

Abstract

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Genetic variation at the SLC23A1 locus is associated with circulating concentrations of L-ascorbic acid (vitamin C): evidence from 5 independent studies with >15,000 participants.

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BACKGROUND: L-Ascorbic acid is an essential part of the human diet and has been associated with a wide range of chronic complex diseases, including cardiovascular outcomes. To date, there are no confirmed genetic correlates of circulating concentrations of L-ascorbic acid.

OBJECTIVE: We aimed to confirm the existence of an association between common variation at the SLC23A1 gene locus and circulating concentrations of L-ascorbic acid.

DESIGN: We used a 2-stage design, which included a discovery cohort (the British Women's Heart and Health Study), a series of follow-up cohorts, and meta-analysis (totaling 15,087 participants) to assess the relation between variation at SLC23A1 and circulating concentrations of L-ascorbic acid.

RESULTS: In the discovery cohort, variation at rs33972313 was associated with a reduction in circulating concentrations of L-ascorbic acid (-4.15 $\mu\text{mol/L}$; 95% CI: -0.49, -7.81; $P = 0.03$ reduction per minor allele). Pooled analysis of the relation between rs33972313 and circulating L-ascorbic acid across all studies confirmed this and showed that each additional rare allele was associated with a reduction in circulating concentrations of L-ascorbic acid of -5.98 $\mu\text{mol/L}$ (95% CI: -8.23, -3.73; $P = 2.0 \times 10^{-7}$) per minor allele).

CONCLUSIONS: A genetic variant (rs33972313) in the SLC23A1 vitamin C active transporter locus was identified that is reliably associated with circulating concentrations of L-ascorbic acid in the general population. This finding has implications more generally for the epidemiologic investigation of relations between circulating L-ascorbic acid and health outcomes.

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