PFNDAI Bulletin June 2010

Editorial

Fresh vegetable and fruit prices have shot up tremendously in the last couple of months. Such common vegetables like bhindi (okra or ladies fingers) have been selling for Rs. 80 per kg and French beans touched Rs. 100 per kg. Fruits are also so expensive. Apples have been selling at Rs. 120 to 140 per kg. Fruit sellers have been sticking a small sticker on each of the apples claiming it to be of some brand or quality and some of the apples are now appearing in individual soft plastic netting pack to prevent it from damage. If middle class is finding it difficult to buy these fruits and vegetables, we do not know what poorer section would be doing.

Secondly, the quality is also nothing to talk about. One could see that these vegetables have seen the better days of their lives (or shelf life). Either there would be plenty of dirt adhering to them, or they would have withered or one could see that some of the spoiled portions have been trimmed off. We also hear about these vegetables being grown by the railways and being irrigated by sewage water.

The humble bananas are also selling at Rs. 40 per dozen. Nowadays, these bananas do not last very long after you purchased them ripe. You can also see them quite attractive and many times uniformly coloured. The truth is that they are now using artificial ripening to ripen the bananas as cities like Mumbai and Delhi need such vast quantities of bananas, it is virtually impossible to transport them in such conditions that they are just ripe while they reach the markets. Even the warehouse costs are skyrocketing so it is now a common practice to bring them in cities raw to prevent the mechanical damage and then ripen them artificially to within a day they ripen and ready for the markets. The only problem is that the cheapest chemical ripener is calcium carbide. Actually ripening artificially is not harmful but using a harmful chemical is dangerous as it may leave residue on the fruit itself and that is harmful.

It is time authority started checking the safety of such practice. There is also a need for evaluating the nutritional quality of such bananas and comparing with those ripened naturally. There is also a need for evaluating the nutritional qualities of various fruits and vegetables available in the fresh market. People are simply accepting these being healthy since they are fresh. It must be remembered that some of these are grown in most unhygienic conditions and there are reports about their very high coliform content. Besides some that come from faraway places are transported over hundreds of kilometres and have been stored for days under ambient conditions that are quite hot in our country. It has been shown that vitamins are very sensitive to environmental conditions and degrade rapidly when unfavourably stored. We still lack the refrigerated transport and further this might drive the cost even higher.

Consumers are still not accepting frozen vegetables although they might be better in quality and at times even in nutritional contents as many big manufacturers get their raw materials directly from the farms and get it transported and stored under optimal conditions before processing to have minimal losses of quality and nutrients. Cost of frozen vegetables may be higher than fresh but we must remember that fresh vegetables after shelling, pruning and removal or inedible parts and spoiled or wilted parts, may become quite comparable in cost. To add to that if we consider the quality and nutrients especially at times when fresh vegetables are expensive and not available in high quality even at high price, then it might be prudent to go for frozen. Our mindset needs to change. We welcome Cargill India, Givaudan India & Gujarat Ambuja Exports in our membership and hope they have a very long and fruitful association. With season's greetings to all

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Cereals & Grains: the Seeds of Modern Civilisation: Part I – Rice:

By Dr. J. S. Pai

Cereals and grains have been the staple foods of many civilisations for thousands of years. Wheat, barley, oats and rye in Europe, maize in America, rice in Asia and millet in Africa have been long consumed and now the whole world consumes them. Cereals are seeds of plants from usually grass family but there are exceptions. They are planted every year although some are planted twice. When the seeds mature, the plant dies down. Seeds could be used again for next crop as in ground in presence of moisture they germinate and grow into a new plant.

Since they contain all the nutrients needed to grow into a plant they are nutritious. In order to make them useful in making many products such as bread, cake, noodle etc. they are usually refined. However, refining also lowers contents of many nutrients so now again products are being prepared with whole grains. Some grains are deficient in amino acid like lysine. However, combining them with legumes the deficiencies could be overcome to get a balanced diet. Examples of these are dal with rice or roti in India, beans with corn tortillas, tofu with rice, peanut butter with bread etc. in other places.

Production

In 1960s, rice was the major cereal with wheat and maize behind it. In 21st century, picture has changed, with maize leading as the largest produced cereal, while wheat and rice are racing for the second and third place. According to FAO Statistics, world production of all cereals in 2008 was over 2.5 billion tonnes of which maize accounted for over 822 million tonnes (MT), wheat about 690 MT and rice over 685 MT. This change is probably due to large increases in consumption of wheat products like burgers, pizza and noodles as well as many corn-based snack products and high-fructose-corn-syrup along with its use in animal feed. Some of the other major cereals produced are barley 158 MT, sorghum 66 MT, millet 36 MT, oats 26 MT, rye 18 MT, triticale 14 MT etc.

India's major crop was rice 148 MT in 2008, followed by wheat 79 MT, corn 19 MT, millet 11.3 MT, sorghum 7.9 MT and barley 1.2 MT. India is the second largest rice producer in the world after China. In 2007, it produced 144 MT compared to China's 187 MT. Some of the other major producers of rice are Indonesia, Bangladesh, Vietnam, Thailand, Myanmar, Philippines, Brazil and Japan. Total cereal grain production in India in 2008 was 267 MT.

Rice Varieties

Rice is the most important human food as it is consumed by the largest population across Asia, South America and West Indies. It was also a traditional crop in Africa but its cultivation dropped during colonial times, however, it helped Africa conquer famine in 1203. Although many products of rice are made, it is mostly consumed as cooked whole grain, while wheat, maize, barley etc. are commonly converted to flours before their products are made.

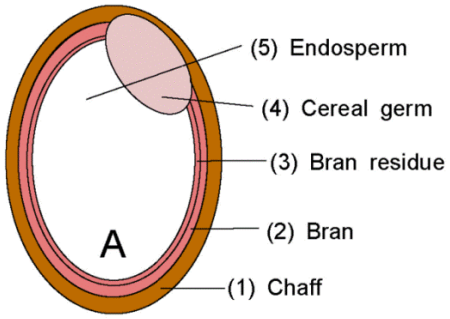
Several varieties of rice are grown in India and other countries. Varieties are chosen for texture, smell, firmness etc. as well as grain shape and size. Normally long grain rice is less sticky. One of the most prized rice variety is Basmati, which is a long grain rice grown in India with characteristic extra-long slender grains that elongate further upon cooking yielding delicious taste and aroma. It is so popular in many other countries like Saudi Arabia, UAE, UK, Kuwait, USA etc. that India exported over 1.5 million tonnes in 2008-09 worth almost 9500 crores of rupees.

Processing & Nutritive Value

The seeds of rice harvested from field are rice paddy with outer husk covering the grain. Milling is done to remove first the husk to get the brown rice and then the bran along with the germ to get white rice. Although white rice lasts a long time without spoilage, it lacks many important nutrients. The lower shelf life of brown rice is due to enzyme lipase present in bran that acts on the oil present in the germ producing free fatty acids and rancidity. When bran is removed, not

only B vitamins and minerals like iron are lost, protein and dietary fibre are also lost as bran is rich in those. Traditional hand pounded brown rice is very nutritious. It has more fibre, protein, and B vitamins. However, because of the rancidity it develops, it cannot be stored for long.

The second alternative is parboiled rice, which has been boiled in the husk. Water is added to paddy and it is heated to partially cook the rice within the husk. As bran contains nutrients, partial boiling drives the nutrients from the bran into the endosperm. After drying to remove the added moisture, the paddy is milled husk and bran is removed. As nutrients have been driven into endosperm, parboiled white rice is nutritionally similar to brown rice in many nutrients especially B vitamins.



Nutrients in Different Rice Products

	Moisture	Protein	Fat	Fibre	Carbohydrate	Energy	Calcium	Iron	B1	B2	Niacin	B6	Folate
	g	g	g	g	g	Kcal	mg	mg	mg	mg	mg	mg	µg
Rice parboiled, hand pounded	12.6	8.5	0.6	-	77.4	349	10	2.8	0.27	0.12	4.0	-	-
Rice parboiled, milled	13.3	6.4	0.4	0.2	79.0	346	9	1.0	0.21	0.05	3.8	0.26	11
Rice, raw, hand pounded	13.3	7.5	1.0	0.6	76.7	346	10	3.2	0.21	0.16	3.9	-	-
Rice, white raw milled	13.7	6.8	0.5	0.2	78.2	345	10	0.7	0.06	0.06	1.9	-	8.0
Rice bran (konda)	11.0	13.5	16.2	4.3	48.4	393	67	35	2.70	0.48	29.8	-	-
Rice flakes (poha)	12.2	6.6	1.2	0.7	77.3	346	20	20	0.21	0.05	4.0	-	-
Rice puffed (murmura)	14.7	7.5	0.1	0.3	73.6	325	23	6.6	0.21	0.01	4.1	-	-

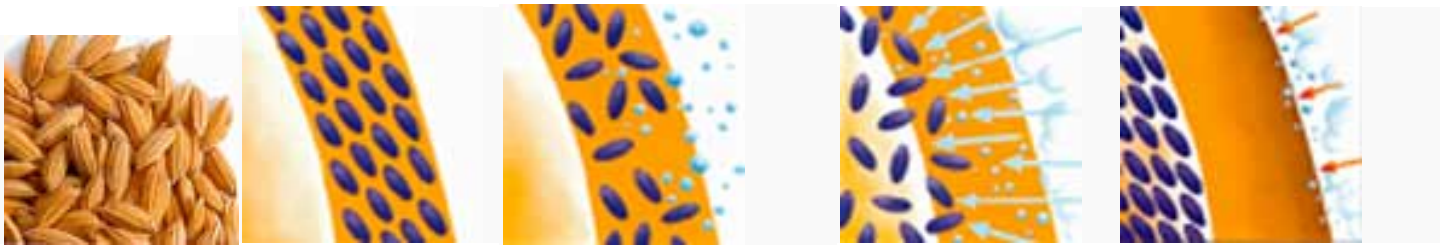
Source: Nutritive Value of Indian Foods by Gopalan & others

Nutrient Values of Rice

		Brown	White	Parboiled
Nutrient	**Units**	**Value per 100 grams**		
Water	g	10.37	11.62	9.7
Energy	kcal	370	365	374
Protein	g	7.94	7.13	8.11
Total lipid (fat)	g	2.92	0.66	1.04
Ash	g	1.53	0.64	0.72
Carbohydrate	g	77.24	79.95	80.43
Fiber, total dietary	g	3.5	1.3	2.2
Calcium	mg	23	28	55
Iron	mg	1.47	0.8	0.74

Thiamin	mg	0.401	0.07	0.224
Riboflavin	mg	0.093	0.049	0.045
Niacin	mg	5.091	1.6	5.137
Pantothenic acid	mg	1.493	1.014	1.133
Vitamin B-6	mg	0.509	0.164	0.455
Folate, total	mcg	20	8	8

USDA National Nutrient Database (2009)



Raw rice (paddy)

Vitamins & minerals in bran.

Warm water makes nutrients soluble & move from bran.

Hot steam pushes nutrients into rice

Parboiled rice retains many nutrients of brown rice.

Starches in parboiled rice become gelatinized, making rice harder and glassier than ordinary rice and it takes more time to cook, cooked rice is firmer and less sticky.

