

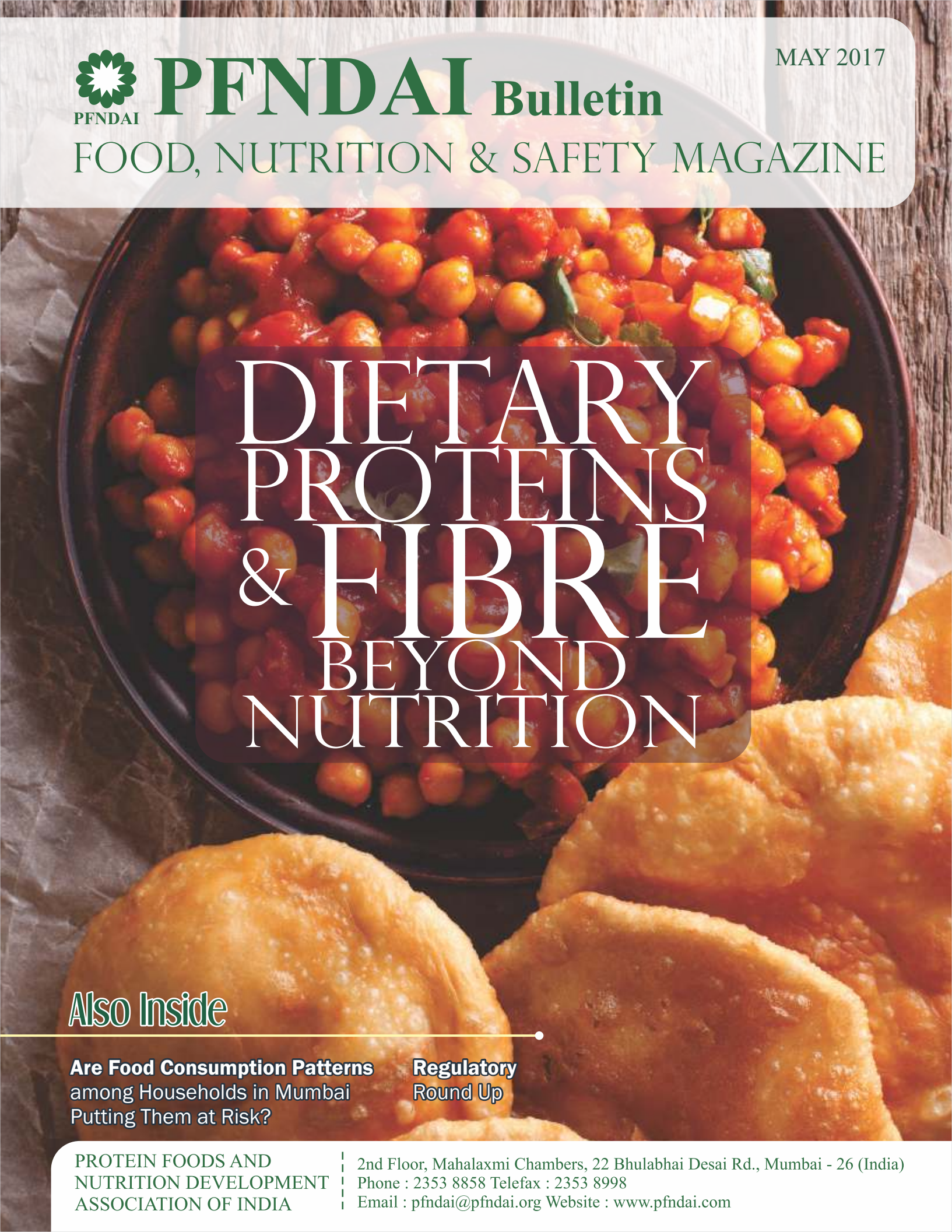


PFNDAI

# PFNDAI Bulletin

MAY 2017

FOOD, NUTRITION & SAFETY MAGAZINE



## DIETARY PROTEINS & FIBRE BEYOND NUTRITION

### Also Inside

**Are Food Consumption Patterns**  
among Households in Mumbai  
Putting Them at Risk?

**Regulatory**  
Round Up

PROTEIN FOODS AND  
NUTRITION DEVELOPMENT  
ASSOCIATION OF INDIA

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# EDITORIAL

Indians loved their traditional foods so much so that they missed their foods when they went abroad for business or pleasure. However, slowly newer foods and flavours have been making inroads in Indian dietary so now especially the younger ones love to not only experiment with newer foods, some of them have their burgers and pizzas in their daily fare.

There were traditional foods in west as well, but they decided to experiment with newer tastes and flavours and formats in which these were delivered and it caught the fancy of the consumers. Here too they have done the same and it has caught the young mind which is always looking for taste and a form of rebellion from the tradition.

However, food is not just taste and flavour and something new, it has a major role of providing nutrients and as more recently realised, it also helps protect us from the onset of many illnesses. So when we keep on consuming ingredients that provide taste and flavours with less of the primary objectives, we start having problems.

We need not forgo taste, but ensure that somehow we incorporate nutrients into great tastes so we do have something new but without losing out of health and nutrients. The recent trend of snacking has become so large that people are now snacking round the clock. They prefer to have snacks for even their major meals. Snacks are convenient and tasty so with today's lifestyle, people can quickly have some snacks and carry on with their work which does not permit regular timings for their meals.

Earlier snacks were only fun foods and very little thought for nutrition. So it was not very healthy. However, things are changing both consumers as well as manufacturers of newer foods have realised that they not only must provide foods which takes care of their hunger, desire for tasty foods and convenience. So they have come up with many foods and snacks that are not just filling and tasty but also provide essential nutrients.

This concept could be stretched further and develop a range of foods containing ingredients that would provide protein and fibre which have been lacking in today's diets of most Indians and not sacrifice taste and flavours.

Indians still love their spices so most fast food operators have been providing special spicy variations so they do not go away disappointed. Some have incorporated traditional tastes as well. It is going to require a little ingenuity to incorporate fibre and proteins. It is possible to incorporate pulses, soya, and certain cereals which will provide both. There are also ingredients available to provide both. Such changes in formulations would go a long way in providing both taste and the nutrition & health.

**Prof. Jagadish S. Pai,**  
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# DIETARY PROTEINS & FIBRE BEYOND NUTRITION



By **Dr. B Sesikeran**  
**MD, FAMS**

Dietary protein is one of our most essential nutrients. Proteins contribute to key body functions like blood clotting, fluid balance, production of hormones and enzymes, vision and cell repair.

## What are Bioactive peptides?

Bioactive peptides are proteins synthesized in the cell in the form of large prepropeptides which are then cleaved and modified to give active products. They have been defined as “food derived components that, in addition to their nutritional value exert a physiological effect in the body”. They can be derived from plant or animal proteins.

- Dairy products
- Bovine blood
- Meat
- Eggs
- Fish

&

**Ms Swechha Soni,**  
**Intern, PFNDAI,**  
**MSc student, Nirmala Niketan College**



- Wheat, maize, soy, rice.
- Sorghum
- Mushrooms

Bioactive peptides from food proteins offer major potential for incorporation into functional foods and nutraceuticals. Food derived bioactive peptides display a wide range of physiological functions including antihypertensive, antioxidative, immunomodulatory, antimicrobial, prebiotic, mineral binding, antithrombotic and hypocholesterolemic effects.

Modes of action:

- IGF – The insulin-like growth factors IGF-I and IGF-II promote cell proliferation and differentiation.
- Lactoferrins- Lactoferrin has been reported to prevent microbial growth, Moreover, peptides released from lactoferrin by digestion with pepsin or by heat treatment at an acidic pH showed antimicrobial

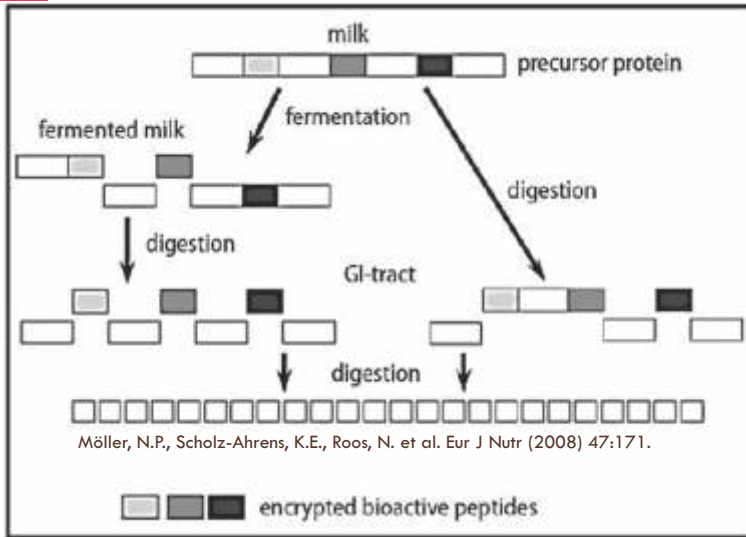
effects.

- Immunoglobulins/ Immunomodulating
- Bioactive as part of a large protein molecule
- Antihypertensives- inhibiting ACE
- Anti lipidemic
- Osteoprotective
- Antioxidant
- Antimicrobial

Bioavailability:

Bioactive peptides may be encrypted in the amino acid sequence of a larger protein. These peptides are released from the original protein after degradation by the following ways:

- During natural digestion by enzymes like trypsin and due to microbial enzymes in vivo.
- During the process of fermentation, biopeptides are released from the enzymes from starter cultures.



- They are released during the ripening stages of foods and their processing by isolated or microbial enzymes. The enzyme cleavage sites of biopeptides are different in different processes.
- Bioactivities of these peptides vary from nil in intestinal enzyme digestion to mild activity with bacterial enzyme digestion.

**Absorption:**

Bi or tripeptides directly pass through larger molecules via receptor binding & cell signalling in the gut.

**Immune modulating proteins:**

Casein, whey, and other protein-derived peptides display an immunomodulatory role when consumed exogenously. Immunomodulating peptides have been found to stimulate the proliferation of human lymphocytes, the phagocytic activities of macrophages and antibody synthesis. Also, it has been suggested that immunomodulatory milk peptides may alleviate allergic reactions in humans and enhance mucosal immunity in the gastrointestinal tract. Casein proteins comprise about 80% of the total protein content in bovine milk and are divided into  $\alpha$ -,  $\beta$ - and  $\kappa$ -caseins. In regards to whey protein it is composed of  $\beta$ -lactoglobulin,  $\alpha$ -lactalbumin, immuno-globulin (IgG's), glycomacropptides, bovine

serum albumin, and minor proteins such as lactoperoxidase, lysozyme, and lactoferrin. Each of the protein sub-fractions found in casein or whey has its own unique biological properties. Milk proteins can be degraded into numerous

peptide fragments and liberated by enzymatic proteolysis during gastrointestinal digestion to produce a number of bio-active peptides. The immunomodulatory action of primary milk proteins is well balanced and may get out of control after isolation or neutralization of certain components. (Cross ML, Gill HS (2000) Immunomodulatory properties of milk. Br J Nutr 84:S81–S89)

**The Balancing Act:**

Lactoferrin stimulates Phagocytic activity in granulocytes. It also binds Fe & deprives bacteria from growing (directly microbicidal). Glyco macropptides from k-casein has inhibitory properties on mouse splenocytes (Otoni et al 1992).

ACE Inhibitory (antihypertensive actions of some peptides)  
 ACE-inhibitors lower hypertension and are believed to prevent cardiovascular diseases. They prevent an enzyme from producing angiotensin II, which narrows blood vessels and raises blood pressure.  
 •The group of Yamamoto and

Maeno obtained an antihypertensive effect with  $\alpha$ -s1 and b-casein hydrolysates by using extracellular lactobacillus proteases. VPP and IPP were identified as antihypertensive peptides yielded by fermenting milk proteins with *L. helveticus* and *Saccharomyces cerevisiae*.

•Matsui and others (2010) reported the antihypertensive effect of wheat germ hydrolysate due to the presence of tripeptide IVY as a potent ACE inhibitor. The antihypertensive effect of IVY was tested on mice. Their mean arterial pressure gradually decreased after 5 mg per kg of IVY injection and gave a maximum reduction (19.2 mm Hg), after 8 min, which was held for 20 min.

•Peptides known as lactorphins, obtained by proteolysis of  $\alpha$ -lactalbumin and  $\beta$ -lactoglobulin using gastric and pancreatic enzymes, showed a lowered BP effect.

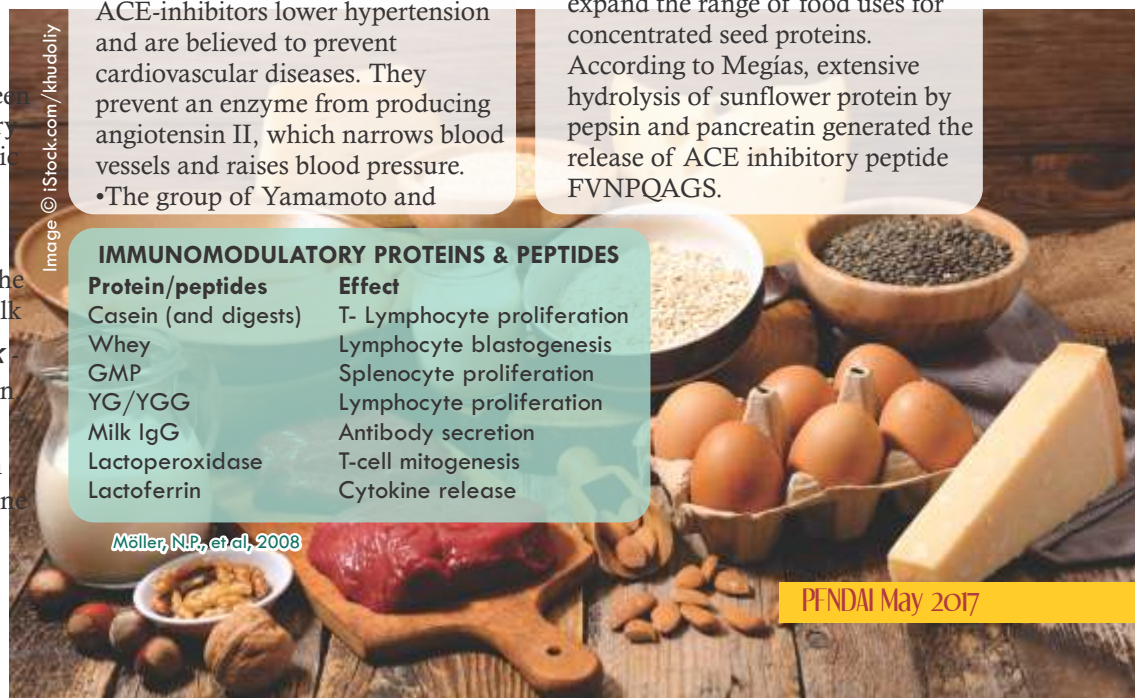
•Beef is also a meat containing proteins which are a source of ACE-inhibitory peptides. The peptide VLAQYK (obtained from sarcoplasmic proteins of beef rump) was considered for testing in clinical trials as a component of functional food possessing properties capable of reducing the elevated BP.

•Sunflower proteins have unique functional properties which may expand the range of food uses for concentrated seed proteins. According to Megías, extensive hydrolysis of sunflower protein by pepsin and pancreatin generated the release of ACE inhibitory peptide FVNPQAGS.

**IMMUNOMODULATORY PROTEINS & PEPTIDES**

Protein/peptides	Effect
Casein (and digests)	T- Lymphocyte proliferation
Whey	Lymphocyte blastogenesis
GMP	Splenocyte proliferation
YG/YGG	Lymphocyte proliferation
Milk IgG	Antibody secretion
Lactoperoxidase	T-cell mitogenesis
Lactoferrin	Cytokine release

Möller, N.P., et al, 2008





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# AAK KAMANI

Osteoprotective proteins:

- Casein & whey proteins have a significant role in calcium absorption in the intestine and bone metabolism. In addition to major

whey proteins, such as  $\alpha$ -

lactoglobulin &  $\beta$ -lactoglobulin, several bioactive proteins with alkaline isoelectric points are present in whey.

- The basic milk proteins stimulated osteoblasts so as to remodel bones & simultaneously suppressed osteoclasts so as not to dissolve bones.

- Lactoferrin inhibits osteoblast apoptosis & promotes osteoblast growth. It also suppresses osteoclast differentiation.

- Casein phosphopeptides- CPPs have been shown to have strong anticariogenic effects. Apart from their ability to bind  $\text{Ca}^{2+}$  ions, CCPs may also improve the solubility and availability of other minerals like zinc, magnesium, iron, chromium and selenium.

Anti Lipemic proteins:

A reduced lipase activity in the gut can result in an inhibition and/or a delay of fat assimilation and, consequently, in a decrease of postprandial triglyceride levels in the blood. High postprandial triglyceride levels are associated with insulin resistance, precocious atherosclerosis, obesity and other traits of the metabolic syndrome.

- Protamine is a naturally occurring protein with a basic character obtained from the sperm of various fish species. In an animal trial, protamine decreased postprandial triglyceride level.

- A bovine hemoglobin hydrolysate significantly decreased postprandial triglycerides in humans. The tetrapeptide VVYP was identified as a substance with the strongest lipase inhibitory effect.

- Proteins isolated from wheat germ, wheat flour,

soybean cotyledon and defatted rice bran showed lipase inhibitory action in vitro or reduced the plasma triglyceride levels in rats.

- Fish protein hydrolysates (FPH) reduce mRNA levels of desaturases & have cardio-protective properties.

Neutraceutical bioactive peptides:

There certainly is a potential for the application of bioactive proteins and peptides as functional foods or pharmaceutical products.

The most widely used method for yielding bioactive peptides in vitro is the enzymatic hydrolysis by pancreatic enzymes, especially trypsin. Once the amino acid sequence of the molecule is known, the peptide can be synthesized by chemical synthesis or recombinant DNA technology.

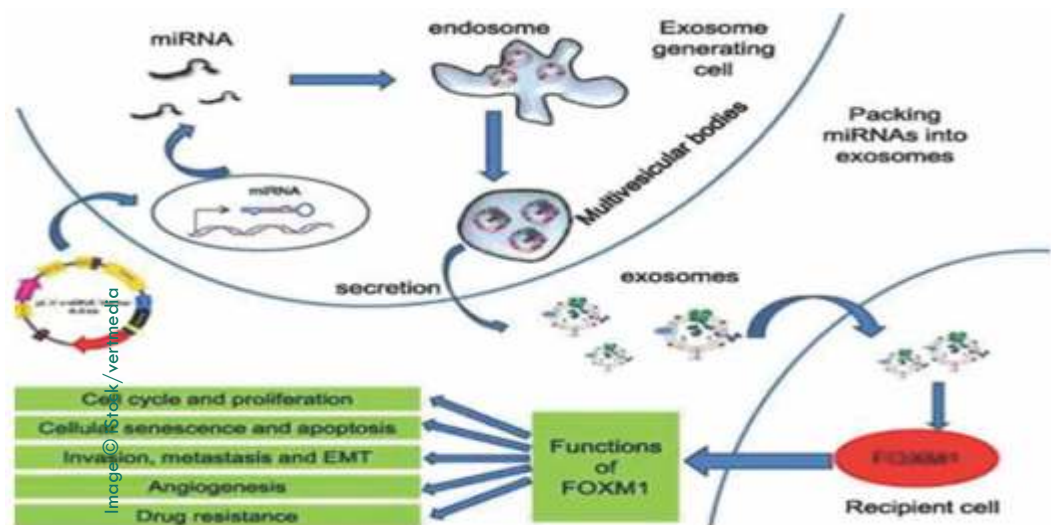
Another possibility for generating bioactive substances with peptide character may be achieved through the development of stable bovine colostrum concentrates or through gaining milk from hyper immunized dairy cows.

