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FOOD, NUTRITION & SAFETY MAGAZINE

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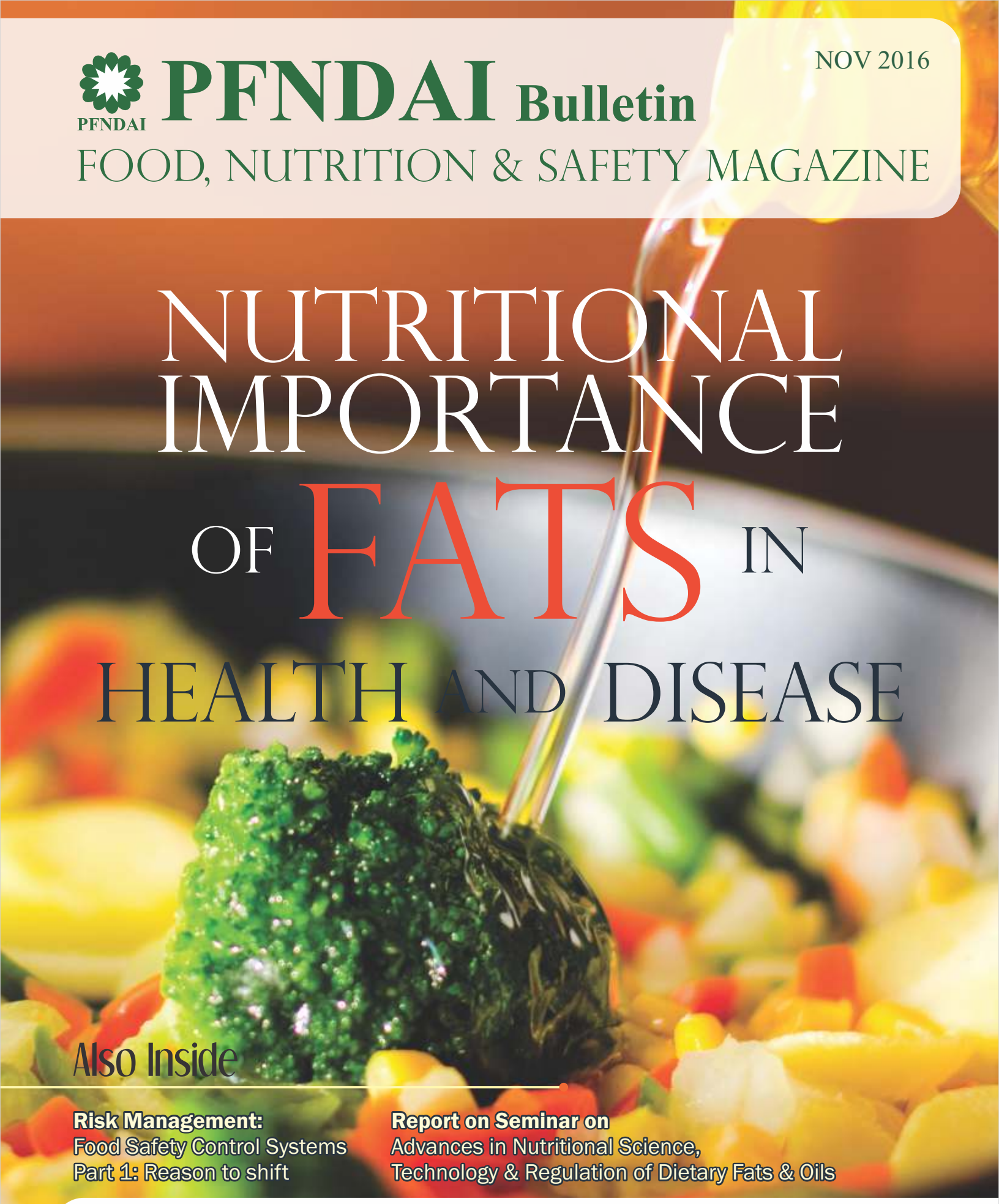

NUTRITIONAL IMPORTANCE OF FATS IN HEALTH AND DISEASE

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Food Safety Control Systems
Part 1: Reason to shift

Report on Seminar on
Advances in Nutritional Science,
Technology & Regulation of Dietary Fats & Oils

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EDITORIAL

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It would be an understatement if one says that internet has changed our life more than anything in the last decade or so. People are buying all kinds of things needed for household or workplace online. There is grocery available online, medicine, clothes, cosmetics and entertainment all available online. You can read news online. You can hire cars, buy tickets for airplane, train, bus and also for movies and theatre online. You can order food from any restaurant online. Meetings and conferences are held online. Now there are doctors available online. How can education be left behind?

There are many courses available online and there are places where students do not have to attend classes but stay at home and attend lectures through video. For last couple of decades there has been a lot of information being uploaded on internet. There is literally information explosion on the internet. Even when one uses keywords and advanced search, the results you get are mindboggling in number.

In food science and nutrition also there are a lot of enthusiasts who upload information. There is a lot of authentic credible information along with a large amount of false information. People who are good cooks suddenly become experts on nutrition and start giving advice. Celebrity clientele also gives some a big boost and they become famous and sought-after experts. Laypeople without expertise or experience start advising others on internet about health. So now there is credibility crisis. Whom does one believe and whom one should call a quack? This phenomenon is global and a well-prepared website may give erroneous impression.

For this reason, there is a need for professional organizations and educational institutes of repute to start their own efforts to educate not just their students but also common consumers. The need is more critical at present when there are a lot of substances and ingredients having physiological activity which can be useful in reducing risks of many diseases are being permitted to be used under food domain and are being marketed. These substances will go a long way in reducing our cost of medical care which is skyrocketing. However along with a lot of genuine substances a lot of fake as well as unproved or untested materials are being marketed using internet. They can do a lot of harm.

Education is a slow process and people are not very patient. They are looking for instant remedies and solutions and some sites may lure them. Books are very expensive so students and others resort to internet where a lot of information is freely available. Let us try to provide them authentic information.

Many colleges and universities have websites and give information about their courses, teachers and programs etc. but very little additional information useful to students in their course work is given. Many universities allow students to log in to this information which has been compiled by their teachers for students. Additional information can be uploaded for consumers or laypersons who are interested in knowing more about the subjects so authentic and credible information can be provided.

Unless these pillars of education and information with their present and past faculty members, qualified health professionals and their associations decide to start this process someone else will fill the gap and then it will be too late. Already some business houses are converting the profession of providing health into business. It won't take too much time for them to take over education in food science and nutrition.

Prof. Jagadish S. Pai,
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NUTRITIONAL IMPORTANCE OF FATS IN HEALTH AND DISEASE

By Dr. Shobha Udipi, Sr. Nutritionist, PFNDAI

By 2020, approximately 75% of all deaths; and 60% of all disability adjusted life years worldwide, would be attributable to non - communicable diseases. What is of concern is that the largest increase and burden will be in low and middle income countries like India. Also, most burdens will occur prematurely, but they can be either prevented or delayed by healthy life styles including healthy diets.

High caloric/ energy-dense diets have been linked to weight gain, obesity/ adiposity and associated metabolic complications. However, it is not just total energy intake that is important. Scientific evidence indicates that problems related to obesity, fat deposition/adiposity, metabolic perturbations and development of disease are linked to dietary fats, specifically the absolute amount of fat and relative amounts of different fatty acids.

Dietary fats contain a wide spectrum of fatty acids (FA) that differ in chain length and degree of unsaturation. With advancing research and new knowledge, dietary recommendations regarding oils and fats have undergone a sea change. In the past, based on findings that polyunsaturated fatty acids (PUFA) lowered cholesterol, especially LDL cholesterol, recommendations were made to replace saturated fats including ghee, coconut and coconut oil, groundnut oil with PUFA rich oils like safflower and sunflower oils.

However, our well-intentioned efforts and guidelines to the public were based on available information at a time when we did not have adequate knowledge about the importance of n-3 and MUFA and the relative risks and benefits that need to be considered in the light of the balance between n-3 and n-6 PUFA. Today, the focus has shifted to the ratio of n-6 to n-3 fatty acids, intakes of monounsaturated fatty acids and trans fatty acids for their influence on health and risk of disease. This article focuses on how n-3, n-6 and MUFA influence health.

Specific dietary lipids can influence:

- structural composition of cells
- Fluidity of cell membranes or cell membrane lipid matrix properties
- Signalling functions of specific cellular processes, ion channel functioning with effects on multiple organ systems.
- Metabolic pathways including regulation of lipid catabolism and lipogenesis.
- PUFA metabolites act as mediators in endocrine, paracrine and autocrine signaling in adipose tissue.
- Inflammation.
- Gene expression by affecting transcription factorsthat have a role in controlling proteins involved in lipid synthesis and oxidation, and lipoprotein secretion. PUFAs also have a role in regulating genes related to inflammation, cell survival, cell proliferation, and contraction of cardiac muscle.
- Tissue FA composition which is linked with changes in tissue function.

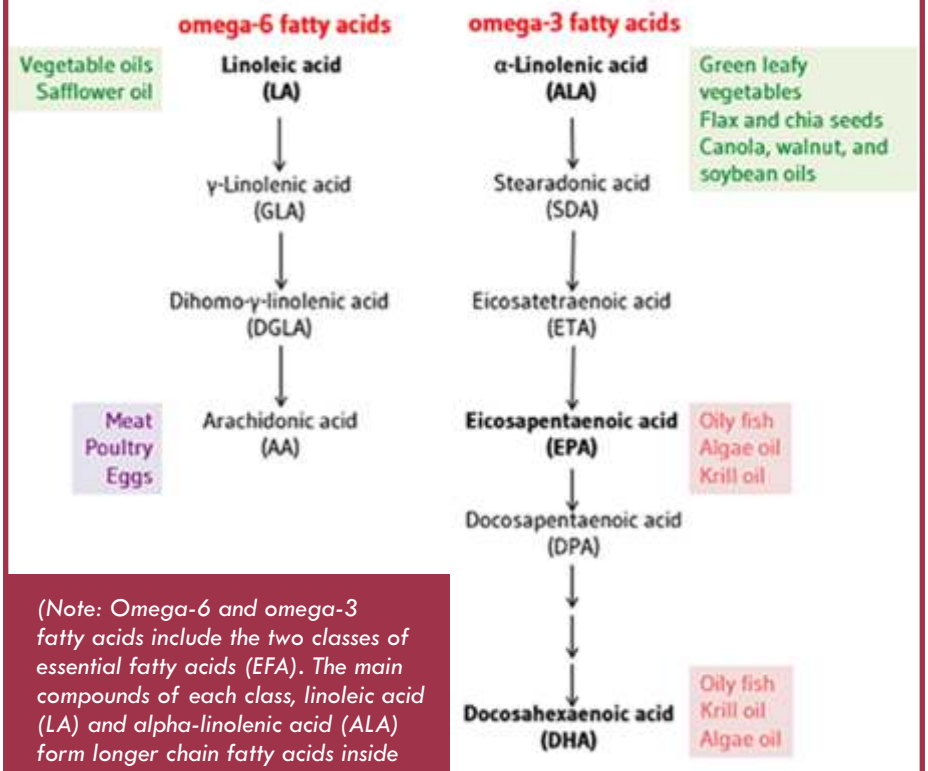
n-3 and n-6 PUFA differ in their physiological functions. They compete for the same enzymes that are part of the process of chain lengthening of FA and their desaturation. In general, these enzymes have more affinity for and so preferentially process the n-3 PUFAs. However, if the intake of n-6 PUFA (linoleic acid [LA]) is very high, desaturation and elongation of alpha-linolenic acid (ALA) will be affected and will interfere with the production of docosahexaenoic acid (DHA)

Fatty acids and Inflammation: Inflammation is an essential component of the innate immune response to tissue injury. When tissue injury occurs, serum proteins, lipids, and blood leukocytes move into affected tissues in order to eliminate/ neutralize the source of tissue injury and restore normal tissue structure and function. Failure to control the magnitude and duration of inflammatory response can damage host tissue and contribute to pathology of several diseases (see box), regardless of the original insult.

In general, metabolism of n-3 PUFA gives rise to compounds that are anti-inflammatory whereas the reverse happens with n-6 PUFA.

Cardiovascular disease	Metabolic disorders	Diabetic Complications	Bone and Joint disease	Autoimmune disorders	Neurological disorders
Atherosclerosis	Type 2 diabetes mellitus,	Neuropathy	Osteoarthritis	Inflammatory bowel disease	Parkinson's disease
Stroke	Fatty liver disease,	Retinopathy	Rheumatoid Arthritis	Crohn's disease	Alzheimer's disease
Hypertension	Renal disease	Hypertension	Osteopenia	Colitis	Multiple sclerosis
Heart Failure		Heart disease	Osteoporosis	Type1 diabetes	
				Multiple sclerosis	
Other diseases possibly linked to inflammation	Cancers, pulmonary diseases like bronchitis, chronic obstructive pulmonary disease, asthma				

Figure: Classes of Essential Fatty Acids



(Note: Omega-6 and omega-3 fatty acids include the two classes of essential fatty acids (EFA). The main compounds of each class, linoleic acid (LA) and alpha-linolenic acid (ALA) form longer chain fatty acids inside the body.
Due to low efficiency of conversion of ALA to the long chain omega-3 PUFA, EPA and DHA, it is recommended to obtain EPA and DHA from additional sources. Dietary sources are indicated by coloured boxes for each EFA)

Membrane fluidity:

Cell membrane fluidity, more recently termed 'lipid rafts' or 'membrane microdomains' is important because FA in the cell membrane can influence risk of heart disease by:

- influencing the physical proximity of cell membrane-bound proteins,
- being highly flexible, they influence the partitioning of the relatively rigid cholesterol and phospholipid molecules into rafts,
- modulating the activity of proteins involved in ion transport.

They also play a role in signal transduction, cell Ca2+ handling, and intracellular pH regulation. Decreased membrane fluidity may have a role in pathogenesis of hypertension. It could significantly alter vascular endothelial response to shear stress, impair endothelial cell wound closure as well as interfere with sodium-dependent D-glucose transport and insulin sensitivity.

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Saturated Fatty Acids (SFA):

In general, SFA are hypercholesterolemic, although there are differences between individual fatty acids - myristic acid is the most potent whereas stearic acid is apparently neutral.
In rodents fed a high-fat obesogenic diet and increasing SFA impaired insulin sensitivity in liver, skeletal muscle, heart muscle and adipose tissue.

In a multinational study of Diabetes, dietary surveys conducted in 6 countries indicated that persons recently diagnosed with diabetes had relatively higher intakes of total fat and SFA from animal fat sources compared to healthy controls. Other prospective studies suggest that a high SFA intake coupled with low relative intake of LA can increase risk of type 2 diabetes, possibly because of increased insulin resistance. In an intervention study, when SFA was replaced by linoleic acid (LA) insulin sensitivity improved. Also, replacement of SFA by PUFA reduced visceral adiposity. Saturated fatty acids like lauric, myristic, palmitic and stearic acids may trigger inflammatory responses including increased expression of pro-inflammatory gene expression.

It is recommended that not more than 10% of dietary energy should come from SFA. However, reduction of SFA without considering what nutrient(s) will replace SFA is important. Substituting 5% of energy from SFA by PUFA will reduce the risk of coronary heart disease (CHD) by 10%, whereas replacing SFA by refined carbohydrates/sugars may not decrease CHD risk. In contrast to replacement by carbohydrates from whole grains or cis-polyunsaturated fatty acid (cis-PUFA) does. Also, the risk of cardiovascular disease decreased by about 17% when saturated fat intake was reduced from 17% to 9% of energy.

High density lipoprotein (HDL) is protective and the target is to raise HDL-cholesterol (HDL-c) levels. Substitution of dietary carbohydrates with fat (including whole milk) has been shown to elevate HDL-c, as did all types of FA ingestion, although the effect decreased as the unsaturation of the fatty acid increased.

Insulin Sensitivity and SFA:

Insulin action has been found to be related to the proportion of long chain FA in skeletal muscle. In a long – term follow up study in Uppsala, insulin resistance was found to be associated with high proportions of palmitic acid, palmitoleic acid and dihomo-γ-linolenic acid and low proportion of LA in skeletal muscle phospholipids. In healthy subjects, SFA in serum phospholipids were negatively correlated with insulin sensitivity.

In Finland, glucose intolerance and type 2 diabetes were associated with high palmitic and palmitoleic acid, and low LA in cholesterol esters. Two SFA that are said to impair insulin sensitivity are palmitic acid and myristic acid in healthy persons. However, SFA's effects on insulin resistance are contingent upon intake of ample amounts of carbohydrate. When carbohydrate intake was restricted even though SFA intake was high, there was improvement in insulin sensitivity, although rates of lipolysis and release of FA into circulation increased. Thus it would be worthwhile to determine the effects of low carbohydrate diets for weight maintenance and for their effects on plasma lipids.

Effects of n-6 PUFA on health:

n-6 PUFA and adiposity: In rats, n-6 PUFA rich-diets may stimulate lipogenesis and increase abdominal adiposity. In contrast, in both rats and humans, n-3 PUFA rich diets led to less fat deposition, lower fasting serum triglycerides and increased fatty acid oxidation, indicating that they have anti-obesogenic effect. Perinatal exposure of mice to high n-6 fatty acid diet (similar to 'Western' diet) resulted in progressive accumulation of body fat across generations. During the perinatal period, high n-6 PUFA intake in animals was associated with increased adiposity in the offspring. At three years of age, children who had had a higher ratio of n-6/n-3 in the red blood cells of umbilical cord blood, were found to have higher subscapular skin-fold thickness at 3 years of age. Also, high fat diets rich in n-6 have been linked to higher risk of leptin resistance and diabetes.

n-6 PUFA and cancer: In animal studies, n-6 PUFA enhanced mammary tumours. Epidemiological studies show that n-6 PUFA intake is positively associated with risk of breast cancer. The Veterans Los Angeles clinical trial, was undertaken to find out whether serum cholesterol - lowering diet would prevent overt complications of CHD and other manifestations of atherosclerosis. The investigators reported that changing the saturation of dietary fat was largely responsible for lowering serum cholesterol. After eight years, LA concentration in adipose tissue increased to 33.7% among volunteers who were 'good adherers' from 10.9% at the beginning of the study. However, an unexpected finding (not part of the original objectives) was a significant increase in incidence of new cancers and cancer mortality in the high n-6 group.

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Another trial - The Lyon Diet Heart Study, compared the effectiveness of a Mediterranean-type diet with a prudent Western type diet to determine whether recurrence of myocardial infarction would be reduced in persons who had had one myocardial infarction. During the five years of the study, the experimental group consumed less amounts of lipid, saturated fat, cholesterol and LA, while their intakes of oleic and ALA increased. n-6 PUFA intake reduced to 3.6% of total energy in experimental group compared to 5.3% in the other group. The low n-6 group showed significant decrease in cancer incidence.

Need to balance ratios of n-6 to n-3 PUFA:

There is a wealth of scientific literature on importance of n-3 PUFA and that an imbalance between n-6 and n-3 may be responsible for the rising global prevalence of NCDs. In a recent article, it has been highlighted that during evolution, the ratio of n-6 to n-3 in human diets was 1:1. Today, the ratio is highly skewed, the highest probably in urban India (Box).

