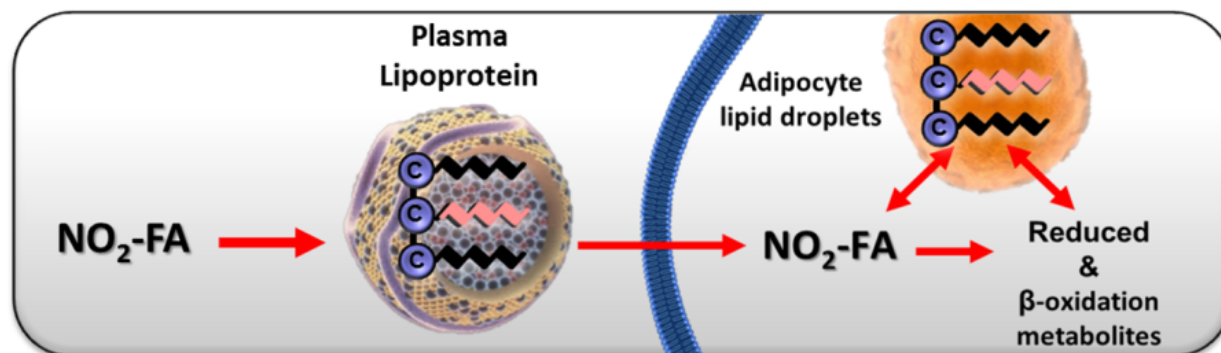
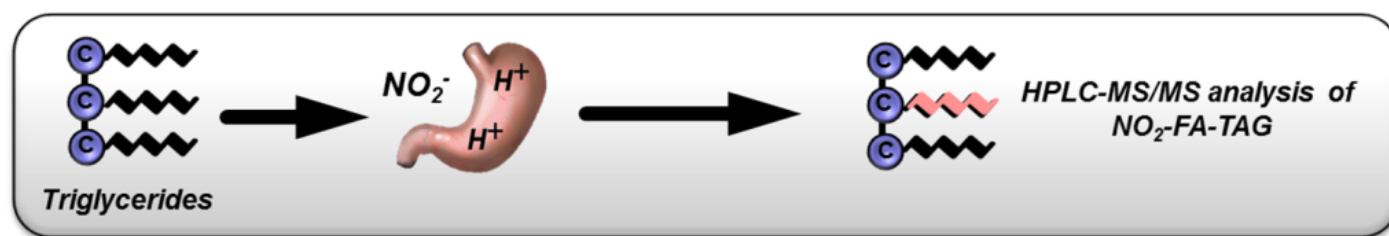


Generation and incorporation of electrophilic fatty acid nitroalkenes in triacylglycerides

Electrophilic fatty acid nitroalkenes (NO₂-FA) are compounds formed in our body that induce protective programs in cells and tissues and reduce inflammation. Beneficial effects have been proven in various diseases such as diabetes, stroke, heart attack, lung injury, acute and chronic kidney injury, inflammatory bowel disease and cardiovascular disease among other. NO₂-FA are normally detected in human plasma and urine and are generated by nitration of dietary unsaturated fatty acids. Basically, consumption of fruit, vegetables and dairy products, provides the component for the formation of not only in the stomach but also at sites of inflammation. For example, extra virgin olive oil (EVOO) can be transformed into these nitrated products, and later released by the activity of digestive enzymes such as lipases. Thus, exposure of EVOO to nitrite, an ion usually found in cured meat and leave vegetables, generates under acidic gastric and lipase digestive conditions NO₂-FA, such as nitro-conjugated linoleic acid (NO₂-CLA) and nitro-oleic acid (NO₂-OA).



However, this process has been predominantly approached using free fatty acids such as oleic acid (OA), conjugated linoleic acid (CLA) and arachidonic acid because of technical challenges in the direct mass spectrometric analysis of triacylglycerides (TAG). Importantly, dietary and endogenous free fatty acid levels are proportionately very low (1-5 % of total) when compared to the levels of esterified fatty acids in dietary sources and tissues. This limitation motivated the investigation of these species using highly specific and sensitive mass spectrometers able to detect the mass of an electron. Thus, for the first time, we were able to unequivocally show the detection and characterization of NO₂-FA-containing triacylglycerides (NO₂-FA-TAG) and demonstrated that

unsaturated fatty acids of dietary TAG are targets for nitration reactions during gastric acidification. These lipids are hydrolyzed and the resultant fatty acids are absorbed, re-incorporated into TAG of specialized lipid particles, called lipoprotein, to be delivered to the tissues. The delivery of these molecules helps maintain inflammatory status and protect tissues from oxidants, stress and environmental factors. In particular, these particles containing NO₂-FA are concentrated in fat, where they are stored and can be released when needed. Upon entry into fat specialized cell called adipocytes, NO₂-FA participate and modulate metabolic reactions to be re-incorporated into TAG for storage. In this regard, we reported the process by which these signaling molecules are distributed, metabolized and incorporated in rat plasma TAG, after a single oral dose of NO₂-OA, and in cultured adipocytes. Our data revealed that TAG incorporate both NO₂-OA and its inactivated products. This may contribute to the systemic distribution of NO₂-FA-TAG and may serve as a depot for subsequent mobilization by lipases of NO₂-FA to in turn impact adipocyte functionality and anti-inflammatory activity.

Publication

[Generation and esterification of electrophilic fatty acid nitroalkenes in triacylglycerides.](#)

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