The bioactive peptides if not properly characterized, could cause undesirable effects like allergies. Modern biotechnology may help hyper express beneficial peptides.

Molecular components in foods as bioactive substances:

Exosomes and microvesicles are extracellular nanovesicles released by most but not all cells. They are

specifically equipped to mediate intercellular communication via the transfer of genetic information, including the transfer of both coding and non-coding RNAs, to recipient cells. As a result, both exosomes and microvesicles play a fundamental biological role in the regulation of normal physiological as well as aberrant pathological processes, via altered gene regulatory networks. Extracellular vesicles (EV) in milk harbour a variety of compounds including lipids, proteins, non-coding RNAs & mRNAs and could play an important role in the instruction of the neonatal immune system. Encapsulation in exosomes confers protection against enzymatic and non-enzymatic degradation of cargos and provides a pathway for cellular uptake of cargos by endocytosis of exosomes. Exosomes in bovine milk are transported by intestinal cells, vascular endothelial cells, and macrophages in human and rodent cell cultures and bovine-milk exosomes are delivered to peripheral tissues in mice. Evidence also suggests that cargos in bovine-milk exosomes, in particular RNAs, are delivered to circulating immune cells in humans. Some microRNAs and mRNAs in bovine-milk exosomes may regulate the expression of human genes and be translated into protein, respectively.





Low concentrations of dietary microRNAs may alter gene expression, such as the accumulation of exosomes in the immune cell microenvironment and the binding of microRNAs to Toll-like receptors. Phenotypes observed in infant feeding studies include higher Mental Developmental Index, Psychomotor Development Index, and Preschool Language Scale-3 scores in breastfed infants than in those fed various formulas. (Zempleni et al J Nutrition 2017 & Cavalieri, D. et al. Plant microRNAs as novel immunomodulatory agents. Sci. Rep. 6,25761; doi: 10.1038/srep25761 (2016))

### Dietary Fibre

Fiber, also known as roughage, is the indigestible part of plant foods that travels through our digestive system, absorbing water along the way and easing bowel movements.

### Dietary Fibre Constituents Non Starch Poly & Oligosaccharides

Groups	Source
Cellulose	Veg, Brans
Hemi cellulose	$\beta$ glucan, Arabinoxylans
Polyfructose	Galactomannan
Gum, Mucilages	Inulin
Pectins	Guar, Karaya, Psyllium
	Fruits, Veg, Legumes

### Dietary Fibre Constituents 2 Carbohydrate Analogues

Groups	Source
Resistant Starch and Maltodextrins	Maize, Peas, Potatoes
Chemical Synthetics	Polydextrose, Lactulose
Enzymatic Synthetics	FOS
Lignins	Woody Plants
Animal Origin- Chitin, Chitosan Collagen, Chondroitin	Fungi, yeasts, Invertebrates

Tungland and Meyer. Comp Rev Food Sci Food safety, 2002

## COMING EVENTS

### SupplySide West 2017 September 25-29, 2017

Expo Hall, Mandalay Bay, Las Vegas

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### International Conference on Obesity and Weight Loss

Obesity 2017

November 6-8, 2017

Barcelona, Spain

### 19th China (Beijing) International Nutrition & Health Industry Expo 2017

December 27-29, 2017

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# ARE FOOD CONSUMPTION PATTERNS AMONG HOUSEHOLDS IN MUMBAI PUTTING THEM AT RISK?



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Kasturba Health Society.



In 2016, PFNDAI conducted a survey on 2977 households in Mumbai city and suburbs, to assess the consumption patterns for raw and processed foods among 794 families from low socioeconomic status (SES), 1238 families from middle and 945 from high SES families. The survey was conducted in collaboration with Dr. B.M. Nanavati College of Home Science, Dept. of Food Science and Nutrition, SNDT Women's University and Nirmala Niketan, College of Home Science.

Information was recorded for the household by interviewing the

housewives. Purchase was recorded in terms of how often a food is purchased. The amount purchased at a single time was recorded and with this information the amount purchased per month was calculated. Then intake per consumption unit was calculated as per the methodology in the NNMB and NSSO surveys.

A total of 183 foods under the following categories was studied: dairy products, fats and oils including fresh and dry coconut, coconut milk and powder, vegetables and vegetable products, fruits and fruit products, confectionery, cereals, cereal products and millets, pulses and legumes, mithai made from cereals and/or pulses, bakery products, meat and meat products, egg and fish, sweeteners and desserts including chikki, laddoo and gudchana, seasonings and sauces,

foods intended for special purposes such as health foods, dietary supplements, beverages, snacks and savouries, deep fried snacks, steamed/frozen/baked snacks, prepared composite foods/dishes e.g. pav bhaji, nuts and oilseeds, dry fruits and salt / salt substitutes.

Cereals and cereal products: Mean consumption of rice was 2.27 kg per consumption unit (CU) per month and its products i.e. rice flakes, puffed rice and rice flour combined was 1.47 kg per CU/month. Consumption of wheat was 3.39 kg/Cu/mo and its products like rava/lapsi, vermicelli etc was 517g/CU/mo. Almost all families (93.4%) consumed bread either sliced and branded or pav and the mean monthly consumption per CU was 548g. Millet consumption was relatively low (533g/CU/mo).

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## NUTRELA SOYA NOODLES

### Ingredients

- 400 gm . . . . . noodles
- 1 cup . . . . . **Nutrela Soya Mini Chunks** (soaked, boiled and squeezed dry)
- 2 medium . . . . . spring onions (sliced)
- 3 tbsp . . . . . oil
- 1 medium . . . . . carrot (shredded)
- ¼ tbsp . . . . . white pepper powder
- ½ . . . . . medium red capsicum (shredded)
- ½ . . . . . medium green capsicum (shredded)
- 1 tbsp. . . . . soya sauce
- Salt to taste



### Method

- Heat 7 cups of water in a deep non-stick pan. Add salt and place a colander in it. Put noodles in the colander and boil.
- Chop the green part of spring onions to garnish at the end.
- When noodles are done, lift the colander with the noodles and put into another pan with cold water.
- Heat 2 tbsp of **Nutrela Refined Soyabean Oil** in a non-stick wok. Add spring onion (white part), carrot and capsicums and toss.
- Remove noodles and add to the vegetables. Mix well. Add **Nutrela Soya Mini Chunks**. Cook on medium flame for a few minutes.
- Add 1 tbsp **Nutrela Refined Soyabean Oil**, salt, and soya sauce. Toss on high heat.
- Garnish with chopped spring onion green. Serve hot.

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**Pulses and legumes:** Mean consumption of pulses and legumes was 1.29 kg/CU/mo in low SES families and was slightly higher in the middle (1.49kg/CU/mo) and the high (1.56 kg/CU/mo) in the high SES families. Mean monthly consumption of pulses was found to be approximately 1.5 kg more as compared to the previous PFNDAI survey in 2011 when mean pulse consumption was 3.68 kg, compared to 5.1 kg observed in the present survey.

**Milk:** Almost all families (99.2%) purchased milk, with little difference between the three socioeconomic groups. Mean monthly consumption of milk per CU varied from 7.14L in the low SES to 12.32 L in the high SES. The mean family consumption (ml/month) in the HSES was almost two times the mean consumption in the LSES.

**Vegetables:** Consumption of leafy vegetables among the households was less than half the amount recommended by the National Institute of Nutrition. Mean consumption for the different vegetables was : Leafy vegetables- 648g/CU/month, potato- 1.26kg/CU/mo, onion-1.6 kg/CU/mo, tomato – 1.2 kg/CU/mo, other vegetables – 1.3 kg/CU/mo. Consumption of other vegetables should be approximately

200g per day, whereas the mean intakes (excluding onion) in the present study are less than half of the recommended intake. Even if onion intake is included vegetable intakes are below the recommended 200g, even among HSES families.

**Fruits:** Not all families purchased fruits. The percentage varied from 93.3% families purchasing banana, to 78.1% purchasing citrus fruits, 74.2% purchased mango and 84.9% who purchased other fruits. Banana was the most popular fruit, with not much difference between the three SES categories. Mean number of times in a month that the fruits were purchased was: Banana-  $8.1 \pm 9.2$ , citrus fruits -  $4.2 \pm 4.7$ , mango -  $3.7 \pm 4.0$  and other fruits-  $4.2 \pm 4.6$ . Comparison with the previous PFNDAI survey in 2011, fruit intakes appear to have drastically decreased. In 2011, mean fruit intake per family on a monthly basis

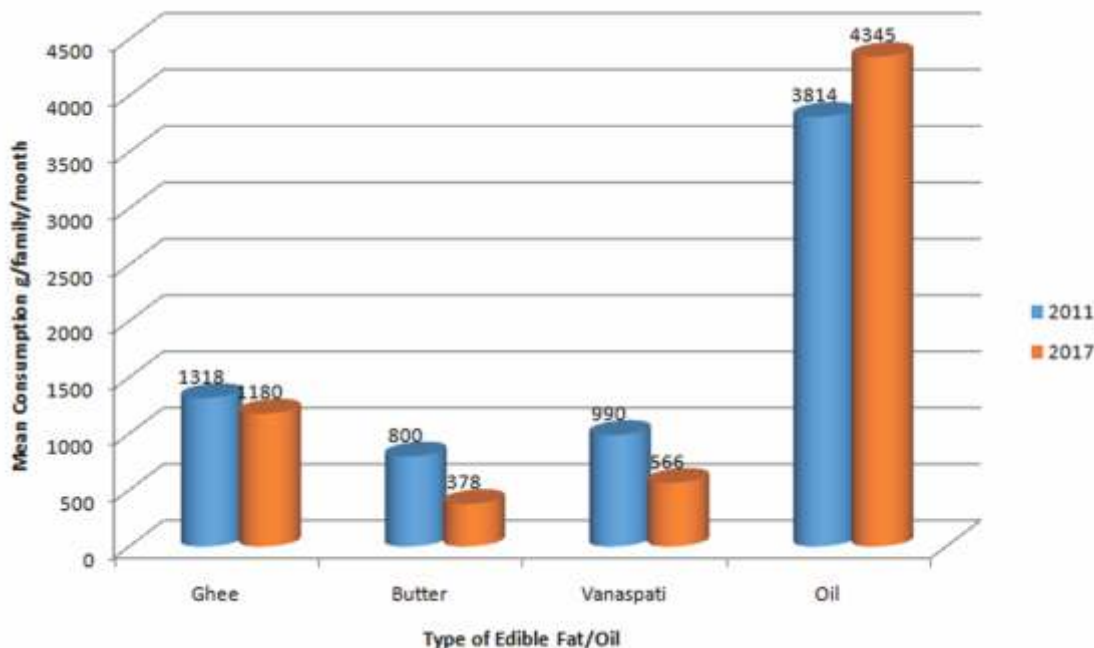
was 11.8kg which is almost four times more as compared to the present consumption figures.

**Non-vegetarian foods:** Percentage of families consuming non-vegetarian foods was 27.5% for mutton/beef/pork (fresh/frozen), 41.3% for chicken (fresh/frozen), 39.5% for fish and 40.6% for eggs. Only 4.6% consumed shellfish and 5.5% consumed dried fish. Egg consumption was found to be 1.6 per month per family in the 2011 PFNDAI survey. The present survey egg consumption has increased by approximately 700g. In 2011, mean consumption per family per month was 4.09kg (fish, shellfish and dried fish combined) whereas in the present survey it was approximately 3.6 kg.

**Oils and Fats:** The most popular oil was safflower/sunflower oil, followed by groundnut oil and rice bran oil. Blended oils were purchased by very few families. A higher percentage of MSES families purchased safflower/sunflower oil whereas about one-fifth of LSES families purchased mustard oil, which was purchased by very few MSES and HSES families. Similarly, a little less than one-fifth of the LSES families purchased gingelly oil compared to approximately 2 percent of MSES and HSES families.



Image © iStock.com/highviews



**Figure 1: Comparison of Mean Monthly Intakes of Edible Oil and Fats between 2011 and 2017**

Groundnut oil was purchased by about one-fourth of LSES families compared to a little less than one-fifth of MSES families and one-sixth of HSES families. Palm oil was purchased by little less than one-sixth of LSES families but was not favoured by the MSES and HSES families surveyed. A little less than one-tenth of HSES families used olive oil/canola. Rice bran oil was purchased by about one-third of the HSES families and one-sixth of the MSES families compared to only 3.5% of the LSES families.

Butter was consumed by majority of the families (81.4%). This is

higher than the percent families (67.4%) who consumed butter in the 2011 survey conducted by PFNDAI. Even among the LSES group 65.1% of the families consumed butter and the percentage was much higher among the MSES group (85.3%) and the HSES families (89.9%).

Mean consumption of ghee, butter, vanaspati and oil in 2011 is compared with consumption figures in the present survey (Figure 1). The amount of ghee, butter and vanaspati, particularly butter and vanaspati has decreased whereas that of oil has increased. The difference between the

two surveys in consumption of ghee is 138g, for butter - 422g, vanaspati 424g and edible oil-531g. Consumption per CU per day was 54.7g for all three SES combined (LSES- 48.2g/CU/day, MSES families - 58.7g/CU/day) and 55.2g/CU/day.

Snacks: A variety of snack foods are available in the market such as biscuits, cakes, nankhatai, muffins, pastries, puffs etc chocolates, savoury

foods like samosas, wadas, pakodas and bhajias and shelf stable items like sev, farsan, chips/wafers. The percentage of families consuming such foods is given in Table 1.

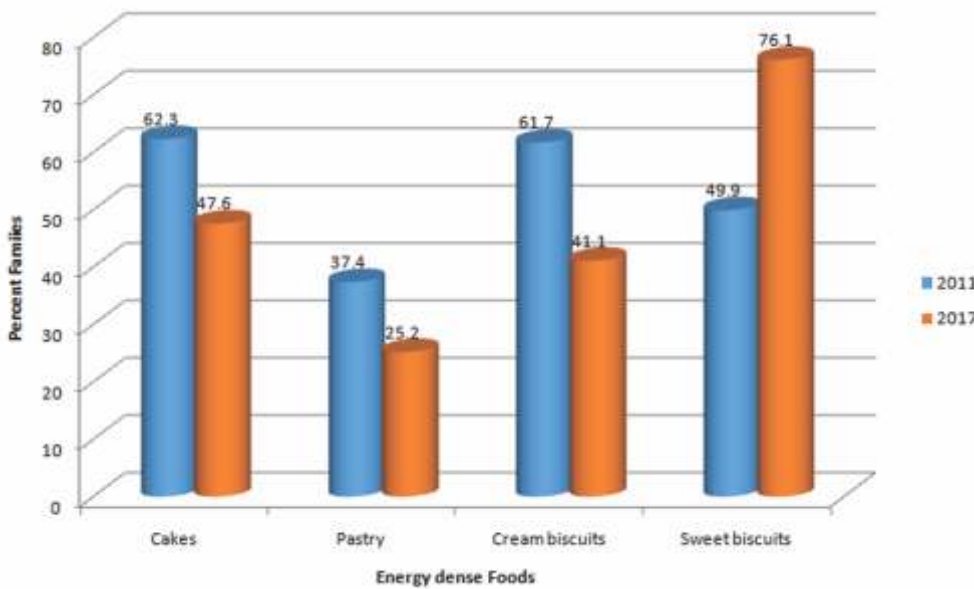
Mean consumption of sev/farsan and samosa per family was about one kilogram per month. Consumption by LSES families for almost all fried snacks tended to be higher than mean consumption by MSES and HSES families.

Extruded/puffed snacks were purchased by approximately 90 percent of LSES and MSES families and 80 % of HSES families from local vendors/grocery stores. These items were reported not to be consumed by adults in a substantial percentage of families (LSES - 62.6%, MSES -45.7%, HSES -32.6% and preschool children (LSES -12.6%, MSES -23.9%, HSES -25%). Less than two percent of families reported that children of other ages did not consume these foods suggesting that they are popular among children of school age and possibly adolescents.

**Table 1: Percent Families Consuming Various Snacks by Socioeconomic Status**

Snack	LSES	MSES	HSES	All SES
Sev-Farsan	74.7	76.3	79.8	77.0
Samosa	70.3	60.6	58.4	62.5
Fried Chivdas	11.8	13.1	15.8	13.6
Sabudanawada	4.2	7.1	7.5	6.4
Kachori	12.6	16.1	17.7	15.7
Batatawada	61.3	43.1	43.8	48.2
French fries	3.1	13.9	18.8	12.6
Potato wafers	52.4	57.0	60.5	56.9
Chaklis	17.8	20.7	24.8	21.2
Pakodas/Bhajias	11.1	12.4	12.0	11.2
Chicken lollipops	4.3	9.9	12.0	9.1
Doughnuts	1.6	9.8	17.6	10.1

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**Figure 2: Percentage of Families Consuming Selected Energy-Dense Foods in 2011 and 2017.**

Baked goods have become increasingly popular and availability of cakes and pastries, puffs across the city has increased in recent times. Khari biscuit is one of the popular items, with 54.2% of the families consuming these items. Butter biscuit was also consumed but by approximately one-third of the families. Cakes are consumed by 47.6% of the families, although the percentage of LSES families was only one-third (33.6%) compared to 48.2% of MSES and 58.4% of HSES families. Compared to 2011, the percentage of families consuming these items was less, but the percentage consuming sweet biscuits has markedly increased (Figure 2).

Biscuits are a very popular item. Overall, 89.8% families consumed biscuits, with the percentage of HSES being slightly higher (91.1%) compared to 88.0% of the LSES families and, 89.9% of MSES families. Total mean daily consumption of biscuits is about 14 g/day with mean consumption among HSES families being slightly lower (approximately 2-3 g) as compared to MSES and LSES families. Sweet biscuits appeared to be more popular than are salty biscuits since overall

percent families consuming sweet biscuits was 76.1% compared to a much lower percentage (57.8%) consuming salty biscuits. Similarly, cream biscuits are also popular, with overall 41.4% families consuming cream biscuits.

**Sugar:** Total sugar intake comprises discretionary sugars i.e. refined sugars that are added at the table (almost exclusively sucrose, but in the Indian context also includes jaggery), and added refined sugars that are added to food and drinks in commercial food preparation. Since jaggery is a popular sweetener used in India, intake of jaggery and honey was also recorded (Table 2).