Population	ω-6/ω-3
Paleolithic	0.79
Greece prior to 1960	1.00–2.00
Current Japan	4.00
Current UK and northern Europe	15.00
Current India, rural	5–6.1
Current US	16.74
Current India, urban	38–50

Source: SimopoulosAP(2016) An Increase in the Omega-6/Omega-3Fatty Acid Ratio Increases the Risk for Obesity. Nutrients 8:128. doi:10.3390/nu8030128

Reconstruction of East African paleolithic diets showed that energy contribution of the three macronutrients in diets that humans evolved on, is very different from the diets we consume today. In the Paleolithic era, protein intakes were moderate-to-high - contributing 25%–29% of energy intakes, fats contributed 30%–39%, whereas carbohydrate intakes were moderate, contributing 39%–40% of energy intakes. Further, animal meat consumed by Paleolithic or Neolithic hunters contained suitable amounts of n-3 fatty acids.

Many dietary changes have occurred rapidly in the last 100 to 150 years. Also, modern agriculture and animal husbandry have contributed to changes in the animal feeds, resulting in lower n-3 PUFA intake by animals compared to earlier intakes.

Previously in 1975 the diets of Alaskan natives consisted mostly of unsaturated fats with considerable amounts of n-3 fatty acids (MUFA and n-3 fatty acids contributed approximately 39% of energy intakes, protein 33% and carbohyrates only 28%), being supplied largely from their consumption of fish, whale, walrus and seal. Their diets are now undergoing a transition and contain more saturated fats. The foods they eat are now mostly purchased in stores, carbohydrate contribution to energy intake has risen to 48% and the fat intake is such that their intake of saturated fats is twice the recommended intake. The Genetics of Coronary Artery Disease in Alaska Natives (GOCADAN) study on participants from this population shows that about four decades ago, the prevalence of diabetes and coronary heart disease were very low, less than 0.4% and <2%, respectively. Now the prevalence of diabetes is 2.8 to 9.6%.

Adiposity, Obesity and Insulin Resistance: The amount and type of fatty acids can influence events after insulin binds to its receptor. If lipid availability is increased, insulin-stimulated glucose utilization in skeletal muscle is reduced possibly due to fatty acid-mediated inhibition of insulin signalling. In a study with rats, it was seen that a palatable diet with high amounts of fat and SFA caused obesity and affected the rats' brain glucose metabolism.

Body fat is influenced differently by n-3 and n-6 fatty acids. They have different effects on adipogenesis, lipid homeostasis, systemic inflammation and the brain-gut-adipose tissue axis, which ultimately influence differentiation of preadipocytes and inflammatory mediators. n-6 PUFA give rise to eicosanoid products that are potent mediators of thrombosis and inflammation, unlike the n-3 PUFA. Metabolites of arachidonic acid (AA) have a role in terminal differentiation of pre-adipocyte to mature adipocytes, which can be inhibited by n-3 PUFA. n-6 PUFA increase triglyceride content of cells by increasing membrane permeability as well as inhibiting conversion of white fat cells to brown fat cells (where more fatty acids are oxidized, thereby affecting energy balance and helping to lower body weight), through the AA metabolites prostaglandins E2 and F2.

These metabolites may inhibit conversion of white fat to brown fat cells, and favour fat accumulation whereas n-3 PUFA do the opposite, by suppressing enzymes of lipogenesis and increasing β-oxidation .An n-6 fatty acid rich diet will lead to a shift in the physiological state that is pro-inflammatory, pro-thrombotic, and pro-aggregatory, associated with more blood viscosity, more risks of vasospasm, vasoconstriction and cell proliferation.Increased n-3 PUFA in diet and muscle cells was found to enhance lipolytic capacity in skeletal muscle and to enhance fluidity of mitochondrial membrane.

Recent studies have shown that perinatal exposure of mice to a high omega-6 fatty acid diet (similar to Western diet) resulted in progressive accumulation of body fat across generations, which is consistent with observations that in humans, overweight and obesity have steadily increased in the last decades, and emerge earlier in life.

Besides influencing adipose tissue directly, n-6 PUFA may increase activity of the endocannabinoid system, whereas n-3 PUFA do not. Endocannabinoids are derived from AA and their concentrations are regulated by the ratio of n-3 to n-6 PUFA. A diet with a higher ratio of n-6 to n-3 PUFA was associated with increased endocannabinoid signalling and related mediators, increased inflammation besides influencing energy homeostasis and mood..The endocannabinoid system along with other systems regulates food intake/appetite and energy balance, and is regulated by leptin, insulin, ghrelin, cholecystokinin. Sustained hyperactivity of the endocannabinoid system is associated with obesity. Thus having more n-6 PUFA that are precursors of AA will lead to a physiological and metabolic state that is associated with obesity. Further in mice, endocannabinoids were found to selectively enhance sweet taste which may result in a preferential intake of sweet foods. In the present scenario where sugar containing foods are available in plenty, especially in urban markets, this could increase risk of weight gain and obesity.

In children, the AA level in adipose tissue was associated with BMI and overweight status. Also, at 3 years of age, children who had high subscapular skin-fold thickness had a high n-6:n3 fatty acid ratio in umbilical cord RBC membrane phospholipids.

In a cross-sectional study on working Japanese individuals, impaired glucose metabolism was inversely associated with intakes of PUFA, n-6 PUFA, oleic acid, and LA but alpha –linolenic acid (ALA) an n-3 PUFA intake was associated with lower prevalence of impaired glucose metabolism. Among three different dietary fatty acid patterns - fish oil pattern, meat oriented pattern, and plant oil pattern, the latter which was characterized by high intakes of ALA, LA, and oleic acid was inversely associated with impaired glucose metabolism.

Arachidonic acid is essential:

While the imbalance in ratios of n-6 to n-3 fatty acids needs correction, the essentiality of AA cannot be overlooked, especially for brain growth, through its role in cell division and signalling. Mammalian brain contains 60% fat and requires AA as well as DHA for growth and functioning. These two fatty acids constitute about one-fourth of the total FA in brain and are major structural components of neural cellular membranes.
From the beginning of the third trimester during pregnancy AA accumulates in the brain up to approximately 2 years of age, a period when myelination occurs. Hence, diets low in long chain PUFA can have adverse effects on brain development. Besides myelination, AA mediates neuronal firing, signalling, is important for hippocampal plasticity, activates the peroxisome proliferator-activated receptor gamma and protects brain against oxidative stress, is important for new protein synthesis. It is also important for growth and repair of neurites, a critical step in neuronal development.

AA is the important precursor for adrenic acid (22:4n-6) which is the third most abundant PUFA in the brain and is present in myelin lipids. About 5-16% of AA is converted to adrenic acid. Adrenic acid like AA accumulates rapidly in the early postnatal period after birth when there is a brain growth spurt in infants. Besides this, it has been reported that AA modulates inflammatory response and has effects on immune system, and may thus have a role in common inflammatory childhood conditions like asthma, eczema, atopic dermatitis, and food allergies.

AA is also important for hormonal regulation of normal bone formation and whole body mineral metabolism during infancy and childhood through relaying cellular, organ, and systemic signals for balancing the calcium and phosphate for bone formation and other metabolic activities. AA also mediates vitamin D3-regulated chondrocyte maturation and proliferation for the mineralization of skeletal growth plates.

Monounsaturated Fatty Acids: Mean MUFA intakes vary from 3.5 % of total energy in some regions of China to around 22 % in Greece. Almost all the dietary MUFA (≥90 %) is oleic acid (18:1; n-9, cis-MUFA). cis-MUFA has a favourable effect on blood lipids and when SFA was replaced by MUFA, considerable decreases in total cholesterol, LDL-cholesterol, and apoB100 and total to HDL cholesterol ratio were seen. However, it did not affect fasting flow- mediated vasodilation or arterial stiffness, but did improve endothelial activity and reduced night systolic blood pressure. serum HDL-cholesterol, apo-AI, and triglyceride concentrations.

An oil rich in MUFA and DHA increased LDL- and HDL cholesterol, lowered serum triglycerides more than did four other oils (olive oil, high-oleic acid sunflower oil, high oleic acid safflower oil, and rapeseed oil) enriched with cis-MUFA.

The effect of a high fat challenge given in the form of a milk shake on postprandial vascular responses was studied on normal –weight and obese men. The milk shake contained 95 g of fat either from SFA or cis-MUFAs or n-3 PUFA. The MUFA-containing milk shake reduced the augmentation index more than did the SFA and n-3 PUFA. This index reflects the tone of peripheral arterial resistance and blood pressure.

Results from a long - term prospective study – the PREDIMED trial indicated an inverse association between cardiovascular death and MUFA intakes. When 5% of energy from SFA or trans FA was iso-caloricallly substituted with cis-MUFA, risk of cardiovascular events was lowered by one –third. Similar trends were seen in the Nurses' Health study over two decades and the Health Professionals Study where the follow up was for almost a decade and a half, wherein replacing 5 % of energy from dietary SFA with an equivalent amount of cis-MUFA was associated with15% lower risk of CHD.

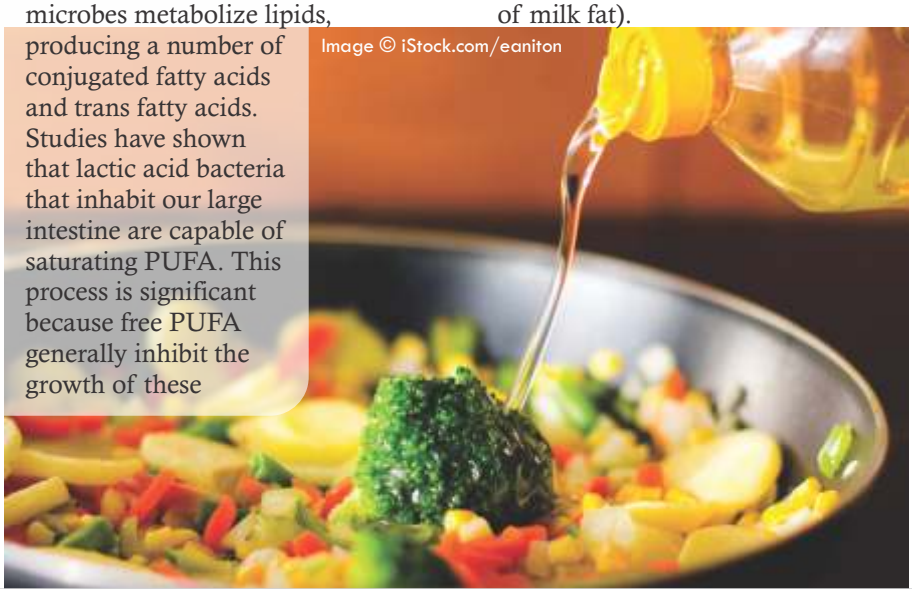
Comparison of high (>12% MUFA) compared to low MUFA diets (≤12%) showed that in overweight/obese persons, systolic and diastolic blood pressure reduced significantly. Also, oleic acid intake was associated with decreased prevalence of impaired glucose metabolism. In persons who had abnormal glucose metabolism, fasting blood glucose levels and glycosylated haemoglobin improved although the blood lipid levels did not.

Energy metabolism may also be influenced by MUFA. Acute studies show that following administration of MUFA rich oils, energy intake at a meal was lower. This may be attributed to the presence of a compound oleoyl-ethanolamide that is involved in appetite regulation and is produced by the small intestine. Other studies indicate that diet-induced thermogenesis, fat oxidation and energy expenditure in increased by MUFA and PUFA as compared to SFA. However, groundnuts that are a source of MUFA did not yield similar results.

Gut microbiome and Dietary Fatty Acids: Dietary fats are metabolized by microorganisms in the human gastro-intestinal tract. These microbes metabolize lipids, producing a number of conjugated fatty acids and trans fatty acids. Studies have shown that lactic acid bacteria that inhabit our large intestine are capable of saturating PUFA. This process is significant because free PUFA generally inhibit the growth of these organisms. By saturating them the free PUFA are converted into saturated fatty acids that are less toxic. The organisms can also generate hydroxyl fatty acids, and oxo fatty acids which can influence the health of the host.
A high fat diet has been found to alter gut microbial phyla and when oleic acid was given, it restored the microbial phyla as well as prevented weight gain. MUFA intakes may be involved in downstream effects of microbiota and through prevention of dysbiosis may be responsible for improving insulin sensitivity.

n-3 PUFA may have favourable effects on gut flora whereas n-6 PUFA may not. Unfavourable alterations in gut microflora caused by n-6 PUFA were prevented by n-3 PUFA, indicating that the latter can protect against dysbiosis. In animals, eicosapentaenoic acid and docosahexaenoic acid reduced bacterial overgrowth and SFA-induced inflammation in the small intestine. Pathogenic organisms like Helicobacter and Pseudomonas as well as organisms associated with ulcers, infection, and weight gain. It is possible that n-3 PUFA and other FA have bactericidal effects on some organisms. There are reports from studies on swine that dietary fish oil led to strengthening of intestinal barrier function and reduced plasma endotoxin levels.-

Dairy Fatty Acids: In the past, restriction of butter and ghee was generally advised, as they contain high amounts of SFA (about 70% of milk fat).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However, in elderly Swedish men, dairy fat intake showed inverse association with metabolic abnormalities including high fasting plasma glucose. Other studies indicate an inverse association between insulin resistance and dairy consumption, especially low fat dairy intake.

It has been suggested that a trans fatty acid[TFA] (16:1n27) may stimulate fat oxidation or inhibit de novo lipogenesis in the liver, resulting in lower hepatic fat content, improved hepatic insulin sensitivity and glucose tolerance. Thus, persons consuming dairy products, particularly dairy fat may have better insulin sensitivity and glucose tolerance. Dairy fats also contain a minor fatty acid-phytanic acid that may regulate liver fat oxidation. This fatty acid may act synergistically with the TFA16:1n27 to stimulate fatty acid oxidation and inhibit fat synthesis in liver cells.

Amount of fat consumed:

Not only the type of fat but the amount consumed is also important. Fat supplies twice the amount of energy as do carbohydrates and proteins.

Chronic increase in plasma free fatty acids may be linked to pancreatic beta cell lipotoxicity as they may interfere with functioning of these cells and lead to their death through lipoapoptosis. Excess fatty acids induce hepatic insulin resistance and impair insulin clearance which has been seen in animals and humans. It has been suggested that insulin secretion may be influenced by fatty acid chain length, with secretion increasing as chain length increases and decreasing as degree of unsaturation increases.

In studies with rodents a maternal high fat diet during gestation and lactation altered development of pancreas and liver and the systems in the central and peripheral nervous systems involved in energy homeostasis.

Genetic variations in fatty acid metabolism:

FADS 1 and FADS 2 encode rate-limiting enzymes involved in fatty acid metabolism. Genome-wide genotyping of the FADS region in five European population cohorts and analysis of genomic data available for humans and primates indicates that present –day human beings have two common FADS haplotypes A and D. These two haplotypes are greatly different in generation of long chain PUFA. Haplotype D is the most common whereas haplotype A is less common. The former is associated with high blood lipid levels, enhanced and more efficient ability to produce arachidonic acid (AA) from LA and ALA whereas Haplotype A is associated with low lipid levels . This apparently has appeared after humans split from ancestors that we had in common with Neanderthals. There appears to be positive selection in African populations, is probably almost fixed but it is less frequent outside Africa.

The efficient synthesis of LC-PUFAs with Haplotype D must be kept in mind with the higher intakes of n-6 PUFA, as the risk for many of non-communicable diseases would be higher. Also to be borne in mind is that FADS2 enzyme decreases with age, and some subgroups such as premature infants, hypertensives and some diabetics may have limited ability to metabolize ALA to EPA and DHA.

All of these issues need to be considered while making dietary recommendations. It is time for Indians to study their own traditional diet patterns and traditional foods and make recommendations based on Indian data rather than continually looking westward and making recommendations or discarding traditional practices without a firm and scientific evidence base.

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RISK MANAGEMENT: FOOD SAFETY CONTROL SYSTEMS

PART 1: REASON TO SHIFT

By Dr. Joseph I. Lewis, Consultant, FSSAI

Traditional food inspection systems of production facilities are centred on a number of general compliance standards as in Schedule IV, which are generic and may not be up to date.

To a large extent reliance is on a method of 'not knowing what to look for' or 'not knowing relevance of processes' in delivering safe food. Besides when the number of food business facilities to inspect is significantly more than there are inspectors, prioritization is key. Without prioritization, scarce inspection sources as wasted or badly utilized. Risk based prioritized inspections is a modern food control system for ensuring safe and wholesome food.

Traditional food control systems:

were based on adulteration i.e. whether the food inspected conformed to specifications (often confused with foods being safe). Inspections placed little or no emphasis on safety. Test reports will reveal that most of the testing and failures are on account of quality and identity parameters (moisture, solids non fat, whether product is toned milk or whole milk etc.). None of these are safety parameters though their failure is often touted as dramatic failure of the regulatory system.

Adulteration based food control is outdated being a reactive control system (after the fact or event has happened); and hardly assures the consumer of safe and wholesome food. With the incoming Food Act (FSSA 2006), the framework of food control has changed. It moves from a reactive system to a preventive approach and in some cases a predictive system (Fig 1). Under the risk management concept – food safety control relies upon inspection (scrutiny) at each point of the chain for risks introduced or safety compromised. The prime responsibility of safe and wholesome food is placed on the FBO(s) engaged in working the chain. A Performance Objective (PO) governs each point in the chain (Fig. 2)

The outdated concept (PFA) of product-based-inspection visits has several drawbacks that risk based inspections have overcome. Since inspections are a 'snapshot' of what is taking place at a food processing facility 'at the time of inspection' – the panorama presented to the inspector is not necessarily complete. Situations may occur throughout the day that the inspector does not see. Product inspections are never a reliable food control measure – process-based-inspections that make the product are the true indicator of safety and quality.

New Initiative by FSSAI:

The Food Authority in the past year has initiated several measures based on the risk framework, required under the Act. Each of these – Food Safety Management System (FSMS), Risk Assessment Cell, Food Safety Knowledge Assimilation Network (FSKAN), Food Import Inspection, Food Hygiene (Street vendors, etc.), FSO /FBO Training and other partnership measures – while appearing separate now are expected at an appropriate time of maturity to mesh into a system interlinking each other. Food Safety Control would then move from being manual based to e-data based decision-making processes, whereby a division services another within a feedback loop (instead of vertical silos) on how safety is being monitored (Fig below). Data based systems for decision-making is more reliable than opinions founded on hearsay and skimpy data or media hyped information.

Risk based inspection system (RBIS) is the next major initiative in strengthening the food control system in India. Collaborations between FSSAI and international Institutions and Governments with experience in best practices in the field of risk based safety control have been initiated and field work and training will commence. The role of the Food Safety Officer also shifts tothat of an auditor and collaborator in achieving the ultimate objective of placing safe food on the market. Enforcement without compliance assistance is self-defeating to achieving the outcomes of food safety i.e. protecting the consumer. This effort will significantly change the landscape of the regulators role at the field level and bring greater transparency and focus on food safety.

Mandate of the Act:
Under chapter VII (Enforcement of the Act; the Authorities responsible for enforcement of the Act are expected to maintain a system of control and other activities as appropriate to the circumstances, including communication on food safety and risk, food safety surveillance and other monitoring activities covering all stages of food business.

It is important to note that the term 'health risk' is being repeatedly used and this alone should obtain a paradigm shift in enforcement activities and practices.

