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Gender differences in retinol metabolism are independent of β -carotene bioconversion

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Gender-related differences in retinol and provitamin A carotenoid metabolism have previously been detected, with higher retinol concentrations in men, and on the contrary, higher β -carotene concentrations in women⁽¹⁾. This reversed relationship suggests a higher β -carotene to retinol conversion rate in males⁽¹⁾. Furthermore, lower conversion efficiency is correlated with BMI in women, but not in men⁽²⁾. We investigated retinol metabolism and β -carotene conversion efficiency in 23 female and 19 male volunteers by co-administering 2 mg [¹³C₁₀]- β -carotene and 1 mg [¹³C₁₀]-retinyl acetate. Relative absorption of β -carotene in the first 24 hours represented 11% of total ingested [¹³C₁₀]- β -carotene, with an inter-individual coefficient of variation of 49%. [¹³C₁₀]- β -carotene plasma concentration within the first 24 hours post-dose were significantly inversely related to the ability to convert β -carotene into retinyl-palmitate ($r = -0.89$; $p < 0.001$). More importantly, significantly higher plasma concentrations of preformed [¹³C₁₀]-retinol and bio-converted [¹³C₅]-retinol were found in men compared to women (Figure 1), although plasma [¹³C₁₀]- β -carotene concentrations were similar between the genders. Interestingly, differences in retinoid concentrations are independent from the ability to cleave [¹³C₁₀]- β -carotene, since both retinyl palmitate/ β -carotene and the newly-formed retinoid reference dose ratios are not significantly different between men and women (Figure 1).

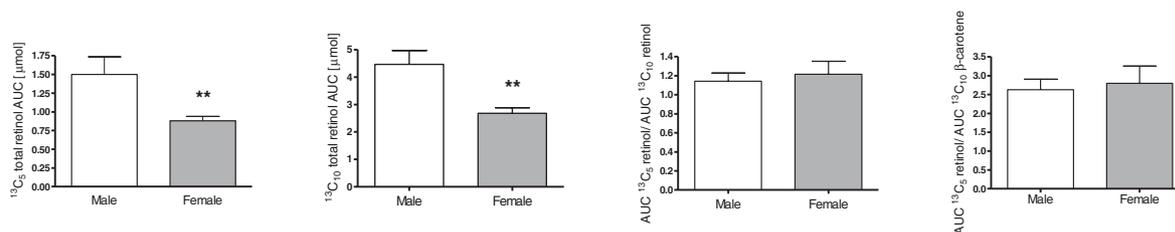


Fig. 1. Effect of gender on plasma retinol concentrations and provitamin A conversion efficiency (AUC = Area under the curve for the first 24 hours post-dose).

In summary, our isotope dilution technique revealed that men have higher circulating retinol concentrations compared to women, and that this difference is independent of provitamin A conversion efficiency. We hypothesize that a gender specific effect on metabolic flux between different tissues could explain this difference.

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1. Faure H, Preziosi P *et al.* (2006) *Eur J Clin Nutr* **60**(6), 706–17.
2. Tang G, Qin J *et al.* (2003) *Am J Clin Nutr* **78**(2), 259–66.