Contents Digest

Trends in Food Science & Technology 38 (2014) 1–4

Flaxseed (*Linum usitatissimum* L.) bioactive compounds and peptides

Flaxseed (*L. usitatissimum* L.) is an oilseed used in industrial and natural health products. Flaxseed accumulates many biologically active compounds and elements including linolenic acid, linoleic acid, lignans, cyclic peptides, polysaccharides, alkaloids, cyanogenic glycosides, and cadmium. Most biological and clinical studies of flaxseed have focused on extracts containing a-linolenic acid or lignan. Other flaxseed compounds have received less attention and their activity is not well described. The benefits of consumption of whole flaxseed fractions such as oil, mucilage and protein indicate that consideration of the entire portfolio of bioactives present is required to associate biological activity with specific compounds. On page 5, Martin J.T. Reaney and coworkers review bioactive peptide nomenclature, and flaxseed compounds and their activity. Flaxseed oil is a rich source of ALA but this oil also contains cyclic peptides. Most studies of ALA acid are truly studies of cold pressed flaxseed oil. These studies may erroneously attribute biological activity to ALA that is contributed by cyclic peptides. Additionally the oxidative state of the oil in many studies is not known. Flaxseed coat materials are a rich source of lignans and the polysaccharide mucilage. The latter has profound effects on digestive health. Studies that attribute biological activity of flaxseed hull and flaxseed hull extracts to either lignans or olysaccharides alone may also be in error. Alcohol extracts of flaxseed meal contain lignans, cyanogenic glycosides and cyclic peptides. These materials may all contribute biological activity. Flaxseed cyclic peptide nomenclature has not been applied with rigor, and recommendations have been made for specific peptides to be named more systematically. The risk of toxicity from flaxseed consumption due to linatine, cyanogenic glycosides and cadmium appears to be negligible for most individuals when flaxseed products are consumed in moderation. Regular consumption of flaxseed or flaxseed meal products could place a significant portion of the “cadmium burden” on individuals. However, current recommendations for maximum weekly cadmium consumption are not likely to be exceeded with reasonable flaxseed product consumption levels. The cyanogenic glycoside levels in flaxseed do not appear to be sufficiently concentrated to contribute any biological effect. There is a reported interaction of cyanogenic glycosides with selenium toxicity. This interaction has not been studied in sufficient detail to use flaxseed as a treatment for selenium poisoning. The level of the vitamin B antagonist, linatine, in flaxseed has never been associated with toxicity in humans but the consumption of large amounts of flaxseed can lead to evidence of limited vitamin B availability in swine. It is not known if individuals with compromised vitamin B might become deficient when consuming flaxseed. The level of linatine is not known for most current flaxseed varieties and thus it is not possible to suggest that the dose of this compound is acceptable in untested varieties of flax.

Electrospinning and electrospraying techniques in food based applications

Electrohydrodynamic processes namely electrospinning and electrospraying are facile, cost effective and flexible methods that utilize electrically charged jet of polymer solution for production of fibers or particles at micron, submicron and nanoscale. The electrospun fibers and electrosprayed particles possess many structural and functional advantages. However, their use in the field of food processing and preservation remains less explored. On page 21, C. Anandharamakrishnan and J. Anu Bhushani review the potential food based applications of electrospinning and electrospraying techniques such as encapsulation, enzyme immobilization, food coating and development of materials for filtration and active food packaging, as well as any existing limitations and scope for future research are discussed. Electrospinning and electrospraying techniques can augment the growth of food processing sector in fields of encapsulation, food packaging and edible coating. The merits of electrospun fibers and electrosprayed particles with regard to food applications can be classified into structural and functional advantages. Structural advantages are its amendable size and morphology, highly porous structure, high surface area and intertwined fibrous structure. Whereas functional advantages are its sustained release property, high encapsulation efficiency and enhanced stability of encapsulated food bioactive compounds. The potential food based applications of electrospinning and electrospraying are encapsulation, enzyme immobilization, food packaging, food coating and as aids in filtration processes. The encapsulation of food bioactive compounds in electrospun fibers and electrosprayed particles enhances their stability and controlled release properties. Further, the use of electrospun fibers for enzyme immobilization is shown to improve the efficiency and catalyzing capability of immobilized enzymes. Electrospun fibers act as materials for active food packaging and interlayer in multilayer packaging system with enhanced mechanical and functional properties. Also, electrospraying is used for formation of edible coating on food materials with improved barrier or functional properties. Further, another less explored area in the food-based use of electrospun fibers is in filtration or clarification of beverages. Currently, fabrication of electrospun