- Under Section 33 the FSO is to be satisfied that a health risk exists with respect to use of the process or treatment or premises or equipment for the purposes of the food business
- Under Section 34 for an emergency prohibition notice the DO is to be satisfied that a health risk condition exists; and then the prohibition order will cease to have effect when the FBO has taken sufficient measures for justifying the lifting or orders

Three active considerations arise relating to risk based inspection systems arise from these mandates provided under enforcement;

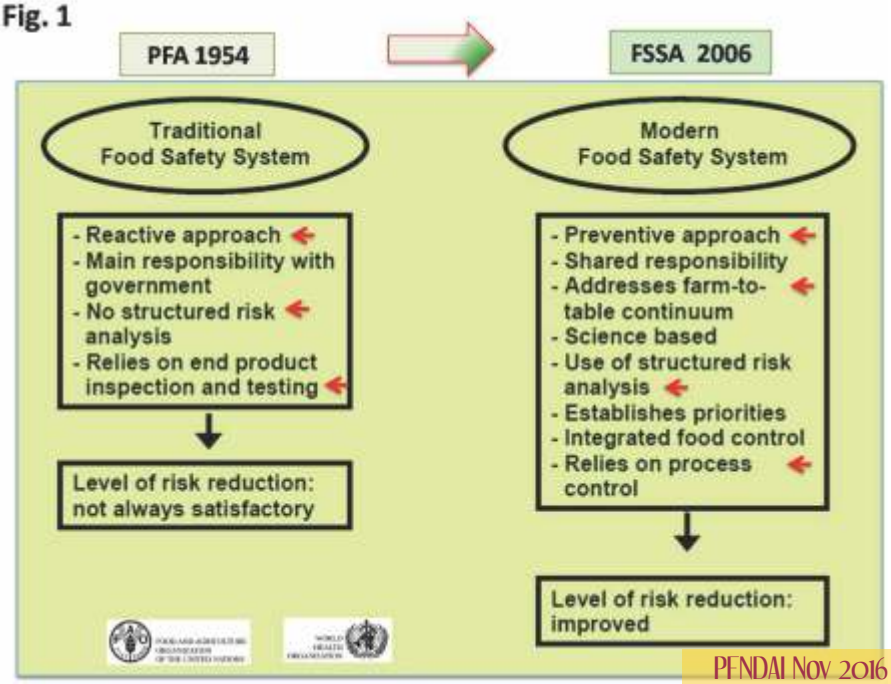
1. System of Control (Enforcement of the Act)
a. Shift from Adulteration to Risk based (safety) controls.
2. Health Risk (concept of control at FBO premises)
a. How do FSO's identify a 'health risk condition exists' due to processes/equipment/premises. The need to shift from inspections being "snapshot visitations' or 'historical capture of processes'.
b. Are improvement notices sufficiently process focussed and consequences of their failure leading to a 'health risk condition'
c. Is there a market testing of product as a consequence of process shortcoming/failure/absence.
d. Verification that the re-instituted process/equipment justifies the lifting of a prohibition order
3. Training & installation of a risk based inspection system (RBIS)

Basis of Risk Control:
Food safety is to be seen as an enlarged scope of substances in foods, the food itself and processes that may reduce its 'wholesomeness' (i.e. being fit for human consumption). Unsafe food as defined in the Act may occur from several instances of addition, presence (not intentionally added) and processing (Fig 3). There is a fundamental understanding in regulatory control that every food has two types of risk factors, namely intrinsic risk (food) and control risk (process). Foods may have different intrinsic factors and for the same food the control risk factor may be different. Food risks are a combination of these two factors.

Intrinsic Risk Factor: Foods that favourably support or promote the growth of microorganisms due to their inherent potential to do so are high-risk foods, such as meat, egg, milk, poultry fish etc. These foods have a higher propensity to cause public health issues. The purpose of identifying such foods in risk based inspection controls is to monitor these facilities more frequently and the specific processes that control pathogens and toxin generating organisms. A high inherent risk food compared to other low or medium risk foods would qualify for stricter classification and control. (Table 1)

Control Risk Factor is an extrinsic factor that measures the capability of risk control by an establishment/FBO such as a

Fig. 1



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- Shelf Lift Study
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- Quality Tolerances for Water for Processed Food Industry as per IS:4251:1967

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LAB RECOGNITION:

- NABL (ISO/IES 17025:2005 - National Accrediation Board for testing & calibration Laboratories in the field of Chemical & Biological)
- FSSAI - Local and Import Food (Food Safety & Standard Authority of India)
- APEDA - (Agricultural & Processed Food Products Export Development Authority)
- BIS - (Bureau of Indian Standards, approval for Infant Formula Food, Water & Salt)
- EIC - (Export Inspection Council of India, approval for Fish, Water, Peanut and Peanut products)
- GAFTA - (Grain and Feed Trade Association, approval for Grain & Feeding Stuff)
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manufacturer, processor, producer, or country. It is the ability of the FBO to control hazards from entering or propagating while the food is within the FBO's custody for processing. Absence of control measures would increase the risk profile of the food and presence would lower the same. Risk control systems in a facility are measurable outputs from records, data maintained under its existing food safety management systems (e.g. GMP, GHP HACCP, incoming quality etc.). Compliance is established by either regulatory agencies or recognized accredited systems. Control measures include all such actions that lie within the control of the production or manufacturing unit, and include premeditated fraud resulting in public health consequences.

Identifying foods for intrinsic and control risk is the basic concept that underlines a risk based food control system. This may often happen on a cases to case basis as the risk presented is always a combination of the two factors. Foods with lower intrinsic risks e.g. food grains may pose high control risk factor from contamination (toxins) due to poor handling or unhygienic practice including storage conditions. Such a food may be rated equivalent to a high-risk food (Table 1).

Table 1. Assigning Priority Rating to an Establishment Risk Profile

Food Facility Compliance Profile	Food Product Risk Profile	Inspection Priority
Low	High	1
Low	Low	2
High	High	2
High	Low	3

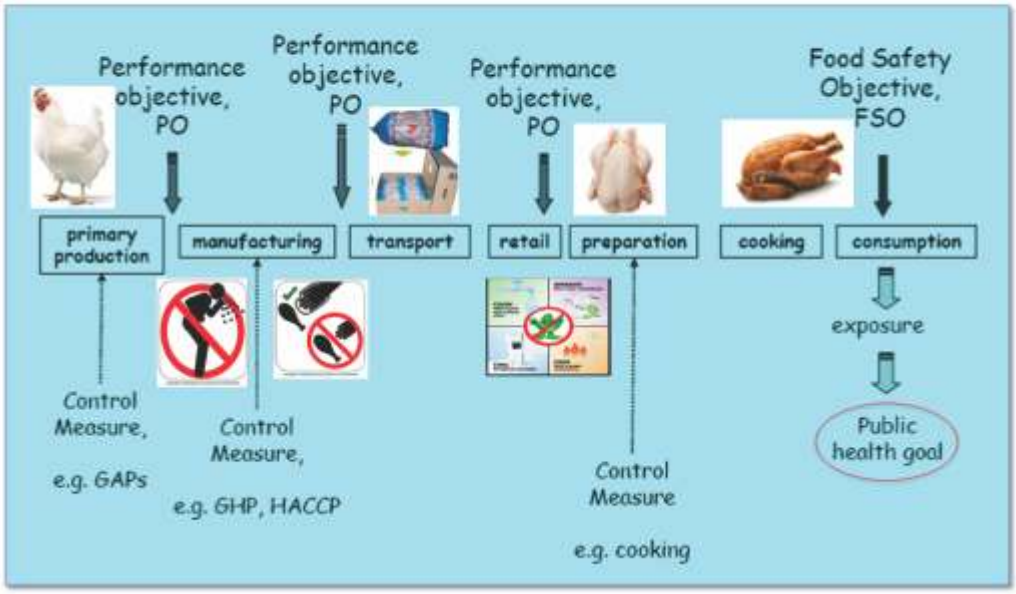
1= Top Priority, 2= Medium Priority and 3= Low Priority

**WHO Food & Nutrition Paper 89* Image © iStock.com/sydeen

So also foods intended and marketed, as 'ready-to-eat' carries a high risk factor depending on the severity of the risk it carries. Ready-to-eat food can present a greater risk of causing food-borne illness, as it is not intended for further heat processing or preparation before consumption. For example mayonnaise carries both a high intrinsic risk (egg) and control risk factor (as the control processes do not have a heating step in manufacture) and is further a ready-to –eat food. The severity of food borne disease is high if the food shows the presence of salmonella – a pathogen.

Fig. 2 Risk based Inspections . . .

. . . Processes deliver safe product



Under a risk based inspection system, every facility is characterized on its history of compliance; those with frequent non-compliances (based on improvement notices) or violations receive more attention. The demonstration of a food chain (meat, milk, poultry etc.) to be highly compliant with producing safe and wholesome food is the basis of a preventive system of control.

The overwhelming dependence on the present practice of product testing is inadequate as a food control system for India. First and foremost the product pick up for testing is not based on statistically valid sampling plan. A statistical valid plan will involve large number of samples and tests making the entire effort cost ineffective. Secondly the Analyst tests for parameters without a view as to what is the defect or violation that is suspected. Thereafter there is no follow-up inspection plan to identify/reduce/eliminate the cause(s) of these test failures – this is an expected practice as most failures reported are on quality and identity parameters and the inspector is clueless on how to remedy these aberrations. The inadequacy of the system is self-perpetuating.

The sheer geographical size of the Indian market with its deep penetration into village level retail outlets and the number of FBO(s) makes the whole enforcement effort a humongous task. Only an e-based intelligent food control system that collects, collates, analyses and summaries risks encountered by inspections at FBO facilities, corroborated by market failures (testing) and a loop around to identifying perennial violators will the country be able to assure safe and wholesome food. It time to shift.

(The views expressed here are his own and do not reflect the views or opinions of the Food Authority)

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REPORT ON SEMINAR ON ADVANCES IN NUTRITIONAL SCIENCE, TECHNOLOGY & REGULATION OF DIETARY FATS & OILS

A seminar on Advances in Nutritional Science, Technology & Regulation of Dietary Fats and Oils was organized on Friday, October 14, 2016 at Hotel VITS, Andheri-Kurla Road, Mumbai. The seminar was sponsored by AAK Kamani and the souvenir for the seminar was supported by Mother Dairy, Vasta Biotech, and Omni Active Health Technologies.

Mr. Bhupinder Singh, Chairman PFNDAI and CEO Vista Processed Foods, welcomed all to the seminar and outlined the objectives of this seminar. Dietary Oils and Fats are a most important aspect of food industry and this seminar was organized to disseminate the knowledge on various aspects of Oils and Fats,to interact with eminent speakers and get a thorough understanding of the oils and fats industry and its associated industries as well as the current technological advances in it uses.

Mr. Prakash Chawla, CEO, AAK Kamani delivered the Inaugural address with presenting the 'Technological benefits of Fats'. He talked about the prices of oils and how it has alwaysbeen on the minds of government andconsumers. Oil over a period of timehas increasingly becomean area of concern for consumers as everyone wants fast lifestyle and all are health conscious, and every body wants health and taste. Oil itself is tasteless but how it affects food is amazing, thus one needs to understand the various aspects of oils before any variations in the products. Also oils are important nutrients and its need varies for different age groups.With globalization we need to consider the needs for various phases of life for all across the globe. Also with global environment, we need to focus on having products that are prepared equal for all.

Dr. Shobha Udipi, Senior Nutritionist, PFNDAI gave the Keynote address with her insights on 'Nutritional Importance of Fats in Health and Disease'. Poor diets have been linked to disease and it is estimated that among the top 20 individual causes of disease burden worldwide, eight are due to poor nutrition, largely because of increased risk of chronic diseases. The role of fats in nutrition is well recognized and the nutritional importance of the polyunsaturated fatty acids is well elucidated. Since the 1970's saturated fatty acids were considered to be unhealthy and it was recommended that n-6 fatty acids would be heart-healthy. With the vast amount of research on n-3 fatty acids, today the world is leaning towards emphasis on these and more importantly on the ratio of n-6 to n-3 fatty acids. We have been consuming some of the traditional oils since years and as a country we have not researched our own data and our own oils that we have been consuming since ages, thus there is need for generating more data for our own country.

Dr. Prabhakar Kanade, Consultant-Food Industry, chaired the technical session that gave an insight into how oils play a very vital role in product development which was covered in various presentations in this session.

Dr. TSR Murali, Chief of R&D at Mother Dairy Fruits and vegetables presented 'Fats in Dairy Products' He stated that although milk is consumed in largest quantity, its loss as compared to other food


Audience


Mr. Prakash Chawla


Dr. Shobha Udipi


Dr. Kanade

products and vegetables is very low. In today's generation, people are not consuming base milk to a great extent but other products of dairy origin are consumed more. There are various benefits of milk and its fats. Dr Murali gave an insight into the physiological aspects of fats in milk and its benefits for health and how short chain fatty acids in milk are also helpful as they act as prebiotics.

Mr. Sanjay Naphade, R&D Director at Pepsico presented on 'How to reduce Dietary Fat in Food Products'. He gave an insight into the nutritional importance of dietary fat as it plays an important role in a healthy diet.

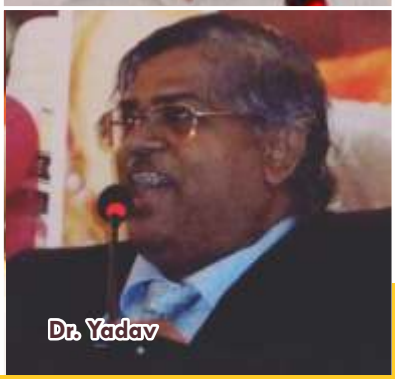
Other than taste and providing energy, oils and fats are carriers of fat soluble vitamins A, D , E & K and sources of essential fatty acids. Thus while reducing oil from food, one has to keep in mind some of these aspects as well. For reduction in oil in food products, innovation has to be done and move slightly ahead of traditional techniques with inclusion of fat mimics in dough to reduce fat content, however the selection of techniques / equipment would dependent on the investment / development cost and products. One of such technology being flavour technology also play an important role in reduction of fats.

Dr.K.D.Yadav,Sr VP Tech at AAK KAMANI PVT LTD presented 'Bakery & Confectionery Applications of Fats & Shortenings'. He gave an insight into the important factors for satisfactory performance of a bakery fat , some of which are optimum plasticity range and tolerance to high temperature. Shortenings having the right plasticity, have good spreadability in dough, good heat resistance and creaming properties. Throwing some light on the current new trends, he stated how incorporation of ingredients provide health benefits. Shortenings/margarines are now fortified with omega-3 fatty acids (EFAs). Also there has been incorporation of ingredients that address health concerns.


Dr. Ramasubramanian


Dr. Sanjay Naphade


Dr. Murali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Dr. Ramasubramanian, Director at VR Food Tech gave an insight into the 'Use of Omega 3 in Food Products' wherein he presented on some of the products that can be fortified using Omega 3 fatty acids. He also stated the need for incorporation of omega 3, as there is poor conversion of ALA to DHA and with age it further decreases, also vegetarians are challenged in meeting the needs of omega 3. Innovations are required to incorporate this important nutrient in our daily diet and some means are incorporating it into breads, softgel capsules in small and soft elastic chewable forms which could be vegetarian capsules.


Dr. Suvarnapathaki

Dr. Rupali Suvarnapathaki, Senior Manager, Omni Active Health Technologies presented the 'Application of Lipid Soluble Nutraceuticals in Foods' wherein she gave an insight into the advantages of Lipid Soluble Nutraceuticals as they are absorbed in the body due to permeability through lipid layers of cells . Also there is sustained release of active ingredients due to slow absorption and they exhibit desired stability under proper formulation and storage conditions. With significant therapeutic efficiency of properly formulated actives there are many health benefits of these nutraceuticals in palatable forms. There are many formulation challenges to incorporate them in functional foods, beverages and fortified foods because of their oily nature, poor water solubility and stability.

Dr. Lewis J.I., Consultant to FSSAI and past Chairman of the Regulatory Affairs Committee of PFNDAI chaired the panel discussion on regulatory aspects and nutritional & technological importance of dietary oils and fats. He gave an insight into the global perspective of oils and fats and how the communication gaps can be filled to create a better understanding about this important nutrient.

Ms. Naaznin Husein, President IDA-Mumbai Chapter and Dietitian, stated that there has to be a cognitive limit to stop and consumers have to draw a line in their own minds as to what is their limit to stop and not over indulge themselves in high fat foods. We have to get the ingredients of Indian origin back into food.

Mr. Ali Muhammad Lakdawala, procurement in-charge at ITC stated that India has potential of growth with respect to oils and fats market. Every state has its own taste of food and oil preference. Globally, Palm Oil is more preferred as it is comparatively cheaper. India also needs to be at par with global markets and there is a need to balance the imports as we need to be self dependent. The biggest challenge is to answer the question as to will 'Make in India' be a reality for oil industry too?

Dr. Prabodh Halde, Head Technical Regulatory, Marico stated that though purchasing power has increased, people are not aware of science, thus it is the responsibility of food industries to create and awareness about which oil can be used for what purpose, for e.g. some oils are preferred for frying but others are for salad dressing . Thus the nutritional importance and impact of various ways of cooking in these oils need to be conveyed to the masses in a meaningful way.

Dr. K.D. Yadav, stated that traditional oils and fats and traditional ways of its uses need to be revisited and we need to understand the various logical and scientific reasons behind those traditions, those ways of consumption of oils and fats to derive the best nutritional benefits.

The seminar was well appreciated by industry delegates, nutritionists and dieticians.


Audience

SWEETENERS

By Dr. J. S. Pai, Executive Director, PFNDAI

Sweetness has always been a favoured taste and people always liked sweet things.

Earlier sweetening agents were honey and sweet fruits and their juices and some herbs but then sugar and jaggery from sugar cane and beet were developed and then sweet foods were more easily available. There were less sweet starch products like corn syrup and others also contributed. Some hydrolysed products also appeared. Various combinations of natural sugars including sucrose, glucose and fructose gave the sweet taste in their products. People started consuming alarmingly more sugar than was prescribed. WHO released a new guideline in March 2015 which recommends that "adults and children reduce their daily intake of free sugars to less than 10% of their total energy intake. A further reduction to below 5% or roughly 25 g (6 teaspoons) per day would provide additional health benefits".

People have got used to sugar so much that it is very difficult to stop eating sweet things drastically so sweeteners have appeared. There are many types of sweeteners being sold, some having less calories, some with no calories, some natural and some artificial. There have been many studies to evaluate the safety of most and there are many who oppose consumption of them stating them to be having undesirable effects. It would be worthwhile taking a look at them for their applicability and safety.

Sweetener is a food additive providing sweet taste like sugar while containing a lot less or no calories. Some of these are present in nature and others are produced synthetically and being not present in nature. Those not present in nature and produced synthetically are called artificial sweeteners.

There are some called high-intensity sweeteners as these have sweetness many times that of sucrose, the common sugar. Thus they are needed much less and their caloric contribution is often negligible. The sweet taste of many of these is different from sucrose so they are used in mixtures to achieve similar sweet taste sensation.

Sucrose in many foods provides other functions than just sweet taste. It provides texture to the product, it balances sourness, provides typical mouthfeel, and sometimes acts as natural preservative. When sweeteners are used as sugar substitutes these points need to be considering while designing a food product with sweeteners and other substances may be needed to achieve the functions of sugar. Sweeteners are used for many reasons including, to help manage weight, to avoid dental caries, to allow diabetics to eat sweet foods and still keep blood sugar under control.

Many different sweeteners are being used today including acesulfame K, aspartame, maltitol, saccharin, sorbitol, sucralose, stevia (steviol glycosides) and xylitol. Erythritol is gaining market. There are also many other sweeteners which are used in a few countries including cyclamate and thaumatin.