Rice bran is the hard outer part surrounding edible portion i.e. white rice. There is also germ present along with it that contains oil. When rice is milled bran and germ are removed to get the white rice. Bran contains an enzyme lipase that comes in contact with oil and hydrolyses it producing free fatty acids and making the oil unstable. Rice bran is also a good source of dietary fibre and other nutrients like vitamin E, B vitamins, and minerals including iron. If oil is to be recovered for use, bran needs to be stabilized by heating to deactivate lipase enzyme.

Rice bran oil has some advantages from health as well as from processing points of view. It has very high smoke point and mild flavour so it is quite useful for high-temperature cooking like pan frying or deep fat frying. About 47% of its fat is monounsaturated and it also contains phytosterols and oryzanol, which has many health benefits in reducing the risk of heart diseases.

Rice may be cooked and eaten as such. This is the most common form of consumption in most rice eating countries. However, there are other ways too. Rice can be ground into a flour to make beverages including rice milk and sake (rice wine). Since rice flour does not contain gluten it is suitable for gluten-free diet. There are many traditional Indian products made from rice flour that may contain added other flours. Nutritional quality especially of protein improves when rice flour is mixed with legume flour. Idli, dosa, medu vada etc. are prepared after mixing rice and black gram (urad) flour. Legumes also provide dietary fibre that is lacking in cereals especially when they are refined.

Cooked Rice

There is no standard process of cooking of rice as there are not only different varieties of rice including long grain, short grain, brown, parboiled etc. but also some become sticky due to higher amylopectin in starch as well as the cultural practice. Some prefer to boil the rice in excess water and after cooking the extra water that is not absorbed by rice is drained off. Sometimes excess water is not drained off to make a gruel-like product called kanji or congee, which is soft and is sometimes given as traditional breakfast food or food during convalescence. In order to retain most nutrients in rice, it can be cooked in just enough water as it absorbs. This also saves fuel.

Rice may be heated in oil before boiling to make the cooked rice less sticky. Sometimes rice is soaked before cooking to reduce heating as well as stickiness. Instant rice is fully cooked and then dried so all it takes is addition of hot water to it

and allow it to hydrate to make it ready to eat. There is another convenient product that is retort pouch product. Cooked rice commonly in the form of biryani or pulao is also prepared with spices and vegetables along with optional meats and packed in retort pouch and can be kept in room temperature. When needed, the pouch can be heated in hot water and the contents served. Such products are quite convenient when cooking facilities are minimally or not available.

As mentioned above, protein content of rice is between 6.5 to 8.5g/100g of raw rice and there are some of the essential amino acids like lysine deficient as is the case of most cereals. That is why rice is usually eaten along with pulses as dal, which provides good amount of protein with adequate lysine. The protein quality and quantity may also be improved by eating rice with meat, fish, poultry or eggs in the form of curry. There are also some of the vitamins like A and B vitamins and iron may be lacking in predominant rice eating population unless complemented by sufficient green leafy vegetables and/or non-vegetarian items.

Fortification

White rice, although nutritionally inferior to brown or parboiled rice, is preferred by most rice eating population because of its appearance, texture and flavour, a large section of predominantly rice consumers have deficiencies especially in B vitamins. Also many areas where rice is a staple food there are deficiencies of certain micronutrients like iron so there have been attempts to fortify rice.

Rice fortification is more difficult than wheat, since rice is mostly consumed whole while wheat flour is commonly used for preparing wheat based products like bread, roti, biscuits etc. Nutrients can be easily incorporated into wheat flour by simple mixing. Enriched flour is prepared in this way in the US for many decades to ensure that population gets adequate B vitamins. Not only is whole rice more difficult to fortify, the practice of washing the rice before cooking will remove nutrients added in the form of a coating unless they are made to withstand washing. Another precaution needed is to avoid the practice of using too much water to cook the rice and then draining off the excess after cooking. This will also remove not only fortificants but also some nutrients that are inherently present in rice.

White polished rice offers a difficult surface to coat with nutrients. One method is to parboil the rice and after milling when the grain is still hot and moist, to apply powdered nutrient mix that easily adheres to the surface. However, if one washing this rice, nutrients will be lost so the product is labelled not to wash before or drain after cooking to retain added vitamins. To prevent such losses, after nutrient mixture is applied, it is coated with water insoluble material made of various materials including protein, long chain fatty acids, cellulosic materials etc. Using coated grain process, different nutrients including B vitamins, vitamins A and E, iron etc. have been successfully added to rice with losses in washing as low as about 1%. Some iron compounds may either produce colour problems or may react with other nutrients. To avoid this multiple coatings have also been successfully done that would isolate the problematic nutrient.

Since coating technology has certain difficulties, another method has been developed to produce Ultra Rice, in which rice dough is prepared containing nutrient premix. This is then extruded to prepare small rice like pieces that resemble natural milled rice in size and shape and does not break during washing and cooking. Although one can make out differences between this and normal rice, when this Ultra Rice is blended with normal rice at a ratio 1:100, it becomes indistinguishable. Since nutrients are present within the matrix of extruded material it does not get washed away during normal process of rice preparation. This process has been successfully tested in Brazil and is being studied in Indonesia and Philippines. The extruded rice must look like the locally consumed rice in colour, size, shape etc.

Other Products

One of the popular snack or breakfast ingredient is poha or rice flake. Moistened paddy is partially cooked and then put through rolls to flatten the cooked rice. This is further dried. Depending on the variety of rice used as well as the process, thin or thick poha is prepared that could be used for breakfast items like spiced poha with potato or onions or snack items like chivda.

Another popular item is murmura or puffed or parched rice. The process is similar to pop corn. When moistened paddy or rice is heated intensely moisture gets converted into steam that expands the kernel which become very light and brittle. This is also used in snacks like poha and some sweets are prepared from this like chikki and laddu.

Future

Biotechnology may be able to give some solutions to improvement in rice. Already during Green Revolution, high yielding varieties were developed to increase global food production including that of rice. Now the scientists are working on developing genetically engineered rice that would have beta-carotene, the precursor of vitamin A. As carotene gives golden yellow colour to rice, it is called golden rice. Safety may have to be proven beyond any reasonable doubt in order to make it acceptable in rice eating countries.

Risk assessment of Nutrients, Functional foods, Genetically Modified Foods

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During the twentieth century, essential nutrients were discovered and nutrient standards, dietary guidelines, food guides and concept of balanced diet to prevent nutrient deficiencies and support body growth, maintenance and development emerged. Presently the scope has widened from balanced diet to prevent nutritional deficiencies, to food which can maximize physiological functions to ensure well being and optimal nutrition and health, while minimizing the risk of disease throughout life, Regulators world wide are confronted with the challenging task of assessing the safety of dietary supplements, fortified foods, functional foods etc that are invading the market.

In this context the concept of establishing upper safe limit for intake of nutrients has evolved.

The establishment of science based upper levels of intake is designed to protect the consumer from potentially harmful intake. The science based nutrient risk assessment can help regulators in formulating a wide array of science based policies, including food standards and food fortification practices, as well as sensitizing them to the need to take public health action ranging from enhanced education of consumers to restricting access to certain products.

Steps in risk assessment

Classic approach for all non nutrients are four general steps

i) Hazard identification
ii) Hazard characterization
iii) Exposure assessment
iv) Risk characterization

Unlike this approach the risk assessment for nutrients need modification as nutrients are required for physiological functions and have demonstrated favourable impact on health at specified level of intake. This consideration influences approaches used to adjust for uncertainty associated with the data used to estimate an upper level of intake and stresses the need to understand the homeostatic mechanisms specific to essential nutrients as well as their synergistic effects.

For nutrients a clear distinction of hazard identification and hazard characterization may not be possible as these processes are closely interlinked and are iterative in nature. Data derived from these two above steps for non nutrients is applicable to all subpopulations globally. However for nutrients data specific to the sub population of interest are used for dietary intake assessment, and in turn for risk characterization, and therefore are highly population, sub population, group specific. It cannot be generalized. The methodology used to conduct dietary intake assessment and to certain extent risk characterization can be the same in principle.

Therefore for risk assessment following key determinants are used.

a) An adverse health effect in terms of morphologies, physiology, growth, development, reproduction or life span of an organism, system or subpopulation that results in an impairment of functional capacity, an impairment of the capacity to compensate for additional stress or an increased susceptibility to other influences.
b) Hazard which may be inherent property of a nutrient or related substance to cause adverse health effects depending on the intake level of habitual intake which is average long time daily intake of nutrient.
c) The upper level of intake (UL) which is maximum level of habitual intake from all sources of a nutrient or related substance judged to be unlikely to lead to adverse health effects in humans.

For nutrient risk assessment the ULs have to be developed for age/sex/life stage subpopulations. Physiological differences among age and sex groups and during certain stages of the life cycle such as pregnancy or lactation result in different in take – response relationships for the nutrient including different adverse health effects. For example macro nutrient like saturated facts are essential but with incremental intake above certain level is correlated with increased incidence of coronary heart disease. For another nutrient namely Vitamin A there is evidence to suggest that there may be overlap between current recommendations for intake related to

conventional health benefits and emerging understanding about levels associated with risk of decreased bone density and increased risk of hip fracture.

Homeostatic mechanisms for nutrients

This phenomenon is unique to nutrients. Biological systems have inherent tendency to achieve steady state levels. This is facilitated by the control mechanisms controlled by negative feedback. Thus for all essential nutrients, body can regulate absorption, retention, storage and excretion of the substance. For example the plasma concentrations of essential micro nutrients like zinc, calcium are controlled in such a manner that they do not change significantly with changes in intake.

Nutrient related homeostatic mechanisms are responses involving organs like liver, gastrointestinal tract and kidneys as well as enzyme systems, for instance down regulation of metabolic responses. For example, iron levels are determined by increases or decreases in iron stores, vitamin D levels are dependent on renal conversion to active hormone which in turn is regulated by calcium level; calcium absorption in intestine, deposition and release from bone and urinary excretion are under complex control in which active vitamin D hormone plays a vital role.

Both the requirement and excess levels are dependent on nutrient related homeostatic mechanisms which are related to the unique dual risks that are posed by inadequate intake of essential nutrient substance on one hand and by excessive intake of the substance on the other hand. When the levels versus responses are plotted there is an intake response curve associated with deficiency states (left curve) and a second intake responses curve associated with high intakes (right curve).

Effect Biomarkers

Use of biomarkers will help in setting UL and can be used to predict risk due to deficiency and excess intake . The biomarkers can be "factors" represent an event that are associated directly for example folate intake and levels of homocysteine, "indicators" are biomarkers that represent correlated events example high saturated fat intake and cardiovascular risk.

Nutrient hazard identification and characterization

Both the above processes are closely linked and involve the following steps:

a) Identification of adverse health effects associated with intake
b) Selection of critical adverse health effect
c) Establishment of ULs after taking into account uncertainties and
d) Characterization of the hazard and identification of vulnerable sub groups.

Evidence from literature can be used for assessing the adverse health effects. The "Evidence Based Systematic Review" (EBSR) is widely used in generating clinical practice guidelines and in identifying research gaps and needs for specific topics.

Human data

Human data provides relevant evidence for nutrient risk assessment. The data could originate from randomized controlled trials, crossover studies and clinical interventions, observational data such as cohort studies (prospective and retrospective) and case control studies. A design such as double blind placebo controlled trial is generally regarded as gold standard.

