The Role of Weight Loss on Endogenous Oxalate Synthesis, Gastrointestinal Oxalate Absorption, and Renal Oxalate Handling

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Objective: The purpose of our research was two-fold. First, to determine if weight loss (by OptiFast) reduced the contribution of endogenous oxalate synthesis to the urinary oxalate pool by placing a group of calcium oxalate stone formers on a controlled ultra-low oxalate diet and measuring urinary oxalate excretion. Second, to determine if gastrointestinal oxalate absorption is reduced with weight loss and if this is associated with a reduction in gut permeability (concomitant reduction in sucralose absorption) by utilizing $^{13}C_2$-oxalate and sucralose oral loading studies in obese calcium oxalate stone formers.

Summary: My time at Kidney Stone Laboratory within the UAB School of Medicine Department of Urology was incredibly productive. My primary mentor, Dr. Assimos, had weekly meetings with me to review my progress. My research spanned two domains while in the lab: bench research and clinical research.

From the bench research perspective, Dr. Knight served as my co-mentor. I worked with Dr. Knight and Dr. Li on how to perform various protein and enzyme assays which pertained to the oxalate breakdown pathway. I performed both in-vivo and in-vitro experiments under their supervision. I was able to handle the radiolabeled $^{13}C_2$-oxalate and learned how to utilize it in measuring gut permeability in mouse models.

From the clinical research perspective, Dr. Wood served as my co-mentor. I worked with Dr. Wood and Dr. Crivelli on how to appropriately screen potential study patients. I was able to speak with patients in clinic and introduce them to the study and was able to learn from our lab coordinator about the research consent process while in clinic. In one example, I was able to follow a patient from initial health record screening to their clinic visit, through the research and surgical consent process, to the following week in the operating room. Furthermore, during my time I participated in multiple research subjects as they performed diet-controlled studies and the phenotyping protocols which involved $^{13}C_2$ isotopes.

Spending a Monday in the lab performing enzyme assays of the oxalate breakdown pathway, to spending a Tuesday in the clinic consenting patients to join our clinical research project, to seeing them in the operating room undergoing surgical treatment of their stone disease, was a transformational experience for me. Seeing the application of basic science bench research principles applied to patients in the clinical setting, by my mentors, has further inspired me to pursue an academic career where I can perform research while simultaneously working toward new scientific discoveries that will help improve their quality of life and medical outcomes.

I would like to thank the Endourological Society for funding my research experience with Dr. Assimos and his Kidney Stone Laboratory at UAB. I would like to thank my primary mentor, Dr. Assimos, and all my co-mentors, Dr. Wood, Dr. Knight, Dr. Crivelli, and Dr. Li, for their boundless patience, kindness, and generosity. I hope to make the Endourological Society and all my mentors proud as I embark on my career to become a physician scientist.

My time in the Kidney Stone Laboratory, funded by the Endourological Society, resulted in the following research accomplishments.

Publications:

Paiste H, Hemal K, Boyd CJ, Wood KD, Assimos DG. Overview of the COVID-19 Pandemic on the Urology Literature. AUA News. Publication accepted, November 2021.

Paiste H, Narang K, Dangle PP, Assimos DG, Wood KD. "Pediatric Obesity." Diagnosis and Management of Pediatric Nephrolithiasis, edited by Paloian NJ et. al. Springer Nature. Chapter accepted, pending publication. July 2021.

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Daniel SL, Moradi L, **Paiste H**, Wood KD, Assimos DG, Holmes RP, Nazzal L, Hatch M, Knight J. 40 Years of Oxalobacter formigenes, a Gutsy Oxalate-Degrading Specialist. Appl Environ Microbiol. 2021 Jun 30:AEM0054421. Online ahead of print. PMID: 34190610

Crivelli JJ, Maalouf N, **Paiste H**, Wood KD, Hughes AE, Oates GR, Assimos DG. Disparities in Kidney Stone Disease: A Scoping Review. J Urol. 2021 Apr 27:101097JU0000000000001846. Online ahead of print. PMID: 33904797

Posters:

Zaza T, Boudreau HS, **Paiste H**, Crivelli JJ, Wood KD. Hypercalciuria in a stone-forming population at UAB. UAB Medical Student Research Day. Birmingham, Alabama, September 14, 2021

Moradi L, **Paiste H**, Singh NP, Wood KD, Assimos DG, Knight J. Oxalobacter formigenes: discovery and role in intestinal oxalate degradation. UAB Medical Student Research Day. Birmingham, Alabama, September 15, 2020.

Moradi L, **Paiste H**, Singh NP, Knight J, Wood KD. Oxalobacter, Microbiome, and Kidney Stone Disease. UAB Department of Urology Research Day. Birmingham, Alabama, June 10, 2020.

Paiste H, Moradi L, Singh NP, Knight J, Wood KD. Association between Pediatric Kidney Stones and Childhood Obesity. UAB Department of Urology Research Day. Birmingham, Alabama, June 10, 2020.