There are some who are afraid that sweeteners may be unsafe as they are synthetic. Both Cancer Research UK and the US National Cancer Institute have said that sweeteners do not cause cancer. According to Cancer Research UK, large studies with people have provided strong evidence that artificial sweeteners are safe for humans. Sweeteners used in European Union are rigorously assessed for safety by EFSA (European Food Safety Authority) before being allowed in food and drink. EFSA sets and acceptable daily intake (ADI), the amount of sweetener considered safe if consumed every day for entire lifetime. Using this they apportion amounts to be used in various foods and beverages considering the eating habits of people.

Global market for sugars and sweeteners was about $80 billion in 2012 and is expected to reach almost $100 billion by 2017. Sugar holds almost 80 to 85% share. While the market for sugar alcohols is around $3 billion, high intensity sweeteners are expected to reach almost $2 billion. The growing population of overweight, obese and diabetics globally is driving the growth in these markets.

Industry has been increasingly using sweeteners in foods and beverages in a range of products normally made with sugar. These are also increasingly available in restaurants where customers may add to their tea or coffee.

Overview of common nutritive and non-nutritive sweet-tasting compounds and their relative sweetness, glycaemic index and caloric value.[1]

Sweetener	Relative sweetness	Glycaemic index	Energy (kcal/g)
Nutritive sweeteners			
Sugars (NS)			
Monosaccharides			
Glucose	50[b]	100[b]	4[b]
Fructose	150–180[b]	19–23[b]	4[b]
Galactose	26[c]	23[c]	4[b]
Disaccharides			
Maltose	40[b]	105[b]	4[b]
Sucrose	100[b]	61–65[b]	4[b]
Lactose	20–40[b]	46[b]	4[b]
Bulk sweeteners (NS)			
Erythritol	60–80[a]	0[b]	0.2[b]
Isomalt	45–65[b]	2[b]	2.0[b]
Lactitol	35–40[b]	6[b]	2.4[b]
Maltitol	50–90[b]	35–52[b]	3.0[b]
Mannitol	50–72[b]	0[b]	1.6[b]
Sorbitol	50–100[a]	9[b]	2.6[b]
Xylitol	100[b]	7–13[b]	3.0[b]
Tagatose	92[b]	0[b]	1.5[b]
Non-nutritive sweeteners			
Acesulfame-K	20,000[a]	0	0
Aspartame	18,000–20,000[a]	0	4
Cyclamate	3000[a]	0	0
Neohesperidin DC	190,000[a]	0	0
Saccharin	30,000–50,000[a]	0	0
Sucralose	60,000[a]	0	0
Thaumatin	200,000–300,000[a]	0	0
Steviol glycosides	1000–1500[b]	0	0

[1]Sweetness is expressed relative to sucrose, which has a relative sweetness index of 100.

Sweeteners may be derived from naturally occurring substances, including herbs or sugar itself. Intense sweeteners are many times sweeter than regular sugar so they add virtually no calories to diet when consumed. Also only a small fraction of them compared to sugar is needed for normal use for sweetness. When they are used some modification is needed for baking and cooking as they provide no bulk or volume as sugar does. Sugar also provides textural characteristics along with colour and flavour to food due to changes in processing.

Most of these are chemically synthesised and are very potent sweeteners, which makes them cost-effective options as only small amounts are necessary for the application. When used as sweeteners they provide virtually no metabolisable energy unlike sugar and nutritive sweeteners. Those approved in EU are aspartame, saccharin, acesulfame-K, cyclamate, neohesperidin DC, sucralose, thaumatin and steviol glycosides. There is hardly any evidence to show that their use has beneficial or negative effects on obesity. It has been suggested that non-nutritive sweeteners may trigger signal to increased appetite and so energy intake, but it may be redundant when they are consumed as part of an energy-yielding food, as other food components would provide sensory stimuli for metabolic and satiety response. Those suffering from phenylketonuria (a rare metabolic disorder) must avoid aspartame.

Polyols or sugar alcohols e.g. xylitol, matitol and sorbitol are saccharide derivatives occurring naturally in fruits and vegetables and can be chemically prepared by hydrogenation of sugars. They are poorly absorbed, provide fewer calories and lower glycemic responses. This makes them popular for use in diabetic and low-calorie foods. They are not fermented by oral bacteria so are non-cariogenic, so used in chewing gum. They are less sweet than sugar so usually used with intense sweeteners to avoid use of large amounts. They need to be consumed in limited amounts as higher doses over 50-60 g may cause laxation. Those with fructose intolerance do not tolerate sorbitol as well.

Stevia is the newest sweetener approved by FSSAI in India a year ago in a range of products including carbonated water, dairy-based desserts and flavoured drinks, yoghurts, ready-to-eat cereals, fruit nectars and jams etc. Stevia sweeteners are prepared from leaves of plant Stevia rebaudiana, which has been grown for sweetness and medicinal purposes for centuries in South America. Glycosides present in the extract are several hundred times sweeter than sugar. It has also been used in Japan. Glycosides are often mixed with other sweeteners.

Some health benefits have been shown that stevia can lower high blood pressure. It has also been shown to help blood sugar levels for diabetics. Studies in rats have shown improvement in insulin sensitivity. More studies needed for substantiation of these. Among other sweeteners permitted in India are Aspartame, Acesulfame K, Saccharin and Sucralose. All of them are being used in various products commonly meant for those who want to watch their weight and diabetics.

(Table from: Edwards, C. H., et al., The role of sugars & sweeteners in food, diet & health: Alternatives for the future, Trends in Food Science & Technology (2016), http://dx.doi.org/10.1016/j.tifs.2016.07.008)

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RESEARCH IN HEALTH & NUTRITION

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Almond consumption may help lower total, LDL cholesterol

IFT Weekly September 7, 2016

A study published in the Journal of Nutritional Science shows that eating almonds may reduce total cholesterol, LDL cholesterol ("bad" cholesterol), and triglycerides, while having no significant impact on "good" HDL cholesterol levels.

The researchers conducted a systematic review and meta-analysis of 18 published randomized controlled trials with a total of 837 participants. When data from all of the studies were pooled, the reduction in total cholesterol was 5.92 mg/dL. When the meta-analysis was restricted to those studies where the amount of almonds consumed was at least 45 g/day (~1.5 oz/day), the reduction in total cholesterol was 8.20 mg/dL. These data suggest that the effects of almonds on total cholesterol are dose-dependent, with a larger almond intake resulting in a greater reduction in total cholesterol. In addition, when the subjects had elevated total cholesterol levels as baseline, the reduction in total cholesterol was 10.48 mg/dL.

Similarly, when data from all of the studies were pooled, the reduction in LDL cholesterol was 4.80 mg/dL. The reductions were 5.10 mg/dL and 6.11 mg/dL when the meta-analysis was restricted to those studies in which at least 45 g (~1.5 oz) of almonds were consumed per day and in which the subjects had elevated LDL cholesterol levels at baseline, respectively.

"These results strengthen decades of research about how the regular consumption of almonds can favourably impact blood lipid levels and have a positive effect on heart health," said Kathy Musa-Veloso, lead author and director of health claims, food and nutrition group, Intertek. "The consumption of almonds as part of a healthy diet should be encouraged in order to improve blood lipid levels and reduce the risk of heart disease."

Healthy diet boosts children's reading skills

Medical News Today 13 September 2016

A heathy diet is linked to better reading skills in the first three school years, shows a recent study from Finland. Published in the European Journal of Nutrition, the study constitutes part of the Physical Activity and Nutrition in Children Study conducted at the University of Eastern Finland and the First Steps Study conducted at the University of Jyväskylä.

The study involved 161 children aged 6-8 years old, and followed up on them from the first grade to the third grade in school. The quality of their diet was analysed using food diaries, and their academic skills with the help of standardised tests. The closer the diet followed the Baltic Sea Diet and Finnish nutrition recommendations - i.e. high in vegetables, fruit and berries, fish, whole grain, and unsaturated fats and low in red meat, sugary products, and saturated fat - the healthier it was considered.

The study showed that children, whose diet was rich in vegetables, fruit, berries, whole grain, fish and unsaturated fats, and low in sugary products, did better in tests measuring reading skills than their peers with a poorer diet quality.

The study also found that the positive associations of diet quality with reading skills in Grades 2 and 3 were independent of reading skills in Grade 1. These results indicate that children with healthier diets improved more in their reading skills from Grade 1 to Grades 2-3 than children with poorer diet quality. "Another significant observation is that the associations of diet quality with reading skills were also independent of many confounding factors, such as socio-economic status, physical activity, body adiposity, and physical fitness," says Researcher Eero Haapala, PhD, from the University of Eastern Finland and the University of Jyväskylä.

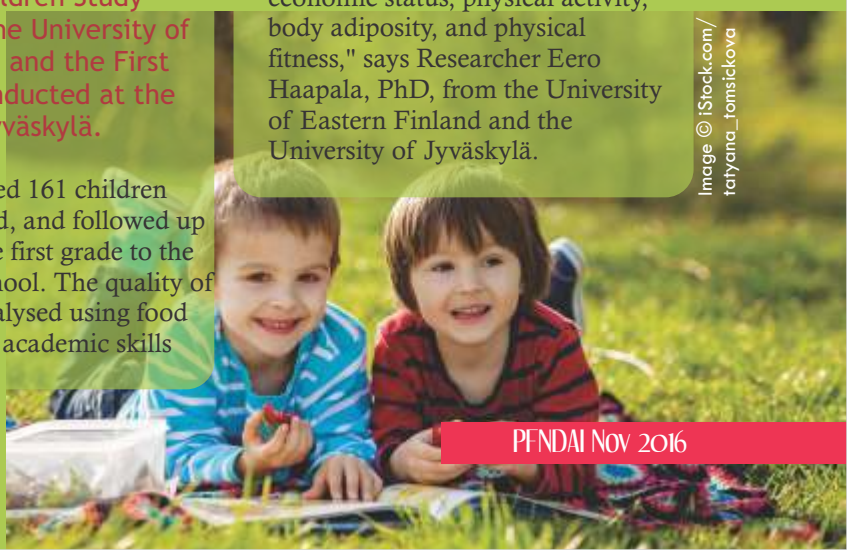


Image © iStock.com/tatyana_tomsickova

Parents, schools, governments and companies can improve the availability of healthy foods
A healthy diet seems to be an important factor in supporting learning and academic performance in children. By making healthy choices every meal, it is possible to promote a healthy diet and enhance diet quality. Parents and schools have an important role in making healthy foods available to children. Furthermore, governments and companies play a key role in promoting the availability and production of healthy foods.

Chronic Sleep Loss Increases Appetite, Exercise Reduces It

Nutrition Insight 27 Sep 2016

A new study published in the journal Psycho-neuro-endocrinology, has shown that a lack of sleep could lead to a greater sensation of hunger, while partaking in intensive exercise after a bad night's sleep, may curb an increase in appetite.

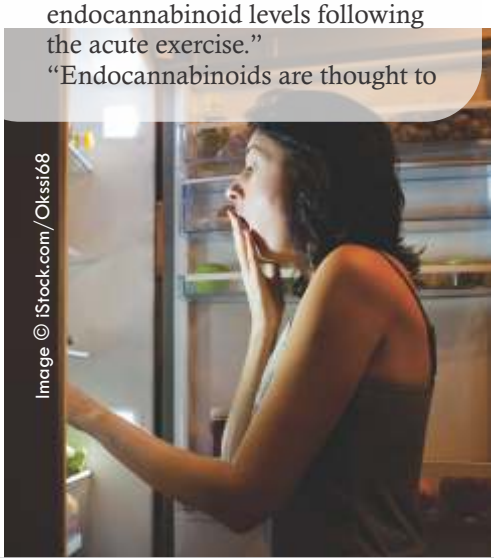
Researchers from Uppsala University investigated how levels of endocannabinoids, which target the same receptors as cannabis, are affected by short sleep duration, and whether acute exercise can modulate this effect.
They invited healthy normal-weight participants to a sleep laboratory on two separate occasions, to be studied after three consecutive nights of normal sleep, and after three nights of only sleeping four hours each night.

Meals and activity patterns were kept standardized while participants were in the lab, and blood was drawn repeatedly to assess endocannabinoid levels in blood. This was also done on the last day both before and after a short bout of intensive exercise.
"Previous studies have shown alterations in the levels of some hunger hormones after sleep loss, but the results have been mixed and hormones that drive hedonic food intake have been less investigated," explained lead author, Jonathan Cedernaes, M.D., PhD, at Uppsala University.

"Furthermore, whereas exercise has many beneficial effects, whether exercise can modulate the effects of sleep loss on various hormonal pathways is currently unknown."
The researchers found that the levels of 2-arachidonoylglycerol – the most abundant endocannabinoid in the brain – was about 80 percent higher after the nights of short sleep compared with after the normal sleep session. When the participants exercised, the levels of 2AG still went up almost by half, regardless of whether participants had been allowed to sleep for three normal nights, or to only sleep four hours each night.

"As previously shown by us and others, sleep loss increased subjective hunger compared with the well-rested state. Given the role of endocannabinoids for promoting hunger and hedonic eating, this could offer an explanation as to why," notes Cedernaes.
"Meanwhile, we instead saw lower stress ratings after exercise in the sleep deprivation condition, which could also possibly be attributed to the observed endocannabinoid levels following our exercise intervention," says senior author associate professor Christian Benedict.

"It is noteworthy that when sleep-deprived, the participants saw the same amount of increase in endocannabinoid levels following the acute exercise."
"Endocannabinoids are thought to confer both the "runner's high" as well as at least some of the neuroprotective effects of exercise. Therefore, this may suggest that even under conditions of chronic sleep loss, exercise may exert similar centrally active, and possibly neuroprotective, properties as under conditions of sufficient sleep," added Benedict. "This is an important area for future research as we and others have found that short sleep duration by itself may be harmful to the brain, and in the long run increase the risk of e.g. Alzheimer's disease," concludes Cedernaes.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Vitamin B During Pregnancy Reduces Child Eczema Risk

Nutrition Insight 26 Sep 2016

Infants whose mothers had a higher level of the vitamin B Nicotinamide during pregnancy are 30% less likely to develop eczema by the age of 12 months, a new study has shown.


Image © iStock.com/SvetlanaFedoseeva

The findings from the Medical Research Council Lifecourse Epidemiology Unit, University of Southampton, is the first to link maternal serum levels of nicotinamide, a naturally occurring vitamin, and related metabolites to the risk of atopic eczema in the child. The researchers believe the findings support the concept that eczema partly originates as a baby develops in the womb and could reveal ways of reducing the risk of the skin condition. The findings from the Medical Research Council Lifecourse Epidemiology Unit, University of Southampton, is the first to link maternal serum levels of nicotinamide, a naturally occurring vitamin, and related

metabolites to the risk of atopic eczema in the child. The researchers believe the findings support the concept that eczema partly originates as a baby develops in the womb and could reveal ways of reducing the risk of the skin condition.

Dr Sarah El-Heis, the study's lead researcher from the University of Southampton, said, "Nicotinamide cream has been used in the treatment of eczema but the link between the mother's levels of nicotinamide during pregnancy and the offspring's risk of atopic eczema has not been previously studied. The findings point to potentially modifiable influences on this common and distressing condition."

Nicotinamide is a form of vitamin B3, and its level is maintained through intake of foods such as fish, meat, chicken, mushrooms, nuts and coffee as well as tryptophan, an amino acid found in most proteins. Nicotinamide and related nutrients are important for the body's immune responses and energy metabolism. The research, published in Clinical and Experimental Allergy, assessed the amount of nicotinamide and related tryptophan metabolites during pregnancy in 497 women that took part in the Southampton Women's Survey.

The rate of eczema in their children at ages 6 and 12 months was studied, and the results showed that offspring of mothers with higher levels of nicotinamide had a 30 per cent lower chance of developing atopic eczema at 12 months. Researchers say that nicotinamide can improve the overall structure, moisture and elasticity of skin, therefore potentially altering the disease processes associated with eczema.

The study also showed a gradual association between higher maternal nicotinamide and anthranilic acid levels and a lower risk of atopic eczema, suggesting that the development of eczema is not simply prevented by the presence of these nutrients. Professor Keith Godfrey, Director of the NIHR Southampton Biomedical Research Centre in Nutrition, added: "More research is needed to investigate this interesting association, but the findings are further evidence of the potential benefits of eating a healthy balanced diet during pregnancy."

Research Says Fish Oil May Help Improve Mood in Veterans

Nutrition Insight 23 Sep 2016

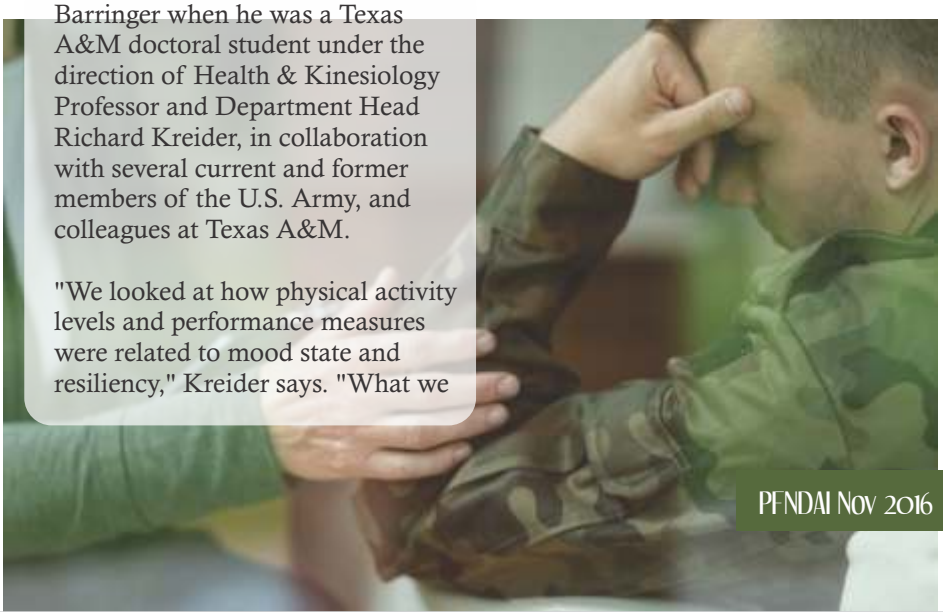
Low concentration of fish oil in the blood and lack of physical activity may contribute to the high levels of depressed mood among soldiers returning from combat, according to researchers, including a Texas A&M University professor and his former doctoral student.

In a study titled "Fatty Acid Blood Levels, Vitamin D Status, Physical Performance, Activity and Resiliency: A Novel Potential Screening Tool for Depressed Mood in Active Duty Soldiers," researchers worked with 100 soldiers at Fort Hood to identify which factors affected moods in returning soldiers. The research was conducted by Major Nicholas Barringer when he was a Texas A&M doctoral student under the direction of Health & Kinesiology Professor and Department Head Richard Kreider, in collaboration with several current and former members of the U.S. Army, and colleagues at Texas A&M.

"We looked at how physical activity levels and performance measures were related to mood state and resiliency," Kreider says. "What we found was the decrease in physical activity and the concentration of fish oil and Omega-3s in the blood were all associated with resiliency and mood." Kreider says fish oil contains Omega-3 fatty acids that help to boost brain function. He says studies also show that fish oil acts as an anti-inflammatory within the body -- helping athletes and soldiers manage intense training better. Fish oil content is especially important for soldiers due to the consistent training and physical regiments performed in and out of combat and risk to traumatic brain injury.

The study originated from research conducted by Colonel Mike Lewis, M.D. who examined Omega-3 fatty acid levels of soldiers who committed suicide compared to non-suicide control and found lower Omega-3 levels in the blood were associated with increased risk of being in the suicide group. Barringer says he believes these findings to be significant toward addressing some of the issues many soldiers face. "The mental health of our service members is a serious concern and it is exciting to consider that appropriate diet and exercise might have a direct impact on improving resiliency," Barringer notes.

