

The more we offer «light-food» to the consumers, the more obesity increases: could emulsifiers be responsible?

Editorial

Lipids are essential nutrients for humans but could be nonetheless dangerous because of their high energy content. Today, because of a massive worldwide epidemic in obesity, principal nutritional recommendations are leading consumers to significantly decrease the total intake of lipids. Furthermore, due to recent scientific advances in lipid requirements, many attempts have been made to convince consumers to concomitantly decrease their lipid intake, and optimize their intake ratio of polyunsaturated fat (ratio omega 3/omega 6) if they want to keep the doctor away. This public health message has been well integrated by modern consumers who are now looking for a new generation of functional processed foods with low and optimized lipid content.

Because lipids are key ingredients for organoleptic properties of food like taste, flavor and texture, formulating services in the food industries have a key role to play in the development of such kinds of functional foods. Among various strategies used to decrease total lipid incorporation in modern processed food without destroying its organoleptic properties, are incorporating foam or emulsions into the recipes, instead of continuous oil or solid fat. In order to maintain the stability of emulsions in food and/or during food processing, industries have important molecules in their toolbox: emulsifiers, also called food grade surfactants for “surface active agents”. Empirically, egg yolks containing lecithin and phospholipids were first used in traditional recipes for their emulsification properties before the introduction of commercial emulsifiers. Used for the first time in the food industry, mono-glycerides and diglycerides make their appearance in food ingredient lists as emulsifiers in the 1930s, with the development of margarine. Then the major breakthrough came around the 1960s, with the development of new processes for the baking industries. Today, one of the major food additives market is emulsifier, which was estimated to be worth around 2.4 billion dollars in 2014, with an estimated growth of more than 5% per year. Today food emulsifiers or food grade surfactants are used for various applications in foods like functional food, and bakery, dairy and meat products. But within all the applications listed above, the baking industries are one of the main users, with more than 50% of the emulsifier market.

Emulsifiers are amphiphile molecules that form or preserve an emulsion during food processing. They belong to the category of food additives, and could be natural, like lecithin or beta -lactoglobulin, or less natural, like polysorbate 80 (Tween 80), sodium stearoyl-2-lactylate better known as SSL (or in Europe E481) or calcium stearoyl-2-lactylate better known as CSL (or in Europe E482). They were used massively by the food industries in order to give palatability to food. Even if they were considered as non-toxic molecules as regards the different food regulatory agencies around the world, they were now, paradoxically, being pointed out more and

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more by researchers because of their influence on lipid absorption and/or their potential adverse effects on intestinal mucosa integrity and/or gut microbiota, which could induce metabolic syndrome.¹⁻⁶ Indeed, before being used by the food industry, they were widely used by the pharmaceutical industry to enhance global high junction permeability between intestinal epithelial cells of the gut mucosa in order to increase drug absorption. Today, and paradoxically, in spite of their massive use by the food or pharmaceutical industry, little is known about the mechanisms underlying the role of surfactants on biological membranes, especially those lining the epithelium of the gastrointestinal mucosa. The intestinal mucosa is the largest mucosal surface in the body separating the closely regulated internal milieu of the human body from the environment. The functions of this mucosa were not only to digest and absorb nutrients, but also to prevent and control the entrance of xenobiotics like pollutants, residues, toxins, drugs, allergens and/or infectious biological agents (bacteria, viruses and so on). The disruption of the intestinal barrier function is a widely accepted pathophysiological concept for a number of diseases. New therapeutic approaches, including the use of nutritional approaches using probiotics and peptides to restore the disrupted barrier functions, have been actively developed over the last few years.⁷

In conclusion, the use of food emulsifiers as a formulation strategy to develop new functional foods with low lipid content or higher palatability is probably a bad idea. Indeed, emulsifiers act as disruptors of tight junctions in the epithelial cells of gut mucosa, increasing the absorption of lipids, but also other adverse molecules like allergens, or xenobiotics, and thus disturbing the quite fragile equilibrium of gut microbiota and potentially inducing the development of metabolic syndrome.

So there is an urgent need to revisit the uses and practices concerning food emulsifiers in the food industry in regard to their

potential adverse effects on intestinal barrier functions. Rather than trying to repair a disrupted intestinal barrier, how about trying not to damage it in the first place through our daily food intakes.

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Conflict of interest

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