The World Health Organization (2015) recommends that adults and children restrict their sugar intake to less than 10% of total energy intake per day, which is equivalent to approximately 12 teaspoons of sugar (assuming 1 teaspoon is 5g of sugar) for adults. The WHO has also suggested a further reduction to below 5% of total energy intake per day. In the present study, sugar consumption is most probably much higher than the recommendations, since sugar intake refers to sugar from all sources i.e. (i) naturally found in foods like milk and milk products, fruits (ii) sugar added to foods and drinks during processing and preparation.

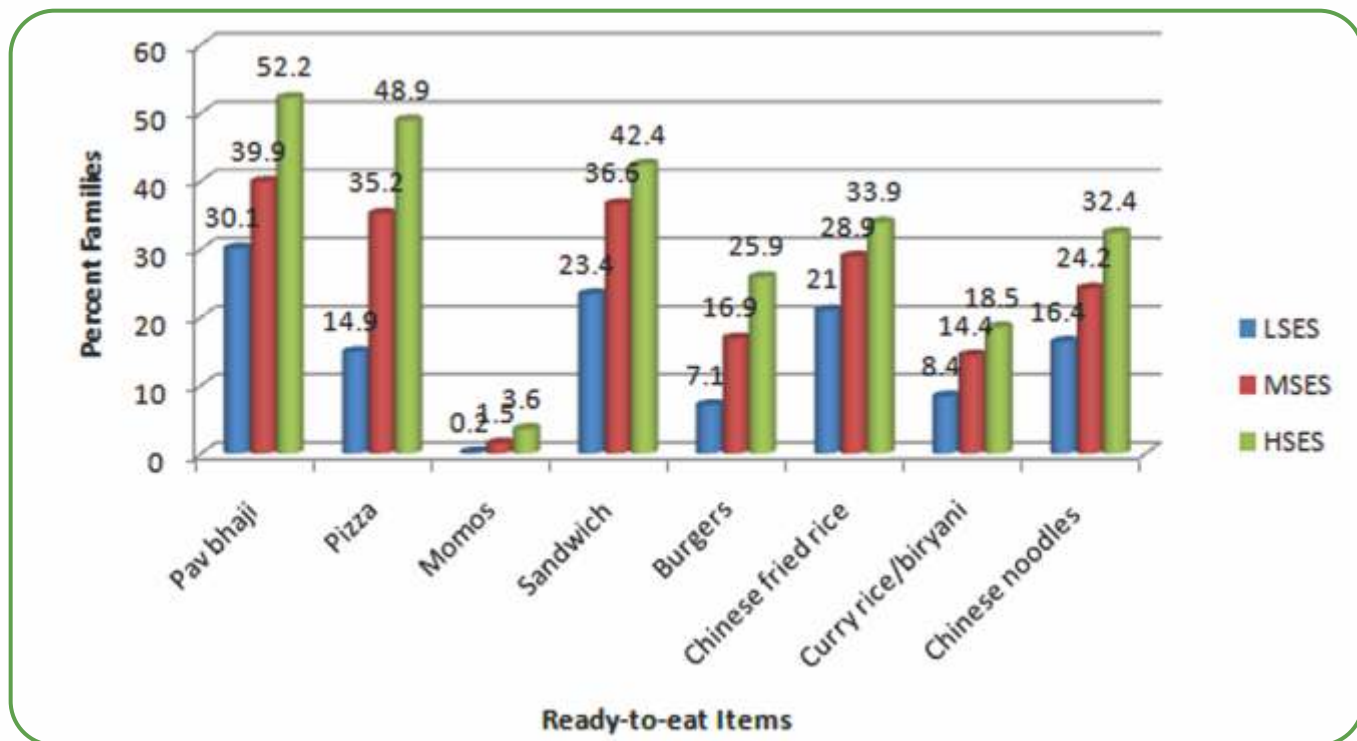
**Salt:** The World Health Organization recommends an intake of no more than 5 grams of salt per day. High salt intakes are linked to hypertension and its consequences such as coronary artery disease and stroke, renal disease. In India, salt and 'black salt /kalanamak' are used routinely in food preparation. Salt intake is of concern, given the increase in hypertension among urban Indian population. The 66th NSSO survey report indicated that per capita salt consumption was 8.9g per day. However, this does not include intake of salt from commercial ready-to-eat foods and processed foods, some of which are likely to have a fairly high sodium and salt content.

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**Table 2: Consumption of Sugar, Jaggery and Sugar + Jaggery per Consumption Unit per Day.**

SES Group	Sugar	Jaggery	Total (Sugar + Jaggery)
LSES	31.9±19.4	5.6±6.9	35.6±21.8
MSES	34.5±25.3	7.9±9.7	40.5±28.0
HSES	33.3±30.9	8.1±8.2	39.8±32.8
All SES	33.4±25.9	7.4±8.7	38.9±28.3



Guidelines given by the National Institute of Nutrition recommend that salt intakes should be about 6 g per day. Mean daily consumption was  $10.7 \pm 7.1$ g/CU/day among LSES families,  $11.5 \pm 8.2$ g/CU/day among MSES families and  $12.0 \pm 9.7$ g/CU/day in the HSES category. This indicates that salt intakes in Mumbai are quite high and much above the guideline of 6 g/day.

**Ready - to - eat foods/Composite dishes:** Urban lifestyles are such that ready – to - eat foods especially meals or

preparations that can replace a meal, make it convenient to have a meal given the time constraints caused by travel and work hours. The percentage of families purchasing the various items is shown in Figure 3.

In conclusion this survey indicates that diet quality of families in Mumbai city needs to be improved, as intakes of vegetables and fruits were less whereas that of salt, sugar and fat per se as well as foods that provide these were more than what the guidelines of expert groups recommend. Further, it was

observed 21.3% families had one member with diabetes mellitus and another 4 % had 2 or more members. Similarly, 21.7% had one member with cardiovascular disease and another 6.6% had 2 or more members with this health problem.

Given the rising prevalence of non-communicable diseases in India, these data highlight the need for concerted efforts to be made to educate the community about healthy eating habits and the ills of overconsumption of convenience foods.



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# REGULATORY ROUND UP



By  
**Dr. N. Ramasubramanian,**  
VR Food Tech Private Limited  
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Food regulations published during August are summarized below.

## Standards

Here is an interesting regulatory introduction in milk and milk products sector. [An order issued by FSSAI operationalizes the draft regulation on milk and milk products, published on 6th December 2016.](#) This regulation makes a major change in the existing milk and milk product standards. As the new regulation is operationalized, it can be adopted. The existing regulation can also be followed. The new regulation brings in new definitions, has enabling amendments in ice cream standards, recognizes dairy whitener, flavoured milk and many other products as a standard product.

[A draft regulation on MRL of pesticides](#) in agricultural commodities, edible oil, milk and products, meat and meat products, etc. This regulation replaces the existing standards described under 2.3.1 of Food Safety and Standards (Contaminants, Toxins and Residues) Regulations, 2011. It lists 219 pesticides as against 149 in the present regulation. Meat and meat products is a new introduction. As

there are new entries, one needs to prepare for future compliance.

[A draft amendment to Food Safety and Standards \(Food Products Standards and Food Additives\) Regulations, 2011](#) relating to standard for chilled and frozen meat including pork and its products, beef, mutton, poultry. The draft also specifies requirements for egg and egg products, fish and fish products.

The same regulation extends the scope of proprietary food. Presently proprietary foods can contain ingredients standardized in the regulations or permitted in any standard food. In addition, it is now proposed to permit those food/ingredients mentioned in the Indian Food Composition Tables (IFCT), 2017, National Institute of Nutrition. One more addition to your regulatory library.

[An amendment is proposed to include more additives in different food categories.](#) It is a great time for food product developers.

[A draft regulation defining “Spring water” and its standards is published.](#)

[Standard of identity for Colostrum and its products have been proposed](#)

[in a draft regulation.](#) The standard includes minimum level of immunoglobulin and lactoferrin in colostrum and its products. No additives are permitted in colostrum.

General Principles of Food Hygiene (CAC/RCP 1-1969) and its HACCP Annex is up for a revision. [The document with proposed amendments is available in FSSAI website.](#) The amendments will be discussed in the forthcoming Codex meeting in USA in November, 2017. It is an excellent checklist for those who wish to implement GMP and HACCP in their food operation.

[Final notification](#) on table olive oils, vanilla, coconut cream, coconut milk, cocoa beans. The regulation also defines “seasoning” in terms of permitted ingredients and additives.

[Final Gazette notification](#) relating to use of additives, enzymes and processing aids in alcoholic beverages including alcohol-free and low alcohol products.

[Final notification](#) fixing the upper limits for hydrocyanic acid, a naturally occurring toxicant, in sago, cassava flour, tapioca flour and their products.





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# RESEARCH IN HEALTH & NUTRITION

## Morning people may make healthier food choices

IFT Weekly March 1, 2017

A study published in *Obesity*, the scientific journal of The Obesity Society, suggests that a person's internal clock may impact what he/she eats and overall health. By comparing "morning type" people with "evening type" people, researchers found that morning people ate more balanced foods overall and ate earlier in the day.

Researchers looked at data from nearly 2,000 randomly chosen people to determine if their circadian or biological clock rhythm (chronotype) affected what they ate and at what time. Clear differences in both energy and macronutrients between the two chronotypes abound, with morning people making healthier choices throughout the day. Evening types ate less protein overall and ate more sucrose, a type of sugar, in the morning. In the evening, they ate more sucrose, fat and saturated fatty acids. On weekends, the differences between the morning and evening type people was even more pronounced, with evening types having more irregular meal times and twice as many eating occasions. The evening types also slept worse and were less physically active overall.

"Linking what and when people eat to their biological clock type provides a fresh perspective on why certain people are more likely to make

unhealthy food decisions," said Mirkka Maukonen, who led the study out of the National Institute for Health and Welfare at the Dept. of Public Health Solutions in Helsinki, Finland, using data from the national FINRISK 2007 study. "This study shows that evening type people have less favourable eating habits, which may put them at a higher risk for obesity, diabetes, and heart disease."

The researchers concluded that for people working to lose weight, this new research may provide a compelling window into why they choose to make certain food choices throughout the day.

## Dementia risk reduced by eating 'five-a-day's

Medical News Today 24 February 2017 by Honor Whiteman

Dementia is estimated to affect around 47.5 million people worldwide, and this number is expected to more than triple by 2050. But according to new research, there is one simple thing older adults can do to help reduce their risk of dementia: eat their "five-a-day."

Researchers say eating five portions of fruits and vegetables

daily could reduce older adults' dementia risk. In a study published in the journal *Age and Ageing*, researchers found that eating at least three portions of vegetables and two servings of fruits daily was associated with lower risk of dementia in older adults.

The World Health Organization (WHO) recommend that adults should consume at least 400 grams of fruits and vegetables daily - the equivalent to around five servings - in order to improve overall health and lower the risk of chronic diseases, such as heart disease and cancer. Previous research has indicated that fruit and vegetable intake may also reduce the risk of Alzheimer's disease and other dementias, but the precise amounts that should be consumed to pose such benefits have been unclear.

For this latest study, co-author Linda Lam - of the Department of Psychiatry at the Chinese University of Hong Kong - and colleagues set out to investigate whether adhering to the five-a-day recommendation is associated with reduced dementia risk.



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Lower dementia risk for adults who ate at least five-a-day

The researchers came to their findings by analyzing the health and diet of 17,700 older Chinese adults. All adults were free of dementia at study baseline. The researchers followed the participants for an average of 6 years to see whether they developed the condition, and whether dementia development might be associated with fruit and vegetable intake.

Compared with adults who did not adhere to WHO recommendations for fruit and vegetable intake, adults who consumed three servings of vegetables and two servings of fruits daily were found to be at lower risk of dementia development over 6 years.

Dementia risk was further reduced for adults who consumed an additional three portions of vegetables each day, the team reports. The results remained after accounting for a number of confounding factors, including age, smoking status, and the presence of other chronic diseases.

Findings highlight importance of fruit and veg intake for older adults. The study was not designed to pinpoint the reasons why fruits and vegetables might lower dementia risk, but the researchers speak of one hypothesis. They explain that oxidative stress - an imbalance between free radical production and the body's ability to counteract the toxic effects - and inflammation is believed to play a role in dementia. Fruits and vegetables contain vitamin B, vitamin E, and other nutrients with antioxidant and anti-inflammatory properties that could help prevent such processes.

Further research is needed to explore precisely how fruits and vegetables might lower dementia risk, but this current study sheds light on how much we need to consume to reap the rewards.

"The findings of our study not only highlight the importance of consuming both fruits and vegetables in dementia prevention among older people, but also provide some insight into the daily amount of fruits and vegetables required for cognitive maintenance. As a public health promotion strategy, the need for a balanced diet on cognitive health should be duly emphasized in the older population." Linda Lam

### Unlocking the heart-protective benefits of soy Medical News Today 24 February 2017

**A product of digesting a micronutrient found in soy may hold the key to why some people seem to derive a heart-protective benefit from eating soy foods, while others do not, a University of Pittsburgh Graduate School of Public Health-led study discovered.**

Japanese men who are able to produce equol - a substance made by some types of "good" gut bacteria when they metabolize isoflavones (micronutrients found in dietary soy) - have lower levels of a risk factor for heart disease than their counterparts who cannot produce it, according to the research published in the British Journal of Nutrition.

"Scientists have known for some time that isoflavones protect against the buildup of plaque in arteries, known as atherosclerosis, in monkeys, and are associated with lower rates of heart disease in people in Asian countries," said senior author Akira Sekikawa, M.D., Ph.D., an associate professor of epidemiology at Pitt Public Health. "We were surprised when a large trial of

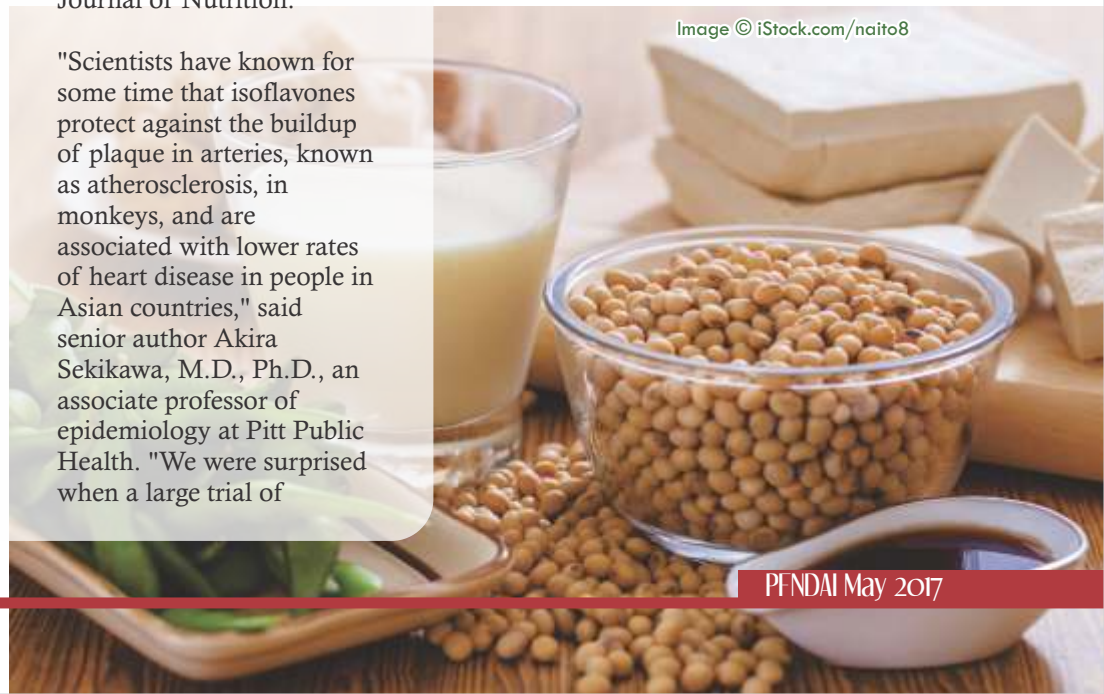
isoflavones in the U.S. didn't show the beneficial effects among people with atherosclerosis in Western countries. Now, we think we know why."

All monkeys can produce equol, as can 50 to 60 percent of people in Asian countries. However, only 20 to 30 percent of people in Western countries can.

Sekikawa and his colleagues, who include scientists in Japan, recruited 272 Japanese men aged 40 to 49 and performed blood tests to find out if they were producing equol. After adjusting for other heart disease risk factors such as high blood pressure, cholesterol, smoking and obesity, the team found that the equol-producers had 90-percent lower odds of coronary artery calcification, a predictor of heart disease, than the equol non-producers.

The daily intake of dietary isoflavones - found in traditional soy foods such as tofu, miso and soymilk - is 25 to 50 milligrams in China and Japan, while it is less than 2 milligrams in Western countries. Equol is available as a supplement - bypassing the need for gut bacteria to produce it - though no clinical trials have been performed to determine a safe dosage for heart protective effects, or if it even does provide such protection.

Image © iStock.com/naito8



"I do not recommend that people start taking equol to improve their heart health or for any other reason unless advised by their doctor," said Sekikawa. "Much more study is needed."

Sekikawa and his team are pursuing funding for a much larger observational study to expand on their findings and eventually a randomized clinical trial to examine the effect of taking equol on various medical conditions and diseases.

"Our discovery about equol may have applications far beyond heart disease," said Sekikawa. "We know that isoflavones may be associated with protecting against many other medical conditions, including osteoporosis, dementia, menopausal hot flashes, and prostate and breast cancers. Equol may have an even stronger effect on these diseases."

### Red wine compound found to slow down neural aging in mice

Medical News Today 7 March 2017 By Ana Sandoiu

New research suggests that a compound commonly found in red wine and some fruits may protect our neurons against the unwanted effects of aging. In fact, the study suggests that the benefits may be equivalent to those of dieting and exercising. A new study shows that resveratrol - a compound found in red wine and the skin of red grapes - may have neuroprotective benefits in mice.

Resveratrol is a polyphenolic compound that can be found naturally in peanuts, the skin of red grapes, red wine, and in some berries. Polyphenols are a type of phytochemical, which are believed to have antioxidant properties - namely, that they can fight the

damaging effect of free radicals and protect the "youth" of our cells.

Some studies have suggested that resveratrol may help to prevent against cancer, heart disease, and various neurodegenerative illnesses. New research strengthens the belief that the compound may protect the health of our neurons, as a mouse study shows that resveratrol and metformin (a drug commonly used to fight type 2 diabetes) may both protect our neural connections from the adverse effects of aging.

The new study - spearheaded by researchers from the Virginia Tech Carilion Research Institute in Roanoke, VA - was published in the *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*. The research team was led by Gregorio Valdez, assistant professor at the Virginia Tech Carilion Research Institute.