In order to properly measure soldiers physically, Kreider and Barringer developed a formula they say has the potential to assist in effectively screening soldiers with



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Nutrela
LIVE HEALTHY, LIVE HAPPY

Now every dish will be healthy.

52% PROTEIN

99% FAT FREE

Veg. Manchurian

100% Veg

INGREDIENTS:

For Nutrela Soya Crispies:

- 1 cup cooked Nutrela Soya Chunks
- 1 cup maida,
- 3 tablespoon grated carrot,
- 3 tablespoon shredded capsicum,
- 4 tablespoon shredded onion,
- 1 teaspoon chopped garlic,
- 1/2 tablespoon baking powder, salt, water, oil

For Sauce:

- 2 tablespoon corn flour mixed with 1/2 cup water,
- 2 teaspoon soya sauce,
- 1½ tablespoon chopped garlic,
- 1½ tablespoon chopped green chillies,
- 1/2 teaspoon pepper powder,
- 1/2 teaspoon sugar,
- 1 tablespoon vinegar, Oil, Water, Salt

METHOD

- First fry chopped garlic and chillies for a min then add Soya sauce, pepper powder, sugar, vinegar, salt and cook for few mins.
- Then add water & corn flour mixed with water and boil the sauce to make it slightly thick. Once the sauce is ready pour it hot on Nutrela Soya crispies.

potential PTSD ahead of time. The formula measures a number of factors including: fitness and psychometric assessments, physical activity, and additional analysis. "By improving resiliency in service members, we can potentially decrease the risk of mental health issues," Barringer says. "Early identification can potentially decrease the risk of negative outcomes for our active service members as well as our separated and retired military veterans."

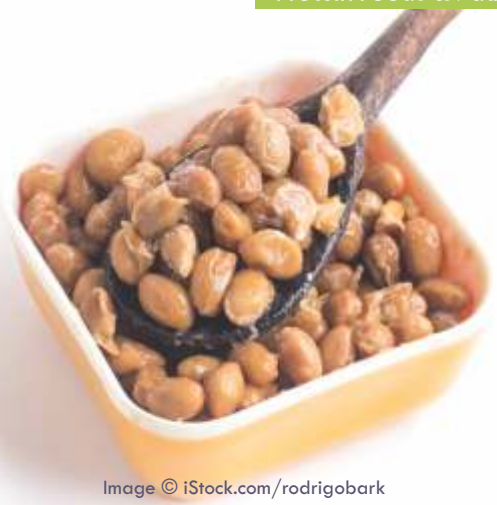
"The military is using some of our exercise, nutrition, and performance-related work and the findings may help identify soldiers at risk for depression when they return from combat tours," Kreider notes. He says that by working to identify such high-risk issues faced by soldiers, it can set a precedent that will benefit not only military leadership, but also the general public. "The public must realize that our soldiers need support before, during, and after their service," Kreider explains. "There needs to be a time for soldiers to transition, become re-engaged within a community, and stay engaged in that community."

Vitamin K2 Associated With Reduced Risk of Heart Disease

Nutrition Insight 23 Sep 2016

A new study has shown that a high intake of menaquinones (vitamin K2) is associated with a reduced risk of coronary heart disease, (CDH) while the high intake of phylloquinone (vitamin K1) was not associated with any reduced risks.

The new long-term study published by Clinical Nutrition explored if there was a relationship between intake of phylloquinone and menaquinones (vitamins K1 and K2, respectively) and all-cause and cause-specific mortality.



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"As with the Rotterdam Study (2004) and Prospect-EPIC Study (2009), a link has been established between intake of long-chain menaquinones and cardiovascular health," says Hogne Vik, chief medical officer with NattoPharma, world leader in vitamin K2 R&D and exclusive global supplier of MenaQ7 Vitamin K2 as MK-7. "Improving one's K2 status results in less calcification of the arteries and soft tissues, leading to improved long-term health outcomes." Vik added, "These benefits are recognized with Vitamin K2, but not K1, which is important because there is a misconception that daily recommended intake of the vitamin K1 is sufficient to protect the arteries for developing arterial diseases."

"This is not the case," Vik stated, "since vitamin K1 is only documented and recognized to meet our needs for coagulation. It is, however, vitamin K2, the menaquinones, that are responsible for the cardiovascular benefits, and not vitamin K1." The cohort study, entitled "Vitamin K intake and all-cause and cause-specific mortality", looked at 33,289 participants from the EPIC-NL cohort, aged 20-70 years at baseline and recruited between 1993 and 1997.

It assessed dietary intake at baseline with a validated food frequency questionnaire and intakes of phylloquinone, and total, short-chain and long-chain menaquinones were calculated.
Information on vital status and causes of death was obtained through linkage to several registries, and the association between the different forms of vitamin K intake and mortality was assessed with Cox proportional hazards, adjusted for risk factors for chronic diseases and nutrient intake.

During a mean follow-up of 16.8 years, 2,863 deaths occurred, including 625 from cardiovascular disease, 1,346 from cancer, and 892 from other causes. After multivariable adjustment, phylloquinone (k1) and menaquinones (k2) were not associated with all-cause mortality with hazard ratios for the upper vs. the lowest quartile of intake, and neither phylloquinone intake nor menaquinone intake was associated with risk of CVD mortality.

However, the researchers concluded that higher intake of long-chain menaquinones (k2) was borderline significantly associated with lower CHD mortality. None of the forms of vitamin K intake were associated with cancer mortality or mortality from other causes.
"Our three-year interventional study confirmed that adding vitamin K2 to one's daily intake improves arterial health and flexibility," Vik finalized, "We are enthused to see additional studies confirming this mechanism and encourage the nutritional community to embrace Vitamin K2 for its unique and specific benefits.""

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Gut Bacteria Influences Fat Absorption

Nutrition Insight 12 Sep 2016

The amount of bacteria in the gut could influence how the body absorbs fat, a new study


Image © iStock.com/highviews

from the University of Cincinnati has found. The research lends additional insight into how bacteria in the gut, or lack thereof, influences intestinal mast cells (MMC) activation and fat absorption.

The study's principal investigator Patrick Tso, PhD, Mary Emery Professor of Pathology and Laboratory Medicine at the UC College of Medicine, explained, "A change in the absorption of fat is very important for the development of obesity studies." According to the National Institute of Diabetes and Digestive and Kidney Diseases of the National Institutes of Health (NIH) overweight and obesity are risk factors for Type 2 diabetes, heart disease, high blood pressure, and other health problems.

The study, funded by the NIH, saw Tso and his team compare intestinal fat absorption and mast cell activation in rodents placed on antibiotics to clear their systems of bacteria, as well as a control group. They then introduced lipids to both groups. "Our results suggest that the presence of gut microbiota is involved in MMC activation, induced by the ingestion of fat, and contributes to fat-induced permeability," explained Tso, adding that the study also found a "novel role of the gut microbiome in the promoting the absorption of lipid." Mast cells are intimately involved with the immune system in the body. They come from bone marrow and go into all tissues of the body. Each mast cell contains secretory granules, like storage sacs, containing powerful biologically active molecules called mediators. These can be secreted when mast cells are activated, leading to allergic and inflammatory responses. The team detailed how mast cells also play a key role in the defence of the gastrointestinal tract against foreign organisms, and while the absorption of fat is actually associated with mucosal mast cell activation, it is not known exactly what role the gut bacteria plays.

Tso added, "This effect is specific to fat, since the absorption of carbohydrates or protein does not activate mucosal mast cells."

Mangos Can Reverse the Effects of a High Fat Diet

Nutrition Insight 08 Sep 2016

Research published in the Journal of Nutrition has suggested that mangos could play a beneficial role in curbing the adverse effects associated with a high-fat diet.

Samples from studies performed on mice were compared from the beginning to the end of the study period, and mango supplementation was found to prevent the loss of beneficial gut bacteria often induced by a high-fat diet.
The findings are thought to be important because specific bacteria in the intestinal tract may play a role in obesity and obesity-related complications, such as type 2 diabetes.

The study looked at 60 male mice that were assigned to one of four dietary treatment groups for 12 weeks. Control diet with 10% of calories from fat, high-fat diet, with 60% calories from fat, or high fat with 1% or 10% mango. All high-fat diets had similar macronutrient, calcium, phosphorus, and fibre content. The high-fat dietary treatment with 10% mango (equivalent to 1½ cups of fresh mango pieces) was found to be the most effective in preventing the loss of beneficial bacteria from a high-fat diet without decreasing body weight or fat accumulation.

Specifically, mango supplementation regulated gut bacteria in favour of Bifidobacteria and Akkermansia and enhanced short-chain fatty acid (SFCA) production. SCFAs have been shown to possess a wide range of beneficial effects, such as anti-inflammatory properties. "Fibre and other bioactive compounds in plant-based foods are suggested to prevent gut dysbiosis caused by a high-fat diet," said Edralin A. Lucas, Ph.D., professor of nutritional sciences at Oklahoma State University and lead researcher of the study. "Mango is a good source of fibre and has been reported in previous studies to have anti-obesogenic, hypoglycemic and immune-modulatory properties," continued Lucas, "The results of this animal study showed that adding mango to the diet may help maintain and regulate gut health and levels of beneficial bacteria levels."
Further research is necessary to see if these study results can be replicated in humans."

Gut bacteria differ between obese, lean youth

Science Daily September 20, 2016

Children and teenagers who are obese have different microorganisms living in the digestive tract than their lean counterparts, according to a new study published in the Endocrine Society's Journal of Clinical Endocrinology & Metabolism.


Image © iStock.com/bowie15

The study is the first to find a connection between gut microbiota, also called gut flora, and fat distribution in children and teenagers. Obesity affects 17 percent of children and teens nationwide, according to the U.S. Centers for Disease Control and Prevention. Childhood obesity is associated with an estimated $14.1 billion in additional prescription drug, emergency room visit and outpatient visit costs each year, according to the Society's Endocrine Facts and Figures Report.

"Our findings show children and teenagers with obesity have a different composition of gut flora than lean youth," said the study's senior author, Nicola Santoro, MD, PhD, Associate Research Scientist in the Department of Pediatrics at Yale University in New Haven, CT. "This suggests that targeted modifications to the specific species composing the human microbiota could be developed and could help to prevent or treat early-onset obesity in the future."

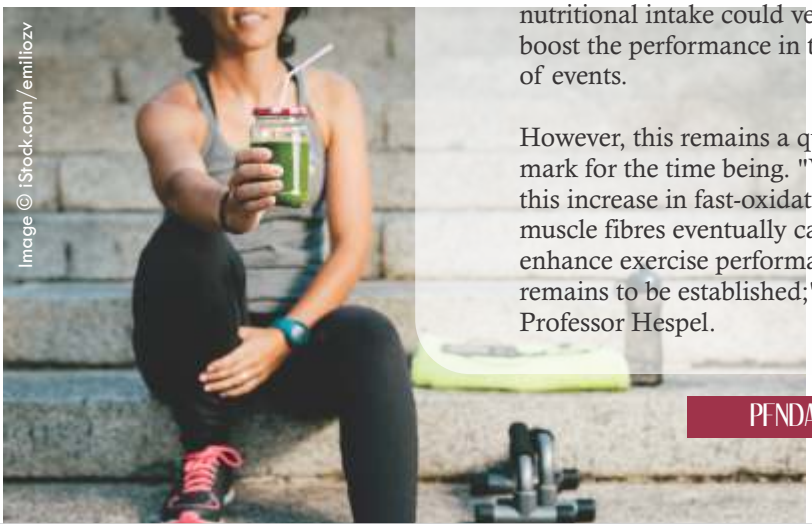
The study examined gut microbiota and weight in 84 children and teenagers who were between 7 and 20 years old. The participants included 27 youth who were obese, 35 who were severely obese, seven who were overweight and 15 who were normal weight. Researchers analyzed the participants' gut microbiota. The participants underwent an MRI to measure body fat partitioning, provided blood samples and kept a three-day food diary.
The researchers found eight groups of gut microbiota that were linked to the amount of fat in the body. Four of the microbial communities tended to flourish in children and teens with obesity compared to their normal-weight counterparts. Smaller amounts of the other four microbial groups were found in participants who were obese compared to children and teenagers of normal weight. The gut microbiota found in youth who were obese tended to be more efficient at digesting carbohydrates than the gut flora of teenagers and children of normal weight.

In addition, the children with obesity tended to have higher levels of short chain fatty acids in the blood than children of normal weight. The study found short chain fatty acids, which are produced by some types of gut bacteria, are associated with the production of fat in the liver. "Our research suggests that short chain fatty acids can be converted to fat within the liver and then accumulate in the fat tissue," Santoro said. "This association could signal that children with certain gut bacteria face a long-term risk of developing obesity."

Eating your greens could enhance sport performance

Science Daily September 12, 2016

Nitrate supplementation in conjunction with Sprint Interval Training in low oxygen conditions could enhance sport performance a study has found. Researchers from the University of Leuven in Belgium carried out a study with twenty-seven moderately trained participants. These were given nitrate supplements ahead of Sprint Interval Training (SIT), which took the form of short but intense cycling sessions three times a week.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Nitrate is commonly found in diets rich in leafy green foods, like spinach and is important for the functioning of the human body, especially during exercising. To assess differences in performance in different conditions, the study included workouts in normal oxygen conditions and in hypoxia conditions, which are low oxygen levels such as those found in high altitudes.

The observations published in Frontiers in Physiology were unexpected: after only five weeks, the muscle fibre composition changed with the enhanced nitrate intake when training in low oxygen conditions. "This is probably the first study to demonstrate that a simple nutritional supplementation strategy, i.e. oral nitrate intake, can impact on training-induced changes in muscle fibre composition;" stated Professor Peter Hespel from the Athletic Performance Center at the University of Leuven.

For athletes participating in sports competitions which require energy production in conditions with limited amounts of oxygen, this study is particularly interesting. In fact, exercising at high altitudes has become a training strategy for many athletes, albeit the uncertainties about such methods. In these conditions, performing intense workouts requires high input of fast-oxidative muscle fibres to sustain the power. Enhancing these muscle fibre types through nutritional intake could very well boost the performance in this type of events.

However, this remains a question mark for the time being. "Whether this increase in fast-oxidative muscle fibres eventually can also enhance exercise performance remains to be established;" said Professor Hespel.

He cautioned: "consistent nitrate intake in conjunction with training must not be recommended until the safety of chronic high-dose nitrate intake in humans has been clearly demonstrated."

In times where athletes push the limits of their bodies and thrive for ever greater performances, this is clearly only the beginning of the research into how athletes can improve their competitive edge through dietary supplements. Looking to the future, Professor Hespel suggested: "it would now be interesting to investigate whether addition of nitrate-rich vegetables to the normal daily sports diet of athletes could facilitate training-induced muscle fiber type transitions and maybe in the long term also exercise performance."

Folic acid may protect against congenital heart defects

Written by Hannah Nichols
Medical News Today 30 August 2016

Foods fortified with folic acid decrease rates of some types of congenital heart defects in Canada, finds new research published in the American Heart Association's journal Circulation.

Folic acid is a B vitamin that our bodies use to make new cells, and it is important for the development of a healthy fetus. Adding folic acid to white flour, pasta, and cornmeal has been mandatory in Canada since 1998. Evidence of folic acid reducing neural tube defects, oral cleft, and cardiovascular anomalies led to the Government of Canada taking steps to help women of childbearing age increase the amount of folate they consume.

The United States Centers for Disease Control and Prevention (CDC) recommend that women take 400 micrograms of folic acid per day from at least 1 month before getting pregnant to prevent major birth defects of the baby's brain (anencephaly) and spine (spina bifida). The research was conducted to determine if there is an association between food fortification with folic acid and birth prevalence of specific congenital heart defects (CHDs).
According to the study, there are approximately 650,000 to 1.3 million U.S. children and adults living with congenital heart disease. The most common type of defect in children is ventricular septal defects, which account for 620,000 of cases.

Previous studies have yielded inconsistent results for the effects of folic acid and folic acid food fortification on CHDs. "Our study examined the effect of folic acid food fortification on each specific subtype of congenital heart disease based on the Canadian experience before and after food fortification was made mandatory in 1998," says Dr. K.S. Joseph, Ph.D., the study's senior author and professor in the Department of Obstetrics and Gynecology and the School of Population and Public Health at the University of British Columbia in Vancouver, Canada.

Effects of folic acid only evident in some subtypes of CHDs

Researchers analyzed data from almost 6 million births in Canada between 1990-2011 and controlled for influencing factors, such as maternal age, multiple births (twins, triplets), pregnancy complications, prenatal diagnosis, and pregnancy terminations. Findings indicated that folic acid food fortification was associated with an 11 percent decrease in rates of congenital heart defects.

Dr. Joseph and colleagues also noted that the beneficial effects of folic acid were only observed in some types of CHDs. For example, there was a 27 percent reduction in conotruncal defects, or severe heart outflow tract abnormalities, and a 23 percent decrease in coarctation of the aorta, which is a narrowing of the major artery that carries blood to the body.

Also, a 15 percent reduction was seen in atrial and ventricular septal defects, which are the holes in the wall that separate the heart chambers. No change was observed concerning chromosomally associated defects - an abnormality in the number of an infant's chromosomes.

Dr. Joseph says that although the data is from Canada, the findings apply to the U.S. population, as the same fortification of foods with folic acid were implemented in the U.S. around the same time as Canada due to the North American Fair Trade Agreement of 1994.
The authors say: "Our study shows associations between food fortification with folic acid and reductions in the birth prevalence of specific CHD subtypes. The associations were stronger for conotruncal defects and coarctation of the aorta and more modest for septal defects. Older maternal age, prepregnancy diabetes mellitus, and preterm preeclampsia were also associated with population rates of CHDs," they add.

Dr. Joseph highlights the importance of taking folic acid for women who are trying to become pregnant, as they may not receive an adequate amount of folate from diet alone. While food fortification with folic acid was aimed at reducing neural tube defects, the study shows that folic acid may also have a beneficial effect on specific types of CHDs, which are collectively more common.

Written by Hannah Nichols


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Concussions and brain injury - can omega-3 intake aid in brain health recovery?

Medical News Today 26 August 2016

The treatment of concussions and traumatic brain injury (TBI) is a clinical challenge. Clinical studies thus far have failed to identify an effective treatment strategy when a combination of targets controlling aspects of neuro-protection, neuro-inflammation, and neuro-regeneration is needed. According to emerging science and clinical experience, aggressive intake of omega-3 fatty acids (n-3FA) seems to be beneficial to TBI, concussion, and post-concussion syndrome patients. This research is presented in Concussions, Traumatic Brain Injury, and the Innovative Use of Omega-3s, a review article from the Journal of the American College of Nutrition, official publication of the American College of Nutrition.

Research suggests that early and optimal doses of omega-3 fatty acids (n-3FA) have the potential to improve outcomes from traumatic brain injury. The article reviews preclinical research and cites three brain injury case studies that resulted from a mining accident, a motor vehicle accident, and a drowning accident. Each instance showcased evidence of safety and tolerability, wherein the patients who sustained life-threatening brain injuries recovered brain health with the aid of omega-3 fatty acids (n-3FA).

Growing clinical experience by numerous providers is that the brain needs to be saturated with high doses of n-3FA in order for the brain to have the opportunity to heal. Without an optimal supply of omegas, healing is less likely to happen. It is well recognized that n-3FAs are not a drug and not a cure and every situation is different. Clinically, some patients respond better than others. However, there is no downside to providing optimal levels of nutrition in order to give a patient the best opportunity to regain as much function as possible following a TBI.

