Effect of almond skin polyphenols and quercetin on human LDL and apolipoprotein B-100 oxidation and conformation.

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Abstract:
Almond skin polyphenols (ASP) and vitamins C or E inhibit the Cu2+-induced generation of conjugated dienes in human low density lipoprotein (LDL) in a synergistic manner. However, the mechanism(s) by which this synergy occurs is unknown. As modification of apolipoprotein (apo) B-100 is an early, critical step in LDL oxidation, we examined the effects of combining ASP or quercetin and antioxidant vitamins on the oxidation of this moiety as well as on the alteration of LDL conformation and electronegativity (LDL-). In a dose-dependent manner, ASP (0.12-2.0 μmol/L gallic acid equivalents, GAE) decreased tryptophan oxidation by 6.7-75.7%, increased the generalized polarity (Gp) of LDL by 21.0 -81.5% at 90 min, and reduced the ratio of LDL- to total LDL (tLDL) by 38.2-83.8% at 5 h. The actions of ASP on these parameters were generally additive to those of vitamins C and E. However, a 10-25% synergy of ASP plus vitamin C in protecting apo B-100 tryptophan against oxidation may result from their synergistic interaction in prolonging the lag time to oxidation. ASP and vitamin E acted in synergy to reduce LDL-tLDL by 24-43%. The actions of quercetin were similar to ASP, though more potent in inhibiting tryptophan oxidation. Thus, ASP and quercetin reduce the oxidative modification of apo B-100 and stabilize LDL conformation in a dose-dependent manner, acting in an additive or synergistic fashion with vitamins C and E.