Animal and invitro data

These two systems have limited use to assess nutrients. The high levels used for animal feeding could result in nutritional imbalances and cannot be extrapolated to humans as can be done for non nutrients. At the most they can be used to support human data, help in understanding mechanisms.

The nutrient substance hazard identification process should be centered on following points of focus.

- Age, Sex, health and ethenicity
- Study size
- Levels and duration of intake
- Nature and characterization of nutrients
- Diet of the population and the national reference intake

- Intake assessment
- End points and relation between intake and response
- Adverse health effect (biomarker effect or clinically observable effect)
- Confounders (susceptibility, use of medicines) and effect modifiers

Critical adverse health effect and establishment of UL

Human and animal data can be sourced. Invitro data may be useful to support the rationale for a UL established either from animal or human data.

To quantify upper level, the benchmark intake (BI) which is actually the intake of nutrients that is expected to result in a pre specified level of effect . This is also known as bench mark dose (BMD). The No Observed Adverse Effect Level (NOAEL) and Lowest Observable Adverse Effect Level (LOAEL) are used.

Uncertainty factors

These are required for quantitative adjustments like interspecies, inter individual variations, inadequacy of certain pivotal studies and the nature of adverse health effects. These provide assurance that intake levels below the UL are unlikely to pose a risk. These factors are used concomitantly with quantitative adjustment to best account for the full range of uncertainties. Unlike non nutrients where a factor of 100 is commonly used for nutrients. This could be inappropriate, as resulting UL would be a value that is below the intake required to ensure nutritional adequacy. Nutrients like iron, zinc, copper and some times calcium have recommended intakes that are relatively close to intake levels that demonstrate risk. Therefore in nutrient assessment a case by case basis approach is followed while applying uncertainty factors which must be in tune with the established intake requirements. The uncertainty factor would also include scaling according to body weight (BW). However BW should not be used for pregnant individuals and for the elderly.

Elderly persons may have lower body mass then do younger adults but unlike them may have lower metabolic activities. In this context scaling according to basal metabolic rate may be more logical than scaling according to body weight. This is based on assumption that energy turnover and nutrient turnover change together. Except thiamin and niacin, data to show this relationship is not available for other nutrients.

While calculating ULs for children three possibilities are possible.

i) Quantified reference body weight for a particular age group
ii) Body surface area, which is calculated using reference body weight taken to the power of 0.66 ($BW^{0.66}$) or energy requirement, calculated by using the reference body weight taken to the power of 0.75 ($BW^{0.75}$). The formula used is

$$UL_{(child)} = (UL_{adult}) (weight_{child} / weight_{adult})$$

In conclusion, explanation based on scientific evidence may be provided for the selection of the scaling method for a particular nutrient.

Steps in the determination of the Upper Level of intake

The critical adverse health effect (for age / sex / life stage subpopulation) should be identified and NOAEL, LOAEL or BI should be determined. The composite of uncertainty factors should be applied and UL specific for age/sex/life stage sub population has to be calculated after adjusting ULs for above variables. This would give complete set of ULs for relevant age / sex / life stage sub population.

Dietary intake assessment

This is similar to the risk assessment for non nutrients. Quantitative estimate of the intake of a nutrient by subpopulation of interest is needed to estimate the proportion of the sub population that is likely to exceed the UL. This information is combined with data on hazard identification / characterization to describe the risk associated with excessive intake. Nutritionists collect this information and can use composition data, consumption data for individual or household by using different diet survey methodologies.

ULs for inadequately nourished population

Clinical data on high levels of intake of nutrients in under nutrition is limited with few exceptions like that of free iron resulting from reduced transport protein production under condition of Protein Energy Malnutrition.

Another case may be with respect to Vitamin A. Decreased formation of both transport and binding protein may impair the normal mechanism for handling large intakes of vitamin A. Consequently free retinol / retinoic acid could enter the circulation and UL specified for well nourished sub population could be too high for an undernourished sub population. Impairment of absorption in certain people may be another situation, which may be due to ingestion of large amount of phytates that interfere with absorption of certain minerals.

The scenario is even more complex where the ULs for certain groups has to be higher. For example UL for iron may be higher for iron deficient children than iron replete children. Adverse effects from iron therapy in subjects who were iron replete has been demonstrated in India. The situation may be reverse in persons with infections diseases where ULs may be lower as sometimes some nutrients are known to exacerbate infectious responses.

Functional foods

Functional foods are defined as foods that provide additional physiological or health promoting benefits beyond the well established functions of nutrients contained in foods. Some components other than the known nutrients found in natural foods, particularly plant foods (phytochemicals) were found to have specific health benefits. However the intake of nutrients in terms of quality and quantity should match with the unique biochemical needs and genetic predisposition of the individual.

Nature of functional foods

The functional food is basically a natural food to which a component may be added or removed or the nature of one or more components has been modified or in which the bioavailability of one or more component has been modified or any combination of these possibilities. Due to their diversity all functional foods require a case by case evaluation for their safety. This process must include nutritional and toxicological evaluation.

Due to long-term use of traditional foods, people know to manage some adverse effects. However, this experience is lacking when novel foods are consumed. Due to their diversity all functional foods require a case by case evaluation for their safety. This process must include both nutritional as well as toxicological evaluation.

Hitherto concept of food safety has been limited to potential for producing acute and chronic toxic effects or nutrient deficiency. Nutritional assessment of functional food will include the role of diet in causation or prevention of many diseases, ranging from classical nutrient deficiencies to coronary heart disease and cancers which are among the major determinants of human morbidity and mortality. Consumption of functional foods can modify dietary habits that can decrease risks or increase the risks for chronic or other diseases. Table summarises the important factors for substantiation for nutritional safety and efficacy of functional foods which may be novel or not. Most of the parameters of safety evaluation are also applicable to other novel foods, like GM foods.

Table : Factors for Substantiation of Nutrition Safety

S.No.	Factors
1.	Source and origin of food
2.	Nutrient composition
3.	Presence of anti-nutritional factors
4.	Methods of production and / or preparation
5.	Technical specification including preparation

6.	Purpose to indicate rationale behind the development of functional food
7.	Instruction for storage and use including frequency, dose and duration in relation to dietary recommendations
8.	Interactions with other components of diet and bioavailability
9.	Overall toxicological assessment including toxicokinetics, genotoxicity / intolerance
10.	Implications for possible changes in gut microflora
11.	History of safe use
12.	Effect on metabolism and physiological functions in humans
13.	Potential effects on vulnerable groups like infants, elderly, etc.,
14.	Relation to current dietary recommendations / targets

Safety assessment of genetically modified foods using recombinant microbe

Recombinant microbes are used to produce foods or food ingredients that may contain viable or non-viable recombinant DNA microbe. A variety of microbes are used in food production. These organisms have long history of safe use or have been assessed scientifically in a manner that would characterize all potential risks associated with the food that are used to produce, including few situations where there could be consumption of viable microbes.

Foods that contain microbes require focused approach of risk assessment which could include

i) Uses of living organisms in food productions
ii) Consideration of genetic manipulations made in microbes
iii) Methodologies available for safety assessment.
iv) Genetic stability of the microbe, potential for gene transfer, Colonization of the gastrointestinal tract and its persistence, interactions with gut flora and effect on immune system.

The frame work of food safety assessments

The steps for assessment are as follows.

Safety Assessment of food produced using recombinant DNA microbe

1. Description of the recombinant DNA microorganisms;
2. Description of the recipient microorganism and its use in food production
3. Description of donor organism(s)
4. Description of genetic modification(s) including vector and construct;
5. Characterization of genetic modification(s);
6. Safety assessment:
    a) Compositional analyses of key elements;
    b) Evaluation of metabolites
    c) Effects of food processing
    d) Expressed substances: assessment of potential toxicity and other traits related to pathogenicity;
    e) Assessment of Immunological effects:
        - Source of protein

- Amino acid sequence homology
- Pepsin resistance
- Specific serum screening

f) Assessment of viability and residence of micro organisms in the human gastro intestinal tract:

g) Antibiotic resistance & gene transfer:

h) Nutritional modification

The concept of substantial equivalence given in table is applicable to GM foods.

The goal of each safety assessment is to provide assurance that GM food will not cause harm when prepared or consumed according to its intended use nor should the organism itself cause harm when present in food. The assessment should address health status of population, including immuno-compromised individuals, infants and the elderly. The end point would be to conclude if the GM is as safe as its conventional counterpart.

In summary, although food and its active components may be designed and used with the aim of providing positive impact on an individual's health, physical performance or state of health, it should be considered on par with its original counter part from safety assurance point of view. The risk assessment paradigm for functional foods, GM foods and novel foods is more or less similar.

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How to Build a Healthier Savoury Snack

by Mark Anthony

Savoury snack industry will touch $10 billion by 2012 as per Business Insights. Consumers are now looking for more natural and organic ingredients, spices and exotic ethnic touches while asking for fewer additives like MSG, hydrolysed proteins and hydrogenated oils and want them healthier. Americans want all these without sacrificing crunch and flavour.

Several manufacturers are putting new face on snacks. One is appropriately named Sensible Portions that presents a wide range of "better-for-you" snacks, including "all-natural" choices such as multigrain crisps, pita crackers and pita chips. In addition to convenient packaging that gives built-in portion control, ingredients like whole grains, soy protein, vitamins, iron and fibre are included and trans fats, saturated fats and cholesterol are avoided. It provides a healthier feel to snacking that is highly marketable.

Another new face provides alternatives to chips from wheat and corn flour, specifically beans. The product mixes pinto beans or black beans with whole grain rice and flax seeds to create bean dough that is cut into round shapes, baked and flash fried in vegetable oil. The result is unique, fibre rich chip – Beanito with high amounts of omega 3 fatty acids. It is difficult to make a bean-based chip that tastes great.

Another range of products is "heart-healthy snacks". One company introduced reduced fat potato chip with plant sterols in early 2008. The company claims that phytosterols have been shown to inhibit the absorption of cholesterol in the small intestine by up to 50%, which in turn can lower LDL blood cholesterol by up to 15%. The flavours are also novel like Italiano Four Cheese, Spicy Rio Habanero, Mediterranean Garlic & Herbs, and Pacific Rim Barbecue etc. Later they introduced tortilla chips with phytosterols and this year oatmeal squares (cereal bars) with phytosterols.

Ultra thin, crispy, fried potato chips have also undergone improvement. One company reduced the fat in chips and spiked them with Mediterranean flavours with no preservatives, trans fats or saturated fats. Company says that customers are looking for better-for-you snacks and they still want to indulge but want to take the guilt out of snacking. They are becoming aware of nutrition and good eating habits and now recently with obesity in children.

Keeping it natural

Getting healthy snacks to taste "just right" is an R&D project needing consideration of many variables. The trend is to incorporate efficacy without affecting taste, colour and shelf life that involves technical challenges. An example is probiotics that is popular but to keep them active is a challenge as they are fragile. Many companies are developing microencapsulated probiotics that can survive harsh conditions of processing, maintaining their viability in finished snack.

There is a lot of interest in antioxidants too. To address this, a new functional antioxidant from rosemary, a highly concentrated carnosic acid ingredient is developed by unique processing. Using natural antioxidants has two perspectives.

