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► To cite this version:

Marie-Noëlle Maillard, Nicolas Delchier, Catherine Billaud, Véronique Bosc, Marie-Jose Vallier, et al.. Do natural antioxidants protect food lipids in gelled emulsions throughout their life cycle?. 12th Euro Fed Lipid Congress – Oils, Fats and Lipids: from Lipidomics to Industrial Innovation, Sep 2014, Montpellier, France. 2014. hal-01269477

HAL Id: hal-01269477

<https://hal.science/hal-01269477>

Submitted on 3 Jun 2020

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Do natural antioxidants protect food lipids in gelled emulsions throughout their life cycle?

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Designing food products with an optimised antioxidant profile to protect lipids from oxidation is only possible if the transformation dynamics of these systems is well understood during their elaboration, storage, domestic use and human gastrointestinal digestion. To date, most data are available on continuous or emulsified liquid media, and consider food either before ingestion or during gastrointestinal tract. A generic study enabling to predict the behaviour and fate of lipids and antioxidants in structured food throughout its life cycle remains necessary. A series of gelled emulsions including sunflower oil (30%, w/w) and one or several natural antioxidant(s) - vitamin E, vitamin C, caffeic acid, chlorogenic acid - was thus developed. These food models differed from their structure and physical properties (viscoelasticity, resistance to failure) but contained an homogeneous distribution of lipid droplets with a similar size (1.5 microns). In order to identify the key steps promoting oxidation of polyunsaturated fatty acids and their protection by antioxidants, the reactivity of these molecules was followed in these different systems, first during storage and/or heat treatment (oven cooking process), and then during gastric digestion (*in vitro* model involving oxidative stress) after mimicking oral mastication. Lipid oxidation and antioxidant stability will be discussed in relation to the initial structure of the food matrix, the distribution of antioxidants and the possible interactive effects between them.

Acknowledgement: This work was carried out with the support of the "Alimantiox" AIC INRA project