### Resveratrol has neuro-protective benefits in mice

Our neurons communicate with each other through synapses - the space between brain cells that allows chemical signals to be exchanged. On average, a neuron forms around 1,000 synaptic connections with other neurons. Some of these synapses are crucial for voluntary movement, and these are called neuromuscular junctions. These synapses pass on the "order" to move from our spinal cord neurons to the muscles. As we age, our neuromuscular junctions tend to degenerate. In their previous research, Valdez and team showed that a healthful diet combined with regular exercise can help to protect neuromuscular junctions from age-related damage. In this new study, the team investigated mice that were 2 years old. This is typically considered "old" for mice, given

that their average lifespan is around 24 months.

They treated the mice with resveratrol for 1 year, and noticed that the compound had the same beneficial effects as a good diet and exercise.

Additionally, the researchers looked at the effect of metformin, and saw that while the drug slowed down the rate of muscle fibre aging, it did little to affect the aging of neuromuscular junctions. Valdez notes, however, that the drug may be able to protect the synapses if administered in a different dosage. "Metformin is an FDA-approved drug to treat diabetes, but our study hints it may also serve the purpose of slowing the motor dysfunction that occurs with aging," Valdez explains.

### Significance of the findings

Regarding the benefits of metformin, Valdez says that his study might signal "an opportunity for researchers and medical doctors to look at the patient population using this drug and ask whether [it] also has a positive effect on motor and cognitive function in humans." As for the benefits of resveratrol, the lead author cautions against drinking large amounts of red wine to obtain the same neuro-protective effects as the ones seen in mice.

"In wine, resveratrol is in such small amounts you could not drink enough of it in your life to have the benefits we found in mice given resveratrol. These studies are in mice and I would caution anyone from blasting their bodies with resveratrol in any form."

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Future research, Valdez suggests, should look at the exact mechanism behind the neuro-protective effects of resveratrol. "If we know the mechanism," Valdez says, "we can modify resveratrol or look for other molecules that are more effective at protecting the synapses."

Overall, the findings contribute to the larger aim of slowing down aging and its negative effects. "Gait, balance issues, and impaired motor coordination contribute to health problems, accidents, lack of mobility, and a lower quality of life," Valdez adds. "We work on identifying molecular changes that slow down motor deficits that occur with aging. I believe that we are getting closer to tapping into mechanisms to slow age-induced degeneration of neuronal circuits."

### Soy may improve survival rates in some breast cancer patients

Published Monday 6 March 2017 By Ana Sandoiu

Some studies have linked the consumption of soy products with breast cancer. The findings have been mixed, but new research aims to settle the controversy. Soy is found to be safe and potentially even beneficial for women with a certain type of breast cancer. New research shows that soy food consumption may lead to prolonged survival in some women with breast cancer.

Breast cancer is one of the most common forms of cancer in women, affecting approximately 220,000 women in the United States every year. The disease can also affect men, with 2,000 male patients being diagnosed yearly with breast cancer in the U.S. Risk factors for breast cancer include having a family history of breast cancer, being overweight, having a late menopause, or never giving

birth.

Previous research has suggested that the consumption of soy products may increase the risk of developing breast cancer. One study showed that adding a medium amount of soy to one's food may activate genes that make cancer grow and spread.

A possible explanation for the results has been that soy contains a lot of isoflavones, which are plant-based compounds that resemble estrogen. Estrogen has been shown by some studies to help cancer cells multiply and spread - especially in hormone receptor-positive cancer, which is the most common form of the disease. Researchers have therefore been worried about the adverse health effect of soy on breast cancer patients. However, a new study may now settle the controversy, as researchers from Tufts University in Massachusetts investigate the link between a dietary intake of isoflavones and breast cancer mortality.

Examining the link between soy intake and breast cancer mortality risk

The new findings were published in the journal of the American Cancer Society, Cancer. The lead author of the study, Dr. Fang Fang Zhang, of the Friedman School of Nutrition

Science and Policy at Tufts University, explains the motivation behind the research:

"Isoflavones - the component of soy that has estrogen-like properties - have been shown to slow the growth of breast cancer cells in laboratory studies, and epidemiological analyses in East Asian women with breast cancer found links between higher isoflavone intake and reduced mortality," Dr. Zhang says. "However, other research has suggested that the estrogen-like effects of isoflavones may reduce the effectiveness of hormone therapies used to treat breast cancer. Because of this disparity, it remains unknown whether isoflavone consumption should be encouraged or avoided for breast cancer patients," Dr. Zhang explains. Therefore, Dr. Zhang and her team set out to examine isoflavone intake in 6,235 women diagnosed with breast cancer from the U.S. and Canada. The women were followed over a median period of 9 years, and the study examined the isoflavones that occur naturally in foods, not supplementary isoflavones.

High amount of soy consumption linked to 21 percent mortality drop  
Overall, researchers found dietary soy intake to be safe, and noticed a correlation between high soy consumption and a decrease in the mortality risk for some breast cancer patients. During the follow-up period, women with breast cancer who consumed isoflavones in large amounts were 21 percent less likely to die than their counterparts who consumed small amounts.

This drop in the mortality risk was noticed only in women who had hormone receptor-negative cancer and women who had not been taking anti-estrogen therapy such as tamoxifen. However, high amounts of isoflavone did not associate with higher mortality in women who did receive hormonal therapy.



"Based on our results, we do not see a detrimental effect of soy food intake among women who were treated with endocrine therapy. For women with hormone receptor-negative breast cancer, soy food products may potentially have a protective effect. Women who did not receive endocrine therapy as a treatment for their breast cancer had a weaker, but still statistically significant, association." Dr. Fang Fang Zhang, lead author

The study's senior author, Esther John, Ph.D., of the Cancer Prevention Institute of California, also weighs in on the findings. Referring to receptor-negative breast cancer - which makes up 20 percent of all recently diagnosed cases of cancer - she says that "whether lifestyle factors can improve survival after diagnosis is an important question for women diagnosed with this more aggressive type of breast cancer."

"Our findings suggest that survival may be better in patients with a higher consumption of isoflavones," Dr. John adds. The study was observational, and the mechanism by which soy consumption may improve survival rates is not yet known. However, isoflavones have been shown to have antioxidant and anti-inflammatory properties, which might affect the growth and survival of breast cancer tumors.

### The Link between Nutrition and Cognitive Health

Nutrition Insight 06 Feb 2017

The link between the types of foods we eat and our cognitive performance is becoming ever stronger. Increasing evidence suggests that good nutrition is essential for optimal brain performance, as well as overall mental health, and that many mental health conditions could be directly influenced by a poor diet. Today, NutritionInsight looks

**into the role food and nutrition can play in preventing cognitive decline, as well as enhancing the brain performance of consumers on all walks of life.**

#### Nutrition & Cognitive Health: The Studies

Several studies have looked into the relationship between nutrition and brain performance, with most finding a definitive link between the two. Previous studies also have even linked a higher BMI, the index of body fat based on height and weight, to lower cognitive functioning. An example of such includes a recent study from researchers at the University of Arizona, who found that a BMI could negatively impact the cognitive functioning in older adults due to the extra inflammation in the body.

Studies looking into how fatty western diets affect cognitive behaviour have seen similar trends. An additional recent study looked at children who eat excessive amounts of fatty foods, and found that as well as being at risk of obesity, they could also develop cognitive and psychiatric problems when they are older. The researchers claimed that the high fat diet could lead to a dip in several forms of cognitive functions, such as behavioural flexibility and memory.

The types of oils and fats eaten by consumers have even been linked to cognitive health. A recent report has shown how eating vegetable oils could lead to fatigue, migraines and dementia. And on the flipside, further studies have shown how a 'healthy diet' can have a beneficial impact on mental capabilities.

The widely praised "Mediterranean diet" has been associated with cognitive health, and a recent study conducted by the Alzheimer's Association suggesting that consuming the diet may be the key to maintaining good brain health

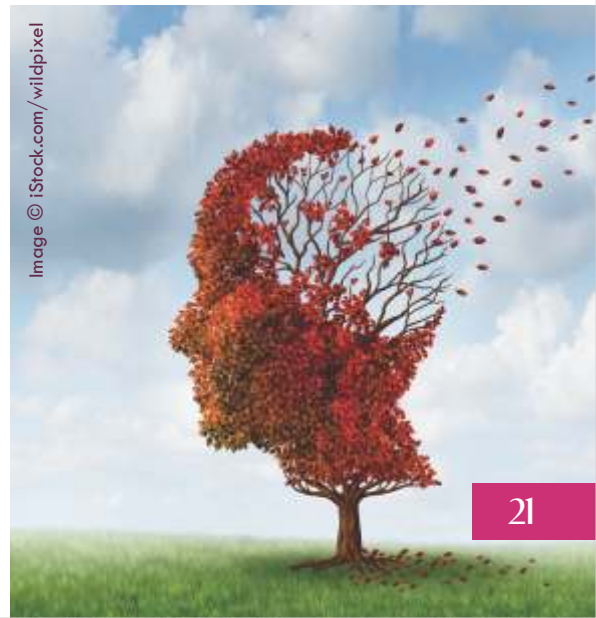
into old age. So with good nutrition a proven key to maintaining cognitive health, the nutrition industry has been left with a golden opportunity to develop and innovate new products aimed to enhance the brains of consumers.

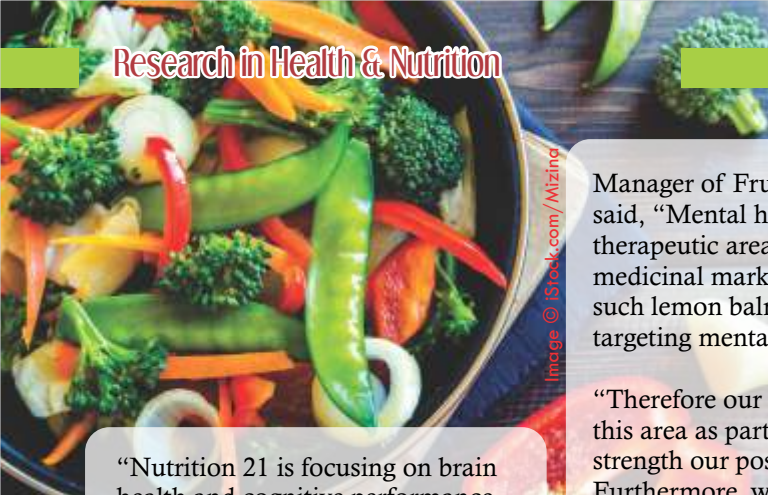
Supplementing for Brain Health 2016 was a strong year for the supplement sector, with cognitive supplements products, in particular, continuing to perform strongly in the overall market. And 2017 looks set to keep the trend growing. Several nutrition companies have already made long strides to ensure they're hot on heels of the cognitive nutrition trend.

Nutrition 21 is an example of such a company, and with their new product Nitrosigine, (bonded arginine silicate) they have ambitions to link the thriving fitness industry with the cognitive health trend.

Speaking with NutritionInsight, James Komorowski, Vice President, Scientific & Regulatory Affairs at Nutrition 21, explained the importance of nutrition and the brain, and who the Nitrosigine audience is. "Good nutrition is key to proper brain health and function," Komorowski begins. "The brain uses a lot of energy to continuously function at a very high energy level and therefore needs continuous access to key nutrients. This is important not only for today, but also important in years to come."

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“Nutrition 21 is focusing on brain health and cognitive performance because these areas affect so many different categories of consumer interest, from learning, to mood, to sports performance.” He continues, “When we discovered that Nitrosigine had a significant effect on cognitive function, we quickly found out how these positive effects can also be applied to many other areas of both mental and physical performance.”

James Kahn, Executive Director of Sales at Nutrition 21, added, “Nitrosigine is targeting consumers interested in cognitive health, including students, athletes, and older populations, by providing a non-stimulant, jitter-free ingredient, which provides a significant improvement in processing speed and executive function.”

### Plant Supplements for Cognitive Health

Much of the cognitive supplement industry is based around plant products, providing a huge opportunity for the companies already invested in the area. And the trend between plant products and cognitive health is a growing one. In 2016, 4.5% more botanical and herbal supplements claiming to promote cognitive health were launched than in 2015.

Frutarom Health BU is an example of a company planning to strengthen its focus on its phyto-pharmaceutical business in 2017, with mental health, (such as stress, mood, fatigue, restlessness, cognition) being a key target area for them.

Speaking with NutritionInsight, Maider Gutierrez, Marketing

Manager of Frutarom Health BU, said, “Mental health is a key therapeutic area within the herbal medicinal market with ingredients such as lemon balm and passion flower targeting mental stress and sleep.”

“Therefore our interest is to cover this area as part of efforts to strength our position in this market. Furthermore, we see an increasing demand for natural solutions to enhance cognitive performance. It is becoming extremely important to maintain an optimum cognitive function, especially in stressful situations, which have become a normal part of our society.”

“More and more people perceive increasing levels of stress, which, on the long run, could lead to health issues. Traditional plants can be a safe and natural solution to support an optimum cognitive function and their popularity will grow as the demand for natural products do.”

### Natural Foods & Cognitive Benefits

Along with the supplement sector, natural food suppliers have also started to hone in on the cognitive benefits of their products. Dariela Roffe-Rackind, Director for Europe for the Almond Board of California and Richard Waycott, President & CEO, recently spoke to NutritionInsight about how cognitive benefits is something else the almond can offer consumers.

Commenting on a study that has been submitted for publication, Roffe-Rackind said, “Researchers have looked at cognitive health and brain function, so looking at when people are eating almonds, what happens to their sensory function and what is going on in their brains.” She continues, “There are a lot of beliefs into almonds and mental acuity, memory and brain function.”

“There are a lot of traditions, especially in India, where mothers give their children almonds every

morning before they go to school to help them function and to help with memory.” Waycott continues, adding, “This tradition goes back thousands of years, and it’s a very strong belief in India that almonds help cognitive function. So we plan to look into that further.”

However, Waycott notes that scientifically, it is a hard area to work with. “It’s difficult because of all the confounding influences on the brain which a lot of people don’t really understand,” he said.

### The Demand for Brain Health Products

The market for brain health products is a certainly an exciting one, appealing to many different demographics for a number of different reasons. On one hand, the world’s aging population means that there has been, and will continue to be, an increase in mental health issues such as Alzheimer’s and other memory issues.

Nutrition designed to actively prevent and treat such conditions not only positively impacts consumers already in old age, but also the older generations of the future, thus future proofing and reducing the pressure on the medical providers worldwide.

On the other hand, the products also appeal to the ever-busy consumers of today, the younger demographic who are more stressed, anxious and overwhelmed than ever before. With mental health becoming less of a stigma worldwide, there is an opportunity, and a need, to provide such consumers with a product that can improve their mental wellbeing.

### The Future of the Nutrition and Cognitive Health Market

Sara Perez Ojalvo, Scientific Affairs Manager at Nutrition 21 is confident that all signs point towards a promising future for the cognitive and mental health sector.



“Nutrition and mental health is an exciting growing field that will very likely be expanding with new research and links in the years to come,” she says.

Perez Ojalvo adds, “Brain health, cognitive function, and even mood are being found to be very much linked to nutrition and a healthy lifestyle with particular nutrients being especially influential in this field.”

Komorowski agrees, and adds that the food industry should continue to conduct and publish research in this area. “The more research we do, the more we learn about the impact of various common nutrients on brain health as well as discover the benefits of new nutrients.”  
by Hannah Gardiner



### Dispelling the notion that frozen fruits, veggies not as good as fresh

IFT Weekly March 22, 2017

A study published in the *Journal of Food Composition and Analysis* suggests that the nutritional value of certain frozen fruits and vegetables are generally equal to fresh produce. Conducted by the University of Georgia (UGA) in partnership with the Frozen Food Foundation, the research compares the nutrient content of eight commonly purchased frozen and fresh fruits and vegetables.

This two-year study compared the status of targeted nutrients in selected fresh and frozen fruits and vegetables. In addition, a third category was examined—a “fresh-stored” categorization intended to mimic typical consumer storage patterns of produce following purchase (five days of refrigeration). The researchers analyzed broccoli, cauliflower, corn, green beans, green peas, spinach, blueberries, and strawberries of all three categories of freshness for their concentrations of l-ascorbic acid (vitamin C), trans- $\beta$ -carotene (provitamin A), and total folate. Analyses were performed in triplicate on representative samples using standardized analytical methods and included a quality control plan for each nutrient.

The researchers found that in most comparisons between nutrients within the categories of fresh, frozen, and “fresh-stored,” there were no significant differences in assessed vitamin contents. In the cases of significant differences, frozen produce outperformed “fresh-stored” more frequently than “fresh-stored” outperformed frozen. They concluded that when considering the refrigerated storage to which consumers may expose their fresh produce prior to consumption, “the findings of this study do not support the common belief of consumers that fresh food has significantly greater nutritional value than its frozen counterpart.”

### Drinking tea could help stave off cognitive decline

Medical News Today 28 March 2017 By Honor Whiteman

Thanks to its high levels of antioxidants, tea has been linked to a lower risk of diabetes, heart disease, and cancer. However, its potential health benefits may not end there.

Researchers have found that regular

tea consumption could more than halve the risk of cognitive decline for older adults, particularly for those with a genetic risk of Alzheimer's disease. New research suggests that regular tea intake could lower the risk of cognitive decline in later life.

Tea is one of the most popular beverages in the United States; in 2015, more than 3.6 billion gallons of tea were consumed in the country, with black tea being the favourite. The possible health benefits of tea consumption have been well documented. A recent study published in *The American Journal of Public Health*, for example, associated moderate tea intake with a reduced risk of cardiovascular events.

Past research has suggested that drinking tea may also have brain benefits, with one study linking green tea consumption to better working memory.

For this latest study, lead investigator Feng Lei, from the Department of Psychological Medicine at National University of Singapore's (NUS) Yong Loo Lin School of Medicine, and colleagues sought to determine whether there might be a link between tea intake and cognitive decline.

The researchers came to their findings - published in *The Journal of Nutrition, Health & Aging* - by collecting data from 957 Chinese adults aged 55 and older.

Between 2003 and 2005, the team collected information on the participants' tea consumption, including how much tea they drink, frequency of tea consumption, and what types of tea they consume.

Every 2 years until 2010, the participants underwent standardized assessments that evaluated their cognitive function. The researchers identified 72 new cases of neuro-cognitive disorders among participants between 2006 and 2010. Up to 86 percent lower risk of cognitive decline for tea drinkers. Compared with adults who rarely drank tea, those who consumed tea regularly were found to have a 50 percent lower risk of cognitive decline.

Furthermore, among adults who possessed the APOE ε4 gene - which is associated with an increased risk of Alzheimer's disease - those who drank tea regularly were found to be at 86 percent lower risk of cognitive decline.

These findings remained after accounting for numerous confounding factors, including the presence of other medical conditions, social activity, physical activity, and other lifestyle factors. The researchers note that the cognitive benefits were seen with consumption of tea that was brewed from tea leaves, such as green tea, black tea, and oolong tea.