Article author Michael D. Lewis, a retired Army Colonel and physician, is the author of the highly anticipated book, When Brains Collide: What Every Athlete and Parent Should Know About the Prevention and Treatment of Concussions and TBI, that will be available on Amazon in September 2016. Dr. Lewis concludes, "n-3FA should be considered mainstream, conventional medicine, if conventional medicine can overcome its inherent bias against nutritional, nonpharmacological therapies."

Wheat protein rivals whey for muscle growth, study suggests

By Will Chu, NutraIngredients 05Sep2016

Hydrolysed wheat protein has shown muscle maintenance properties that compare favourably to whey protein in a study that demonstrates its efficacy amongst the elderly population.

In a Tereos-funded study that involved researchers from the University of Maastricht, the results saw that older men who consumed a larger dose of wheat protein saw notable gains in muscle size. These results were only observed when wheat protein hydrolysate contained the same amount of the amino acid leucine as whey protein.

The findings identify wheat protein as a viable protein source for muscle maintenance in the -elderly. Whey protein is considered first choice among individuals looking for gains in muscle as part of a balanced nutritional regimen. Its ability to promote muscle maintenance while losing fat has made it a favourite amongst bodybuilders and keep-fit enthusiasts. However, how whey preserves lean mass while losing unwanted body weight is not fully understood and is the subject of a number of ongoing studies.

The results in this study put a case forward for the efficacy of plant-based proteins, which have previously been deemed less potent in stimulating post meal muscle growth than animal-sourced proteins. This is due to plant protein's lower digestibility and deficiencies in amino acids such as leucine, lysine and/or methionine observed in certain plants. Innovations in food processing have solved many issues with regard to plant-based protein digestibility by the production of plant-based protein concentrates, isolates and hydrolysates.

Another alternative, dairy proteins have proved potent for the stimulation of muscle protein synthesis due to their high digestibility and high leucine content, but are relatively expensive. An alternative approach has been to blend wheat proteins with dairy-based ones. This is considered much more economical for the nutrition industry and the consumer as well as being more environmentally sustainable.

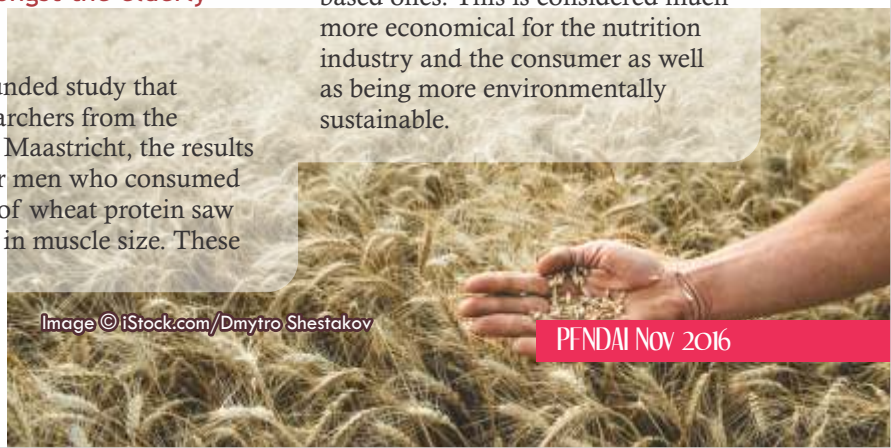


Image © iStock.com/Dmytro Shestakov

Study details
The study enrolled 60 healthy older men with a mean age of 71 years and body mass index (BMI) of 25.3 kg/m2. On the evening before the infusion trial, all participants consumed a standardised meal composed of 16% of energy from protein, 33% from carbohydrate and 51% from fat. These men were randomly assigned to consume 35 g wheat protein (WP357), 35 g wheat protein hydrolysate (WPH35), 35 g micellar casein (MCas35), 35 g whey protein (Whey35) or 60 g wheat protein hydrolysate (WPH60).

Results demonstrated that the postprandial increase in blood amino acid concentrations was greater after ingesting Whey35 than after MCas35 and WPH35. Myofibrillar protein synthesis rates increased after ingesting MCas35 and were higher after ingesting MCas35 than after WPH35. The post meal increase in plasma leucine concentrations was greater after ingesting Whey35 than after WPH60, despite similar leucine contents of 4.4 g. Nevertheless, the ingestion of WPH60 increased protein synthesis rates recorded at the start of the trial.

Plant proteins not bad?
"The muscle protein synthetic response after the ingestion of wheat protein hydrolysate is lower than after the ingestion of casein," the study observed. "It seems likely that this is attributable to differences in amino acid composition, with the essential amino acid and leucine contents being lower in wheat protein hydrolysate than in casein."

Plant-based proteins' low digestibility characteristics means less dietary protein is effectively digested and absorbed. This could explain the lower post meal availability of amino acids as precursors for muscle synthesis. "However, once freed from anti-nutritional compounds that interfere with protein digestion and absorption, purified plant-based proteins are likely to possess digestion and absorption kinetics that are not different from animal-derived proteins," the study noted.

Hunger pains: Kids who skip breakfast more likely to get angry, say teachers

By Vince Bamford, Bakery & Snacks 07Sep2016

Three quarters of Canadian teachers say children who skip breakfast are more likely to become frustrated or angry at school, according to a new survey for Kellogg.

More than half (54%) of the 403 Canadian elementary, middle and high school teachers polled said they have brought in extra food for students in need. And 92% said they have personally helped a student who has arrived at school hungry. Children who miss breakfast are more easily frustrated, according to 77% of the teachers quizzed for Kellogg's third annual Breakfasts for Better Days Survey, while 73% said these children more easily become angered, annoyed or irritated.

Other findings included:

☹ 86% of teachers say students who come to school hungry are more likely to engage in bullying
☹ 63% say hungry students are more disruptive in class
☺ 93% say students who eat breakfast achieve better academic results than those who do not.
"As a teacher, it was impossible for me to remain unaffected by the struggle of students who consistently came to school without eating a nutritious breakfast in the morning," said TV sports presenter Paul Jones, a former elementary school teacher and principal.

Signs of hunger

"I would look out at my class and immediately recognize the signs of hunger. Students fighting to focus on the lesson. Falling asleep at their desk. Acting out. Stealing food. Bullying other students. And my experience isn't unique — many teachers I know tell the same story." Jones added that Canadians needed to consider that, when a child comes to school hungry, this can affect every student in the class. "The time a teacher takes to care for a child who is acting out or bullying a peer simply because, through no fault of their own, they are hungry, is time they are not spending with the rest of the class," he said.

Raising awareness of issue

Kellogg Canada is calling on consumers to raise awareness of the issue by sharing the Feeding Better Days Infographic on social media using #FeedingBetterDays. The company is also donating a portion of the proceeds from its cereals to breakfast partners across Canada, to a maximum of $100,000. Kellogg has also donated more than $3m and 30 million servings of cereal and snacks to organisations including Breakfasts Club Canada and Food Banks Canada. "When children start the day off with a nutritious breakfast, we know they are better equipped to learn, succeed and surpass their goals," said Kellogg Canada communications director Lores Tomé. "That's why we're so committed to shedding a light on the issue of hunger in the classroom."

Earlier this year, Kellogg released retails of a similar survey conducted in the UK that showed almost all UK teachers feel the number of children coming to school hungry is as high or higher than a year ago. Of the 765 teachers polled by the cereal manufacturer late last year, 78% said they see children coming into school hungry at least once a week.


Image © iStock.com/djedzura

FOOD SCIENCE & INDUSTRY NEWS

Using legume by-products to add fibre to cakes

IFT Weekly September 21, 2016

A study published in the Journal of Food Science investigated the potential of using pea and broad bean pods to add fibre to cakes. Legume by-products, pea pods (Pisum sativum L.) and broad bean pods (Vicia faba L.) have been found to have high dietary fibre content (43.87 g/100 g and 53.01 g/100 g, respectively).

Image © iStock.com/Niteenrk

Protein content was also a considerable component for both by-products. The aim of this study was to determine the composition and functional properties of flours made from the broad bean and pea pods and then to evaluate the effect of substitution of wheat flour by these two by-products on the texture and sensory properties of cake.

The researchers prepared cakes with the addition of 0%, 5%, 10%, 15%, 20%, 25%, and 30% levels of pea pod and broad bean pod flours. The researchers then determined the cakes volume, weight, density, hardness, cohesiveness, adhesiveness, elasticity, and crust and crumb colour.

The researchers found that after the addition of pea pod and broad bean flours, cakes (especially at level of 30%) become greener and darker. As the concentration of the flours increased from 0% to 30%, cake volume decreased from 900 cubic centimetres (cc) to 725 cc and to 650 cc for broad bean pods and pea pods, respectively. The cake density increased also from 0.363 g/cc to 0.467 g/cc and to 0.508 g/cc with broad bean pod and pea pod flours, respectively. The researchers noted that the cakes became harder with increasing levels of broad bean pod and pea pod flours.

The sensory evaluation showed that cakes with 5% and 10% broad bean pod and pea pod flours had an acceptable result. The researchers concluded that the overall acceptability rate showed that a maximum of 15% of broad bean pod and pea pod flours can be added to prepare acceptable quality cakes.

Using spent coffee grounds to remove lead from water

IFT Weekly September 21, 2016

A study published in ACS Sustainable Chemistry & Engineering shows that incorporating spent coffee grounds in a foam filter may remove harmful lead and mercury from water.

Restaurants, the beverage industry, and people in their homes produce millions of tons of used coffee grounds every year worldwide, according to researcher Despina Fragouli. While much of the used grounds go to landfills, scientists are studying it as a possible material for water remediation. Experiments so far have shown that powder made from spent coffee grounds can rid water of heavy metal ions, which can cause health problems. But an additional step is needed to separate the powder from the purified water. Fragouli and colleagues wanted to simplify this process.

The researchers fixed spent coffee powder in bioelastomeric foam, which acted as a filter. The bioelastomeric foams were composed of 60% spent coffee powder and 40% silicone elastomer using the sugar leaching technique. In still water, the foam removed up to 99% of lead and mercury ions from water over 30 hours. In a more practical test in which lead-contaminated water flowed through the foam, it scrubbed the water of up to 67% of the lead ions. Because the coffee is immobilized, it is easy to handle and discard after use without any additional steps, the researchers say.

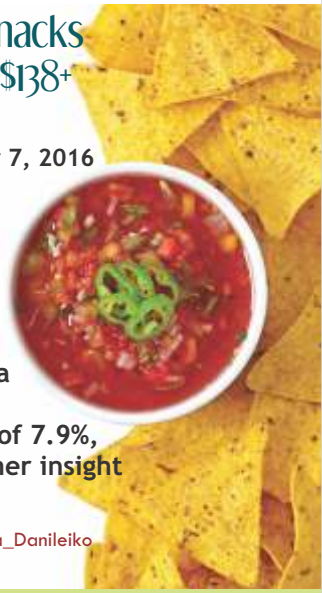
Image © iStock.com/KEVMA21

Global savoury snacks market to reach $138+ billion by 2020

IFT Weekly September 7, 2016

The global savoury snacks market will grow from $94.5 billion in 2015 to $138.2 billion by 2020, representing a compound annual growth rate (CAGR) of 7.9%, according to consumer insight firm Canadean.

Image © iStock.com/Elena_Danileiko



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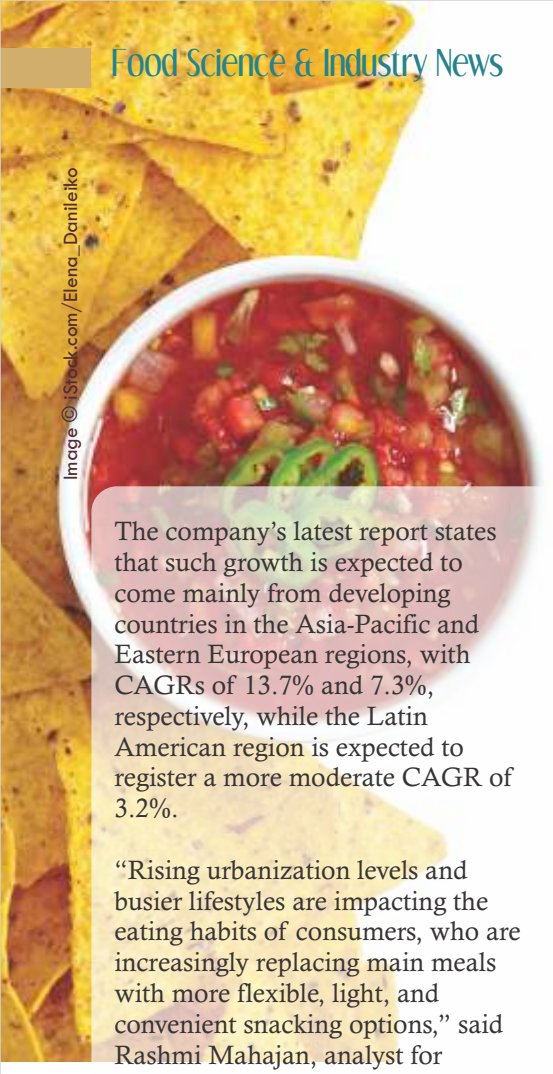
Image © iStock.com/Elena_Danileiko

The company's latest report states that such growth is expected to come mainly from developing countries in the Asia-Pacific and Eastern European regions, with CAGRs of 13.7% and 7.3%, respectively, while the Latin American region is expected to register a more moderate CAGR of 3.2%.

"Rising urbanization levels and busier lifestyles are impacting the eating habits of consumers, who are increasingly replacing main meals with more flexible, light, and convenient snacking options," said Rashmi Mahajan, analyst for Canadean. "Changing consumer preferences and the growing trend of 'snackification,' which represents a significant portion of everyday eating routines, is driving the demand for portable and on-the-go formats."

Big opportunities exist in large, populous developing countries with low per capita consumption levels, such as China (0.8 kg of savoury snacks per person in 2015) and India (1 kg), compared to the high levels of consumption in developed countries such as the United States (9.5 kg) and the United Kingdom (7 kg).

Canadean's analysis reveals that the health and wellness trend has impacted the eating habits of consumers in developed markets, who tend to base their snacking choices on nutritional value and quality. In this way, consumers are trading up and spending more on premium varieties of snacks. Consumers in emerging countries including Brazil, China, and India, on the other hand, mostly base their snack choices on value and experimentation.

"Despite the regional differences in snacks consumption, innovation in flavours remains an important differentiating factor globally, as consumers across all ages opt for products offering new and unusual consumption experiences," said Mahajan. "Examples include nacho chips in papdi chaat flavour in India, maize snacks in a tangy fruit chutney flavour in South Africa, popcorn in strawberry and cream flavour in the United Kingdom, and potato chips in chocolate chili flavour in France."

Asian Consumers Want Healthier Food

Nutrition Insight 22 Sep 2016

New research from Sensus has confirmed that consumer interest in healthier foods in the Asia Pacific region is strengthening.

The 2016 survey has revealed that consumers opt for food and drink products with natural, clean label, ingredients, as well as functional foods with demonstrable benefits. The results suggest strong potential in the region for new healthier food and drink products that are made from natural ingredients with proven effects on health. The trend seems to be driven by health concerns and the rise of chronic, lifestyle-related diseases, such as heart disease, diabetes and obesity. However, it also reflects enhanced awareness of a wide range of issues around food production from climate change to food safety.


Image © iStock.com/OrtodoxFoto

The 2016 Sensus survey canvassed the opinions of more than 2,500 adults in Australia, China, Indonesia, Japan and Thailand to gain insight into their perceptions on the need for healthier foods. These countries were chosen to provide a cross-section, representative of the multinational population in the Asia-Pacific region. More than 500 online interviews per country were carried out in local language with men and women aged between 18-75 years old who were partly or fully responsible for grocery shopping.

The results showed that more than 90 % of respondents were interested strongly enough in 'healthy food and drink products' to purchase them, and approximately 30% claimed to purchase food and drink with added health benefits on a weekly basis. More than three-quarters of those surveyed (76%) indicated that they would be willing to pay a little more for food that is healthier.

The survey also showed that consumers were particularly interested in food and drink products that could contribute towards better digestive health. A high percentage (89%) of those surveyed in all Asia-Pacific countries recognized that fibre intake is important for bowel or digestive health. However, despite this, the majority (69%) had no idea of the recommended daily intake of fibre, and whether or not they reach this. In addition, few people in the region actively look for high fibre products (just 20%), but most (41%) would select the high fibre product if they had the choice.

Those who participated in the survey were given a short introduction to chicory root fibre, a prebiotic, functional fibre, food ingredient, which is sourced from natural chicory roots.
"Combining the high levels of interest in healthier eating and specific concerns identified in our survey with the positive interest in chicory root fibre, the widespread uptake of healthier, tasty food and drink products made with chicory root fibre could contribute towards better health in the Asia-Pacific region," said Michael Chow, Sales Manager at Sensus.

"While chicory root fibre is already available in selected products, we hope that the results of this survey will encourage food manufacturers to develop an even wider range of products that contain this naturally-sourced ingredient to support the efforts of people in the region, who are trying to improve their diet."

Purdue scientists have bright idea for detecting harmful bacteria in food products

Medical News Today 22 September 2016

Scientists looking for traces of E. coli O157:H7 contamination in foods soon could have a new detection method on their hands - turning off the lights to see if the bacteria glow in the dark.

Image © iStock.com/anyaivanova

Purdue University researchers have engineered a bacteriophage called NanoLuc - a virus that only infects bacteria - to produce an enzyme that causes E. coli O157:H7 to emit light if infected. The process can shave hours off traditional testing methods, which can be critical when stopping the distribution of tainted foods.

"It's really practical. They (testing labs) don't have to modify anything they're doing. They just have to add the phage during the enrichment step of the testing protocol," said Bruce Applegate, a Purdue associate professor of food science. "We could detect as few as four bacteria in eight hours, and the process is cheaper than tests being used today."
The study involved Purdue faculty, graduate students and scientists from the U.S. Department of Agriculture's Agricultural Research Service and the Purdue Center for Food Safety Engineering. Results were published in Scientific Reports.

While many strains of E. coli bacteria are harmless, some can cause severe and potentially fatal illnesses. Ingesting as few as 10 colony-forming units of E. coli O157:H7 can result in serious illness.
Current detection methods cannot find just a few E. coli O157:H7 cells in a sample, so inspectors do an enrichment process, culturing the bacteria to multiply so they can be detected. With the bacteriophage added to the sample, scientists can add a reagent and detect E. coli O157:H7 before the enrichment process is even finished, within seven to nine hours. "The current detection methods cannot bypass the enrichment process, but our technology can explore the enrichment phase. That can give us a time advantage over other methods," said Dandan Zhang, a graduate research assistant in the Purdue Department of Food Science and the paper's first author.

The process is also unlikely to create a false positive because the bacteriophage cannot produce the light-emitting protein without encountering E. coli O157:H7, which is the only bacterium NanoLuc is able to infect. "The phage is just a virus. It cannot carry out metabolism until it infects a bacteria, which in this case is E. coli O157:H7," Applegate said. "They won't create these proteins unless they've found their specific host."

Based on the number of bacteriophage added, the amount of time that has passed and the amount of light emitted, the authors can use an equation to determine approximately how much E. coli O157:H7 is present. Their tests were done in an enrichment broth made with ground beef.
Zhang said future work would focus on detection of E. coli O157:H7 in lettuce, spinach and other produce. Other bacteriophages could also be developed to detect other pathogenic bacteria, such as Salmonella, in a similar fashion.

