

Title: The Potential of a Single- Versus a Dual-isotope Prediction Equation for Added Sugar Consumption

Authors: Valisa Hedrick¹, Tanya Halliday¹, Brenda Davy¹, A. Hope Jahren², Jamie Zoellner¹

Institutions: ¹Department of Human Nutrition, Foods, and Exercise, Virginia Tech, Blacksburg, VA.

²School of Earth and Ocean Science and Technology, University of Hawaii at Manoa, Honolulu, HI.

Learning Objective (500 characters, including spaces):

Attendees will be able to: 1) Describe a novel dietary assessment approach for assessing added sugar consumption, and 2) Understand the difference between $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopes for use as dietary intake biomarkers.

Learning Codes (List 3):

2020 – Composition of foods, nutrient analysis

3040 – Food consumption, fluid balance

9070 – Research instruments, techniques

Funding: 1R01CA154364-01A1; principal investigator: JZ

This study was funded, in part, by a Graduate Student Research Grant from the Sports, Cardiovascular and Wellness Nutrition (SCAN) dietetic practice group of the Academy of Nutrition and Dietetics to T.H.

Introduction: The $\delta^{13}\text{C}$ value of blood is a novel validated biomarker of added sugar (AS) intake. Results are mixed if a dual-isotope model ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) demonstrates improved prediction of AS intake over a single-isotope model ($\delta^{13}\text{C}$). Prediction equations were previously developed in an adult population with high AS intake (reference group). **Objective:** To test the previously developed dual- and single-isotope prediction equations for AS intake in a different adult population (comparison group). **Methods:** The comparison group of adults completed 3 24-hour dietary recalls and provided blood samples (plasma or serum), which were analyzed for $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values using NA-SIMS. The reference equations were established using fingerstick $\delta^{13}\text{C}$ ($-19.1\pm 0.8\text{‰}$) and $\delta^{15}\text{N}$ ($7.4\pm 0.5\text{‰}$) blood samples from a population ($42\pm 15\text{yrs}$) with high AS intake ($89\pm 59\text{g}$). Statistical analyses included t-tests and correlations. **Results:** The comparison group ($53\pm 16\text{yrs}$) had significantly lower ($p<0.01$) $\delta^{13}\text{C}$ ($-19.5\pm 0.8\text{‰}$) and $\delta^{15}\text{N}$ ($9.1\pm 0.3\text{‰}$) levels and consumed less AS ($69\pm 43\text{g}$; $p=0.017$) than the reference group. Using the single-isotope equation, predicted AS intake was not significantly different from actual AS intake (difference= $-3.6\pm 40.9\text{g}$; $p=0.51$). Predicted and actual AS intake was correlated ($R^2=0.12$; $p\leq 0.01$) and similar to the reference group ($R^2=0.09$; $p\leq 0.01$). When testing the dual-isotope equation, predicted AS was different from actual AS intake (difference= $13\pm 41\text{g}$; $p=0.02$), and the correlation did not improve ($R^2=0.09$; $p\leq 0.01$). **Conclusion:** $\delta^{13}\text{C}$ is able to successfully predict AS intake using a blood sample. Using a single-isotope prediction equation may be an alternative method to assessing AS intake.