The study was not designed to pinpoint the mechanisms behind tea's potential brain benefits, but Lei says that it could be down to the beneficial compounds the beverage contains, such as theaflavins, catechins, thearubigins, and L-theanine. "These compounds exhibit anti-inflammatory and antioxidant potential and other bioactive properties that may protect the brain from vascular damage and neurodegeneration," Lei explains. "Our understanding of the detailed biological mechanisms is still very limited so we do need more research

to find out definitive answers." A 'simple, inexpensive lifestyle measure' could prevent dementia. According to the World Health Organization (WHO), around 47.5 million people worldwide are living with dementia, and there are around 7.7 million new cases of the condition every year. By 2050, it is estimated that the number of people living with dementia will have risen to 135.5 million.

Although the study from Lei and team was conducted in Chinese adults, the researchers say that their findings are likely to apply to other populations, and they could have important implications for the prevention of dementia.

"Despite high-quality drug trials, effective pharmacological therapy for neurocognitive disorders such as dementia remains elusive and current prevention strategies are far from satisfactory. Tea is one of the most widely consumed beverages in the world. The data from our study suggests that a simple and inexpensive lifestyle measure such as daily tea drinking can reduce a person's risk of developing neurocognitive disorders in late life." Feng Lei

The researchers plan to conduct further studies on the link between tea and cognitive function. In particular, they want to carry out randomized controlled trials to rigorously test the health effects of tea's bioactive compounds.

### 'Medicinal food' diet counters onset of type 1 diabetes

Science Daily March 27, 2017

Monash University's Biomedicine Discovery Institute researchers have

led an international study that found -- for the first time -- that a diet yielding high amounts of the short-chain fatty acids acetate and butyrate provided a beneficial effect on the immune system and protected against type 1 or juvenile diabetes.

Autoimmune type 1 diabetes occurs when immune cells called auto-reactive T cells attack and destroy the cells that produce insulin -- the hormone that regulates our blood sugar levels.

The specialised diet developed by CSIRO and Monash University researchers uses starches -- found in many foods including fruit and vegetables -- that resist digestion and pass through to the colon or large bowel where they are broken down by microbiota (gut bacteria). This process of fermentation produces acetate and butyrate which, when combined, provided complete protection against type 1 diabetes.

"The Western diet affects our gut microbiota and the production of these short-chain fatty acids," researcher Dr Eliana Mariño said. "Our research found that eating a diet which encourages the gut bacteria that produce high levels of acetate or butyrate improves the integrity of the gut lining, which reduces pro-inflammatory factors and promote immune tolerance," Dr Mariño said. "We found this had an enormous impact on the development of type 1 diabetes," she said.

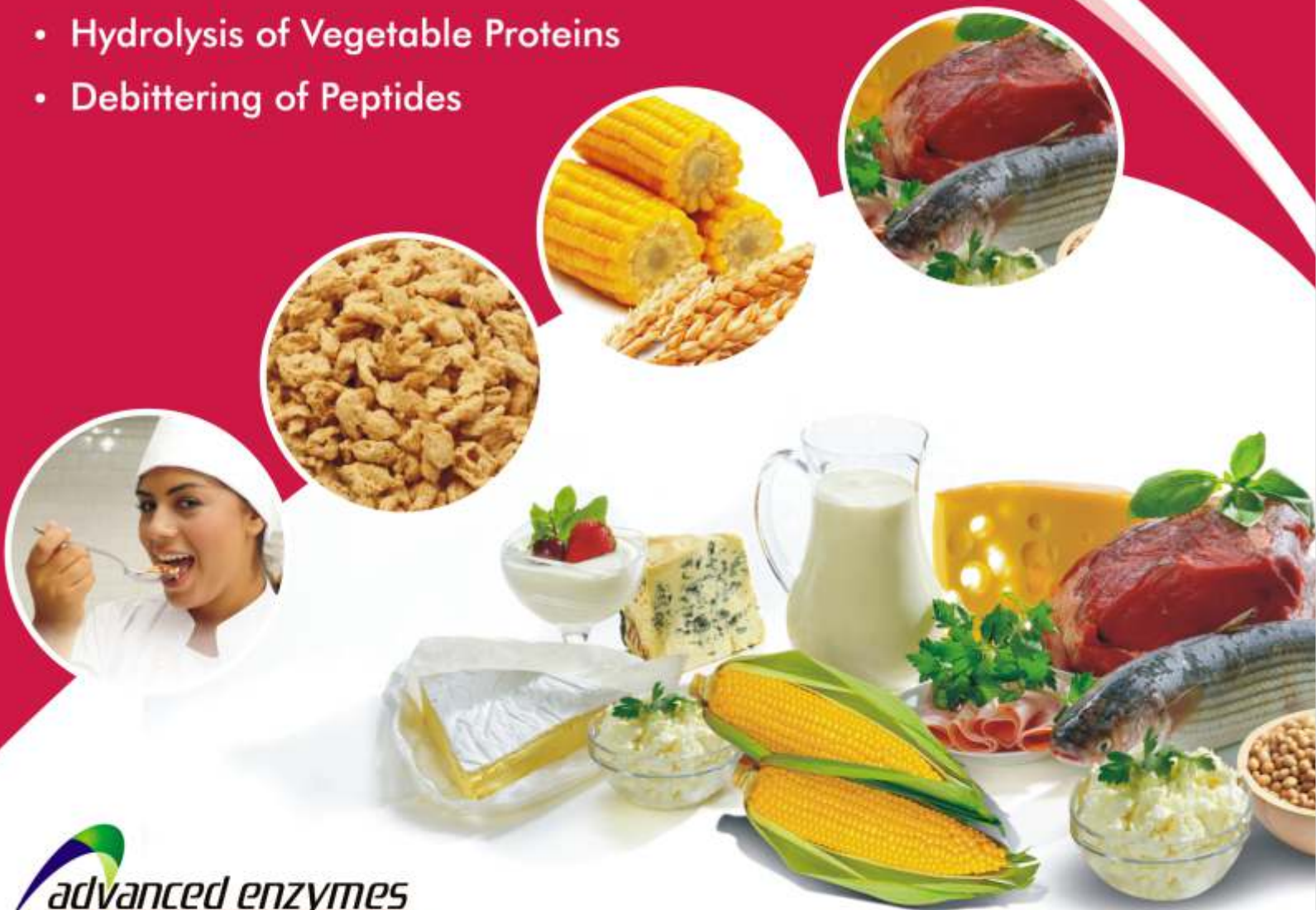
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PFNDAI May 2017

# Enzymes for Protein Modification

- Meat Tenderization / Fish Protein Hydrolysis
- Gluten Hydrolysis & Production of Savory Flavours
- Hydrolysis of Vegetable Proteins
- Debittering of Peptides



The findings, which attracted considerable interest at the International Congress of Immunology in Melbourne last year, were published today in the journal Nature Immunology. Professor Charles Mackay, who initiated the research said the study highlighted how non-pharmaceutical approaches including special diets and gut bacteria could treat or prevent autoimmune diseases such as type 1 diabetes. "The findings illustrate the dawn of a new era in treating human disease with medicinal foods," Professor Mackay said. "The materials we used are something you can digest that is composed of natural products -- resistant starches are a normal part of our diet." "The diets we used are highly efficient at releasing beneficial metabolites. I would describe them as an extreme superfood," he said.

Professor Mackay said that the diet was not just about eating vegetables or high-fibre foods but involved special food and a special process, and would need to be managed by nutritionists, dietitians and clinicians.

The researchers are hoping to gain funding to take the findings into type 1 diabetes into clinical research. Professor Mackay, Dr Mariño and collaborators around Australia are expanding their research to investigate diet's effect on obesity and other inflammatory diseases including cardiovascular disease, type 2 diabetes, asthma, food allergies and Inflammatory Bowel Disease.

**Scientists identify a new way gut bacteria breakdown complex sugars**

Science Daily March 22, 2017

New light has been shed on the functioning of human gut bacteria which could help to develop medicines in the future to improve health and wellbeing.

Scientists have found that single microorganisms in the human gut have the ability to disassemble the most complex of carbohydrates in our diet. It is the first time such a discovery has been made and it is hoped that this may be used to one day identify new pre- and pro-biotic products to enhance people's health.

Led by Professor Harry Gilbert, from the Institute for Cell and Molecular Biosciences at Newcastle University, UK, the study is published today (Wednesday) in the leading academic journal, Nature. Bacteria in the large bowel -- the human gut -- has a major impact on health and physiology as they help to disintegrate substances in food that we cannot digest, such as starches and fibre. The main source of nutrients available to the gut bacteria are carbohydrates from the human diet, which the body is unable to metabolise.

The most complex of these carbohydrates is the plant polysaccharide, 'rhamno-galacturonan II (RG-II)', which can also be found at elevated levels in red wine. Previously it was thought that only groups of bacteria would be able to metabolise and breakdown RG-II, reflecting its complex structure. However, this research shows that single organisms present in the gut also have the ability to do this.

Professor Gilbert said: "Our research reports how a highly complex biological process in the

body is achieved. This is an exciting step forward in the understanding of how human gut bacteria work and has implications for future research."

The team of international scientists found that RG-II is metabolised through the action of a type of bacterial enzyme, known as glycoside hydrolases, which target the complex carbohydrates sugars in the large bowel.

The bacteria that can metabolise RG-II contain several genes that encode proteins that previously had no known action until now. The group have shown that seven of these genes produce glycoside hydrolases -- which split the glycosidic linkage that joins sugars together in polysaccharides -- and contribute to the breakdown of RG-II.

Each of these seven glycoside hydrolases are founding members of a novel enzyme family. Three of the glycoside hydrolases that contribute to RG-II degradation break glycosidic linkages that have not previously been shown to be susceptible to biological attack, and these enzymes display novel catalytic functions.

Professor Gilbert said: "This study has potential applications as understanding how this highly complex carbohydrate, which is an integral component of our diet, is utilised offers opportunities for developing new pre- and pro-biotic strategies to improve human health.

"There is much more exciting work to be done in this area. To fully understand the mechanisms by which complex carbohydrates are utilized by human gut bacteria is relevant to medicine as this microbial community has a significant impact on the body."



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## Screening for both malnutrition and frailty needed to enhance health of aging populations

Science Daily March 21, 2017

By 2035 one in four Canadians will be 65 years old or older, an age group prone to malnutrition and frailty.

A new literature review published today in Applied Physiology, Nutrition, and Metabolism describes the similarities between these two conditions, which are generally considered separately by clinicians, and recommends research efforts, diagnostic tools and medical treatments that consider both conditions.

Frailty in older populations is characterized by loss in strength and endurance, which increases vulnerability to other ailments and overall deterioration of health. Frail, older adults struggle with everyday activities such as cooking and eating, putting them at risk for malnourishment. Previous studies have found that malnutrition often co-occurs with frailty in older adults, exacerbating the condition and causing further weakness. Even though the two conditions coincide with each other, currently, frailty and malnutrition are diagnosed independently of each other using different tools. "Simple tools for screening and processes for detecting and treating these conditions together need to be developed across the continuum of care," says Professor Heather Keller, senior author of the review and lead of the University of Waterloo's Nutrition and Aging Lab. Frailty and malnutrition "should be

considered simultaneously due to the high likelihood that a patient will have both conditions together," Keller adds.

Keller and her research team compiled documents and reports on frailty and malnutrition and identified symptoms shared between the two conditions: weight loss, slowness and weakness. Weight loss can be self-reported or measured, while the latter two symptoms can be readily assessed in any healthcare setting using reduced walking speed and grip strength of a patient's hand. The authors believe that the use of indicators that diagnose both malnutrition and frailty is needed to ensure that effective treatments are used to improve the health of seniors.

The review stresses how treatment plans that address both malnutrition and frailty are currently lacking and their effectiveness is not known. Oral nutritional supplements or nutrient dense diets in combination with physical exercise could improve nutrition status and strength in frail, malnourished patients.

Preventative health practices that capture both nutrition and frailty risk are also important, the authors say. Identifying at-risk individuals with standardized screening can ensure earlier intervention, which can minimize progression of the conditions and hospitalization. The authors conclude that when a health professional considers an older adult to be frail, they should also identify if they are malnourished.

This review is timely given Canada's shifting demographic. Additional burdens on Canada's healthcare system are expected over the next 20 years as a quarter of the country's population will exceed the age of 65

by 2035. Testing and implementing diagnostic and treatment tools that detect related health conditions such as frailty and malnutrition can improve efficiency of hospital and primary care services, and ultimately patient outcomes.

## Exciting findings': Capsicum extract may help slim waist lines

By Stephen Daniells, Food Navigator USA, 09-Mar-2017

Daily supplementation with extracts from chili peppers may significantly reduce the waist to hip ratio in healthy adults, says a new study. A daily 2 mg dose of capsaicinoids for 12 weeks was also associated with significant reductions in calorie consumption, according to findings published in the journal *Appetite*.

"Our data demonstrate that 12 weeks of capsaicinoid supplementation may be effective at reducing appetite and potentially improving select body composition metrics (i.e., waist: hip ratio)," wrote scientists from the University of Mary Hardin-Baylor, Auburn University, and Increnovo LLC. The study used the commercially available Capsimax ingredient.

"A significant study" Capsimax capsicum extract is derived from the capsicum pepper and delivers effective levels of capsaicinoids without the oral and gastric burning sensation of unprotected red hot peppers.

Image © iStock.com/jat306



Capsimax is manufactured using OmniBead Beadlet Technology to encapsulate the beneficial heat of concentrated, highly-active natural capsicum in a controlled release coating.

The study provides further support to Capsimax as a natural and effective ingredient to support weight management and long-term health. This study is significant because it shows that a low dose of capsaicinoids from Capsimax has a significant effect on reducing belly fat as measured by the waist-to-hip ratio (WHR). WHR indicates how fat is distributed across the abdomen and hips and is a better predictor of future health risk than just measuring body weight alone. In fact, WHR has been shown to be a better predictor of cardiovascular disease than body-mass index.

Research shows that people with "apple-shaped" bodies (with more weight around the waist) face more health risks than those with "pear-shaped" bodies who carry more weight around the hips. So, reducing abdominal fat not only improves body image but also long-term health. This study also confirms prior research showing that Capsimax effectively decreases appetite.

The researchers recruited 77 healthy men and women to participate in their study. Participants were randomly assigned to receive either a low dose (2 mg of capsaicinoid; 100 mg Capsimax) or high dose (4 mg of capsaicinoid; 200 mg Capsimax) daily for 12 weeks, or a corn starch placebo.

Results showed that waist to hip ratio in the low dose group significantly decreased by 2.4% after six weeks, but no significant differences were observed between the groups at the end of the 12 week study. Participants consuming the high dose supplement consumed fewer calories after 12 weeks of

intervention, compared to the other two groups.

“Interestingly, [high dose capsaicinoid] participants presented significant increases in serum insulin as well as significant decreases in serum HDL cholesterol levels from [week 0 to week 12],” wrote the researchers. “However, supplementation did not affect the insulin response to the administered [oral glucose tolerance test] and/or other indices of insulin sensitivity.”

“Future studies are needed which control for various lifestyle factors (i.e., diet and physical activity) in order to determine if modulating these factors with concomitant [capsaicinoid] supplementation unveils potential synergistic effects,” they added. “More mechanistic research is also needed in order to determine the mechanisms whereby capsaicinoid supplementation may affect cholesterol production and insulin secretion in diseased populations; specifically, if capsaicinoid supplementation can increase insulin secretion in diabetic patients and/or reduce cholesterol levels in hypercholesterolemic patients then this could be a viable nutraceutical strategy to help improve metabolic outcomes.”

Consumer understanding and awareness of the benefits of capsaicinoid for weight management is growing, said Doyle, especially with the spate of recent media coverage correlating chili peppers with weight loss and even contributing to a longer life.

“Capsaicinoids are an ideal ingredient for the growing dietary supplements category because they provide natural, foodbased solutions for consumers to meet their weight management and exercise goals,” she said. The Capsimax ingredient is found in hundreds of formulas targeting weight management, energy support and exercise performance.

Image © iStock.com/stevanovicigor

## Almost half of all deaths from heart disease & diabetes linked to diet:

### JAMA study

By Stephen Daniells, Nutra Ingredients USA 07-Mar-2017

Omega-3s from seafood, fruits, nuts, vegetables, and whole grains are among the 10 dietary factors associated with an estimated 45% of all cardio-metabolic deaths in the US, says a new study.

Data published in the March 7 issue of JAMA indicated that the highest number of cardio-metabolic deaths were associated with too much sodium and processed meat, and not enough nuts and seeds, seafood omega-3 fats, vegetable, and fruit, compared with optimal consumption levels. “Nationally, estimated cardio-metabolic deaths related to insufficient healthier foods/nutrients remained at least as substantial as those related to excess unhealthful foods/ nutrients,” wrote the researchers, led by Renata Micha, RD, PhD, of the Tufts Friedman School of Nutrition Science and Policy, Boston.

“These results inform strategies for prevention to reduce the health and economic burdens of cardio-metabolic diseases in the United States. For example, positive messaging to patients, the public, and industry can emphasize maximizing the good (rather than simply reducing the harmful) food choices and products.”

“There needs to be a greater effort to increase omega-3s”

Commenting independently on the study’s findings, Harry Rice, PhD, VP of scientific and regulatory affairs for Global Organization for EPA and DHA Omega-3s (GOED), told us: “Given that high quality research continues to be published reporting on the cardiac consequences of sub-optimal intakes of EPA/DHA omega-3s, coupled with the knowledge that omega-3 intake is insufficient, not only in the US, but in most of the world, it seems almost criminal that there isn’t a greater effort to increase omega-3 intake.

“While this is a global public health concern, it continues to frustrate me that every year, people die from low omega-3 intake while the Canadian and US governments continue to debate the merits of establishing dietary reference intakes (DRIs) based on chronic disease risk reduction.”

The researchers estimated the link between 10 foods/nutrients and deaths from heart disease, stroke, and type 2 diabetes using data from a couple of sources, including the National Health and Nutrition Examination Surveys (NHANES) 1999-2002 and 2009-2012, meta-analyses of prospective studies and clinical trials, and the National Center for Health Statistics. Data indicated that there were 702,308 cardiometabolic deaths in the US in 2012. Of these, an estimated 45% were associated with sub-optimal intakes of the 10 dietary factors.

The unhealthful foods/nutrients were listed as sodium (optimal level below 2 grams per day); processed meats intake above (optimal intake was 0 g/d); sugar-sweetened beverages (SSB, optimal intake was 0 g/d); and red meats (optimal intake below 14.3 g/d). Sub-optimal intakes were defined as above these optimal levels.

On the other hand, healthful foods/nutrients were listed as nuts/seeds (at least 20.2 g/d); seafood omega 3 fats (at least 250 mg/d); vegetables (at least 400 g/d); fruits (at least 300 g/d); whole grains (at least 125 g/d); and PUFAs replacing carbohydrates or saturated fats (at least 11% energy/d). Sub-optimal intakes were defined as below these optimal levels.

