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Percentage lean body mass is lower with a higher dietary acid–base load in women aged 18–79 years

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Falls are a major risk for fracture and the age-related decline in muscle mass and strength is a key contributor to falls⁽¹⁾. Bone density is also a predictor of fracture risk, and muscle mass is related to bone density. Thus, it is important to identify factors that affect muscle mass.

Besides the known effects of age and physical activity, nutrition has the potential to influence maintenance of muscle mass. Metabolic acidosis is related to a decline in muscle mass in renal failure, and metabolic acidosis affects protein metabolism by decreasing protein synthesis and increasing N excretion even in healthy individuals⁽²⁾. Thus, it is possible that mild metabolic acidosis could influence muscle mass in healthy individuals. The acid–base load of diet is known to influence acid-base status and so the association between dietary acid–base load (estimated as potential renal acid load (PRAL)) and percentage lean body mass (LBM) was investigated in a study of female twins aged 18–79 years.

LBM was measured using dual-energy X-ray absorptiometry (Hologic (UK) Ltd, Crawley, West Sussex, UK) in 2720 female twins and converted to percentage LBM by dividing by body weight⁽³⁾. PRAL was measured using an FFQ and divided into quartiles, and calculated using the formula: $PRAL = (P * 0.0366 + \text{protein} * 0.4888) - (K * 0.0205 + Ca * 0.0125 + mg * 0.0263)$ ⁽⁴⁾. LBM values were calculated according to quartile of PRAL and are presented unadjusted and adjusted for covariates using robust regression with the cluster option in STATA version 9.1 (StataCorp, College Station, TX, USA) in the Table.

There was a significant difference in LBM of 1.1 % between quartile 1 of PRAL and quartile 4 of PRAL (most acidic) after adjustment for covariates (see Table).

	Quartile 1		Quartile 2		Quartile 3		Quartile 4		P for trend
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	
PRAL (meq/d)	-29.3	0.2	-15.0	0.2	-6.8	0.2	4.8	0.2	-
% LBM	60.7	0.24	60.6	0.27	60.5	0.18	60.4	0.25	0.410
% LBM*	61.0	0.24	60.8	0.24	60.6	0.27	59.9	0.26	0.002

*Adjusted for age, physical activity and smoking habit.

There was a cross-sectional decrease in LBM with a higher (more acidic) PRAL intake and although this difference was relatively small, it was significant and independent of the effects of age and physical activity. Further analyses are ongoing in this twin study to determine the heritable and familial determinants of LBM.

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