It serves as processing aid for savoury snacks providing protection for fat that most savoury snacks contain and extending the shelf life naturally by replacing commonly used synthetic antioxidants making the snacks valued-added, healthier products. The same principle applies to probiotics, omega oils and other functional ingredients and changes the perception of snacks as a not-so-healthy daily choice especially for children.

The processors must however remember that some of these trendy ingredients are unstable, losing activity and deteriorating or oxidising when exposed to high temperatures. Processors must be aware of the processing limitations and organoleptic influence of such ingredients when using them. There are many sources of functional ingredients available but some do not comply with the regulations, for instance where solvent residue or other contaminants are concerned. So choice of these ingredients should not only be based on price but also on whether they comply with safety regulations.

Convergence of criteria

Maintaining taste and texture of the original product is critical to the success of healthy savoury snacks. There is a trend to use functional ingredients in savoury snacks which are brand extensions of existing products. Tomato-based carotenoids like lycopene can provide both nutritional and colour enhancement to savoury products. Some ingredients are also used to reduce the amount of sugar or salt in snack foods. Taste and flavour of nutraceuticals must also be considered besides processing and stability issues before these ingredients are used. Other issues to consider are cultural and regulatory.

Rancidity and contamination are major concerns and offer significant challenges when incorporating new ingredients. Steam sterilisation is used to treat whole ingredients in organic process as an alternative to ethylene oxide. Here not only effectiveness against microbes but also no change in colour or taste of material as well as volatile oil needs to be considered. One classic Mediterranean product hummus, made from chickpeas (Bengal gram), olive oil and spices is being rediscovered as a healthy snack and convenience is being incorporated into it so it can be obtained from vending machines.

Nuts for nuts

Use of nuts in healthy snacks has continued to rise including staples like almonds and cashews as well as exotics like pistachios and hazelnuts. Skinless almonds and cashews are roasted with real herbs and spices for extraordinary flavour. One line of almonds has been released with low-sodium sea salt, salt and vinegar and bold wasabi soy variants. Another nut company introduced snack nuts that are gluten-free with all-natural ingredients and some organics like cocoa, vanilla extract and coconut.

Peanuts can support and complement a vast range of spices and flavours. To Chef Paul, peanut is a canvas upon which one can display works of art, delivering healthy snacks. Fat in peanut is also healthy which can help lower LDL cholesterol and risk of cardiovascular disease. It is an excellent source of protein.

Condensed from: FoodProcessing.Com May 20, 2010

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Research in Food & Nutrition

Antibiotic Use Linked to Resistant E. coli in Kids

Direct and indirect exposure of young children to antibiotics through medical and agricultural usage can increase their risk for carriage of resistant E. coli, according to a new study published in the *American Journal of Tropical Medicine and Hygiene*. The study, conducted by the Johns Hopkins Bloomberg School of Public Health, revealed several factors affecting antibiotic-resistant E. coli carriage in young children in Peru. By analyzing E. coli samples from more than 500 children, the researchers were able to identify individual, household and community factors influencing carriage of the resistant bacteria.

"In analyzing the study results, we learned that children's use of antibiotics, as well as their family members' use, increased their risk for carrying resistant E. coli, and that residing in an area where a greater proportion of households served home-raised chickens protected against resistance. This protective effect can be understood in light of the fact that the home-raised chickens carried significantly lower levels of resistant E. coli than did the market chickens, which in Peru are intensively raised with antibiotics. The strength of this community level variable suggests that this is where the transmission of resistance resulting from agricultural antibiotics use was taking place," said lead study investigator Dr. Henry D. Kalter, associate, Department of International Health, Johns Hopkins Bloomberg School of Public Health."

In poor communities in developing countries, with inadequate protection of excreta and water, contamination of the environment with antibiotic-resistant bacteria appeared to play at least as great a role in children's carriage of resistant E. coli as did the children's own antibiotics use.

"This study is important in a number of respects," said Edward T. Ryan, MD, president of the American Society of Tropical Medicine and Hygiene (ASTMH). "It improves our understanding of the growing global public health threat of antibiotic resistant organisms, and underscores the critical role that antibiotic use in animals plays in contributing to this threat. The vast majority of the tons and tons of antibiotics ingested each year on this planet are administered to livestock and animals. This study clearly shows that such use comes with a very real cost to human health."

May 4, 2010 Food Product Design

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Boosting Nutrition Values in Corn

Agricultural Research Service (ARS) researchers and colleagues at Purdue University and the International Maize and Wheat Improvement Center (CIMMYT) have identified two genes in corn that are linked to higher beta-carotene levels, and developed a cheaper and faster way to screen corn plants for more genes that will produce even higher levels of the essential nutrient. The research is expected to at least triple the levels of carotenoids in Africa’s corn and could increase levels in some varieties far beyond that, according to Edward Buckler, a geneticist in ARS’s Robert W. Holley Center for Agriculture and Health in Ithaca, N.Y.

Researchers surveyed the genetic sequences of diverse corn from around the world and found two naturally mutated genes, each producing an enzyme at lower levels than those found in most corn varieties. Plants with either gene mutation have higher levels of beta-carotene, and plants with both mutations have higher levels still. After genes are identified via association mapping, markers can be developed from these genes to allow for marker-assisted selection, which is much simpler, faster, and “up to 1,000-fold cheaper” than running the types of chemical tests previously used, Buckler said.

Scientists in developing countries now can cross the newly identified high beta-carotene lines with local varieties and, applying the markers developed from these two genes, choose progeny that are adapted to local growing conditions but still retain high beta-carotene. The team hopes supplying corn with high beta-carotene levels will help address the ongoing problem of vitamin A deficiency, a major cause of blindness in children in many developing nations.

Food Product Design May 3, 2010

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Brown Rice and Cardiovascular Protection

Rice is generally thought to be a healthy addition to the diet because it is a source of fiber. However, not all rice is equally nutritious, and brown rice might have an advantage over white rice by offering protection from high blood pressure and atherosclerosis ("hardening of the arteries"), say researchers at the Cardiovascular Research Center and Department of Physiology at Temple University School of Medicine in Philadelphia.

New research by Satoru Eguchi, Associate Professor of Physiology, suggests that a component in a layer of tissue surrounding grains of brown rice may work against angiotensin II. Angiotensin II is an endocrine protein and a known culprit in the development of high blood pressure and atherosclerosis.

The findings are contained in a study conducted by Dr. Eguchi and his colleague at the Temple lab, Akira Takaguri. The research team is also composed of Hirotoshi Utsunomiya and Ryohei Kono of the Department of Pathology, School of Medicine, Wakayana Medical University, Wakayama, Japan; and Shin-ichi Akazawa, Department of Materials Engineering, Nagaoka National College of Technology, Nagaoka, Japan. Dr. Takaguri will present the team's findings at the annual 2010 Experimental Biology conference in Anaheim, CA on April 24-28. This presentation is sponsored by The American Physiological Society (APS; www.the-aps.org). The full meeting program can be viewed at http://experimentalbiology.org/content/default.aspx.

Brown Rice and Angiotensin II

The subaleurone layer of Japanese rice, which is located between the white center of the grain and the brown fibrous outer layer, is rich in oligosaccharides and dietary fibers, making it particularly nutritious. However, when brown rice is polished to make white rice, the subaleurone layer is stripped away and the rice loses some of its nutrients. The subaleurone layer can be preserved in half-milled (Haigamai) rice or incompletely-milled (Kinmemai) rice. These types of rice are popular in Japan because many people there believe they are healthier than white rice.

The Temple team and their colleagues at the Wakayama Medical University Department of Pathology and the Nagaoka National College of Technology Department of Materials Engineering in Japan sought to delve into the mysteries of the subaleurone layer and perhaps make a case for leaving it intact when rice is processed. Because angiotensin II is a perpetrator in such lethal cardiovascular diseases, the team chose to focus on learning whether the subaleurone layer could somehow inhibit the wayward protein before it wreaks havoc.

First, the team removed the subaleurone tissue from Kinmemai rice. Then they separated the tissue's components by exposing the tissue to extractions of various chemicals such as ethanol, methanol and ethyl acetate. The team then observed how the tissue affected cultures of vascular smooth muscle cells. Vascular smooth muscle cells are an integral part of blood vessel walls and are direct victims of high blood pressure and atherosclerosis.

During their analysis, the team found that subaleurone components that were selected by an ethyl acetate extraction inhibited angiotensin II activity in the cultured vascular smooth muscle cells. This suggests that the subaleurone layer of rice offers protection against high blood pressure and atherosclerosis. It could also help explain why fewer people die of cardiovascular disease in Japan, where most people eat at least one rice-based dish per day, than in the U.S., where rice is not a primary component of daily nutrition.

"Our research suggests that there is a potential ingredient in rice that may be a good starting point for looking into preventive medicine for cardiovascular diseases," said Dr. Eguchi. "We hope to present an additional health benefit of consuming half-milled or brown rice [as opposed to white rice] as part of a regular diet."

SoyTech eNews May 1, 2010

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Carotene-Rich Veggies Decrease Anemia

Green and yellow veggies are not just colorful to look at, they’re good for you, too. Filipino researchers found eating carotene-rich yellow and green leafy vegetables improved the total-body vitamin A pool size and hemoglobin concentration, and decreased anemia rates with no effect on iron deficiency or iron-deficiency anemia rates (*Eu J Clin Nutr.* 2010;64:468–474). A total 104 Schoolchildren,

aged 9 to 12 years, received standardized meals containing 4.2 mg of provitamin A carotenoids/d (mainly beta-carotene) from yellow and green leafy vegetables and at least 7 g dietary fat/d. The meals were provided three times a day, 5 days a week, for nine weeks at school.

After nine weeks, the mean total-body vitamin A pool size increased twofold, and serum beta-carotene concentration increased fivefold. Blood hemoglobin and zinc protoporphyrin increased. The prevalence of anemia decreased from 12.5 to 1.9 percent. There were no significant changes in the prevalence of iron deficiency or iron-deficiency anemia.

Food Product Design May 7, 2010

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Dietary Patterns and Breast Cancer Risk

An English systematic review and meta-analysis indicated there is a link between some dietary patterns and breast cancer risk (***AmJ Clin Nutr*. 2010;91(5):1294-1302**). MEDLINE and EMBASE were searched for relevant articles that identified common dietary patterns published up to November 2009. Multivariable-adjusted odds ratios (ORs) comparing highest and lowest categories of dietary pattern scores and multivariable-adjusted ORs for a 20th-percentile increase in dietary pattern scores were combined by using random-effects meta-analyses.

Case-control and cohort studies were retrieved that identified prudent/healthy (n=18), Western/unhealthy (n=17) and drinker (n=4) dietary patterns. There was evidence of a decrease in the risk of breast cancer in the highest compared with the lowest categories of prudent/healthy dietary patterns in all studies and in pooled cohort studies alone. An increase in the risk of breast cancer was shown for the highest compared with the lowest categories of a drinker dietary pattern. There was no evidence of a difference in the risk of breast cancer between the highest and the lowest categories of Western/unhealthy dietary patterns.

Food Product Design May 3, 2010

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Flaxseed Lignans May Be Used as Natural Antioxidant

RSSL -- May 6, 2010 -- A review published in *Comprehensive Reviews in Food Science and Food Safety* has investigated flaxseed antioxidant activities and suggests that flaxseed lignans may be used as natural antioxidants. Lignans are found in fibre rich plants including grains, legumes and vegetables. Previous studies have found that flaxseed has potential health benefits including decreased risk of cardiovascular disease and substantial reduction in breast cancer, due to its biologically active components: oil containing approximately 59% a-linolenic acid (ALA); and a lignan called secoisolariciresionol diglycoside (SDG).