“Among individual dietary components, the largest estimated mortality was associated with suboptimal sodium (9.5%) followed by nuts/seeds, processed meats, seafood omega-3 fats, vegetables, fruits, [sugar sweetened beverages], and whole grains (each between 5.9%-8.5%), and, last, polyunsaturated fats (2.3%) and unprocessed red meats (0.4%),” wrote the researchers.

“Among unhealthful foods/nutrients, the present findings suggest that sodium is a key target,” they wrote. “Population-wide salt reduction policies that include a strong government role to educate the public and engage industry to gradually reduce salt content in processed foods (for example, as implemented in the United Kingdom and Turkey) appear to be effective, equitable, and highly cost-effective or even cost-saving.

“The decline in SSB-associated proportional mortality between 2002 and 2012 is promising. The current results suggest that continuing programs to reduce SSBs are important, especially among younger adults, blacks, Hispanics, and individuals in the United States with lower educational attainment. These results should help identify priorities, guide public health planning, and inform strategies to alter dietary habits and improve health,” the authors wrote.

Relevant to public health nutrition policy

In an accompanying editorial in JAMA, Noel Mueller, PhD, and Lawrence Appel, MD, from Johns Hopkins University stated: “The study by Micha et al is quite relevant to public health nutrition policy, a critically important issue both in the United States and around the world. As the authors suggest, policies that affect diet quality, not just quantity, are needed.

“[T]he findings reported by Micha et al appear correct—a substantial proportion of CMD [cardiometabolic disease] deaths are associated with suboptimal diet, and improving diet quality could help prevent a large fraction of CMD deaths and reduce health disparities.”

### Amylopectin/chromium complex boosts muscle protein synthesis rate: Study

By Stephen Daniells, Nutra Ingredients USA 02-Mar-2017

A combination of amylopectin and chromium may double the muscle protein synthesis rate compared to what was seen when using whey protein alone, says a new study using Nutrition 21’s patented Velositol ingredient.

Adding a 2 gram dose of Velositol to a 6 gram dose of whey protein led to a 48% increase in muscle protein synthesis from baseline, compared to a 24% increase seen with 6 grams of whey protein alone, according to findings of a study with 10 healthy men and women aged between 22 and 34.



Image © iStock.com/Petr\_Joura

“Muscle biopsy studies are tightly controlled and highly invasive, so small sample sizes are very common. With a study like this, if you cannot show a difference with 10 people, it’s unlikely one exists in the ‘real world,’” said Tim Ziegenfuss, PhD, lead author of the study and CEO of Center for Applied Health Sciences. “The study results are impressive. It’s not only statistically significant that Velositol doubled muscle protein synthesis, but also practically relevant for anyone who is active and may not be consuming enough protein to support enhanced muscle growth.

“Until this study was done, one of the only ways known to improve the anabolic response to resistance training was to consume more protein, which is not always practical. If future studies confirm our results, Velositol could be a huge benefit not only to people in their 20s and 30s, but especially those in their 40s and 50s and older whose muscles become more resistant to the anabolic effects of protein.”

On two different occasions, Dr Ziegenfuss and his co-workers gave the participants a single dose of Velositol with 6 grams of whey protein or 6 grams of whey protein alone, and completed eight sets of bilateral isotonic leg extensions at a load equivalent to 80% of their estimated one-repetition maximum. Results showed that Velositol plus whey led to significant increases in muscle protein synthesis. A non-significant increase in insulin to help initiate muscle growth was also reported. Blood glucose levels remained in the healthy, normal

range, added the researchers.

“To our knowledge, these results are among the first to illustrate the impact of a novel amylopectin chromium-containing complex on the stimulation of mixed muscle protein synthesis,” wrote the researchers. “In seeking an explanation for our study outcomes, the purported ability of chromium to favorably alter insulin metabolism is an important mechanistic consideration.”

“While the exact role(s) of insulin in muscle protein metabolism continues to be clarified, insulin has a demonstrated stimulatory effect on muscle protein synthesis when adequate EAA [essential amino acids] precursors are present, and seems to work more towards reducing muscle protein breakdown when EAA concentrations are reduced.”

“If [Velositol] acutely enhances these intracellular responses to insulin as indicated by previous work in culture, animal and human studies, then it may potentially augment the anabolic response of skeletal muscle to an otherwise suboptimal dose of whey protein,” they added. “Future research should confirm these data and seek to better understand the mechanisms responsible for the observed results,” they concluded.

“Exceeding expectations” In a release, Nutrition 21 stated that, given the success of this study, more studies will be funded to further demonstrate the additional benefits of Velositol. “This study shows Velositol has the ability to unlock the potential of protein,

promote leaner body composition and enhance muscle building,” said Joe Weiss, president of Nutrition 21. “This study confirmed our theories, and exceeded our expectations for Velositol.”

## Omega-3 found to reduce heart disease risk

By Noli Dinkovski, Food Manufacture UK 23-Feb-2017

Two polyunsaturated fatty acids found in omega-3 can reduce the risk of coronary heart disease, according to a review of studies published in the US.

Consumption of fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) led to a “statistically significant” reduction in coronary heart disease risk, the review in Mayo Clinic Proceedings claimed.

### High triglyceride levels

The reduction in risk was 16% in people with high triglyceride levels and 14% in those with high levels of low-density lipoprotein cholesterol. The heart health benefits of omega-3 were highlighted at last November’s 2016 British Nutrition Foundation (BNF) annual lecture, given by Philip Calder, professor of nutritional immunology at the University of Southampton and president of the Nutrition Society.

Calder explained EPA and DHA also had beneficial effects on other aspects of human health, such as metabolism, inflammation, immune response and the function of the liver and brain.





# FOOD SCIENCE & INDUSTRY NEWS

Image © iStock.com/pinkomelet

## Gamma-dextrin may increase the bioavailability of curcumin

IFT Weekly March 8, 2017

A study published in the European Journal of Nutrition suggests that the bioavailability of curcumin may be increased with the help of gamma-dextrin. Curcumin is an antioxidant that exhibits anti-inflammatory, antibacterial, and hypoallergenic properties, but is not readily absorbed in the human bloodstream.

An independent double-blind crossover clinical study performed in the United States compared the relative absorption of a gamma-dextrin-curcumin formulation (Wacker's Cavacurmin) with pure curcumin extract (95%) and two commercially-available curcumin preparations designed to increase

bioavailability. After oral ingestion of the substance, the blood of the study participants was analyzed at regular intervals over the course of 12 hr.

The researchers found that the gamma-dextrin-curcumin formulation was absorbed approximately 40 times more efficiently than the standard extract, and at least 4.6 times better than the next best comparable commercial product. The cyclic oligosaccharide gamma-dextrin increases the bioavailability of curcumin due to

its unique properties. Gamma-dextrin is hydrophilic on the outside with a hydrophobic cavity on the inside, which allows it to accommodate other hydrophobic substances. In this way, cyclodextrins can bind ingredients, release active agents, or stabilize sensitive substances and interfaces.

To increase bioavailability, the water-soluble gamma-dextrin can encapsulate fat-soluble curcumin, for example. Hydrophobic curcumin thus gets a hydrophilic shell and forms a molecular dispersion in water that leads to a much better absorption by the human body.

## Ageing consumers have potential to lead the sports nutrition market, say experts

By Emma Jane Cash, Nutra Ingredients 10-Mar-2017

Ageing consumers, more feminine products and 'natural' functional foods will lead the market in the coming years, analysts from Euromonitor International told attendees of our recent online event on Sports Nutrition.

Povilas Sugintas and Peder Kraugerud, two research analysts interested in consumer behaviour, explained the current state of the sports nutrition market, as well as forecasting the future, during their presentation.

Sugintas and Kraugerud explained that there

are three groups currently dominating the sports nutrition market: the core users, made up of elite athletes and bodybuilder; the casual users, who look for convenient products with trusted ingredients; and the fitness lifestyle users, who are brand conscious and willing to experiment. Casual and fitness lifestyle users are looking to supplement an active, healthy lifestyle with sport nutrition products.

Sugintas and Kraugerud added that the market will see a rise in casual and fitness lifestyle users as more products will be targeted to women, the overweight and the ageing consumers. "We expect to see more products towards female consumers with characteristics such as natural and organic, sugar-free and flavour innovation... with a clean break from "for her" extensions and pink washing," Kraugerud said.

He added that so far products are not being targeted to obese or overweight consumers, despite the fact that obesity rates are expected to rise over the next five years. "This represents a major market opportunity for sport nutrition producers. This is a large part of the market that is not currently engaged and they need targeted products and introductory products to help them," Kraugerud said.

However, Sugintas and Kraugerud said the most growth is expected to be seen in products targeted towards



the ageing consumers, as 153 million people are over the age of 65. "Sports nutrition is very often marketed towards the younger generation, typically guys between the ages of 15 and 35, but now we see sports nutrition become more common for everyone and we see it in grocery channels etc. We expect this could also translate to ageing consumers who don't purchase products yet but actually need it the most to supplement their diets," they said. Focus areas could be joint care or cholesterol reduction products, said Kraugerud.

Globally the sports nutrition market is expected to perform well over the next five years, and the UK alone will add \$643 m to the market. Sugintas and Kraugerud said convenience, customised blends and natural products will also grow over the next five years, satisfying consumer preferences.

## How to get a surimi of the highest quality?

Food News LATAM 16 MARCH 2017

**The fresh and raw fish is the raw material for the production of surimi, and the management that this fish receives will be fundamental for the success of the productive process.**

The treatment of the raw fish for the elaboration of the surimi carries several well differentiated processes where, from a proper storage and extraction of the muscle, it will go

through a later washing, sieving and chopped.

The first will be the reception in plant of the fish or crustacean that will serve as raw material for the manufacture of the surimi. Usually this fish will be transported in bulk in refrigerated trucks coming from a fish market, so it is advisable to receive a pre-treatment, which consists of: Quality control performed by a specialized operator to ensure that the raw material meets the conditions Required for: Freshness and good condition of the raw material.

What process would you carry out in order to obtain a surimi of the highest quality?

After verifying that the merchandise received is of the quality established, without presenting any irregularities, the first fundamental step would be to classify the fish for processing, distinguishing between the three species received. In addition, the sardines received would be discarded for the realization of the surimi because it is a species of high fat content, so they should be used for other uses, such as obtaining oils, flours, etc. Having carried out this classification process, a connected manipulation process will be carried out, applying the connected techniques established according to the current regulations.

There may be many factors to take into account, since any irregularity during the kneading, mixing and

emulsion of the surimi paste may not have been carried out properly. At the same time, the correct addition of additives during the process should be checked, as must the quality of the fish used and the amount of water it has, and it is essential to distinguish between frozen fish and fresh fish.

Working on a new line of surimi manufacturing, it can be verified that there are numerous records of organoleptic analysis, performed by different workers. The results obtained are very different, even at different times and after having rectified the formula several times, not resulting in a definitive product. What action should be taken to obtain an adequate quality criterion, satisfying the production established by the company?

In the first place the criteria sought in the product must be established, drafting the organoleptic qualities of the final product. Dictated such properties must be allocated responsible tasting which pursue compliance with these properties, the only person able to rectification product. These tasting should be made at different times of day and different masses, being compared records obtained by acquiring the appropriate proportions addition of additives.

The industry of restructured products is based on the use of discarded fish species, and even the remains of fish processing, such as filleting. This fish goes through different processes, such as plant reception, pulping and washing, addition of additives and freezing of surimi. During all these processes, one must be rigorous with the hygienic measures and the low temperatures of the rooms and machinery to obtain a surimi of good quality, not forgetting the essential quality control during the whole process and also to the finished surimi.

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Once the surimi is finished, it is packed in plastic and quickly frozen at  $-35^{\circ}\text{C}$  to preserve it properly, until it is necessary to elaborate the restructured products such as seafood sticks, kamaboko, gulas, and all those analogous to fish and seafood. This will be possible thanks to gelling. Surimi will be kneaded, adding the additives that mark the formulation, and the gels will be obtained with the textures needed to mold the target products. A base of krill and fish can be prepared multitude of pre-cooked dishes such as croquettes, empanadillas, battered shrimp, sticks of hake, etc., where other processes such as floured, breaded and battered will take part. The last step would be conservation, and one of the ways is pasteurization, applying heat under pressure and rapid cooling.

## How is virtual reality affecting the food industry?

Food News LATAM 10 MARCH 2017

Virtual reality can be defined as a computer system that generates in real time representations of reality, which are no more than illusions, it is a perceptual reality without any physical support and that only occurs inside the computers.

The ideal virtual reality would be the one that, from a total immersion, allowed an unlimited interaction with the virtual world, as well as contributing at least the same senses that have in the real world: sight, hearing, touch, taste and smell.

However, most current systems focus on two senses (sight and hearing), but smell and taste have come to virtual reality. Companies in the food industry are not far behind in technological advances, for example McDonald's in Sweden, is betting on an innovative initiative: children who purchase a Happy Meal in one of their

establishments will be able to convert the boxes of their menu into A virtual reality glasses.

During the promotion, which will be active between 5 and 12 March, the chain of restaurants will distribute about 3,500 "Happy Goggles" in 14 restaurants in the Nordic country. The campaign is linked to the so-called "Spotlov", which is the name given to the winter holidays of the region. To use the glasses, you only have to drill and fold the iconic Happy Meal red box and insert the virtual reality glasses (included in the menu) and put your own smart phone. In fact, the glasses are very similar to Google Cardboard, only that these are free.

Pizza Hut also allows its pizza boxes to become movie projectors, although in this case McDonald's goes much further by bringing the virtual reality experience to families, a bet they are increasingly taking more brands. As Jeff Jackett, marketing director at McDonald's in Sweden, explains, "it's a very exciting opportunity to connect families in digital times." "Parents can learn more about their children's digital knowledge and experience. And on the subject of the game can also be a great joint activity that helps families to interact on equal terms," he adds.

This week we share the note " MG2 at Interpack will offer virtual reality and true innovation (/6707-mg2-en-interpack-realidad-virtual-verdaderainnovaci%C3%B3n.html) " where the Italian company, specialized in the design and commercialization of solutions for the pharmaceutical process and machines for capsule ingredients, will participate in the Düsseldorf exhibition following an original approach : An innovative application where visitors will have the possibility to make a virtual visit to the "Pharmaceutical Zone": the new area of the Bolognese

headquarters dedicated to tests and trials where the user can visit it virtually.

We can not fail to name GNT, a leading company in dyes and natural ingredients was present at the event of ProSweets Cologne Germany 2017, who presented at the stand a virtual supermarket to understand the buying decision process and the importance of colours in the food. It was possible to see firsthand how the use of colours in food and the front of the packaging makes the consumer change brand when choosing the product.

ProStart is a program supported by industry members, educators, the National Education Restaurant Association Foundation (NRAEF) and the Restaurants Association partners who created an industry-driven plan to empower the next generation of Restaurant workers in culinary techniques and management techniques. Where to try holographic food is one step closer to becoming reality . Whether you want a Hindu dish, an Italian dish or a Thai dish, virtual reality will put them in your hands - and on the tip of your tongue - in a matter of seconds. The key tool to achieve this is called Project Nourished (<http://www.projectnourished.com/>) is a transducer able to mimic chewing sounds through the bones and the finer muscle tissues. In this way, whoever is using it will be able to hear their chewing as if they were actually eating.

Image © iStock.com/dolgachov



In addition to the pleasure that can provoke a dish anywhere in the world from the living room, virtual food can have many positive applications for the entire society. As stated on the web, Project Nourished can help overweight people reduce their food intake by relating certain calorie dishes with unpleasant memories through virtual reality glasses software. Also people with diabetes and those with food allergies can enjoy the virtual food: ingest what they ingest, will have no effect on the body. Only the pleasure of being able to eat what they are normally forbidden.

Virtual feeding can work to help patients with bulimia and anorexia recover a healthy diet and energetic enough through software psychotherapy. And the restaurant industry is taking the concept of virtual reality to new levels.

"A new type of culinary experience has taken over the world" With this project you can eat a healthy snack but believe and feel that you are eating a delicious lasagna, empanadas, sushi or meat. The company that produces this magic of virtual reality is Kokiri Laboratory and is located in Los Angeles.

The project consists of six parts: An aromatic diffuser to dissipate odours from various foods using ultrasound and heat; A virtual reality lens that gives a visual simulation of the environment and alters the aesthetics of food; A bone conduction transducer, a chewing imitator transmitted from the mouth of the diner through the soft tissues and bones; A gyoscopic device that allows physical movement; A virtual cocktail glass that includes built-in sensors to create the simulation, and printed 3-D food, a vehicle for the taste sensation, texture and consistency.

## The physical and chemical changes of cassava in storage

Food News LATAM 03  
MARCH 2017

Cassava (*Manihot esculenta* Crantz) cultivation in recent decades has increased significantly, making it the third most important food source in the world after maize and rice. In 2016, the cultivated area of cassava in Brazil was 1572,501 hectares, with production of 24,046,847 tons.

Cassava for human consumption, known as table cassava, manioc cassava or manioc, contains low levels of cyanogenic compounds and is sold as a fresh vegetable, minimally processed, refrigerated, frozen or pre-cooked, thus facilitating its preparation and consumption. The cultivation of cassava has a wide use and use, but the high perishability of the roots is a limiting factor for its commercialization, causing economic losses to the producers. In Brazil, it is estimated that 23% of cassava production is lost after harvest, a considerable loss due to a lack of knowledge and storage techniques. To reach a lower volume of losses of cassava roots, some studios have been made, looking for alternatives to slow the rapid deterioration of the roots.

The work carried out by Maraisa Ferreira da Silva and colleagues (<http://www.abarriguda.org.br/revista/index.php/revistaabarrigudaarepb/article/view/308/177>) aimed to evaluate the physical and chemical changes of cassava (minimally processed) stored under refrigeration and freezing conditions in polyethylene bags and in polystyrene trays wrapped in plastic film.



Image © iStock.com/onairjiw

The experiment was carried out in the Laboratory of Agricultural Products of the Federal University of São Francisco Valle-UNIVASF, where all the necessary structure for the development of analysis of mass, pH, soluble solids (° Brix), titratable acidity, Firmness, Moisture and Colour. Cassava roots of the variety 'Recife' were obtained in an experimental area of Embrapa Semiárid in the city of Petrolina (PE), harvested when the plants were 12 months old at the end of 2012. The climate of the region according to Koppen is Classified as semi-arid BSh.

The physical and chemical variables evaluated were: chemical composition, mass, colour, firmness, humidity, pH, soluble solids and titratable acidity. The results showed that for pH, ° Brix, acidity and humidity, storage time and the environment (refrigerated or frozen) were significant, which shows that the time correlated with the environment are processes that compromise the physical and chemical characteristics Of cassava roots.

Regarding colour, it was found that, with seven days of storage under refrigeration, the colour difference of the cassava root was significant due to the proliferation of the fungi. Regarding firmness, the average value for refrigerated and frozen cassava on the seventh day of storage was 9.5N and 8.6N respectively. The most viable storage for the conservation of cassava roots was frozen storage for both packages studied.



