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Title: Structure-response relationship of carotenoid bioaccessibility and antioxidant activity as affected by the hydroxylation and cyclization of their terminal end groups
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Abstract: The structurally related carotenoids beta-carotene, gamma-carotene, lycopene, rubixanthin, and beta-cryptoxanthin differ in their terminal end groups and the presence or absence of a hydroxyl function. In this study, emulsions containing these carotenoids were subjected to an in vitro digestion to compare bioaccessibilities and antioxidant activities of the resulting micellar fractions. The bioaccessibility of lycopene and beta-carotene was 28.6 ± 0.1% and 35.7 ± 0.3% respectively, while the bioaccessibility of rubixanthin (21.8%) and beta-cryptoxanthin (28.8%) was significantly lower. The antioxidant activity of the corresponding micellized carotenoid fractions ranked as follows: rubixanthin > lycopene > beta-cryptoxanthin > gamma-carotene > beta-carotene for both the TEAC and FRAP assays. A similar trend was observed for the hexane-dissolved carotenoids. A negative linear correlation between bioaccessibility and FRAP (R² = 0.7395) and TEAC (R² = 0.9125) values was established. The presence of both open end groups and hydroxyl functions led to higher antioxidant activities as compared to the unsubstituted beta-end group, presumably resulting in decreased stability during digestion and, thus, lowered bioaccessibility. (C) 2014 Elsevier Ltd. All rights reserved.

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