The health benefits from flaxseed lignans are due to their antioxidant activity, mainly from the hydroxyl radical scavengers and also from their estrogenic and antiestrogenic compounds. The review reports on the health benefits of lignans and investigates the role of flaxseed lignans in prevention of breast cancer, prostate cancer, colon and skin cancer. Toure et al. report that SDG is converted by bacteria in human and animal colons to mammalian lignans known as enterodiol and enterolactone. These have been found to reduce growth of cancerous tumors especially hormone sensitive ones such as breast, endometrium and prostate. The scientists also discuss the role of flaxseed in the prevention of diabetes. They indicate that low glycemic index food containing soluble fibre may not only prevent certain metabolic ramifications of insulin resistance but also reduce insulin resistance. Flaxseed could potentially affect insulin secretion and its mechanism in maintaining glucose homeostatis.

A previous study has found that a consumption of 50g/d by young females over a 4 week period caused a reduction in blood glucose levels, which was also seen in a study of postmenopausal women fed 40g/d. Toure et al indicate that cyanogenic glycosides (not exclusive to flaxseed) and linatine found in flaxseed may negatively influence health. Studies have found that cyanogenic glycosides may be toxic to animals and humans however they do state that the release of hydrogen cyanide from flaxseed would be minimal and below the toxic or lethal dose. Linatine has been found in chicks to cause vitamin B6 deficiency however this has not been associated with vitamin B6 deficiency in humans. In conclusion the researchers state that more studies are needed to see if there are any dangers in possible overdoses.

Soya Tech eNews May 6, 2010

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Flaxseed Protects Against Cancer, Diabetes

Flaxseed may play a role in preventing breast, prostate, colon and skin cancers while the soluble fiber and other components may affect insulin secretion and maintenance of steady blood sugar, according to a review paper, published in ***Comprehensive Reviews in Food Science and Food Safety***.

The paper evaluated current research on flaxseed, its role as a functional food, and any potential benefits it may have against diabetes and certain cancers. Flax is rich in alpha-linolenic acid (ALA), an essential omega-3 fatty acid, and phytochemicals such as lignans.

"Flaxseed has been the focus of increased interest in the field of diet and disease research due to the potential health benefits associated with some of its biologically active components," according to researchers at the School of Food Science and Technology at Jiangnan University in China.

Food Product Design May 3, 2010

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Mild peppers may help burn calories

According to *NPR*, science suggests that chemicals found in mild peppers might help burn calories. Research presented at the Experimental Biology meeting in Anaheim, Calif., shows that dihydrocapsiate (DCT)—a chemical found in a strain of mild chili peppers—has helped some people boost their metabolism without the tongue-burning side effects.

Several studies over the past decade have pointed to the chemical capsaicin, which gives peppers their fire, for its potential role in boosting metabolism. Capsaicin also been cited as a potential appetite suppressant, perhaps leading to its frequent starring role in a host of diet and detox products. But while some people pour hot pepper sauce on everything because they like the taste, many people just can't stand the heat. David Heber of UCLA's Center for Human Nutrition and his colleagues set out to see if capsaicin's calmer cousin, DCT, might also exert a calorie-burning effect.

They studied the before and after body weight and fat of 34 men and women consuming a low-calorie liquid meal replacement. Three times a day, a third of them were given a placebo pill, a third were given a pill containing 3 mg of DCT, and a third were given a 9 mg pill.

What they found was that the people given the most DCT after a meal showed an increase in heat production and fat burning without the burning sensation. That is, DCT acted in their G.I. tracks the way hot peppers do—boosting metabolism. And, the chemical structure of DCT is such that it doesn't fit the sensors on our tongue that detect pain, so no burning, Heber said. They found that the 9 mg, three-times-a-day dose helped the average-sized woman burn an extra 100 calories a day.

The participants in the very small study were already on a low-calorie liquid diet for a month. Therefore, more research needs to be done on whether consuming DCT would help people on more realistic diets, said Heber.

IFT Newletter May 5, 2010

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Air bubbles may enable the reduction of salt, sugar content

In a study published in the Journal of Food Science, the effect on taste due to the addition of air bubbles to a water-based gel was investigated. It is an important challenge for the food industry to be able to produce food products that are reduced in salt or sugar content but display good taste. In this study, a method based on the use of inert fillers was investigated to determine how the aqueous tastant concentration could be best increased to enhance taste perception. The gel phase contained either sucrose to give a sweet taste

or sodium chloride to give a salty taste. For the sweet gels, taste intensities were evaluated for samples with different volume fractions of the air bubbles (up to 40%, v/v) and different concentrations of the sucrose. For the salty gels, samples were evaluated at 40% volume fraction of air bubbles.

It was found that a reduction of the sodium chloride or sucrose by the same weight percentage as the volume fraction of the air bubbles in the samples gave equal taste perception as the nontastant-reduced samples. Moreover, saltiness and sweetness perception were clearly enhanced at 40% volume fractions of air bubbles if the sodium chloride or sucrose was not reduced. Thus, the overall tastes of the samples appeared to depend mainly on the concentration levels of the salt or the sucrose in the aqueous phase irrespective of the volume fraction of the air bubbles. However, the air bubbles were found to change the texture and appearance of the samples. It has been demonstrated that the inclusion of air bubbles offers scope for the reduction of sodium chloride or sucrose in food products.

IFT Newsletter May 19, 2010

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Low Folate in Pregnancy May Cause Child Hyperactivity

Low folate status in early pregnancy might impair fetal brain development and increase hyperactivity, inattention and peer problems in childhood, according to a study from University of Southampton, UK (***J Child Psychol Psychiatry*. 2009 Oct 28**).

In a prospective cohort study, maternal red blood cell folate was measured at 14 weeks of pregnancy and total folate intake from food and supplements was assessed in early and late pregnancy. The offspring's head circumference and body weight were measured at birth and in infancy, and 100 mothers reported on children's behavioral difficulties at a mean age of 8.75 years using the Strengths and Difficulties Questionnaire.

Lower maternal red blood cell folate and total folate intake in early pregnancy were associated with higher childhood hyperactivity (P =0.013 and P=0.022, respectively) and peer problems scores (P=0.004 and P=0.009) in the offspring.

Maternal gestational red blood cell folate was positively associated with head circumference at birth (adjusted for gestational age), and mediation analyses showed significant inverse indirect associations of red blood cell folate with hyperactivity, inattention and peer problems via fetal brain growth. Adjustment for mother's smoking and drinking alcohol during pregnancy did not change the results.

Food Product Design April 30, 2010

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Novel Processing Technologies Developed for Extending Use of Oats in Gluten-Free Diet

Oats are a highly nutritious cereal, which can be tolerated by large number of celiac patients. A range of commercial oat flours as well as specific oat flours produced from single varieties have been evaluated for their suitability for bread-baking. Enzyme technology, bioprocessing as well as high-pressure processing technology have been successfully applied to improve the quality, safety and nutritional attributes of oat based foods.

The interest in oats for human nutrition is growing due to its exceptional nutritional quality. In fact, the health effects of oats rely mainly on the total dietary fibre and β-glucan content, which reduce postprandial blood glucose and insulin responses and lower blood lipids, especially serum total and LDL-cholesterol. Besides β-glucan, oats also contain high amounts of other valuable nutrients such as proteins, unsaturated fatty acids, vitamins, minerals and antioxidants. Moreover, recent studies have shown that oats can be tolerated by most people suffering from celiac disease.

Bread, mostly made from wheat, is an essential constituent of the human diet and the nearly ubiquitous consumption places it in a position of global importance. Thus, the development of 100% oat bread could enhance the range of products suitable for people affected by celiac disease and satisfy the consumer demand for diverse and healthy foods. Yet, oat proteins do not possess the unique visco-elastic properties characteristic for wheat gluten, thus oat doughs resemble cake batters rather than bread doughs. Furthermore, most studies investigating the effect of oats on bread quality were previously conducted on composite breads, containing significant

amounts of wheat which masked bread making properties of oats.

Consequently, the objective was to establish the properties of oats required for the production of high quality oat bread by exploiting a combination of baking, rheological and analytical chemistry techniques. The bread making properties of commercial oat flours as well as oat varieties were investigated on simple flour/water mixtures without addition of wheat or structure forming agents in order to avoid synergistic effects with functional ingredients. Moreover, sourdough fermentation and Hydrostatic Pressure (HP) processing were investigated for their potential to improve oat bread quality.

The results showed significant differences in the bread making performance of commercial oat flours. Overall, it was established that in order to achieve high quality oat bread wholegrain oat flours should present low batter viscosity, low flour water hydration capacity, starch content of above 65%, protein content of about 12%, low starch damage and coarse particle size. In addition, it was assessed whether certain oat varieties yield better quality bread than others by investigating their bread making properties under optimised conditions, which allowed the evaluation of oat constituents affecting oat bread quality.

Considerable differences were observed in the bread crumb structure which could be attributed to protein and fat content, starch properties as well as α-amylase activity. Hence, selection of oat varieties in relation to their composition is essential in order to obtain superior oat bread quality.

In addition, the effect of sourdough on oat bread quality was investigated. Oat sourdoughs were produced by spontaneous fermentation and subsequent back-slopping until a stable microbiota was obtained. Identification of the lactic acid bacteria showed dominance of strains which are not commonly found in wheat or rye sourdoughs. Yet, application of these strains as starter cultures for oat sourdoughs used for oat bread production revealed positive effects on loaf volume as a result of gas production by heterofermentative LAB, softening of the doughs and changes in the starch pasting properties.

Furthermore, the impact of HP was investigated on the major oat components, starch and protein which revealed starch gelatinisation and protein network formation at pressures ≥ 350 MPa while a weakening of protein structures was observed at lower pressures. Addition of HP-treated oat batters to oat bread resulted in improved volume and decreased staling at 200 MPa, while higher pressures did not improve oat bread quality.

The work formed part of the European Union project HEALTHGRAIN, and was conducted by the research team of Professor Elke Arendt, University College Cork, Ireland. Part of the microscopical analysis of the oat flours and breads was conducted by the team of Professor Kaisa Poutanen, VTT Technical Research Centre of Finland.

Source: Food Ingredients First 5 May 2010

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Nuts Improve Cholesterol

Consuming nuts was associated with improvements in blood cholesterol levels in a pooled analysis of data from 25 trials reported in the May 10 issue of *Archives of Internal Medicine*, one of the *JAMA/Archives* journals (**2010;170[9]:821-827**).

Joan Sabaté, M.D., Dr.P.H., of Loma Linda University, Loma Linda, CA, and colleagues pooled primary data from 25 nut consumption trials conducted in seven countries and involving 583 women and men with high cholesterol or normal cholesterol levels. All the studies compared a control group to a group assigned to consume nuts; participants were not taking lipid-lowering medications.

Participants in the trials consumed an average of 67 grams (about 2.4 ounces) of nuts per day. This was associated with an average 5.1 percent reduction in total cholesterol concentration, a 7.4 percent reduction in low-density lipoprotein (LDL) and an 8.3 percent change in ratio of LDL cholesterol to high-density lipoprotein (HDL). In addition, triglyceride levels declined by 10.2 percent among individuals with high triglyceride levels (at least 150 milligrams per deciliter), although not among those with lower levels.