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## Total polyphenols and antioxidant capacity of the bean

Food News LATAM 02 MARCH 2017

Beans are one of the oldest foods, being used since the first records of mankind. The genus *Phaseolus vulgaris* L. comprises about sixty species, belonging to the warm countries, their stems are thin and of greater or smaller height according to the variety. The frejol "Panamito" is a white grain produced in the inter-Andean valleys of Peru.

"Huasca" is an orange-yellow grain with an average weight of 25-40 g per 100 seeds. "Sumaq puka" type is a dark red kidney bean.

"Huallaguino" is a reddish yellow bean with an average weight of 25-40 g per 100 seeds. The bean among legumes of food grains is the most important species for human consumption, denominated since antiquity "meat of the poor" for its protein richness and its complete composition.

Soaking is a preliminary step to the methods of preparation of legumes, is practiced to help remove the skins, to moisten and soften the seed and thus shorten the cooking time and reduce the content of toxins. Cooking inactivates thermolabile factors and eliminates volatile compounds responsible for unpleasant flavours, as well as reduces polyphenol content (30-40%). Polyphenols are one of the main classes of secondary metabolites. They are difficult to classify but can be subdivided into

four major groups, first the phenolic acids, the second the lignins, the third the tannins and finally the flavonoids, which in turn are divided into several subgroups such as flavones, isoflavones, anthocyanins, among others.

Frejol is a nutraceutical or functional food, not only for its nutritional characteristics but also for the role that some of its components play in promoting health. Phenolic compounds, besides possessing antioxidant activity, are applied as natural dyes and possess antibacterial and antifungal properties.

Antioxidant compounds have the ability to inhibit the oxidation of molecules and therefore act as protective biological molecules against reactive oxygen species or free radicals.

Based on this framework Salas Alagón Rosario and his colleagues from the School of Engineering in Food Industries ([http://www.unas.edu.pe/revistas/index.php/revia/article/view/74/pdf\\_56](http://www.unas.edu.pe/revistas/index.php/revia/article/view/74/pdf_56)) in Peru, the following objectives were proposed: To evaluate the content of total polyphenols and antioxidant capacity (DPPH and ABTS) in shell, cotyledon, whole grain of four varieties of beans "Panamito" "Sumaq puka", "Huasca" and "Huallaguino" in a raw, soaked and cooked state.

The highest content of total polyphenols in raw frejol was presented by the shell and cotyledon of "Huallaguino" and whole grain "Sumaq puka". In frijol soaked it was "Huallaguino" shell; Cotyledon "Huallaguino", "Huasca" and "Sumaq puka" and whole grain "Sumaq puka". In cooked frejol it was shell of "Huallaguino"; Cotyledon of "Huallaguino" and "Sumaq puka" and in whole grain "Huallaguino," Suamaq puka "and" Huasca ". The highest antioxidant capacity against the radical DPPH and ABTS in shell, cotyledon and

whole grain of raw, soaked and cooked beans showed the "Huallaguino" bean.

## Functional soups: The next big business opportunity for food and nutrition firms in Japan?

By Gary Scattergood, Food Navigator Asia 07-May-2017

Functional soups featuring botanical and herbal ingredients such as ginger, ginseng and cordyceps are ripe for new product development in Japan, with the ageing population a particularly lucrative target market. Only 4% of soups launched in Asia-Pacific in the three years to 2016 contained a functional claim, and that percentage slips to 1.4% in Japan.

Analysts at Mintel say functional soups could provide significant new business opportunities in the country, especially in light of a recent relaxation of regulations. "Although Japan leads global food and drink NPD targeting seniors, functional food development has been slowed by the Food for Specialized Health Uses (FOSHU) registration process," noted Mintel analyst Patricia Johnson.

"However, In April 2015, Japan loosened its regulatory approval process for functional foods, making it easier to make functional claims, and further solidifying Japan as an important market to watch for senior targetted innovation."

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“This creates opportunities for soup products that deliver functional ingredients with properties for supporting maximum health, energy and vitality.”

A wide range of botanicals, herbal ingredients and amino acids, including ginger, ginseng, cordyceps and ornithine would likely be popular with Japanese consumers, with associated health claims that include increased stamina, immunity enhancement, revitalisation, circulation enhancement and brain vitality.

“Ornithine, a functional ingredient that is used predominately in Japan is primarily associated with the reduction of fatigue. Other functional energy drink ingredients, such as maca, and moringa, also have potential for exploration in senior-targeted soups,” said Johnson.

When it comes to marketing strategy, enhanced vitality and energy positioning is preferable over communication that calls attention to loss of function, beauty, strength or memory. “Product NPD and marketing must also remain pragmatic for seniors, addressing product accessibility issues through easy to-open and easy-to-consume formats, as well as local (convenience store) distribution and online ordering/delivery,” Johnson pointed out.

“Finally, consumer-facing soup brands targeting seniors may have an opportunity to support and advance corporate social responsibility (CSR) efforts by linking with organisations that help ageing consumers with life’s challenges, including loneliness, loss of mobility, malnutrition and illness. This is a growing social issue and one that resonates with young and old.”

**Market growth**  
Data from Mintel shows the market has enjoyed steady growth across all

soup segments: dry soups enjoyed value growth of 2.7% in 2015, versus the prior year, while wet soups experienced value growth of 4.4%, with increases coming from both shelf-stable (3.9%) and chilled (5.9%) formats.

The top three major soup players, Ajinomoto Co, Nagatanien Holdings Co, and Sapporo Holdings Limited. However, Japan’s soup market leaders have not explicitly focused on NPD for senior populations, leaving the door open for others to gain a foothold in the space. “Indeed, only about 2% of new soups in the three years ending October 2016 have been targeted for seniors,” said Johnson.

“Senior-targeted soup NPD in Japan has been led by Meiji Holdings, with its Yawaraka Shoku wet pouch-packed soups for frail and ailing seniors. Likewise, Maruha Nichiro Foods has introduced wet soups targeted for seniors who may have chewing and swallowing difficulties. These soups are retailed in updated pouches with beautiful soup graphics that convey quality and universal appeal, as opposed to looking like a medical product.”

## Gluten-free market to grow faster than ever

By Noli Dinkovski, Food Manufacture UK 23-Feb-2017

The gluten-free market is predicted to grow at a faster rate than ever before, and be worth



Image © iStock.com/chameleonseye

**\$5,279M by 2022, a research body has claimed.**

Valued at \$3,126M in 2015, the market is projected to grow 7.5% annually from 2016 to 2022, according to Allied Market Research (AMR). Gluten-free bakery products currently dominate, occupying approximately half of total market revenue in 2015.

Increase in working women Growth could be attributed to an increase in the number of working women as well as increases in per capita disposable incomes globally, AMR said. The promotion of health and wellness, improvement in marketing activities, and growing awareness about coeliac disease and other allergies were also behind the growth, it added. However, price sensitivity was expected to remain a factor.

## Indian shrimp production to benefit from rebalancing of global seafood supply and demand: Rabobank

By Jane Byrne, Food Navigator Asia 01-Mar-2017

India’s shrimp exports could benefit as China’s dominance as a seafood exporter is set to gradually diminish, says Rabobank.

China has been the main contributor to seafood supply for the world, but it will, over the coming years, become the largest importer or, at least, lose its positive net trade position, said Gorjan Nikolik, aquaculture industry



Image © iStock.com/hadynyah

analyst, Rabobank's food and agribusiness research and advisory division. "This is the single biggest dynamic in the seafood industry today," he told us.

Image © iStock.com/  
Diana Taliun



The Chinese aquaculture industry and seafood reprocessing is slowing down, at best, or, at worst, contracting - there are concerns with its competitiveness in the export and domestic market due to increasing labour costs and disease, said Nikolik. While its aqua feed output is now the biggest in the world, that too will start to decelerate, he said.

China is one of the most rapidly ageing nations - its population growth slowing down due to single child policy: "From now on, there will be three to four million working population less every year in China, so it won't have the labour force necessary to support expansion of its domestic aquaculture sector," said Nikolik.

Rising income, still growing at 8% per year and higher than nearly any other country in the world, has seen food expenditure in China predicted to hit over \$500bn by 2025: "Chinese consumers have the willingness, ability and opportunity to buy seafood, especially imported seafood more than ever before. This will only increase."

Food scandals have also undermined the domestic food industry and support import demand, especially for fish and proteins - a recent incident where 40-year-old frozen meat was illegally smuggled into China has only served to underline that lack of trust in domestic food production, he said. It followed other incidents - in 2013, 16,000 dead pigs were found floating in a Chinese river.

"Pollution of water and land further undermine domestic supply and ability to export especially in terms of farmed seafood. The government is getting

tough on pollution in aquaculture," said Nikolik.

Though a suitable supply chain is still lagging to store and distribute large quantities of seafood imports, improvements are on the way: "China's cold chain infrastructure is growing by 15-30% annually," said the analyst.

#### Who will step into China shoes?

Eventually, this transformation will lead to new, dominant seafood export countries. There will be a great rebalancing of global seafood supply and demand, predicted the analyst. However, which countries will, in the main, benefit? "The first to become major seafood exporters are other developing Asian countries with large aquaculture sectors including Vietnam, India, Thailand, and Indonesia. However, long term, Brazil will also play a big role," said Nikolik.

Vietnam, as the current backdoor to China in terms of 'unofficial' seafood imports due to China's import tariffs on seafood products, would be a direct beneficiary. Pangasius, shrimp and tilapia production in that country is growing: "And this year alone China is expected to be Vietnam's largest pangasius market," said Nikolik. Indonesia will indirectly benefit through more sales to Europe and North America, he said.

China is likely to become India's third market for shrimp exports after the US and Europe: "It has been difficult to calculate what the actual levels are of seafood imports into China after years of inflation of domestic seafood production numbers by the Chinese government, but it is likely to be

50% self-sufficient in shrimp," said Nikolik.

Although China is a major producer of shrimp, probably still the biggest in the world today, especially if freshwater shrimp is included, they have been only a mid-size exporter, added the analyst.

"In shrimp, China is mostly losing their own domestic market to imports, including Indian product, but Ecuadorian or wild Argentinian shrimp have major exports to China. In tilapia, they are the number one exporter and in frozen fillets had 80% of the export market just a few years ago. In that sector, the Chinese industry is losing their market share in export markets such as in the US - here Vietnamese pangasius is the key competitor," he said.

#### Shrimp boon in India

Indeed, India might be the biggest shrimp producer in the world in the next two years, said Nikolik. Renewed global demand for disease-free, healthy shrimps from India, over Southeast Asia, has made Indian shrimp exporters revise their projection for a year-on-year export revenue growth of 15-20% in FY17, writes the Business Standard.

India, it noted, has benefited as shrimp production in Vietnam, Thailand, Indonesia and China has been hit by diseases, labor and production issues. States such as Andhra Pradesh and Odisha have also opened up opportunities for aquaculture farmers to bring more areas under shrimp production, according to the article.

#### Thai shrimp challenges

Thailand's shrimp production is facing more disease challenges. Six months ago, analysts believed recovery was well underway in that shrimp market following the impact of early mortality syndrome (EMS), but the industry is now contending with EHP disease, said Nikolik.



“Around 350,000 tons of shrimp production was forecast for 2017 compared to 219,000 tons recorded in 2016, as the industry had got EMS under control or could deal with it better. “However, EHP disease has become a problem so recovery will be more gradual - around 300,000 tons of shrimp is now forecast for Thailand in 2017.”

### Indian SMEs need export support and technology partners, not purely cash investment

By Gary Scattergood, Food Navigator Asia 08-Mar-2017

Driving exports to Japan and securing new technology partners for manufacturers and suppliers should be the main priorities for the Indian food processing sector, according to exhibitors at FoodEx Japan.

These priorities seem to differ somewhat from the Indian government’s efforts to entice Japanese firms to enter and invest in the Indian market.

On a three-day trade mission to Tokyo ahead of this week’s FoodEx Japan show, India’s food processing minister Harsimrat Kaur Badal said Indian marine products, fruits and vegetables, as well as non-GM foods, were areas where Japanese firms should consider investment possibilities. “Japan is a saturated market. Its food processing sector does 60 per cent of its business outside Japan. But only 11 per cent of this is with India. There are only 12 Japanese companies operating in India,” she said, adding that India’s infrastructure offers foreign companies the opportunity to quickly make gains in the market.

But the Indian SMEs showcasing their wares in Tokyo at this week’s FoodEx Japan show highlighted other priorities for the food processing sector. According to K.



Rakesh, director at Hyderabad-based superfoods firm Kilaru Naturals, technology partnerships and exports are far more of a priority than hard cash investments. The quinoa, flaxseed and chia seed manufacturer and supplier said he would be interested to collaborate with international partners, especially around extracting chia seed oil, but argued Japan offered more in the way of export potential than investment.

“We are seeing Japanese consumers becoming more health conscious, and while the knowledge of chia and quinoa may still be niche, it is definitely growing,” he said. “For example, we are seeing high-end restaurants using quinoa for sushi instead of rice, so we are optimistic that we can have success in Japan. We already export to South East Asia, but Japan is our next big target. For us, that’s much more important than getting investment from Japan.”

#### Self-sufficient

He said the importance of exports was underlined by the fact that one-third of the 650 tonnes of quinoa the company harvested was exported, while nearly 70% of its 300 tonnes of quinoa went overseas. Fellow exhibitor and boss of Gujarat firm Asian Spices agreed that exports to Japan should be given as much attention as investment from the country. “We are pretty much self-sufficient and have our own manufacturing site with high-tech processing

facilities. We already export to the UK and Malaysia, and, for us, Japan is coming next.”

Similarly, while Tamil Nadu company Port City Impex said investment into India should always be welcomed, it was export potential that had attracted them to Japan. “We have high hopes for our curcumin products and essential oils ingredients, because spices and curries are already part of the Japanese culture,” said S. Vignesh Surya. “The government will always do what it has to do and can take care of investment, but we need to focus on exports.”

### Noodles as a nutrient vehicle: Research reveals how instant snack is suitable for fortification

By Millette Burgos, Nutra Ingredients Asia 16-Mar-2017

Fortifying wheat flour used for making instant noodles has the potential to improve nutrient intakes in Asia, a review showed.

With demand for instant noodles in the region continuing to grow, researchers have said there is a strong case for fortification. They point out that fortified instant wheat noodles retain most of their nutrients after cooking, and a review of various studies revealed that vitamins or minerals added to the flour does not significantly alter the noodle’s taste or texture.



“Before any food is fortified with vitamins and minerals to improve the nutrient intake of a population, several factors should be considered: potential for impact, nutrient retention and bioavailability, sensory changes, efficacy and effectiveness,” researchers from Tulane University School of Medicine, Emory University and Food Fortification Initiative wrote in the *Asia Pacific Journal of Clinical Nutrition*. “The documents revealed that instant noodles produced from fortified wheat flour have potential to improve nutrient intakes, have high retention of most nutrients, and provoke no or minimal changes in sensory characteristics.”

Data for the review were based on 14 relevant documents culled from seven databases. From the reviewed documents, researchers found nutrients mostly used to fortify wheat flours include iron in the form of NaFeEDTA, ferrous sulfate, ferrous fumarate, electrolytic iron, encapsulated elemental iron, and encapsulated ferrous fumarate, as well as folic acid, vitamin B-12 (cyanocobalamin), vitamin A palmitate, zinc oxide, thiamin, riboflavin, and pyridoxine. “The retention studies repeatedly show that for folate, riboflavin and pyridoxine added to instant noodles, more than 75% of the nutrients are retained throughout processing and cooking while almost all iron is retained after production and storage.” On the other hand, thiamin does not retain well, where losses after cooking range from 45-80%.

#### Stable shelf life

Researchers also studied sensory evaluations on fortified noodles done in Malaysia, Philippines, Thailand and Singapore. “Fortification of wheat flour with iron and other nutrients minimally influenced sensory attributes of instant noodles made from the flour and did not decrease the shelf life



Image © iStock.com/ChesireCat

except when stored above 30°C for more than 12 months,” they reported. While the reviewed documents revealed findings on nutrient retention and sensory evaluations, researchers noted that there were no trials examining fortified noodles’ efficacy, bioavailability nor the effectiveness of fortified instant noodles in improving a nation’s nutrition status.

Instant noodles may not be the most healthy food vehicle to encourage increased nutrition intake, but regulators need to consider what food would appeal to more people, the review said. “To reach national-scale coverage of the benefits of fortification, the best foods to fortify are centrally processed foods that are widely eaten, including by the poorest populations. Sometimes this means fortifying foods that are not deemed healthy,” researchers noted. “For example, salt intake is associated with high blood pressure and cardiovascular disease, yet it is the optimal vehicle for increasing iodine intake. In the same way, fortification of wheat flour used to make instant noodles can make an important contribution to increasing micronutrient intakes as instant noodles are widely eaten.” Researchers said instant noodle manufacturers should also be urged to further reduce the sodium and fat content of their products. They concluded: “Given the rising consumption of instant noodles, production of this item with fortified wheat flour has potential to improve nutrient intakes in Asia.”

## Probiotic aimed at lactose intolerance debuts on market

By Hank Schultz, Nutra Ingredients USA 16-Feb-2017

A probiotic developed by a pharmacist has debuted on the market with the claim to alleviate the gastric distress caused by lactose intolerance.

The product, called Lacto-Freedom Probiotic, was the brainchild of New Jersey pharmacist Kenneth Manzo. He started working on the idea more than a decade ago and went to Torrance, CA-based microbiology firm Celprogen to acquire a specific strain that would accomplish his vision. “It is a proprietary strain of *Lactobacillus acidophilus*. It produces a lot more lactase than a run of the mill strain would of the type you would find in stores,” Manzo told NutraIngredients-USA.

Lactose sensitivity is a common health challenge which results from the inability to properly digest lactose, a sugar found in milk and other milk products. This is caused by the deficiency of lactase, an enzyme in the human body which is normally produced by the cells lining the small intestine. After consuming food that contains lactose, people with lactose sensitivity regularly experience abdominal pain, bloating, gas, diarrhea, and nausea. The discomfort can range from mild to severe, depending on the quantity of lactose consumed and the tolerance level of the person.



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“People who are lactose intolerant can just avoid dairy products. That’s relatively simple to do. Or they can take a pill providing lactase before every lactose-containing meal,” Manzo said. “But sometimes you don’t know if there will be lactose in a meal, such as if you are eating out or having dinner with friends,” he said.

Manzo says that after a 7-day course of treatment, the probiotic strain survives in the gut and continues to pump out additional lactase for weeks after. Data from a pilot test run by Celprogen on eight subjects showed a ‘discomfort score’ that averaged a score of 8 before the test and went to zero at week three and only started to rise again at the eighth week after using the product.

There is a potentially large market for Manzo’s product. The product is currently for sale on Amazon for \$24.99 for a 7-day supply. Lactose intolerance as a percentage of population is highest in people of East Asian ancestry, with the vast majority exhibiting the condition.

