

原著

食用油の光又は加熱過酸化に対する β -カロテンの抗酸化性について

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Antioxidant Effect of β -Carotene added to Edible Oils on Peroxidation by Light or Heating

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Abstract

Edible oils supplemented with β -carotene were subjected to both light induced and thermal autoxidation at 180°C. Subsequently, they were analyzed for POV, TBA value, carotene concentration and fatty acid composition to assess the antioxidant ability of β -carotene in edible oils. In light induced autoxidation, the induction periods of peroxidation of β -carotene added edible oils were 4 to 5 times longer than control oils without β -carotene, based on POV and TBA values. β -Carotene concentrations in the edible oils were seen to gradually decrease about 10% during the induction period of oil peroxidation. This was followed by a rapid decrease and decoloring during the subsequent period in which peroxides were produced and decomposed. These facts indicate that β -carotene acts as a radical scavenger with the oil peroxyradical to

protect the oil from peroxidation. In thermal peroxidation at 180°C, the antioxidant abilities of β -carotene added oils were superior to those of the blank control oils. During heating, however, β -carotene decreased rapidly, and no color was visible after 3 hrs. This phenomenon is much different from light autoxidation, and may suggest that β -carotene reacts with unsaturated fatty acids to polymerize as a monomer. A preference test for foods fried in oils at 180°C with and without β -carotene, revealed no differences in taste. Thus, It may be possible to use β -carotene as a good antioxidant for edible oils.

要約

市販食用コーン油, ナタネ油に β -カロテンをレッドパーム油と同程度の濃度に加えた試料油について光自動酸化及び180°C加熱酸化を行わせ, 無添加対照油との抗酸化性を比較評価した. 光自動酸化において β -カロテン添加油(65mg/100g)は酸化誘導期が無添加対照油より4~5倍延長されていることがPOV及びTBA値から明らかとなった. このとき, β -カロテン濃度は酸化誘導期間に約10%の低下が認められるにすぎないが, それ以後の過酸化生成及び分解の期間には急激に退色した. このことは酸化誘導期に β -カロテンが油脂ラジカルと反応して自身は安定な共鳴ラジカルとなって油脂の過酸化を防ぐことを示している. 180°C加熱酸化においても β -カロテン添加油の抗酸化性が対照油と比べて大きいことが認められた. しかし, β -カロテンは3時間加熱において約80%退色し, 常温における光自動酸化とは大きく異なる挙動を示した. これは不飽和脂肪酸の加熱重合反応に β -カロテンもモノマーとして関与していることも考えられることから更に検討を要する. 試料油で揚げたフライについて嗜好調査を行い, β -カロテンの油中存在は風味になんら影響を及ぼさなかった.