“The effects of nut consumption were dose related, and different types of nuts had similar effects on blood lipid levels,” the authors wrote. “The effects of nut consumption were significantly modified by LDL-C, body mass index (BMI) and diet type: the lipid-

lowering effects of nut consumption were greatest among subjects with high baseline LDL cholesterol and with low BMI and among those consuming Western diets."

The results support the inclusion of nuts in therapeutic dietary interventions for improving blood cholesterol levels, they concluded. "Nuts are a whole food that have been consumed by humans throughout history. Increasing the consumption of nuts as part of an otherwise prudent diet can be expected to favorably affect blood lipid levels (at least in the short term) and have the potential to lower coronary heart disease risk."

Food Product Design May 11, 2010

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Obese Pregnancy Ups Kids' Heart Risk

The more obese a woman is when she becomes pregnant, the greater the likelihood that she will give birth to an infant with a congenital heart defect, according to a study conducted by researchers at the National Institutes of Health (NIH) and the New York state Department of Health.

The researchers found, on average, obesity increases a woman's chance of having a baby with a heart defect by around 15 percent. The risk increases with rising obesity. Moderately obese women are 11 percent more likely to have a child with a heart defect, and morbidly obese women are 33 percent more likely.

Researchers analyzed data in the New York State Congenital Malformations Registry, a repository of case reports on children born with birth defects in New York state, excluding New York City. Using 1.53 million births that took place in the state over the course of 11 years, the researchers compared the records of mothers of 7,392 of children born with major heart defects to those of more than 56,000 mothers of infants born without birth defects.

The researchers calculated the mothers' body mass index (BMI), and found obese mothers were 15-percent more likely than mothers with normal BMI to have children with heart defects. Women classified as morbidly obese—with a BMI of 40 or higher—were 33 percent more likely than women with normal BMI to have children with heart defects. The risk of heart defects increased sharply at a BMI of 30 and was progressively higher with each increase in BMI.

On average, women who were overweight, but not obese had no increased risk. However, the researchers saw the chances of having a child with a congenital heart defect increase for obese women, and increase sharply for morbidly obese women.

"The current findings strongly suggest by losing weight before they become pregnant, obese women may reduce the chances that their infants will be born with heart defects," said Alan E. Guttmacher, M.D., acting director of the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the NIH Institute that conducted the study.

In a press release, NIH noted previous studies have shown obesity also increases the risk for pregnancy-induced hypertension, preeclampsia (a serious form of hypertension during pregnancy), gestational diabetes and cesarean delivery. Infants born to women who were obese during pregnancy are themselves at increased risk for overweight and type 2 diabetes later in life. Previous research by NICHD scientists and others has also shown an association between maternal obesity and birth defects, such as neural tube defects—serious malformations of the spinal column.

Food Product Design May 4, 2010

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Soy Protein Isolate Consumption Helps Lower Cholesterol: Russian Study

Research findings, 'Effects of two-month consumption of 30 g a day of soy protein isolate or skimmed curd protein on blood lipid concentration in Russian adults with hyperlipidemia,' are discussed in a new report. "Recently the American Heart Association has reported that favorable effects of soy protein on blood lipids were characteristic only for high amounts of soy protein and not observed for an intake less than 30 g/d. However, the period of the studies with the smaller amount was 4-6 wk and we thought a longer study

was necessary for the conclusion," scientists writing in the Journal of Nutritional Science and Vitaminology report (see also Hyperlipidemia Therapy).

"The death rate by heart disease is very high in Russia; therefore, we have done this study in Russian subjects with hyperlipidemia. Prior to the study we tried to find a favorable method for subjects to take 30 g protein a day from soybean protein isolate (SPI) or skimmed curd protein (SMP) and decided to use Russian style cookies. Thirty subjects with hyperlipidemia were recruited; however, due to the 5-mo long study 28 of them (19 females and 9 males aged 50±2 y) could complete the trial. They were randomly assigned to two groups and were given either cookie for 2 mo separated by a month-long washout interval in a cross-over design. Fasting blood samples were drawn before and after the dietary treatments. Fasting blood samples at 1 mo were also measured as a health check and to observe the trends of the blood parameters in the middle of the study period. Serum samples were used for the lipid and other biochemical measurements. Every month for 3 non-consecutive days, energy and nutrient intakes were assessed and physical activity was estimated by pedometer. With the consumption of SPI for 2 mo, concentrations of total-cholesterol changed from 280±7 to 263±8 mg/dL (-6.5%, p=0.0099), HDL-cholesterol from 57.4±2.5 to 62.6±2.9 mg/dL (+9%, p=0.0047), non-HDL-cholesterol (total-cholesterol-HDL-cholesterol) from 223±7 to 201±8 mg/dL (-11%, p=0.0023) and triglycerides from 204±23 to 173±19 mg/dL (-18%, p=0.022). There were no significant changes with SMP (p >0.05)," wrote E.A. Borodin and colleagues, State Medical Academy. The researchers concluded: "Thus, administration of 30 g SPI a day for 2 mo confirmed its favorable effects on serum lipids in Russians with hyperlipidemia."

Soy Tech eNews April 29, 2010

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Supplements boost health of mothers and their babies, study shows

Taking a multiple micronutrient supplement during pregnancy may improve the health of pregnant women and their babies, according to the **results of a randomised, double-blind, placebo controlled trial** published in the *British Journal of Nutrition*.

The study by researchers at the Institute of Brain Chemistry & Human Nutrition at London Metropolitan University and the Homerton University Hospital involved more than 400 newly pregnant women from east London, 72 per cent of whom had low levels of vitamin D in their blood, 13 per cent of whom were anaemic and 12 per cent of whom were thiamin deficient. Nutrient status was measured at recruitment, 26 and 34 weeks gestation.

The results indicated that women taking Vitabiotics Pregnacare-branded supplements during the trial rather than a placebo benefited from an improvement in nutrient status, with markers of iron, folate, thiamin and vitamin D status all higher during the third trimester in the vitamin group, and a reduction in numbers of small-for-gestational-age infants (low birth weight for time of birth).

Louise Brough, the lead researcher, said: "This research highlights the concerning fact that a number of women, even in the developed world, are lacking in important nutrients during pregnancy. It also demonstrates the benefit of taking a multiple micronutrient supplement such as Pregnacare from early pregnancy. It is especially important to have good nutrient levels during early pregnancy as this is a critical time for development of the foetus. Nutrient deficiencies are correctable and they may influence birth outcomes."

The incidence of low birth weight babies in the UK is worse than any Western European country, even worse than Cuba and on a par with Romania, according to UNICEF figures. When data was gathered for the whole country in 1973 it was 6.6 per cent, while in 2005 it was 8 per cent.

Brough said: "A baby's health can be adversely affected if it is too small at birth, both in early and later life. Being small for gestational age implies intra-uterine growth restriction and a degree of poor foetal nutrition. This study shows that supplementing with a specific multivitamin supplement may help to reduce this. Although the numbers are small, the data is statistically significant and consistent with what is known about maternal-foetal nutrition and justifies a larger study."

Functional Ingredients May 11, 2010

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Unlocking Grain Nutrition Through Technology

It's commonly known that whole grains are more nutritious than milled grains, mainly because of the nutrients contained in grains' bran—the portion removed in the milling process. But scientists in the **HEALTHGRAIN** project of the European Union have found ways to create new healthy ingredients by innovative milling techniques and processes for cereal grains.

The bioaccessability of many of the healthful compounds, such as fiber, micronutrients and phytochemicals, that are concentrated in the bran layers of cereal grains is low because they are trapped in strong cell wall structures which resist conventional milling. Often they are concentrated near contaminants such as microbes, mycotoxins, pesticide residues, heavy metals. Scientists are developing new milling technologies, including partial grain debranning, fine grinding and classification of grain fractions, to manufacture flours with high levels of selected parts of the outer layers.

One technique examined was removing the grains outermost layers by partial debranning by combining peeling or pearling with milling (grinding and sieving). This creates flours with specific composition and controlled bioactive content, as monitored by the marker methodology. These have a better nutritional content than regularly milled flours, while ensuring product safety.

Researchers have also identified biochemical markers in the different portions of the grain (pericarp, intermediate layers, aleurone layers, germ) to determine the composition of the fractions after fractionation operations. This involves more-rapid methods for fractionation monitoring and new devices coupled with microscopy and microspectroscopy to help the development of fractionation with improved resolution. The scientists are looking at the effects of temperature, water content and enzymatic pretreatments of the grain in terms of the composition.

Another way to create healthier grain ingredients is to use miller's bran, a byproduct of the milling industry, as a source of healthy ingredients. Careful limited grinding and sieving of the bran allowed concentration of aleurone cells and aleurone layer, source of most of the bioactive compounds of the grain. Further purification by electrostatic classification resulted in practically pure aleurone cells with excellent nutritional properties.

Ultrafine grinding of bran in ambient or cryogenic conditions resulted in an increase in bioactive compounds' bioaccessibility. Classification using a electrostatic separator created fractions of very different compositions from the starting bran. One ingredient, with concentrated fine aleurone particles, showed a good accessibility of antioxidants and minerals compared to bran and untreated aleurone.

Food Product Design May 10, 2010

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Dietary Protein May Reduce Hip Fractures in the Elderly

Seniors who consume a higher level of dietary protein are less likely to suffer hip fractures than seniors whose daily dietary protein intake is less, according to a new study by the Institute for Aging Research of Hebrew SeniorLife in Boston, an affiliate of Harvard Medical School.

The study, which examined the daily protein intake of 946 seniors from the Framingham Osteoporosis Study, found that individuals who were in the lowest 25 percent of dietary protein intake had approximately 50 percent more hip fractures than those who consumed greater amounts of dietary protein (all within normal intakes). Those who suffered hip fractures consumed less than the 46 grams of dietary protein per day recommended for adults.

"Study participants who consumed higher amounts of protein in their diet were significantly less likely to suffer a hip fracture," says senior study author Marian T. Hannan, D.Sc., M.P.H., co-director of the Musculoskeletal Research Program at the Institute for Aging Research.

The study, which was funded in part by the National Institute of Arthritis and Musculoskeletal and Skin Diseases, will be published this week in the online-first edition of Osteoporosis International. It builds on previous studies that included mostly women and reported a relationship between greater dietary protein intake and decreased risk of hip fracture.

While other studies have shown that dietary protein intake is also linked with higher bone mineral density, Dr. Hannan says dietary protein may further protect elderly people against hip fracture by building stronger muscles in the legs. Most fractures occur after a fall, which may be caused by less muscle mass and decreased strength in the lower extremities.

Dr. Hannan, an associate professor of medicine at Harvard Medical School, recommends that older women consume at least 46 grams of protein per day, and that older men consume at least 56 grams of protein daily. This can come from both animal sources (meat, poultry, fish, eggs, milk, cheese and yogurt) and plants (legumes, grains, nuts, seeds and vegetables). The study did not examine the type of protein consumed.

In addition to increased dietary protein, Dr. Hannan says regular exercise to build stronger muscles and better balance, as well as other falls prevention strategies, such as reducing hazards in the home, can help protect seniors against falls and hip fractures.

