Role of cell walls in the bioaccessibility of lipids in almond seeds.

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Abstract:
Objective: We investigated the role played by cell walls in influencing the bioaccessibility of intracellular lipid from almond seeds.Design: Quantitative analyses of nonstarch polysaccharides (NSPs) and phenolic compounds of cell walls were performed by gas-liquid chromatography and HPLC, respectively. In a series of experiments, the effects of mechanical disruption, chewing, and digestion onalmond seed microstructure and intracellular lipid release were determined. In the digestibility study, fecal samples were collected from healthy subjects who had consumed diets with or without almonds. Almond seeds and fecal samples were examined by microscopy to identify cell walls and intracellular lipid.Results: Cell walls were found to be rich in NSPs, particularly arabinose-rich polysaccharides, with a high concentration of phenolic compounds detected in the seed coat cell wall. During disruption of almond tissue by mechanical methods or chewing, only the first layer of cells at the fractured surface was ruptured and able to release lipid. In fecal samples collected from subjects consuming the almond diet, we observed intact cotyledonary cells, in which the cell walls encapsulated intracellular lipid. This lipid appeared susceptible to colonic fermentation once the cotyledonary cell walls were breached by bacterial degradation.Conclusion: The cell walls of almond seeds reduce lipid bioaccessibility by hindering the release of lipid available for digestion.