Manipulation of lipid bioaccessibility of almond seeds influences postprandial lipemia in healthy human subjects.

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Abstract:
Background: Plant cell walls are known to influence the rate and extent of lipid release from plant food tissues during digestion; however, the effect of cell wall structure on postprandial lipemia is unknown.
Objective: The objective was to investigate the effects of lipid release (bioaccessibility) on postprandial lipemia by comparing lipid encapsulated by cell walls with lipid present as free oil.
Design: A randomized crossover trial (n = 20 men) compared the effects of 3 meals containing 54 g fat provided as whole almond seed macroparticles (WA), almond oil and defatted almond flour (AO), or a sunflower oil blend as control (CO) on postprandial changes in oxidative stress (8-isoprostane F2α concentrations), vascular tone (peripheral augmentation index), and plasma triacylglycerol, glucose, and insulin concentrations.
Results: The postprandial increase in plasma triacylglycerol was lower [74% and 58% lower incremental area under curve (iAUC)] after the WA meal than after the AO and CO meals ($P < 0.001$). Increases in plasma glucose concentrations (0–180 min) were significantly higher after the WA meal (iAUC: 114; 95% CI: 76, 153) than after the AO meal (iAUC: 74; 95% CI: 48, 99) ($P < 0.05$), but no significant differences from the CO meal were observed (iAUC: 88; 95% CI: 66, 109). The peak reductions in peripheral augmentation index after the WA, AO, and CO meals (-9.5%, -10.1%, and -12.6%, respectively, at 2 h) were not significantly different between meals. Plasma 8-isoprostane F2α and insulin concentrations did not differ significantly between meals.
Conclusions: The bioaccessibility of lipid in almond seeds, which is regulated by the structure and properties of cell walls, plays a primary role in determining postprandial lipemia.