More than 25 million Americans over the age of 50 have either osteoporosis, a disease in which bones become fragile and more likely to break, or osteopenia, a condition in which bone mineral density is lower than normal, but not low enough to be considered osteoporosis. More than 95 percent of hip fractures in people over the age of 65 are caused by falls and can lead to severe health problems, including decreased quality of life and premature death.

Scientists at the Institute for Aging Research conduct rigorous medical and social studies, leading the way in developing strategies for maximizing individuals' strength, vigor and physical well-being, as well as their cognitive and functional abilities in late life.

Source: Nutrition Horizon 5 May 2010

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Research Shows Consuming Protein Blends (Soy, Whey and Casein) is Optimal for Sports Performance

A review by Solae's Global Director of Sports Nutrition Dr. Greg Paul was published in a supplement accompanying the current issue of the *Journal of the American College of Nutrition*. The review is titled *The Rationale for Consuming Protein Blends in Sports Nutrition* and concludes that consuming a blend of proteins (isolated soy protein, whey protein and casein) may have advantages for sports performance and provides nutritional advantages over consuming just one type of protein.

"Protein is considered by many to be the most important macronutrient for humans because of the numerous roles protein plays in the body," said Paul. "My review proves not only the importance of protein, but also potential benefits of combining different proteins, particularly to help promote recovery after exercise activity."
According to the U.S. Food and Drug Administration (FDA) labeling guidelines, isolated soy protein, whey protein and casein are all nutritionally complete proteins. However, all three proteins differ in digestion rates, potentially creating a "timed-release" effect that could prolong the time that absorbed amino acids are delivered to muscle resulting in faster recovery. Additionally, comparative studies between isolated soy protein and whey protein show similar increases in lean body mass whereas whey protein may have an advantage over casein.

"Today, more and more sports nutrition products such as nutrition bars and ready-to-drink and powered beverages, include blends of soy and dairy protein," said Paul. "Our sports nutrition customers continue to look for ways to incorporate protein blends into new products due to the nutritional, functional and economical advantages. Additionally, consumers seem to prefer the taste of products that include a blend of proteins versus one type of protein."
In fact, sensory data shows that a sports nutrition beverage formulated with SUPRO® XF, a new isolated soy protein, in combination with a dairy protein is preferred by consumers 2:1 over the leading, all dairy commercial brand.

The possibility exists that endurance athletes, because of their specific needs, would benefit from a different protein blend than a blend used by strength athletes. Further research is needed to show the potential nutritional and performance benefits of different protein blends for specific segments of the sports nutrition consumer.

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First Course of Veggies May Appeal to Hungry Preschoolers

Increasing the amount of vegetables in the first course of preschool lunch could be a smart way to get children to eat more vegetables, according to Penn State nutrition researchers. "We have shown that you can use portion size strategically to encourage children and

adults to eat more of the foods that are high in nutrients but low in calories," said Barbara J. Rolls, Helen A. Guthrie Chair of Nutritional Sciences.

Rolls and her Penn State colleagues study how varying the portions of fruit and vegetable side dishes can be used to raise vegetable consumption in children and adults. Researchers served lunch to 51 children at a daycare center on four occasions and measured their vegetable intake. Children were provided with no carrots or 30 grams (about 1 ounce), 60 grams (about 2 ounces), or 90 grams (about 3 ounces) of carrots as the first course of their lunch.

The children had 10 minutes to eat the carrots, after which researchers served them pasta, broccoli, unsweetened applesauce, and low-fat milk. They found that when preschool children received no first course of carrots, they consumed about 23 grams (nearly 1 ounce) of broccoli from the main course.

When the children received 30 grams (about 1 ounce) of carrots at the start of the meal, their broccoli intake rose by nearly 50 percent compared to having no carrots as a first course. But when the first course was increased to 60 grams (about 2 ounces) of carrots, average broccoli consumption nearly tripled to about 63 grams -- or a third of the recommended vegetable intake for preschool children. The extra carrots eaten at the start of lunch did not reduce the amount of broccoli eaten in the main course, but added to the total amount of vegetables consumed. The team's findings appear in the current issue of the *American Journal of Clinical Nutrition*. "We gave the children carrots first without other competing foods," explained Rolls. "When they are hungry at the start of the meal, it presents us with an opportunity to get them to eat more vegetables."

According to Maureen Spill, graduate student in nutrition and study co-author, the findings challenge the conventional belief that children won't eat vegetables. It also provides parents a simple strategy to get their children eating a more healthy and nutritious diet, she added. "The great thing about this study is the very clear and easy message for parents and care-givers that while you are preparing dinner, put some vegetables out for your children to snack on while they're hungry," said Spill. "Parents also need to set an example by eating vegetables while children are young and impressionable."

Science Daily (May 7, 2010)

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Giving DHA Supplements to Breastfeeding Mothers

Docosahexaenoic acid (DHA), an omega-3 fatty acid, is essential for the growth and development of infants' brains. Very premature infants may be deficient in DHA because they miss out on the third trimester in utero when the fatty acid accumulates in tissues. In addition, their gastrointestinal system is immature, and health problems often increase the risk of malnutrition.

Furthermore, breastfeeding mothers' diets may lack DHA, which is found in cold water fatty fish and fish oil supplements.

Canadian researchers sought to determine if giving mothers DHA supplements would increase DHA levels in breastfed preemies.

"Results suggested that an early supplementation with DHA to lactating mothers with low dietary DHA was successful in increasing DHA status in very preterm infants," said Isabelle Marc, MD, PhD, lead author of the study, which was presented on May 1 at the Pediatric Academic Societies (PAS) annual meeting in Vancouver, British Columbia, Canada.

Mothers of 12 infants born at 29 weeks' gestation or earlier who planned to breastfeed received high dosages of DHA supplements until 36 weeks post-conception. Researchers compared DHA levels in the mothers' breast milk, mothers' and babies' plasma lipids, and daily DHA intakes in the preterm infants from birth to day 49 with a control group of very preterm infants and mothers who did not receive DHA supplements during lactation.

Results showed that DHA levels in the breast milk of mothers who received supplements were almost 12 times higher than levels in the milk of mothers in the control group. Although there was no difference in the enteral (tube) feeding intake among both groups of infants, those in the intervention group received about seven times more DHA than the control group. In addition, plasma DHA concentrations in mothers and babies in the DHA group were two to three times higher than the control group.

"Our study has shown that supplementing mothers is a feasible and effective way of providing DHA to low birthweight premature infants," said Dr. Marc, an assistant professor in the Department of Pediatrics at Laval University in Quebec, Canada, and clinician researcher at Centre Hospitalier Universitaire de Québec.

"Our results underline the urgent need for recommendations addressing dietary DHA intake during lactation of mothers of very preterm infants to reach optimal DHA level in milk to be delivered to the baby for optimal growth and neurodevelopment, since the human milk DHA content in mothers not consuming fish during this period is most probably insufficient."

ScienceDaily (May 1, 2010)

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Nomadic People's Good Health Baffle Scientists

The human body is a true miracle. Nadja Knoll recently found new proof of that statement in the nomadic Maasai people of Kenya in Eastern Africa. For her thesis, the nutritionist from Friedrich Schiller University Jena (Germany) analyzed the diet of a nomadic tribe in the Kajiado District. The surprising results of the field study show that the Maasai are in a good health status in spite of a limited diet.

Blood tests showed that there is a high content of healthy omega-3 fatty acids in their erythrocyte membranes, the cell walls of the red blood cells, even though these acids are not ingested. "We were surprised by these results. They are proof for the enormous adaptability of the human organism," says Prof. Dr. Gerhard Jahreis of the Department of Nutritional Physiology, under whose guidance the study was conducted.

Yet another finding was the outcome of the fieldwork in Africa. Nadja Knoll´s study shows that the traditional story patterns about the Maasai diet are wrong. Travelers in Africa like Gustav Adolf Fischer (1848-1886) and the Englishman Joseph Thomson (1858-1895) spread the image of the blood thirsty Maasai. According to their reports the herdsmen consume mainly meat, milk and blood. A particularly high percentage of fermented milk -- a kind of yoghurt -- was also said to be part of their diet. Nadja Knoll´s findings paint a very different picture. The scientist of Jena University discovered that the Maasai have strongly sweetened milk tea for breakfast. Some Maasai eat a kind of "porridge" in the morning, a liquid mixture of cormeal, water, some milk and sugar.

For lunch there will be milk and "Ugali," a kind of polenta being made from cormeal and water. "Dinner is similar to lunch," says Knoll who points out that she did her field study at the end of the dry season. There may be slightly different results in the -- remarkably shorter -- rainy season, because then the Maasai livestock produces more milk. This milk will then ferment in calabashes. The outcome of the fermenting process will be a yoghurt-like drink that might have pro-biotic benefits.

It is clear though that meat features only rarely on the Maasai menu. The main part -- more than 50 percent -- consists of vegetarian food. The preferred meat is that of sheep and goats, whereas the meat of traditional Zebu cattle is only rarely eaten. "A cow will only be slaughtered for ritual festivities by the Maasai," says Knoll.

Knoll conducted her study together with colleagues of the Jomo Kenyatta University of Agriculture and Technology of Juja/Nairobi (Kenia).

ScienceDaily (May 18, 2010)

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Grapes Reduce Risk Factors for Heart Disease and Diabetes, Animal Study Shows

Could eating grapes slow what's for many Americans a downhill sequence of high blood pressure and insulin resistance leading to heart disease and type 2 diabetes? Scientists at the University of Michigan Health System are teasing out clues to the effect of grapes in reducing risk factors related to cardiovascular disease and metabolic syndrome. The effect is thought to be due to phytochemicals -- naturally occurring antioxidants -- that grapes contain.

Findings from a new animal study will be presented April 26 at the Experimental Biology convention in Anaheim, Calif., and show encouraging results of a grape-enriched diet preventing risk factors for metabolic syndrome, a condition affecting an estimated 50 million Americans and is often a precursor to type 2 diabetes.

Researchers studied the effect of regular table grapes (a blend of green, red and black grapes) that were mixed into a powdered form and integrated into the diets of laboratory rats as part of a high-fat, American style diet. All of the rats used were from a research breed that is prone to being overweight. They performed many comparisons between the rats consuming a grape-enriched diet and the control rats receiving no grape powder. Researchers added calories and sugars to the control group to balance the extra calories and sugars gained from getting the grape powder.

After three months, the rats that received the grape-enriched diet had lower blood pressure, better heart function, and reduced indicators of inflammation in the heart and the blood than rats who received no grape powder. Rats also had lower triglycerides and improved glucose tolerance. The effects were seen even though the grape-fed animals had no change in body weight. In all, researchers say the study demonstrates that a grape-enriched diet can have broad effects on the development of heart disease and metabolic syndrome and the risk factors that go along with it.

"The possible reasoning behind the lessening of metabolic syndrome is that the phytochemicals were active in protecting the heart cells from the damaging effects of metabolic syndrome. In the rats, inflammation of the heart and heart function was maintained far better," says Steven Bolling, M.D., heart surgeon at the U-M Cardiovascular Center and head of the U-M Cardioprotection Research Laboratory.

