Non-targeted Screening for Oxidized Lipids in Foods Charlotte Deyrieu[1], Erwann Durand[1], Nathalie Barouh[1], Jerôme Lecomte[2], Françoise Michel-Salaun[3], Bruno Baréa[1], Gilles Kergourlay[3], and Pierre Villeneuve[1], *[1]CIRAD, France; [2]CIRAD, Greece; [3]Videka Diana Pet Food, France*

Consumption of oxidized fats is known to have detrimental as well as beneficial effects. Studies on structural elucidation of individual oxidized lipids formed during food processing are missing. Thus, a thorough identification of oxidized lipids present in foods is required. We aimed at identifying oxidized triacylglycerols in thermally treated canola oil, pork, salmon, milk, butter and margarine by means of high-resolution MS applying non-targeted screening. Changes in the abundances of oxidized triacylglycerols in differently heat-processed food samples were determined by LC-MS/MS. Besides many hydroperoxides, several epoxidized triacylglycerols could be identified, such as 18:0-18:0-18:0 monoepoxide, 18:0-18:1-18:0 monoepoxide, 18:0-18:1-18:1 monoepoxide, 18:1-18:1-18:1 monoepoxide and 18:1-18:2-18:2 monoepoxide. Among all tested food lipids, canola oil showed to have the highest abundance of oxidized lipids even under non-thermally treated conditions at 25°C. While most epoxidized triacylglycerols decreased by approximately 80% after thermal treatment at 180°C for 30 min, 18:0-18:1-18:1 monoepoxide did not change significantly, indicating a probable structure-specific formation and decomposition rate of oxidized lipids. Interestingly, epoxidized triacylglycerols almost completely vanished after thermal treatment at 80°C for 30min whereas at 180°C these oxidized lipids were more abundant. Taken together, oxidized triacylglycerols could be identified in food lipids under household-representative food processing. LC-MS/MS is a valuable approach to characterize the quality of food lipids and identify their oxidized triacylglycerol profile, which is of relevance to evaluate the biological effects of different oxidized lipids.

Polyphenol Shifts in Lipid Oxidation Pathways and Interactions with Proteins Alter Apparent Antioxidant Effectiveness Karen M. Schaich*[1] and Xiaosong Chen[2], *[1]Dept. of Food Science, Rutgers University, USA; [2]China Agricultural University, China*

Natural phenolic compounds are very attractive as alternatives to BHA and BHT in limiting lipid oxidation but have often been disappointing in their effectiveness in foods. At the same time, reports of pro-oxidant actions of phenols have increased. Research in model systems provides new insights into the complexity of phenol interactions. Studies of alternate competing pathways of lipid oxidation show that phenols can reroute epoxide formation (by peroxyl radical addition to double bonds) to hydroperoxide formation via H abstraction from phenols. When hydroperoxides are the only product analyzed, lipid oxidation then appears to be paradoxically increased. Alkoxyl radicals are similarly rerouted away from rearrangement (epoxides) and scissions (aldehydes and alkanes) to H abstraction generating hydroxylipids, an antioxidant action with most analyses. Phenolic compounds react with proteins as well as lipids. Gallic acid, pyrogallol, hydroquinone, resorcinol, catechol, caffeic acid, para-coumaric acid, and ferulic acid induced denaturation of highly purified alpha-lactalbumin in phosphate buffer, with major changes in protein configuration plus dramatic