Algae protein's limited interaction with other ingredients a 'key competitive advantage,' says TerraVia

By Elaine Watson, Food Navigator USA 28Sep2016

It's still a new player in the burgeoning 'alternative protein' category, but algae could give rivals a run for their money as formulators learn about its unique properties that enable fortification in challenging applications from low pH beverages to dressings and crackers, claims TerraVia.


Image © iStock.com/Magone

One of a series of algae-based ingredients in TerraVia's portfolio, the AlgaVia protein-rich whole algae ingredient contains around 63% protein, along with fiber, lipids and micronutrients such as lutein and zeaxanthin. Unlike pea protein the fastest-growing plant-based protein AlgaVia protein has a neutral taste, and does not interact with other ingredients in a formulations as the cell wall of the algae remains intact, meaning that it remains stable in a variety of temperatures and pH conditions, and it does not add viscosity or grittiness, claims San Francisco-based TerraVia.

Similarly, in a low PH beverage such as tropical fruit juice smoothie, for example, you don't need to add stabilizers to stop the protein from falling out of the solution, ensuring labels stay clean, said Mark Brooks, SVP and General Manager of TerraVia's Food and Ingredients business. "Its limited interaction with other ingredients is a key competitive advantage over other sources of plant-based proteins. When used in formulations, the protein and nutrients are protected by the algae cell wall. "This protection enables fortification in challenging applications such as low pH beverages, doughs, smooth dressings and low-moisture products like crackers – and with no impact on viscosity at up to 20% inclusion. This means beverages stay clean and crisp and foods don't become thick and dry over time."

Paler version enables use in a wider range of color-sensitive applications

It is grown from a native microalgae strain (chlorella) that naturally converts sugars into oils and proteins via a fermentation process, after which it is harvested, washed, dried and milled into a fine, golden yellow powder. (TerraVia also has a paler version for dairy, beverage and baking segments "allowing use in a wider range of color-sensitive applications and a higher inclusion rate than the existing varieties," says Brooks).

From a nutritional perspective, meanwhile, whole algae protein is highly digestible, and has a full complement of amino acids (particularly arginine and glutamic acid), coupled with dietary fiber, healthy fats and micronutrients such as lutein and zeaxanthin. We are excited to have active projects underway in a breadth of new arenas But how is the ingedient the GRAS determination of which was subject to a 'no questions' letter from the FDA performing in the market?

Many projects are still in the development stage, but AlgaVia is slowing creeping into more products US grocery shelves including OLLY protein smoothies (soon to be available in 1,800 Target stores), Enjoy Life Foods baking mixes, and K'ul Chocolate, while scores more are in the development phase as formulators look for new vegan, non-allergenic sources of protein, claimed Brooks.

"Currently, it can be found in numerous foods and brands across the grocery store – including bakery, snacks, beverages, nutritional meals, and bars. Consumers can expect to see more products in the year ahead, as we've been working with leading food companies and sustainable food innovators in the US, Europe and South America. We are excited to have active projects underway in a breadth of new arenas, including savory snacks, salad dressings, cereals, cheese analogs, cookies, coatings, cooking sauces, yogurts and RTM supplements."

Pricing not a barrier, claims TerraVia

However, what really gives it the edge over rivals is that it is vegan, non-allergenic, non-GMO, and arguably 'greener' than rival sources of protein in that it can effectively be made to order – in a matter of days – does not require the cultivation of large tracts of agricultural land, and is highly scalable, said Brooks.

"It also provides a rich collection of dietary fiber, healthy lipids and micronutrients such as lutein and zeaxanthin." Asked whether price was holding back growth, Brooks said: "Price has not been an impediment among manufacturers seeking alternative sources [of protein]. Our customers have recognized the superior value of our algae protein as a way to bring distinctive value to their products as it offers an unparalleled value proposition that is free of known allergens, gluten-free, non-GM and has a neutral flavor profile and texture."

Consumers like the 'whole food' aspect

But are potential customers happy with a 63% protein powder or do they also want concentrates and isolates? According to Brooks "Being a whole food has resonated well with consumers because they value the multi-nutrient content and because they know elements have not been extracted. For a majority of mainstream, everyday products, the protein content is acceptable, especially when combined with the often superior overall sensory experience our ingredient affords."


Image © iStock.com/nanoqfu

Plastic container made of milk protein

Food News LATAM 06 SEPTEMBER 2016

People are generating more plastic waste than ever, globally. Few plastics are recycled, and the large amount we throw is quite alarming.

The reality is that packaging is the main source of plastic waste; most of the food we consume is wrapped in plastic like meat, cheese and most snacks. While manufacturers are trying to prevent food from rotting, this creates more biodegradable waste, which ends well in our cities and oceans. Not only is this situation hurting our environment, it also contributes to serious health problems in humans. As a result, researchers have been working on an edible container made from milk proteins.

On Monday, August 22, 2016, scientists presented their work at the 252nd National Meeting and Exposition of the American Chemical Society (ACS). The ACS is known as the largest scientific society in the world, and more than 9,000 presentations were made at this event. Here, research leader Peggy Tomasula and colleagues at the US Department of Agriculture revealed how they have created a plastic that protects the environment and deterioration better than its regular counterpart foods and is made of milk protein casein.

"The packages based proteins are potent blockers of oxygen that help prevent food spoilage. When used in packaging, could prevent food wastage during distribution throughout the food chain." said Peggy Tomasula, D.Sc, the leader of the research.

According to the ACS, these containers are about 500 times better than ordinary plastics to keep oxygen away from food. While the idea of grocery packaging is not new, it has never been made this way. Most of these commercial products are made from starch, meaning it has more holes where oxygen can travel through. This is where casein-based packaging stands out from its competitors as they have smaller holes that create a more compact space that does not allow oxygen to circulate. While this innovative concept of packaging can potentially solve the world's problems like sustainability, non-biodegradable waste, and contamination and spoilage of food, it also focuses on small problems at home. The same protein blend used for packaging can be used to keep your cereal from getting wet. This is a problem that everyone has experienced and everyone hates. Nowadays, cereals are able to keep their crunchy texture because of a layer of sugar. The casein coating can be used to replace this, therefore resulting in the use of less sugar. In addition, more cereal can be consumed rather than thrown away since it is not going to get wet.

This is truly the ideal packaging solution, as it is also delicious. The group plans to make some further adjustments to its product before it is available to the general public. Future plans may include adding a flavour or even probiotics to make it more nutritious. Laetitia Bonnaillie, Ph.D., and co-director of the study believe their casein containers will be available in stores in about 3 years. Companies have already shown great interest in this product. Let's see what the future holds.

Replacement of wheat by amaranth in the production of noodles

Food News LATAM SEPTEMBER 26, 2016

Pasta is a food of mass consumption and of great acceptability worldwide, due to its low cost, its ease of preparation and storage.

It is usually made with wheat semolina and water. The development of mass consumption foods that provide higher nutritional quality is necessary. Among them, pasta is a food of great consumption and of high acceptability worldwide due to its low cost, its ease of preparation and storage. Nowadays pasta is part of the family basket in Latin America. The elaboration of enriched pastas is achieved by adding raw materials that help improve the nutritional profile in pasta.


Image © iStock.com/casanisaphoto

Within the pseudo-cereals that can be used, amaranth (Amaranthus caudatus), which is native to the Andes, has remained a basic element since pre-Hispanic times.

Amaranth contains high protein, fibre and mineral richness (Fe, Ca and Zn), these attributes make it a good alternative as an ingredient for pastas and helps to promote the culinary variety and appreciation of the ethnic grains of Latin America. In addition, the substitution of wheat by amaranth in 20 to 25% has a contribution of 14 to 17 g of protein in 100 g of pasta. In the present research, physicochemical, microbiological and sensory properties of noodles with partial substitution (20% and 30%) of wheat semolina for whole - grain amaranth flour and crude amaranth flour were evaluated. The Department of Food Agro-industry in Honduras and the Federal University of Health Sciences of Porto Alegre, Brazil carried out a randomized complete block study with a factorial arrangement of 2 × 2 with the blocks each repetition and the factors were the types of flour (HIA and HAC) composed of five formulations with three replicates (with 250 g) per treatment prepared with guar gum (1%), oil (2%) and distilled water (33%) and different proportions of flours: i) past enriched with HIA in 20% concentration for 80% ST, (80ST: 20HIA); ii) HIA-enriched paste in 30% concentration for 70% ST (70ST: 30HIA); iii) HAC enriched paste with 20% to 80% ST (80ST: 20HAC); iv) HAC enriched paste with 30% to 70% ST (70ST: 30HAC); v) paste with 100% ST (control).

These proportions were chosen after preliminary tests with concentrations of 10, 20, 30, 40 and 50% of HAC or HAI. The results obtained in the microbiological analyzes are due to the correct implementation of good manufacturing practices. This indicates that the ingredients were kept under ambient conditions suitable for pulping. In the texture it was observed that the control obtained greater resistance. The degree of water absorption of the control was greater with respect to other flours of this form the integral flour of amaranth could have made difficult the gelatinization of the starch that provoked a less resistance unlike the control and the noodles elaborated with HAC. At the time of the cooking of the noodles, the starch continues to become thicker, more viscous and resistant to flow as it is gelatinized. Additionally, the control showed greater extensibility.

The behaviour of the pasta during and after cooking is one of the parameters of great importance for consumers. The parameters for weight gain and volume are related to the absorption capacity of the masses, in which it can reflect the yield of the paste. The increase in volume is dependent on the content and quality of protein. The cooking time of a fresh ST paste should be between 10 and 13 min. for handmade pastries. If they are precooked, a decrease of cooking time in the masses occurs. In this work (http://renhyd.org/index.php/renhyd/article/viewFile/215/199), the cooking time was directly proportional to the amount of raw meal added amaranth. The 70ST: 30HIA noodle formulation proved to be unwise from the sensory point of view. Noodles made with a substitution of up to 20% and 30% of raw amaranth meal had the physico-chemical characteristics required for this product. The partial substitution of 20% of amaranth flour significantly improved the nutritional content in fibre with a 60% increase and in minerals in 140%. Noodles made with a substitution up to 30% of raw amaranth our had quality characteristics required for this product, where flavour was the most influential factor in overall acceptance.

With inulin they would replace fat in cakes

Food News LATAM 08 SEPTEMBER 2016

This polysaccharide (chain of molecules) produced by many types of plants, in addition to reducing calories from 9 to 2 per gram, also offers benefits in bowel functioning and in the treatment of colon cancer.

Through this research, the pastry industry will be able to offer a much healthier product and adjusted to international standards. "We focus on inulin, because in addition to reducing calories, it is a non-digestible dietary fiber that contributes to the growth of bifidobacteria (present in the intestinal flora)," explains Juan Pablo Rodríguez, a Master's student in Science and Technology food at the National University of Colombia (UN) (http://agenciadenoticias.unal.edu.co/). In support of his thesis, the student emphasizes that due to the presence of inulin in plants such as chicory or yacon, this product has a very competitive character.


Image © iStock.com/michaelpuche

One of the reasons that prompted Juan Pablo to carry out this work was the change of legislation in countries such as Chile and Ecuador, which is moving ahead on the need to regulate foods with excess calories, fats and carbohydrates.

Considered as the most calorific product, with an estimated range of 180 to 200 kilocalories per serving of 34 grams, cakes are also a product that combines elements associated with moisture, carbohydrates and proteins, whose mixture is difficult to stabilize. "From our research group (Biomoléculas Alimentarias) we are interested in evaluating different ingredients with functional characteristics in different food matrices, in order to meet the requirements of the consumer and the market, but also of legislation and regulations," he emphasizes.

Luis Felipe Gutiérrez is assistant professor of the Institute of Science and Technology of Food (ICTA) of the UN. The teacher also highlighted the connection of the multinational Team, and the contribution of the private company to these types of projects that effectively contribute to the transfer of technology to the productive sector of the country.

As a result of the investigation, it was established that inulin can effectively replace fats in percentages ranging from 30 to 40% and also allows developing a product that is accepted by a consumer accustomed to products advertised as dietary, but unpleasant to the palate. The research was compared with experiments of similar characteristics advanced in Germany, Spain and the United States, where the use of inulin has already been validated; And whose legislations, together with that of Chile and Ecuador, not only question the percentages of sugar, but also oblige producers to make a decisive commitment to the prevention of obesity, using a color method similar to the traffic light.

The student Rodríguez estimates that at the beginning of next year, the first industrial tests could be made that would approve the exit of this new product to the market. According to the Food and Agriculture Organization of the United Nations (FAO), about 3.4 million adults die each year as a result of being overweight or obese. According to the National Survey of Nutrition Situation in Colombia (Ensin 2010), obesity rates in the country vary between 3.4 and 4.7% in the population aged 5 to 17 years, and from 11.5 to 20.1% in population between 18 and 64 years.

Herbal product sales rise 7.5% according to ABC

By Hank Schultz, NutraIngredients USA 09Sep2016

Herbal supplement sales increased by 7.5% according to a new report by the American Botanical Council's 2015 report.

Consumers in the US spent $6.9 billion on herbal products during the year, according to the publication. Published under ABC's HerbalGram masthead, the report showed that consumers spent an additional $480 million on herbal products in all channels in the year. Sales in 2014 were $6.4 billion. In the years ABC has been conducting the report, sales have grown from $4.2 billion in 2000. After a decade of low single digit growth, the trend has shown more than 7% year-over-year gains in recent years.

The leading botanical for the second year in a row is horehound (Marrubium vulgare). Sales of this supplement were $115 million in 2015. While the report terms these 'dietary supplements' many are sold in lozenge as foods without claims other than to soothe the throat. Other horehound supplements are sold in liquid form as supplements. The report covers only retail sales of herbal dietary supplements and does not reflect the sales of most herbal teas, botanical ingredients used in cosmetics, or government-approved herbal drug ingredients in over-the-counter medicines.

"These figures confirm that strong consumer demand for herbs and herbal products continues in the United States, based on a consumers' interest in natural and relatively low-cost ways to maintain their health," said Mark Blumenthal, founder and executive director of ABC. "Herb supplement sales continue to grow to record levels, evidence that much of the public considers herbs to be an essential component of a healthy lifestyle."


Image © iStock.com/Elenathewise

No NYAG hangover

It's interesting to note that sales continued to rise in a year in which the dietary supplement category suffered its worst public relations disaster in recent memory. In February of 2015 New York Attorney General Eric Schneiderman launched an investigation of herbal supplements that targeted four mainstream retailers, claiming that DNA tests (that were misapplied, according to experts) showed that the products had little or none of the targeted herb in them. Schneiderman ramped up the pressure with a

subsequent action targeting additional supplements, and later in the year Sen. Claire McCaskill, DMO, added calls of her own for FDA to take action against certain categories of products. The message seems to be that little of any of this information is having an effect on the consumer level. In addition to horehound, the top selling botanical ingredients according to SPINS/IRI data were cranberry, which racked up $66 million in sales for 16% year-over-year growth and echinacea ($60 million 7.4%). Rounding out the top five were two perennial best sellers Garcinia cambogia and green tea that both showed sales declines ($55 million 23.3% and $49 million, 23.4% respectively).

Boswellia, despite ranking 39th in this channel, had perhaps the best year of any supplement sold in mainstream retail outlets, with a 674% increase in sales over 2014. Also known as Indian frankincense, this tree gum has been used for millennia in the traditional Indian medical system of Ayurveda for ceremonial, religious, and medicinal reasons. Today, boswellia herbal supplements are marketed for anti-inflammatory benefits, often in combination with turmeric, another traditional Indian ingredient known for its anti-inflammatory properties.

Industry lauds success of self-regulated nutrition labelling plan

By RJ Whitehead, Food Navigator Asia 06Sep2016

The Southeast Asian food industry's efforts to transform food labelling have been lauded by a report that analyses a growing movement to post guideline daily nutrition amounts.

Members of Food Industry Asia, the Singapore-based industry representative body, were found to have doubled their implementation of front-of-pack guideline daily amounts (GDA) since they making a collective commitment to do so. The initiative was designed to tackle the growing incidence of obesity and non-communicable diseases in Southeast Asia.

According to the FIA's report, significant progress has been made in driving the availability and awareness of GDA nutrition labelling. Of the 13 FIA members surveyed across 19 Asian markets, the study found that 85% had rolled out GDA labelling.

"The fact that we've seen such significant growth since our last survey in 2012, across more markets and more SKUs, is extremely encouraging and shows the food industry's commitment to having a seat at the table and being part of the solution to tackle Asia's growing obesity problem," said Matt Kovac, executive director of FIA.

The report shows that 11 out of 13 FIA participants have adopted GDA labelling for all or partial lines in selected markets in Asia. Of the 11, five have implemented the practice in all Asian markets where they operate, while six others have plans to expand GDA adoption in more Asian markets this year. Adoption is most prevalent in Singapore, with 11 out of 13 FIA members using GDA labels for all or some product lines, while the next highest adoption rate has taken place in Malaysia, where 10 members have rolled out GDA labels.

The Philippines has seen the most progress since 2012—nine FIA members now have GDA labels for all or some SKUs, compared to three members previously. GDA labelling has become more prevalent across markets in Southeast Asia, with three new markets adopting the labelling since 2012—namely Laos, Bangladesh and Myanmar. The labelling has seen highest penetration among confectionary products, together with non-alcoholic carbonated drinks, dairy products and ice cream, according to the report.

FIA members, who are also members of the International Food and Beverage Alliance (IFBA), have made global commitments to roll out GDA labelling in all markets they operate in by the end of 2016. Kovac said that it was encouraging to see, from the report, that two non-IFBA members have adopted GDA labelling in all or selected markets in Asia, as part of their commitments to supporting appropriate eating choices by providing better consumer education on their products' nutrition values.

"The GDA labelling system highlights the amount and percentage contribution of an average person's daily intake, giving him or her better understanding of how products should be consumed within a balanced diet and lifestyle. Science-based guidelines, such as the GDA scheme, give consumers an understanding of how a single food product contributes to a balanced diet, allowing them to make more informed choices," said Kovac.

FIA now plans to implement a consumer-centric study to canvass insights towards consumer behaviour and understanding of nutrition labelling. It also expects to develop and launch an online nutrition knowledge centre that includes GDA labelling facts.

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Duckweed: A promising new source of plant-based protein?

By Adi Menayang, Food Navigator USA 01Sep2016

Researchers in Germany and India analyzed the nutritional value of duckweeds for human consumption, and found that "owing to the amino acid composition, the total protein of duckweeds qualifies as a high quality protein source for human nutrition."

In a study published online ahead of print in the journal Food Chemistry, researchers investigated six species of duckweed a rapidly growing aquatic plant. There isn't a lot of scientific literature out there yet about duckweed for human consumption, and outside of some Southeast Asian countries, consumption of the plant is not yet widespread, note the authors.

"As a step forward, it would be important to investigate the nutritive composition of duckweeds to prevent any unwanted effects on humans and also to make it more acceptable to the general public of the countries that do not have the tradition of consuming duckweeds," they wrote. "With our present report, we want to contribute to this issue."

As of now, only a few companies are researching and developing food products using duckweed as its main protein source. One example is Florida-based Parabel, which is cultivating a free-floating seed-producing micro aquatic plant from the duckweed family at a $10m production facility and developing a protein-rich whole food powder called Lentein Complete.

"We are set to produce commercial quantities by November. The process facility is going to be finished in October," Cecilia Wittbjer, VP of marketing at Parabel, told FoodNavigatorUSA. "We have self-affirmed GRAS already so the product could be sold straight after that, so we're hoping to be in the stores in 2017."

