/nutrit/nuv064

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PRESENTATIONS AND POSTERS

- **Zhu C.**, Sawrey-Kubicek L., Bardagjy A.S., Houts H., Zhang R., Xu W., Rhodes C.H., Sacchi R., Randolph J.M., Steinberg F.M., Zivkovic F.M. Whole egg consumption increases plasma choline and betaine without affecting TMAO levels and gut microbiome in overweight postmenopausal woman. Experimental Biology 2019, Orlando, FL.
- **Zhu C.**, Sawrey-Kubicek L., Beals E., Hughes R.L., Rhodes C.H., Sacchi R., Zivkovic A.M. Fast food vs. Mediterranean diet rapidly and differentially change human gut microbiome composition and function in healthy subjects. In ASN annual meeting 2018
- **Zhu C.**, Sawrey-Kubicek L., Beals E., Hughes R.L., Rhodes C.H., Sacchi R., Zivkovic A.M.. Short Term Fast Food and Mediterranean Diet are able to Change the HDL lipidome with Different Patterns. In Experimental Biology, 2017.
- **Zhu C.**, Sawrey-Kubicek L., Beals E., Hughs R.L., Rhodes C.H., Sacchi R., Zivkovic A.M. Short Term Fast Food and Mediterranean Diet are able to Change the HDL lipidome with Different Patterns, EB 2017, Chicago
- **Zhu C.**, Sacchi R., Rhodes C.H., Pedersen T.L., Newman J.W., Zivkovic A.M. Comparison of ultracentrifugation and chemical precipitation methods for preparative high density lipoprotein separation, EB 2016, San Diego, CA
- **Zhu C.**, Sacchi R., Rhodes C.H., Pedersen T.L., Newman J.W., Zivkovic A.M. Comparison of ultracentrifugation and chemical precipitation methods for preparative high density lipoprotein separation, 2016 OCC World Congress - Redox Medicine and Nutrition, Davis, CA
- **Zhu C.**, La Frano M.R., Cai Y., Burri B.J. (2014). Impact of traditional African processing and cooking methods on cyanide and β -carotene concentrations in biofortified cassava (*Manihot esculenta*), ACS National Meeting, San Francisco, CA.

AWARDS AND HONORS

Mar Dissertation Year Fellowship Award, graduate group of nutritional biology, UC Davis, 2019.
Carpenter Travel Award, Department of Nutrition, UC Davis, 2017 & 2018
Jastro-Shields Award, UC Davis, 2016 & 2017
Graduate Group of Nutritional Biology progress award, UC Davis, 2015
The Tertiary Scholarship, College of Agriculture and Biotechnology, Zhejiang University, 2009

PROFESSIONAL DEVELOPMENT

Bioinformatics RNA-Seq Workshop, UC Davis Bioinformatics Core
Data Science Specialization, JHU, Coursera.com
Genomic Data Science Specialization, JHU, Coursera.com
Metabolomics Data Processing Course, West Coast Metabolomics Center, NIH

LANGUAGE

Fluent in Chinese and English