Human plasma levels of vitamin E and carotenoids are associated with genetic polymorphisms in several genes involved in lipid metabolism

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Vitamin E and carotenoids are fat-soluble micronutrients carried by plasma lipoproteins. Their plasma concentration is governed by several known factors (dietary intake, bioavailability…) including genetic factors. Scarce data are available on this topic. We hypothesized that genes involved in lipid metabolism are, directly or undirectly, implicated in the intestinal uptake, intracellular trafficking and lipoprotein distribution of these microconstituents, and consequently can regulate their plasma concentration. We therefore assessed whether key genes involved in lipid metabolism were related to the plasma status of these micronutrients. Fasting plasma vitamin E (alpha and gamma-tocopherol) and carotenoids (alpha and beta-carotene, lutein, lycopene, beta-cryptoxanthin and zeaxanthin) concentrations were measured by HPLC in 169 male and female volunteers involved in the Medi-RIVAGE study. Genotyping of several genes involved in lipid metabolism was carried out: Apo-AIV, Apo-B, Apo-CIII, Apo-E, cholesterol ester transfer protein (CETP), hepatic

lipase (HL), lipoprotein lipase (LPL), intestinal fatty acid binding protein (I-FABP), microsomial triglyceride transfer protein (MTP), and scavenger-receptor class B type I (SR-BI). Results showed that plasma alpha-tocopherol was significantly ($p<0.05$) associated with Apo-AIV, Apo-CIII, Apo-E, CETP and SR-BI genotypes. Gamma-tocopherol was associated with Apo-AIV, HL and SR-BI. Alpha-carotene was associated with HL and SR-BI, beta-carotene with Apo-B, HL and SR-BI, lycopene with apo-AIV, apo-B and I-FABP, beta-cryptoxanthin with SR-BI. No association was found between either lutein or zeaxanthin and the studied SNPs. These results show that several genes involved in lipid metabolism are implicated in the plasma status of these micronutrients.