

Associations of biomarkers of acid load and cortisol secretion with potentially bioactive free glucocorticoids in healthy lean adults: a pilot study

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Background: Recent evidence suggests that endogenous glucocorticoid status is related to the body's acid load.

Aims: To examine whether acid load might be a predictor of potentially bioactive free glucocorticoids (UFF+UFE = sum of urinary free cortisol [UFF] and urinary free cortisone [UFE]), independently of adrenocortical activity.

Methods: Body composition, plasma cortisol, plasma leptin, 24-h urinary excretion rates of net acid (NAE), UFF+UFE, and further major glucocorticoid metabolites were examined cross-sectionally in a pilot study in 30 healthy adults (15 females; 22-44 yr old; BMI: 20-25 kg/m²). All glucocorticoids were analyzed by RIA and leptin by ELISA. Overall daily cortisol secretion (adrenocortical activity) was assessed by the sum of the 3 major urinary glucocorticoid metabolites tetrahydrocortisone+tetrahydrocortisol +5 α -tetrahydrocortisol (C21) and daily acid load by NAE.

Results: Plasma leptin (mean \pm SD, 2.8 \pm 1.6 vs. 7.6 \pm 4.9 ng/mL) and percent body fat (%BF, 16.8 \pm 4.2 vs. 26.9 \pm 4.9 %) were lower (P <0.01) and body surface (BS)-corrected C21 higher (P <0.01) in males, whereas plasma cortisol and BS-corrected UFF+UFE were statistically undistinguishable between the sexes. Both UFF+UFE and C21 correlated positively with leptin and %BF in males (P <0.05), but not in females. Multiple regression analysis explained 72% of the UFF+UFE variability by C21, leptin, and NAE (each P <0.05) in females and 31% of UFF+UFE variability by C21 (P <0.05) in males.

Conclusion: Our findings indicate that apart from adrenocortical activity and the body fat product leptin, the acid load could also contribute in explaining variability of potentially bioactive glucocorticoids at least in females. More specific metabolic and larger epidemiologic studies are required to substantiate these associations.