0924-2244/$ - see front matter © 2014 Published by Elsevier Ltd.
http://dx.doi.org/10.1016/j.tifs.2014.06.001

fibers and electro-sprayed particles at industrial scale is feasible. However, this limitation restricts their commercial exploitation at a large scale and hence scaling up ensues a priority for wide application. Thus addressing this constraint by modifying the structural aspects of the setup (e.g., multi-needle arrangement) proves to be a vital area of research. Secondly, the probable or proposed applications of electrospun fibers and electrosprayed particles have to be translated into reality by investigating in food systems or relevant areas so as to validate their efficiency. Studies are necessitated to prove the workability of the resultant products as active/smart food packaging materials without altering the physical, chemical and sensory characteristics of food. Further, the electrospun nanofibrous membranes are potent candidates for liquid separation and this aspect need to be looked upon by re- searchers for usage in beverage filtration and clarification. Similarly, the use of immobilized enzymes in bioreactor especially for continuous operations has to be studied comprehensively. Finally, the application of nanoparticles in foods as a functional ingredient is dependent mainly on the capability of particles to retain their size in nanoscale. The large surface area of the nanoparticles increases its probability of agglomeration or aggregation thereby causing size growth. In this context, the recovery and handling of electrosprayed submicron or nanoparticles from the collector material are of paramount importance. Thus future works are suggested to focus on this aspect of the study so as to broaden the end use of the electrosprayed particles.

Medical nutrition terminology and definitions

A plethora of terms and definitions for medical nutrition has resulted in an ambiguity in the way “medical nutrition” is termed and defined across various societal levels. The terms medical nutrition, clinical nutrition, enteral nutrition, parenteral nutrition, oral nutritional supplements, medical foods, foods for special medical purposes, nutritional support, nutritional intervention and nutritional therapy are used inter- changeably. To date consistent terminology/nomenclature and definitions have not emerged from the US and European medical nutrition community. The current absence of clear medical nutrition product category boundaries makes it necessary to introduce medical nutrition terminology conformance in order to reduce widespread confusion at policy; industry; healthcare; and patient level. On page 34, Tamar C. Weenen and coworkers review attempts to put quantitative and qualitative clarity and continuity to the use of these terms and definitions by: (1) addressing the terminology used; (2) discussing the distinguishing features of medical nutrition in various definitions and (3) proposing a single medical nutrition term and a clear pragmatic operational definition. A scientific literature-based comparison was conducted resulting in the selection of 22 publications, describing 8 different terms with 19 definitions. Based on the terminology found in literature, the following medical nutrition terminology is proposed: medical nutrition comprises both parenteral (intravenous) as well as enteral nutrition (tube feeding and oral nutrition), which may be given via the oral route or via a tube into the gastrointestinal tract. The features found to be most important in describing medical nutrition are: route of administration; disease; supervision; composition and support/management. These features have been integrated into one operational clinical definition and resulted in the following definition: MEDICAL NUTRITION: specially formulated nutritional composition for the dietary management of patients with diseases, disorders or medical conditions that cause distinct nutritional requirements. It may consist of partial or exclusive feeding by means of oral intake, tube feeding and/or parenteral administration under healthcare professional supervision.

The emerging application of ultrasound in lactose crystallization

Ultrasonic processing is the industrial application of sound waves with a frequency above the upper limit of human hearing. Interest has arisen recently in the effects of ultrasound on the crystallisation of lactose as an innovative technology to improve its recovery and the control over its crystal properties. This not only will increase the financial profit for lactose manufacturers and improve the quality of lactose for specific applications, but will also improve the quality of end products manufactured with lactose as an ingredient. On page 47, Mohammad H. Zamanipoor and Ricardo L. Mancera review emerging technique to provide an overall perspective of the benefits of the application of ultrasound in lactose crystallisation. Ultrasonic processing is an emerging technology, which has been generally shown to improve the crystallisation process of a number of chemical compounds, mainly improving control over the crystal properties and recovery. However, the ultrasonic crystallisation of lactose has not been researched extensively, especially in relation to food applications. Contrasting findings have been reported for the use of ultrasound for different chemical compounds, which necessitates in-depth investigation of its application for any crystallisation medium, including lactose. Two major difficulties are associated with the crystallisation of lactose: it is slow and hardly controllable, and different at- tempts have been focused to address these issues. The use of ultrasound has been shown to improve the recovery of lactose, and adjusting the processing