A majority of African Americans reportedly also suffer from the health challenge and a significant portion of the Hispanic population does as well. Lactose intolerance is lowest in people of Northern European ancestry. Lactose intolerance can also develop as people age, regardless of their ethnic background.

### Study on 3D cheese printing offers possibilities

By Jim Cornall, Dairy Reporter  
15-Mar-2017

A study led by researchers at the School of Food and Nutritional Sciences, University College Cork in Ireland, says 3D printing of processed cheese has implications for customized nutrition.

The findings, published in the Journal of Food Engineering, include the discovery that the printed cheese was softer, less sticky and had increased ‘meltability.’ The 3D printing was investigated using a commercially-available processed cheese as the printing material. The objective of the research was to understand the influence of the 3D printing process (melting, extrusion and solidification) on the textural, rheological and microstructural properties of commercially-available processed cheese.

#### Methods

Untreated cheese, melted cheese and printed cheeses (extruded at rates of 4 or 12 mL/min) were investigated. After melting at 75°C for 12 minutes, the processed cheese was printed using a modified commercial 3D printer at low or high extrusion rates. Comparative assessment of untreated, melted and printed cheeses was conducted employing texture profile analysis, rheology, colourimetry and confocal laser scanning microscopy (CLSM).

The study showed both melted and printed cheese samples were significantly less hard, by up to 49%, and both exhibited higher degrees of meltability, ranging from 14% to 21%, compared to untreated cheese samples. Hardness of cheese was significantly decreased by the combination of melting and printing, with decreases of 45–49% for printed

cheeses compared to untreated cheese.

The authors say the shearing effects of the 3D printing process had more significant effects upon the textural properties of processed cheese than the melting process alone. Disruption of the protein phase, and alteration of fat globules in terms of size and morphology, resulted in softer textures and more easily meltable cheeses, apparently due to a weakening of the protein network.

Higher adhesiveness in printed cheese samples and less sticky properties can be explained by increased quantities of surface fat released while shearing the sample, the researchers noted.

#### Potential for study

The 3D printing of food, the authors say, offers many possibilities for customized nutrition, including flexibility in geometries, textures and flavours. However, they noted the fundamental principles underlying how this process affects food microstructures and consequently, sensory attributes, need to be further investigated to allow for greater diversification in more application areas.



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# REGULATORY NEWS

## More research may be needed in antibiotic resistance from farm to fork

IFT Weekly March 1, 2017

In a study published in *Critical Reviews in Food Science and Nutrition*, a team of interdisciplinary scientists examined published literature for evidence of a relationship between antibiotic use in agricultural animals and drug-resistant food-borne *Salmonella* infections in humans.

According to the 2013 U.S. Centers for Disease Control and Prevention (CDC) Antibiotic Resistance Threats Report, two of the 18 pathogens that are of concern in the United States may have a direct link to agriculture—one of them being *Salmonella*.

The researchers reviewed 104 articles in the United States, Canada, Denmark, Scotland, and Ireland over the past five years. Animals included in the reviewed studies were chicken, turkeys, pigs, beef cattle, and dairy cows.

The overall prevalence of *Salmonella* and drug-resistance found in the systematic review aligns with recent National Antimicrobial Resistance Monitoring System (NARMS) reports. The 2013 NARMS report showed that 81% of the *Salmonella* from human infections carried no resistance to any antibiotic, while *Salmonella* resistance rates in animals vary by the antibiotic tested.

The results of the review brought to light important concerns about *Salmonella* and demonstrated that more research in this area is needed. For example, six articles showed increased antibiotic resistance in organisms derived from animals, not retail meats, used in conventional farming, versus those from antibiotic-free operations. No studies were found that followed animal-associated antibiotic resistant isolates from farm to retail products.

“While there were some studies worth noting in our review, it is most apparent that there is a greater need for a more robust data collection system and heightened publication expectations in the United States for transparency in antibiotic usage in both animals and humans,” said Kristi Helke, lead scientist from the University of South Carolina. “There is still much more research to be done. The agriculture and healthcare industries must work hand-in-hand with the scientific community, government regulatory agencies, and human health community in order to ensure safe, humane, and affordable food sources to the public.”

## 96% of Indians dissatisfied with e-commerce labelling laws

RJ Whitehead, *Food Navigator Asia*, 21 May 2017

Almost all of the thousands of respondents to a recent Indian survey on e-commerce supported legislation to force sites to reveal

logistical details of the products they sell.

LocalCircles, a “platform for citizen engagement”, found that 96% of the 10,000 consumers who voted in its poll wanted ecommerce retailers to outline the manufacture and expiry dates of their foods.

Though it is hard to be surprised by the survey’s results, whereby it is natural for consumers to call for greater safeguards on food, the poll has brought to wider attention the limitations of e-commerce laws. LocalCircles said it would pursue the issue with Indian food-safety authorities. “We will be taking up this issue shortly with the [Indian regulator] and the Department of Consumer Affairs, requesting them to take immediate action on this matter so all e-commerce sites and their sellers of packaged foods comply with this ask by the consumers,” the online group said in a statement.

In its analysis, LocalCircles claimed the results stemmed from poor standards employed by a number of e-commerce vendors, adding that many customers reported buying goods were close to the end of their shelf-life. Adding dates and MRP would bring online food purchases in line with conventional retailers, and would serve to increase trust in the channel, it added.



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## European Parliament debates cardiovascular disease: Poor diet remains Europe's biggest killer

By Louis Gore-Langton, Food Navigator 28-Feb-2017

Public officials and researchers will debate today at the European Parliament in Brussels, following a damning report on the damage and cost of cardiovascular diseases (CVDs) in Europe, of which poor diet remains the main culprit.

The debate will focus on statistics and findings of the report, published recently by the European Heart Network (EHN). Despite a drop in deaths from heart disease and strokes, CVDs remain the number one cause of death in Europe, accounting for around 1.8bn deaths per year.

The public financial cost is estimated to reach €210 billion per year within the EU. Of this, healthcare costs account for around 53% (€111bn), loss in productivity for around 26% (€54bn), and 21% (€45bn) on informal care of CVD patients. The debate is aiming to spur more integrated national action on CVD prevention.

### Diet remains biggest killer

Dietary factors were found to be the greatest contributors to CVD-related deaths across all age groups and sexes. Mairead McGuinness, co-chair of the Members of the European Parliament (MEP) Heart Group, said: "With obesity levels rising and diabetes increasing in

Europe (in some countries by more than 50%) it is unlikely that the burden of cardiovascular disease, both in terms of human suffering and economic costs, will decrease.

Our focus must be on prevention of heart health problems and identifying those at risk from heart disease early on. This requires a firm focus in member states on health promotion rather than treating problems as they arise. If we could achieve this focus on prevention then there would be reduced suffering for patients and reduced costs for member states."

Obesity levels in the UK for example are currently at 68% for men and 58% for women according to national statistics. The cost of this burden in the UK alone – according to a Kantar study in 2016 – is around €32bn per year.

The EHN report also showed that whilst fruit and vegetable availability and consumption has largely risen throughout Europe, fat consumption has also risen by an average of 20 grams per person per day since 1998. This trend was driven largely by a steep increase in Eastern Europe, whose fat consumption rose 22% in just ten years between 2001 and 2011.

Karin Kadenbach, co-chair of the MEP Heart Group, said: "If we want to be able to keep up the high living standard, the European Union has to put policies in place which reduce social and economic inequalities between different regions and countries in the EU and help people with chronic diseases to best manage their conditions."

Efforts to combat foods high in fat, sugar and salt are continuing to gain momentum in the EU with increasing taxes being levied on sugary drinks and tighter restrictions being placed on product advertising.

## Draft guidance on using juice as colour additives reopened for comments after transparency complaints

By Elizabeth Crawford, Food Navigator USA 01-Mar-2017

FDA is reopening the comment period for its draft guidance on the use of fruit and vegetable juice as color additives after several industry stakeholders complained about a lack of transparency into the basis of the guidance.

The draft guidance, originally published during the busy end of the year on Dec. 14, appears to be based in part on "informal interpretation letters to individual companies" from FDA responding to questions about whether color additives from plant materials meet the specifications in the fruit and vegetable juice color additive regulations, notes the International Association of Color Manufacturers in a Jan. 5 comment to the agency. The full letters were not included in the draft or as supporting documents. Rather, they were merely listed in a table with a final yes or no verdict, which PurColour, Inc., complains in a Feb. 1 letter "is insufficient information to formally respond to the draft guidance."

It adds that it "respectfully requests the information and supporting documents regarding each plant material to be made publically available for review."



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IACM also requested access to the letters with a formal Freedom of Information Act request – a process that can take much longer to fill than the 30 days the association suggested would be sufficient to receive and review the letters and file comments.

The Grocery Manufacturers Association echoed IACM's request to review the letters, however, in its comments the association asked for an additional 60 days to comment. The agency is effectively giving more time than both requests as it was unable to extend the original comment period, which ended Feb. 14. Rather, the 60-day count-down for the new deadline will begin March 1 when the extension notice is published in the Federal Register, according to FDA.

### Guidance seeks to clarify confusing terms

In the draft guidance, FDA attempts to clarify key terms in the regulations that it says have confused industry, including fruit, vegetable, mature, fresh, expressing the juice, edible and other terms. It stresses in a Constituent Update published Feb. 28 that just because “a plant material can be eaten does not necessarily mean that juice from such plant material meets the specification of these regulations.”

In the draft guidance it further explains “there may be circumstances under which a fruit or vegetable that is normally regarded as edible should not be used as a plant material for producing fruit juice or vegetable juice color additives. For example, a plant material could contain a pesticide chemical that is unsafe” under the regulation. Or, it adds, “the plant could be grown under environmental conditions which cause the plant to produce a deleterious substance which could cause detrimental health effects.”

The agency concludes in the

guidance that if a company is unsure if a color additive from juice complies with the regulations, it should consult with FDA's Office of Food Additive Safety.

### Antibiotic overuse is target for action

By Rick Pendrous, Food Manufacture UK 02-Mar-2017

Experts from the European Food Safety Authority (EFSA) and the European Medicines Agency (EMA) have called on the food supply chain to reduce, replace and re-think the use of antimicrobials in animals to address the problem of antimicrobial resistance (AMR), which is one of the world's most pressing public health issues.

EFSA and EMA have reviewed the measures taken in the EU to reduce antimicrobial use in animals. While recognising there is no ‘one-size-fits-all’ solution to the problem, they have stressed that to be successful, strategies need to follow an integrated, multifaceted approach, which take into account local livestock systems and involve all relevant stakeholders – from governments to farmers.

Last month, EFSA and the European Centre for Disease Prevention and Control (ECDC) published their annual report on the levels of AMR in food, animals and humans across the EU. EFSA, EMA and ECDC are also working on a report that assesses the link between consumption of antimicrobials and development of resistance in bacteria found in animals and humans. This is scheduled to be published at the end of July 2017.

Use of antimicrobials in humans

By the end of 2017, the three agencies will propose a list of indicators enabling risk managers to monitor the reduction of AMR and the use of antimicrobials in humans, food-producing animals and food. “There is a need for innovative solutions – we need to find alternative ways to prevent and treat bacterial infections in animals,” said EFSA's executive director Dr Bernhard Url.

Alternatives to antimicrobials that have been shown to improve animal health and, thereby, reducing the need to use antimicrobials, include vaccines, probiotics, prebiotics, bacteriophages and organic acids. Meanwhile, the Red Tractor assurance scheme has bolstered controls on antibiotic use in the pig supply chain in a bid to tackle the threat of antimicrobial resistance.

### Food safety conference

This follows advances made by the British poultry sector. These will be described at Food Manufacture's 2017 food safety conference ‘Food safety 2020: preparing your business for change’, which takes place at Woodland Grange, Leamington Spa, Warwickshire on June 22. At the conference, Reg Smith, agriculture director for Faccenda and chairman of the British Poultry Council's Antibiotic Stewardship Scheme will describe what the poultry industry has been doing to reduce its use of antibiotics.

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## Food safety ministry told 'could do better' in five-yearly report card

By RJ Whitehead, Food Navigator Asia 14-Mar-2017

**A five-year audit has uncovered severe flaws in India's food safety apparatus, with the government's chief auditor accusing officials of botching investigations and employing too few enforcers.**

In its evaluation of the Department of Food Safety, the Comptroller and Auditor General of India (CAG) said that a staff shortage had disrupted the licensing process for food operators. Against the department's own target of more than 200,000 business licences processed in 2015-16, it fell some 150,000 short. Even though an online licensing payment portal had been launched to some fanfare, there was still little evidence of how many businesses had applied for one, the GAG report claimed.

Moreover, it found that no alcohol licences had been issued in that period in Delhi, even though legislation from 2012 made it mandatory for businesses offering wines, beers and spirits to obtain separate licences. But the department's alleged administrative shortcomings appear most worrying. From the report it has emerged that it failed even to prepare a database of food business operators (FBOs) dealing with such essentials as school meals, packaged water and milk.

Without this vast list of manufacturers, restaurants and retailers it would be impossible to launch even the most cursory investigation. The department didn't even have a database of all the outlets where local majors Mother Dairy and Amul Milk were stocked, even though it was

expected to check samples at all of these. Neither did it appear concerned about alcohol licences.

"Audit scrutiny revealed that the department did not cover FBOs dealing in alcoholic drinks and wines in Delhi. They did not check whether the FBOs concerned had acquired the requisite licences or whether these were still valid. The department attributed non-coverage of such FBOs to shortage of staff," the CAG report added.

## Medical foods for blood sugar still blocked by FDA guidance

By Hank Schultz, Nutra Ingredients USA 23-Feb-2017

**The application of a medical foods positioning to the formulation of blood sugar management products continues to be blocked by a final guidance from FDA on the subject. In May of last year the Food and Drug Administration put out a final guidance on the subject of medical foods.**

The category was founded to give companies a way to address certain difficult to treat inborn errors of metabolism, such as phenylketonuria, an inherited disorder in which sufferers must eat a special diet that limits their exposure to the amino acid phenylalanine.

FDA therefore had from the inception of the category a very narrow view of what kinds of products fit the definition. The diseases these products are meant to address need to have a specific dietary component and one that cannot be dealt with by basic modifications to food intake. In the case of phenylketonuria, for example, products must be specially formulated with proteins in which the amino acid has been removed.

Door shut on metabolic disorders But over the years the category has been pulled and stretched by companies that would like to apply it to issues that have a dietary association, but not a specific dietary component. Chief among these are the whole slew of metabolic disorders, starting with metabolic syndrome and working all the way up to full blown diabetes itself. FDA has viewed this development with a jaundiced eye, and with the final guidance it put its foot down.

On the question of whether diabetes mellitus (DM) has a dietary component, FDA had this to say: "There are no distinctive nutritional requirements associated with the management of DM. Essential nutrient requirements for individuals affected by DM are no different than those for unaffected (generally healthy) persons."

And on whether a medical food could be formulated to address the needs of DM patients, FDA said this: "No. Diet therapy is the mainstay of diabetes management. A regular diet can be modified to meet the needs of an individual affected by DM (along with appropriate drug therapy if necessary)."

Duffy MacKay, senior vice president of scientific and regulatory affairs for the Council for Responsible Nutrition, said there has been little development on the issue since the issuance of the final guidance. "Overall there haven't been any major additions to that story," MacKay told NutraIngredients-USA.



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Still, the pull of a medical food positioning remains strong. Medical foods, which can be packaged in a way similar to a dietary supplement, are supposed to be used under the supervision of a physician. In return for the limited markets they were originally supposed to address, the products can make drug-like claims.

“We know that many companies are trying to jam products into the medical foods space,” said Marc Ullman, a New York-based attorney who is of counsel with the firm Rivkin Radler. “They see those drug-type words which is why they want to do it.”

**Missed opportunity**  
Critics of FDA's position on medical foods to address diabetes and other metabolic conditions have the following rejoinder to FDA's blanket order. If diet alone can address these conditions, why are so few people successful in that? Why do so many patients, when first diagnosed with pre diabetes, then eventually end up with full blown diabetes and must remain on drug therapy for the rest of their lives? “It appears that the industry largely disagrees with FDA's interpretation. In the case of metabolic disorders the body has a limited capacity to digest sugars. We think it's a perfect fit for a medical food and a missed opportunity for FDA to take this position,” McKay said.

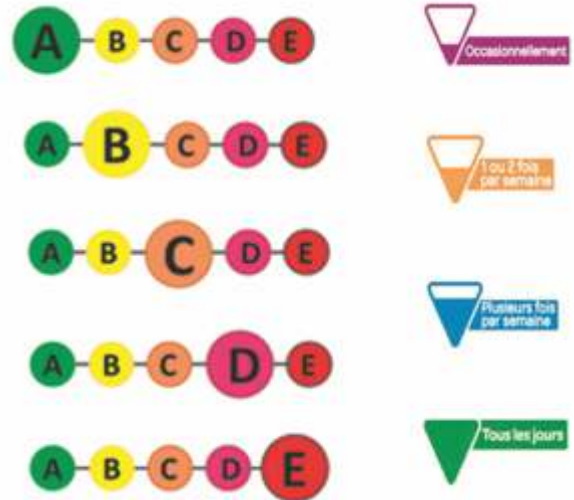
## WHO praises France for 'straightforward' nutrition logo

By Niamh Michail, Food Navigator 24-Mar-2017

The World Health Organisation (WHO) has praised France for officially backing a voluntary, front-of-pack nutrition logo that “clearly stood out as the most consumer-friendly scheme”.

Health minister Marisol Touraine announced that the Nutri-Score, or 5-C logo, had been selected as the most effective front-of-pack label last week. Yesterday the WHO said: “France's recent decision to recommend the Nutri-Score system, a straightforward labelling system that uses colour codes to guide consumers at a glance on the nutritional value of food products, marks an important achievement for nutrition in the WHO European Region. It will build on other ongoing efforts in the country to create healthy food environments.”

“Evidence now from France and elsewhere shows that this type of labelling can contribute to informing healthy choices, meeting growing consumer demands for information on healthier options and limiting the consumption of foods high in energy, saturated fats, sugar or salt, in the context of an overall improvement in the nutritional quality of diets. Rules governing the European Union's single market prevent individual member states from making such front-of-pack labelling



but the UK's traffic light logo has been widely adopted by British supermarkets. France became the second country in Europe to officially recommend colour coded nutrition label, after the UK's Food Standards Agency's traffic light system.

The two differ in that the French logo assesses the global nutrient profile of a food, attributing one colour accordingly, while the UK's traffic light label does so on an individual basis, and could give the same product a green light for its salt content but a red light for saturated fat.

The organisation, a branch of the United Nations, also commended the country's robust use of evidence to inform its decision "including a study that compared the validity of four different nutrient labelling systems and concluded that the Nutri-score system clearly stood out as the most consumer-friendly scheme. Use of the label was also associated with a better nutritional profile of supermarket purchases among study participants".

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