High in amino acids, meeting WHO recommendations Using duckweed clones from the University of Jena's Institute of Plant Physiology stock in Germany, the researchers freeze-dried the plants and finely ground and homogenized them with a laboratory mill. The resulting material was then analyzed for protein and amino acids, minerals, carotenoids and tocopherols, and sterols. The researchers argued that, based on their analysis, all six duckweed species contained an amino acid composition comparable with that of other plant proteins and met the amount recommended by the World Health Organization (WHO).

In addition, the protein content of duckweeds across the analyzed species ranged between 20% and 35% per dry weight, and the researchers argued that "protein content of duckweeds can be easily manipulated by optimizing the cultivation conditions of different duckweed species and clones with the protein content reaching close to 40% of the dry weight."

High yield, high nutritional content

The researchers also concluded that the high growth rates of W. hyaline and W. microscopica "make these rarely used plants an excellent material for human nutrition, even in comparison with other duckweed species." Wittbjer, when asked to comment independently, concurred with this finding. "The yield per acre is extremely high as the crop doubles it's biomass in 24-36 hours. The crop is harvested every day and it only takes three weeks from initial seeding to full harvest," she said.

"We are currently going to produce 1,000 tons from our first facility and another 5,000 tons from the second facility in 2017," she added. "These will be followed by several more in the years to follow. As the system is very scalable we can adapt quickly to industry demand." The researchers from Jena recommended more investigations of analyzing the anti-nutritive components of duckweeds, if any, as an important part for widespread acceptance of duckweed as a human food source.

Protein-packed Brami beans go up against roasted chickpeas and edamame in the snack aisle

By Elizabeth Crawford, Food Navigator USA 28Sep2016

Move over roasted chickpeas and salted edamame, there is a new protein-packed, on-the-go snacking bean in town: Brami's lupini beans. A common snack in Italy, the lupine is now hitting mainstream America thanks to a New York-based startup that launched the sprouted and lightly pickled beans in vacuum-packed, snack-sized bags in January.

Made with all-natural flavours, including Chili Lime, Hot Pepper,

Image © www.bramibeans.com

Garlic and Herb and Sea Salt, the beans are America's "answer to that daily question what is going to satisfy me without ruining my diet or meal plan," said Brami's founder Aaron Gatti. He explained that the beans are a perfect midday snack because their high fiber and protein content satisfy hunger pangs without blowing the calorie budget. In particular, he noted at Natural Products Expo East in Baltimore that Brami's lupini beans have the highest protein density per calorie of any plant with a notable 4 grams per 35 calories per ounce.

The beans' high protein content not only checks an in-demand trend for many of today's consumers, but it offers a "nutritional solution to a health problem by easing our overreliance on animal proteins and all the resource issues that go with" animal protein production, Gatti said. He also noted that the historical association of beans and plants as a lower-class source of protein compared to that from dairy and meat which traditionally were preferred by the middle and upper classes is shifting as the nutritional benefits of plant-based protein become more well known.

In addition to being high in protein, the beans also have 4 grams of fibre per ounce, which is almost the highest fibre content of any plant – falling just under that of collards and berries. This adds to the satiety of the snack and also helps offset some of the health problems associated with diets high in animal protein, including high cholesterol. Gatti also noted that the snack is low in calories, with only about a fifth the amount of the average snack. Plus, he said, it has almost no fat and no carbs.

As if that weren't enough to appeal to health-conscious snackers, Gatti also joked that with 2.5 times more essential minerals, excluding sodium, than coconut water, Brami lupini beans are "the only drink snack that will cure your hangover while you are drinking!"

Beyond its health claims, Brami's lupini beans stand out from other pulse-based snacks available because they are not baked, fried or dried. Rather, they are blanched, lightly fermented in organic vinegar, lemon juice and natural ingredients and then vacuum packed for on-the-go eating. Recognizing that texture is a key component for many snackers, Gatti was quick to note that even though Brami beans are not crunchy like chips, pretzels or roasted chickpeas, they also aren't mushy. In fact, he says, they have a "satisfying pop" when you bite into them with your back teeth.

A long history as portable protein

While lupini beans may be new to many Americans, they have a rich history that helps connect them to the modern trend of eating ancient, nutrient dense foods, such as grains, heirloom seeds and produce. "Lupini have this incredible ancient history. They were found in the tombs of the ancient Egyptians, meaning they wanted to take them with them to the afterlife. They also were part of the Roman diet, where they were known to be used as a portable protein for the soldiers on the campaign. So, we like to say that this is the bean that built the Roman Empire," Gatti said.

He added: "Our innovation here is to take this ancient snacking bean and make it presentable to the modern consumer." Easy to eat, and easy to digest While most Americans now understand the protein power of pulses and legumes, adoption to eating them has been slow in part because of the uncomfortable digestion issues that often accompany them. But, Gatti says, this isn't a problem for lupini. He explained that lupine have naturally lower levels of phytic acid, oligosaccharides, trypsin inhibitors, lectins and saponins, which are what make other legumes tough to digest – leading to bloating and discomfort.

In addition, he said, the extended sprouting process that Brami beans undergo to reduce their bitterness washes out any naturally occurring levels of these elements in the lupine beans "so they are incredibly easy on the digestion system."

Expanding distribution

While Brami beans just launched in January, they already are available "in the four corners of the US" in Whole Foods stores in the Northeast, Southwest, Midwest and Northern California, Gatti said. The wide distribution is "only scratching the surface," but is a promising indicator for growth especially considering how young the brand is. With this in mind, Gatti said he will focus on expanding distribution in the near future as well as adding new flavors. He also is very much aware of the ever-shortening adoption and acquisition cycle for innovative young brands and says while he is "a very open person in general," mergers and acquisitions "are the last thing on my mind right now because I am so focused on sharing this childhood passion of mine with as many people as possible."

REGULATORY NEWS

Australian confectionery industry rejects claims it is snubbing star labelling

By Oliver Nieburg, Food Navigator Asia 27Sep2016

The AI Group has disputed claims from consumer group CHOICE that its confectionery members are ignoring the country's health star labelling system.

The industry body whose members include Mars and Mondelēz – said an agreement had been struck with the Federal Government's Health Star Rating Committee that Australia's Heath Star Ratings (HSR) system does not apply to the confectionery industry. Tim Piper, head of the confectionery sector at the Australian Industry Group, said to therefore criticize the confectionery industry is "totally inappropriate" and "disingenuous". He added that the HSR committee had agreed that the system would be up for review in 2019.

CHOICE calls on all companies to use stars

Consumer group CHOICE last week called on all companies that have not yet adopted HSRs such as Mars, Mondelēz and Goodman Fielder to embrace the system. It also accused some industries of "manipulating the measurement of health implications" in the HSR system after commissioning research on its impact.

The confectionery exception the government-backed HSR system is a voluntary front of pack labelling initiative introduced two years ago. Around 3,000 products now feature star labelling, according to the Australian government. In 2013, the

government agreed some exemptions for the program, such infant nutrition products. The AI Group also agreed with the government's health star committee that confectionery need not display the stars and could have the Energy % daily intake icon only with the group's Be Treatwise messaging front of pack.

'Health halo' claims

CHOICE said there were some anomalies undermining the system and creating "health halos" for those confectionery products using star labelling. It said that chocolate, sugar confectionery and potato chips were sometimes achieving high star ratings despite being high in sugar, salt or saturated fat. For example, it said some licorice products had received 2.5 stars, while some potato chips had a rating of four. "If nutrient-poor foods continue to score high HSRs, consumer confidence in the system will decline," it said in its research report.

The consumer group says there is strong consumer support for star labelling to be mandatory. It is also calling for added sugars to be listed rather than total sugars. Consumers understand Be Treatwise, says AI Group The AI Group said in a release that its confectionery members consider its products treats to be consumed in moderation and said all major Australian confectionery players have adopted the group's Be Treatwise consumer program.

"Be Treatwise has a high recognition and consumer understanding which complements the HSR and helps develop better dietary habits through an understanding of treats," said Piper.

Survey of 1,640 people across Australia and New Zealand.

- 76% of Australians refer to the star system when shopping
- 74% of Australians say HSRs help them maker healthier choices

Three in four think they should be mandatory

- Those earning less than A$50,000 per year less likely to have seen HSRs than those earning more than A$100,000
- 79% of Australians want to see more HSRs on products

Could Smart Label help restore consumer loyalty?

By Elizabeth Crawford, Food Navigator USA 28Sep2016

Widespread confusion about how packaged foods are made and labelled is eroding consumer trust in brands and threatening future product sales, according to new research from Label Insight.

The data company's Food Revolution Study of more than

Could Smart Label help restore consumer loyalty?

By Elizabeth Crawford, Food Navigator USA 28Sep2016

Widespread confusion about how packaged foods are made and labelled is eroding consumer trust in brands and threatening future product sales, according to new research from Label Insight.

The data company's Food Revolution Study of more than 1,500 consumers conducted in the US in April reveals more than a third of people admitted they are sometimes confused by what food labels mean and at some point in the prior month more than 80% consumed at least one ingredient that they did not recognize. "That confusion is causing fractures in the trust relationship that consumers have with the brands they buy," Patrick Moorhead, chief marketing officer for Label Insight, said during a Sept. 27 webinar. He explained that "an alarming … three quarters of people don't trust the accuracy and completeness of food labels." He added that the juxtaposition of this finding with the one that 94% of respondents also said that it is important to them that brands and manufacturers are transparent about what's in their food explains how a significant 37% of consumers say they would switch brands if another brand shared more detailed product information. "Loyalty is up for grabs, and the way to win is to provide consumers with the detailed product information that they are asking for and expecting brand manufacturers to provide them," Moorhead said, adding that "loyalty drives long term value and purchases."

What consumers want to know

Much of the top information that consumers want about products is mandated to be on labels by the FDA, including a full list of ingredients, which 71% of shoppers said they want before making a purchase decision, according to Label Insight's survey. But simply complying with the regulation is not enough, because consumers also want to understand what each of those ingredients are, what they do in the product and where the ingredient was sourced, according to the survey.

Specifically, it found 83% of consumers surveyed would find value in having access to more in-depth product information. This includes where the product was made, which 54% of respondents cited as important, and how it fits into a specific diet, which 53% say they consider when shopping.

Obviously, real estate on product labels and packaging is limited, but if brands don't provide this information they either will lose sales or consumers will look elsewhere for answers and the brand will lose control of its messaging, Moorhead warned. "We live in a world where consumers demand and expect instant information and, like water in the foundation of a building it will get in, and consumers will find the information that they want whether or not we provide it to them," he said. "Often today, the gap in this product information is leading third party sources to have inaccurate, unstructured and potentially derogatory information about the product," he added.

Digital labels offer one solution

Manufacturers can retain control of their messaging and provide consumers with the information that they want without cluttering packaging by offering easy-to-find digital labels, Moorhead said. He explained that when asked what would make grocery shopping easier, consumers ranked digital labels that offer extended product information the highest at 27%. This was followed closely by the ability to order (and ostensibly research) online and pickup in the store, which was listed by 26% of respondents, and dedicated in-store sections that include only items that meet certain dietary restrictions, which was listed by 24% of respondents. Smart Label is perhaps the most high-profile, and hotly contested, solution to offering digital labels. Provided by Label Insight, Smart Label technology can help manufacturers label more than 17,000 attributes per product and tap into a library of more than 250,000 ingredient definitions that can help consumers understand what they are eating.

One of the most debated elements of a Smart Label is the use by some companies of QR codes on packaging that consumers can scan in stores to pull up more information on their smart phones. Designers often complain that QR codes detract from package aesthetics and some manufacturers doubt that consumers would actually use them in the store, given that they often make product selections in a few seconds. But Moorhead says there are other ways to connect consumers to Smart Labels. One of the most effective ways, he says, is to change the Internet landing pages for each brand to a Smart Label page so that when consumers research a product by visiting its webpage they have all the data they need. Another option, Moorhead said, was to have Smart Labels linked to UPC codes or other images on packages that when scanned by the consumer will pull up information on the shopper's phone. This would act much like the QR code, but in a less visually disruptive fashion, he said.

Go beyond physical packaging

No matter how manufacturers direct consumers to Smart Label pages, the most effective ones are those that go beyond mere replicas of the Nutrition Facts Label and data on product packages, Moorhead said. He explained: "Restoring consumer trust through transparency is about more than creating product replicas of labels online. This is the opportunity for brands to claim their information, tell the story about the hows and whys of their product, provide it to consumers in the way they prefer it and digitally unlock that loyalty from increased transparency."

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HEALTH INFOSULES

Gluten Intolerance: Signs and Symptoms

Written by Markus MacGill
Medical News Today 15 September 2016

Gluten intolerance is one of the wheat-related disorders. These are symptoms that some people have after they eat foods that contain gluten. Wheat has high gluten content. Barley and rye also contain it. Researchers often give gluten intolerance the name non-celiac gluten sensitivity. The reaction to eating gluten is not the same as that for people who have celiac disease, even though the symptoms are similar.

Celiac disease happens to people who are genetically at risk, whereas gluten intolerance is not so well understood. In celiac disease, the body's immune system attacks its own tissues, triggered by gluten in the diet. It only happens in people who have a genetic vulnerability. Scientists have even identified certain genes that may be behind celiac disease. The third wheat-related disorder is wheat allergy. This disorder can produce very serious signs and symptoms.

Symptoms of gluten intolerance

The most common symptoms of gluten intolerance are, when the diet contains wheat:

- Bloating
- Belly pain
- Diarrhea
- Feeling unwell, including tiredness

The following are further symptoms that people with gluten intolerance might also experience. They are less common than the symptoms above and include wider symptoms beyond the gut:

Stomach pain (more specific than belly pain)

- Anxiety
- Headache
- Nausea
- Confusion
- Numbness
- Joint or muscle pain

It is important to get medical advice for these symptoms. If the signs and symptoms turn out to be because of some reason other than gluten intolerance, it may be important to get treatment.

Gut symptoms can be vague. Many conditions affecting the gut show some overlap that can be looked into with the help of doctors.

Diagnosing gluten problems requires the diet to carry on as normal. Diagnosis cannot be made if patients decide to stop eating gluten foods before seeing a doctor. Severe belly pain is not a symptom of gluten intolerance. Severe pain needs immediate medical attention.

Difference between gluten intolerance and wheat allergy

Wheat allergy is the most serious of the wheat-related disorders. It is similar to other allergies, has serious symptoms, and can be a severe threat.

Gluten intolerance symptoms are not dangerous, whereas wheat allergy symptoms and signs can even be life-threatening.

The symptoms of wheat allergy include:

- Nausea and vomiting
- Diarrhea
- Bloating
- Mouth or throat irritation
- Rash, hives
- Blocked nose
- Irritated eyes
- Difficulty breathing - people experiencing this should call an ambulance straight away

It is important to get medical advice urgently for suspected wheat allergy.

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Severe allergic reactions can quickly threaten life. Vomiting, diarrhea, and swelling that restricts breathing are all very serious symptoms when caused by allergy. Go to a nearby emergency room or call an ambulance.

What triggers gluten intolerance symptoms?

Scientists have a good understanding of why signs and symptoms happen to people who have celiac disease or wheat allergy. Why people with gluten intolerance have their gut symptoms is not clear, however.

What is gluten?

Gluten is the name for the proteins that give wheat its unique baking qualities. It determines the ability of wheat dough to absorb water, stick together, and remain viscous and elastic. Wheat is the main gluten food but many others also contain these proteins. Gluten foods include other grass-related grains, barley, and rye. Gluten is found in baked foods such as breads and cracker-type biscuits, and in pastas, seasonings, and spices.

While gluten is known to be behind celiac disease, there is debate about whether it is the cause of gluten intolerance. Scientists question whether it is something else about wheat that causes it. There is even debate about whether "non-celiac gluten sensitivity" should be renamed "non-celiac wheat sensitivity." Wheat intolerance may perhaps be a better name than gluten intolerance.

Diagnosis of gluten intolerance

Doctors diagnose gluten intolerance by first excluding more serious diseases. Diagnosis begins with an investigation of the symptoms and signs. Doctors take a history of the gut symptoms that could be signalling gluten intolerance.

Doctors will also ask about any wider signs and symptoms. This is in part to help with ruling out other potential problems. Part of the diagnosis is to rule out celiac disease. Doctors seeing gluten intolerance symptoms should always check for celiac disease.

Doctors test for celiac disease by:

- Testing the blood for certain antibodies
- Taking a biopsy to confirm celiac disease and tell it apart from gluten intolerance

Diagnostic tests are always done while the person has been eating a gluten-rich diet. Otherwise, no reaction can be found. If there are no antibodies, the problem is unlikely to be celiac disease. But people with gluten intolerance can sometimes show this test result. The biopsy gives a clearer answer. A biopsy involves taking a small sample of the lining of the intestine. The lab analysis of the biopsy sample looks for damage to the lining of the intestine. In gluten intolerance, no damage to the lining of the intestine will be found. When the symptoms match and other problems have been ruled out, gluten intolerance is diagnosed.

Living with gluten intolerance

Living with gluten intolerance means a life similar to that of a person with celiac disease. A gluten-free diet is the treatment. For celiac disease, the gluten-free diet is more important and is followed strictly. For gluten intolerance, the best advice is to avoid foods that contain wheat and gluten. This can be difficult because a lot of foods are based on wheat.

There is much help for people who need to avoid gluten. This includes food products in grocery stores being clearly labelled for wheat and gluten content. Nutritionists and dieticians are further sources of help on food planning. Common foods to avoid because they contain wheat and gluten include:

- Breads
- Pastas
- Wheat-based biscuits like crackers

It may also help people to manage the condition by keeping a diary that lists foods eaten and symptoms experienced. This can include amounts and times.

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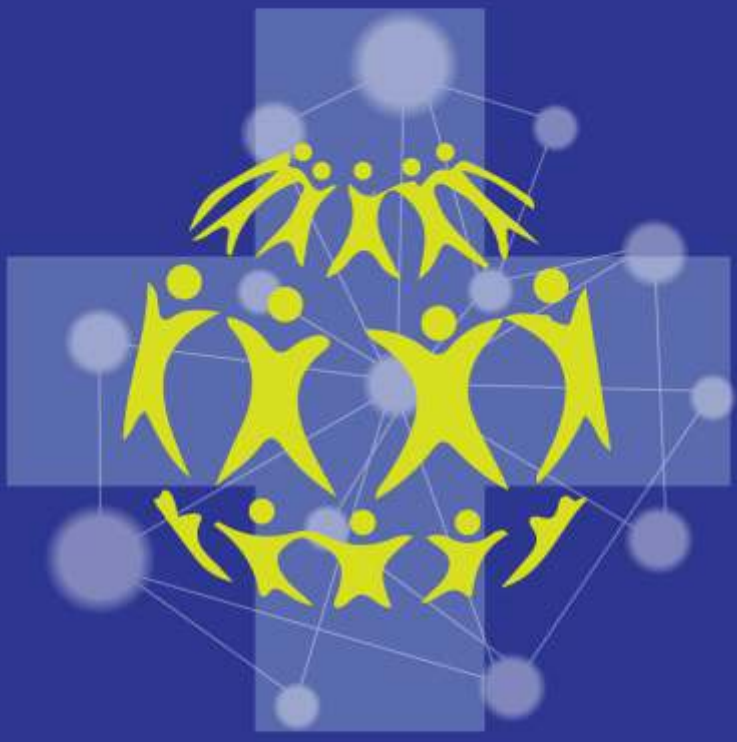

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