

Editorial

Lignan as Interesting Food Components and Their Health Effects

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I would like to bring the attention of the readers of the International Journal of Nutrition Sciences to some of the most interesting and recently studied group of food phytochemicals, the lignan.

The lignan are a major group of plant bioactive compounds contained in commonly consumed foods around the world. They are called “Phytohormones” because of reported activities as powerful hormone mimics [1,2,3]. The foods that contain the highest concentrations of these compounds are widely suggested to be beneficial for human health and because of this they are defined as “Functional Foods”.

The lignan are mostly found in fiber-rich foods such as cereal, vegetables and fruits, typically regarded as healthy diets. They are particularly concentrated in two oilseeds, flaxseed and sesame and in cereals such as rye and wheat brans, although in minor concentration. New mixtures of lignans are also found in spices. An example is nutmeg (*Myristica Fragrans*), which contains the highest amounts of the so called Macelignan, compounds endowed with very potent biological activities [4]. New lignan are also always under discovery in several herbs used as folk medicines in Asian countries, Africa and South America.

Epidemiological studies evidenced that populations with higher consumption of lignans display lower frequency of several diseases [5,6,7,8]. In particular, a few randomized controlled studies have shown beneficial effects of diets supplemented with lignan’s rich foods in the control of the most common metabolic diseases such as the Metabolic Syndrome (MetS) and Type-2 diabetes [9,10]. The results produced in these studies were obtained with different sources of lignans (ie. flaxseed, sesame and cereals bran) and at different concentration in the analyzed foods. Some mechanistic studies have also been performed identifying the lignan mainly as efficient antioxidants and nuclear receptors regulators [11,12,13,14]. All these studies and others, pointed out at some lignan as very promising bioactive candidates that deserve focused attention and that should be considered when elaborating nutritional intervention studies aimed at finding products with the ability to ameliorate metabolic imbalances (MetS) (Grosso 2016) which is likely, the main area of interest when studying the effect of new functional foods on human health.

These chemicals and their most rich-containing foods are especially under characterization to assess their hormone-dependent nutrigenomic profiles (transcriptomics, lipidomic, and metabolomic) as markers of “Healthy Signatures”, beyond classical pharmacotoxicological approaches and epigenetics. To understand their mechanisms of action, research is particularly focused on the study of lignans through the regulation of nuclear receptors (PPAR γ , LXRs and ERs) that are central to the metabolic control of the adipose organ and lipid metabolism, glucose homeostasis, cholesterol biosynthesis and insulin biosynthesis and secretion. Moreover, specific responses to lignans-integrated diets and factors affecting lignans bioavailability and effects on intestinal metabolization by the gut microbiota are of particular importance. The outcome of these integrated approaches to the characterization of lignan and the generated information is stimulating the food industry to design and produce new lignan-rich food formulations and nutraceuticals.

We can say that lignans represent truly “Western” phytohormones and that their study concerns a promising field of innovation with respect to the great efforts that have been directed in the last two decades towards “Asian Diets” and soy isoflavones. We now know that not only the oilseeds and derived products, which are foods highly represented in the Mediterranean regions and the Middle East and that are also increasingly consumed in Europe and US, contain functional concentration of lignan. Cereals, cereal bran and the numerous derived bakery products represent the most important sources of lignans in the western world which themselves provide from the 30 % to 50% of the daily caloric intake. Thus, the field of interest is quite wide. We may assume that the ongoing research resulting from the collaborative effort of academia and industry will soon lead to science-based dietary advices regarding new functional food preparations based on lignan that, when directed to the consumers they will raise their awareness and power to make healthy alimentary choices.

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