Absorption of Endogenous Endotoxins during Lipid Digestion

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Obesity and type 2 diabetes are nutritional diseases that have become major public health concerns, particularly in regard to their cardio-vascular effects. Recent patho-physiological studies have demonstrated a role for inflammation in cardio-vascular diseases and have highlighted a relationship between the onset of inflammation and nutrition, particularly high-fat intake. However, the mechanism of this subclinical inflammation is poorly understood. Recently published reports of *in vitro* and mouse studies have led to postulate that with high-fat diets, the lipopolysaccharides of Gram negative bacteria in intestinal microflora would be absorbed along with the lipids. This translocation would contribute to the onset and maintenance of low-grade inflammation because lipopolysaccharides, so-called endotoxins, are highly proinflammatory compounds.

In this study, we aimed to elucidate the role of ingested dietary lipids on intestinal endotoxin absorption during digestion. We thus measured postprandial triglyceridemia and plasma endotoxemia (kinetic chromogenic LAL test) in catheterized rats during 6 hours after force-feeding either physiological serum, or serum and sunflower oil, or an emulsion of sunflower oil with lecithin as emulsifier.

Lipid digestion was increased after feeding emulsion compared to oil (AUC triglycerides=551 ±140 vs 154 ±40 mmol/L.min, respectively; $P<0.01$). Moreover, we observed that emulsion led to a 2.3-fold higher endotoxin accumulation in plasma than oil (AUC Endotoxins = 150 ±41 vs 66 ±28 EU/mL.min) and 7-fold higher than serum (20 ±16 EU/mL.min; $P<0.001$). Most strikingly, postprandial triglyceridemia and endotoxemia were highly correlated ($R^2=0.99$) in rats force-fed with different lipid bolus.

Our results demonstrate that dietary lipid digestion results in a transient accumulation of endogenous endotoxins in plasma, all the more than lipids are structured as a fine emulsion containing lecithin. Therefore, controlling the composition and structure of dietary lipids could be a strategy to modulate absorption of endotoxins from intestinal microflora. Studies are currently conducted to study endogenous endotoxin absorption in humans.