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STABLE ISOTOPE TECHNIQUES TO ASSESS VITAMIN A STATUS OF VULNERABLE CHILDREN IN AFRICA

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Vitamin A is a micronutrient essential in vision, reproduction, immune function, cellular differentiation, and bone health. Assessment of vitamin A status is not straightforward. Concentrations of retinol circulating in blood are homeostatically controlled and therefore are not useful indicators of status until liver reserves are dangerously low. The retinol isotope dilution (RID) tests have been validated against liver reserves of vitamin A from deficiency through hypervitaminosis A, have a working range that far exceeds all other currently available indirect biomarkers of vitamin A status, and are very conducive to assessing long-term vitamin A status as it relates to vitamin A exposure. RID was very good at determining vitamin A status of rats over a very broad range of liver vitamin A reserves (2-10 fold difference), while serum retinol did not detect a difference. RID has been used to estimate total body reserves of retinol in groups of humans. Both deuterium and ¹³C have been introduced into the retinol moiety with various enrichments. Depending upon the enrichment and mass spectrometer sensitivity, traditional gas chromatography (GC), mass spectrometry (MS), GC-combustion isotope ratio-MS, and liquid chromatography tandem MS have been used for analysis. The most sensitive method, GCCIRMS, allows researchers to use small doses of tracer to not perturb normal vitamin A metabolism. Eleven

African countries were involved in an International Atomic Energy Agency project to assess the vitamin A status of groups of three to five year old children. The dose level of ¹³C₂-retinyl acetate used in the African children was 1 µmol/child. The RID test using either D₄ or D₈-retinyl acetate used 6 mole/child, which is less than prior doses. Although vitamin A deficiency has been the most concerning over the past few decades, widespread fortification and the continued use of high-dose supplements cause new concerns for hypervitaminosis A demanding more sensitive methodology.

Biography

Sherry A Tanumihardjo studies vitamin A and carotenoid metabolism, serves as Director of the Undergraduate Certificate in Global Health, and teaches at undergraduate and graduate levels including international field experiences. She is on the Executive Board for the UW Global Health Institute. She has more than 160 publications and chapters published. She has presented at more than 280 domestic and international venues. She has served as a reviewer for many journals and is the recipient of the following awards: Who's Expert Advisory Panel, G Malcolm Trout Visiting Scholar at Michigan State University, Ruth Pike Lectureship at Pennsylvania State University, Alex Malaspina ILSI Future Leader, Dannon Creative Leadership Institute, Endowed Chair and Vilas Associate at UW.

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