The researchers also looked for signs of inflammation, oxidative damage and other molecular indicators of cardiac stress. Again, the rats who consumed the grape powder had lower levels of these markers than rats who did not receive grapes. There is no well-accepted way to diagnose metabolic syndrome which is really a cluster of characteristics: excess belly fat (for men, a waist measuring 40 inches or more and for women, a waist measuring 35 inches or more); high triglycerides which can lead to plague build-up in the artery walls; high blood pressure; reduced glucose tolerance; and elevated c-reactive protein, a marker for inflammation in the body. Those with metabolic syndrome are at higher risk for cardiovascular disease and type 2 diabetes.

But the U-M study suggests that it may be possible that grape consumption can change the downhill sequence that leads to heart disease by prolonging the time between when symptoms begin to occur and a time of diagnosis. "Reducing these risk factors may delay the onset of diabetes or heart disease, or lessen the severity of the diseases," says E. Mitchell Seymour, Ph.D., lead researcher and manager of the U-M Cardioprotection Research Laboratory. "Ultimately it may lessen the health burden of these increasingly common conditions."

Rats were fed the same weight of food each day, with powered grapes making up 3 percent of the diet. Although the current study was supported in part by the California Table Grape Commission, which also supplied the grape powder, the researchers note that the commission played no role in the study's design, conduct, analysis or preparation of the presentation.

Research on grapes and other fruits containing high levels of antioxidant phytochemicals continues to show promise. U-M will further its research this summer when it begins a clinical trial to test the impact of grape product consumption on heart risk factors.

"Although there's not a particular direct correlation between this study and what humans should do, it's very interesting to postulate that a diet higher in phytochemical-rich fruits, such as grapes, may benefit humans," Bolling says.

Bolling says that people who want to lower their blood pressure, reduce their risk of diabetes or help with weakened hearts retain as much pumping power as possible should follow some tried-and-true advice to eat a healthy diet low in saturated fat, trans fat and cholesterol, achieve a desirable weight and increase physical activity.

ScienceDaily (May 10, 2010)

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Probiotics Help Extremely Premature Infants Gain Weight

Extremely low birthweight infants (ELBW) who received feedings supplemented with probiotics had better weight gain than infants who were not given the supplements, according to a randomized, controlled, double-blind study presented May 1 at the Pediatric Academic Societies (PAS) annual meeting in Vancouver, British Columbia, Canada.

Probiotics, which means "for life" in Latin, are healthy, live organism supplements that provide benefit to the host. Their effect on digestive health and immune function has been studied. However, the safety and efficacy of probiotic supplementation in ELBW infants has not been explored thoroughly.

In this study, Mohamad Al-Hosni, MD, and colleagues from three medical centers, in collaboration with Vermont Oxford Network, evaluated the effect of supplementing enteral (tube) feedings with probiotics in extremely premature infants who weighed 2 pounds, 2 ounces or less. They hypothesized that infants who received probiotic-supplemented feedings would tolerate larger volumes of feeding per day, grow faster and require fewer days of antimicrobial treatment than those in the control group.

Fifty infants received 500 million colony-forming units (CFU) of Lactobacillus rhamnosus GG and 500 million CFU of Bifidobacterium infantis in enteral feedings once a day until discharge or 34 weeks postmenstrual age. Fifty-one infants received feedings with no probiotics.

Results showed superior weight gain in infants who received the probiotics even though the average daily volume of their feedings was less than infants in the control group. There were no statistically significant differences in other complications of prematurity such as sepsis or necrotizing enterocolitis. In addition, no side effects were seen as a result of probiotic supplementation, according to Dr. Al-Hosni, an assistant professor of pediatrics at Saint Louis University School of Medicine in the division of neonatal-perinatal medicine at SSM Cardinal Glennon Children's Medical Center.

"These findings strongly suggest that probiotic supplementation to enteral feedings plays a major role in feeding tolerance and nutrient absorption," he said. "Improved tolerance of feedings and nutrient absorption lead to better weight gain in this extremely premature infant group."

Dr. Al-Hosni concluded that larger clinical trials are needed to demonstrate the safety and efficacy of probiotic supplementation to enteral feeding in this group of infants.

ScienceDaily (May 4, 2010)

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How Dark Chocolate May Guard Against Brain Injury from Stroke

Researchers at Johns Hopkins have discovered that a compound in dark chocolate may protect the brain after a stroke by increasing cellular signals already known to shield nerve cells from damage. Ninety minutes after feeding mice a single modest dose of epicatechin, a compound found naturally in dark chocolate, the scientists induced an ischemic stroke by essentially cutting off blood supply to the animals' brains. They found that the animals that had preventively ingested the epicatechin suffered significantly less brain damage than the ones that had not been given the compound.

While most treatments against stroke in humans have to be given within a two- to three-hour time window to be effective, epicatechin appeared to limit further neuronal damage when given to mice 3.5 hours after a stroke. Given six hours after a stroke, however, the compound offered no protection to brain cells.

Sylvain Doré, Ph.D., associate professor of anesthesiology and critical care medicine and pharmacology and molecular sciences at the Johns Hopkins University School of Medicine, says his study suggests that epicatechin stimulates two previously well-established pathways known to shield nerve cells in the brain from damage. When the stroke hits, the brain is ready to protect itself because these pathways Nrf2 and heme oxygenase 1 are activated. In mice that selectively lacked activity in those pathways, the study found, epicatechin had no significant protective effect and their brain cells died after a stroke. The study now appears online in the Journal of Cerebral Blood Flow and Metabolism.

Eventually, Doré says, he hopes his research into these pathways could lead to insights into limiting acute stroke damage and possibly protecting against chronic neurological degenerative conditions, such as Alzheimer's disease and other age-related cognitive disorders.

The amount of dark chocolate people would need to consume to benefit from its protective effects remains unclear, since Doré has not studied it in clinical trials. People shouldn't take this research as a free pass to go out and consume large amounts of chocolate, which is high in calories and fat. In fact, people should be reminded to eat a healthy diet with a variety of fruits and vegetables.

Scientists have been intrigued by the potential health benefits of epicatechin by studying the Kuna Indians, a remote population living on islands off the coast of Panama. The islands' residents had a low incidence of cardiovascular disease. Scientists who studied them found nothing striking in the genes and realized that when they moved away from Kuna, they were no longer protected from heart problems. Researchers soon discovered the reason was likely environmental: The residents of Kuna regularly drank a very bitter cocoa drink, with a consistency like molasses, instead of coffee or soda. The drink was high in the compound epicatechin, which is a flavanol, a flavanoid-related compound.

But Doré says his research suggests the amount needed could end up being quite small because the suspected beneficial mechanism is indirect. "Epicatechin itself may not be shielding brain cells from free radical damage directly, but instead, epicatechin, and its

metabolites, may be prompting the cells to defend themselves," he suggests.

The epicatechin is needed to jump-start the protective pathway that is already present within the cells. "Even a small amount may be sufficient," Doré says. Not all dark chocolates are created equally, he cautions. Some have more bioactive epicatechin than others. "The epicatechin found in dark chocolate is extremely sensitive to changes in heat and light" he says. "In the process of making chocolate, you have to make sure you don't destroy it. Only few chocolates have the active ingredient. The fact that it says 'dark chocolate' is not sufficient."

Source: Nutrition Horizon 6 May 2010

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Low Protein Diet Fights Depression in Diabetics

Consuming a low-protein diet six days a week may significantly reduce depressive symptoms in type 2 diabetics with renal failure, according to a new study (*Nutrition*. **ePub 14 May 2010**). Researchers at the Second University of Naples enrolled 52 young-old type 2 diabetic patients with renal failure to determine the effects of a low-protein diet on depressive symptoms. Participants consumed either a low-protein diet providing 0.8 g/kg per day, seven days a week, or the diet for six days a week. Results on the Geriatric Depression Scale (GDS-15) and Beck Depression Inventory (BDI) were compared to baseline during normal protein diet. While depression scores increased significantly during the normal protein diet regimen, the six-days-a-week low-protein diet significantly reduced those scores, even more than the seven-days-a-week diet.

Food Product Design May 20, 2010

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Probiotic Yogurt Drinks Reduce Sickness in Kids

Probiotic yogurt-like drinks help reduce the rate of common sicknesses such as ear infections, sinusitis, the flu and diarrhea in daycare children, according to a new study published online in the *European Journal of Clinical Nutrition*. The findings also showed no reduction in the number school days missed.

The study, led by Daniel Merenstein, MD, of Georgetown University School of Medicine (GUSOM), and funded by The Dannon Company, Inc., was the largest known probiotic clinical trial to be conducted in the United States. It specifically studied DanActive® and the potential benefits of probiotics such as *Lactobacillus casei* (*L. casei*) DN-114 001.

“We were interested in a study that resembled how children in the U.S. consume drinks that are stored in home refrigerators and consumed without study personnel observation,” Merenstein said. “… To our knowledge this is the largest probiotic clinical trial conducted in the U.S. and provides much needed data. We studied a functional food, not a medicinal product; parents will thus feed their children without any physician input and we felt it was best to assess [the drink] under similar conditions.”

The study, titled DRINK (Decreasing the Rates of Illness in Kids), was a randomized, double-blind, placebo-controlled study – the gold standard in clinical research design. It included 638 healthy children, aged 3 to 6, who attended school five days a week. Parents were asked to give their child a daily strawberry yogurt-like drink for 90 consecutive days. Some of the drinks were supplemented with the probiotic strain L. casei DN-114 001 (DanActive), while others had no probiotics (placebo). Neither the study coordinators, the children, nor the parents knew which drink was given to which participant until the study ended. In addition to phone interviews with researchers, parents kept daily diaries of their child’s health and the number of drinks consumed.

Researchers found a 19-percent decrease of common infections among the children who drank the yogurt-like drink with L. casei DN-114 001 compared to those whose drink did not have the probiotic. More specifically, those who drank DanActive had 24 percent fewer gastrointestinal infections (such as diarrhea, nausea, and vomiting), and 18 percent fewer upper respiratory tract infections (such as ear infections, sinusitis and strep). However, the reduction in infections did not result in fewer missed school days or activities.

Food Product Design May 20, 2010

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Protein, Glucose, Insulin and Appetite

Researchers compared the effects of four protein meals—whey, tuna, turkey and egg albumin—on post-meal glucose and insulin concentrations, as well as on appetite measures and energy intake in 22 lean, healthy men (***Br J Nutr*. May 11, 2010**). "There was a strong relationship between self-rated appetite, post-meal insulin response and energy intake at lunch. Whey protein meal produced a greater insulin response, reduced appetite and decreased ad libitum energy intake at a subsequent meal compared with the other protein meals, indicating a potential for appetite suppression and weight loss in overweight or obese individuals," researchers said.

The cross-over design study randomized participants to consume four liquid test meals on separate occasions and followed up with regular blood sample collections. Participants were then offered a buffet meal four hours later. The blood glucose response after the consumption of the test meal, as an incremental area under the curve (AUC), was significantly lower with the whey meal than with the turkey ($P<0.023$) and egg ($P<0.001$) meals, but it was not lower than with the tuna meal ($P<0.34$). The AUC blood insulin after the consumption of the test meal was significantly higher with the whey meal than with the tuna, turkey and egg meals (all $P<0·001$). The AUC rating of hunger was significantly lower with the whey meal than with the tuna ($P<0.033$), turkey ($P<0.001$) and egg ($P<0.001$) meals. Mean energy intake at the ad libitum meal was significantly lower ($P<0.001$) with the whey meal than with the tuna, egg and turkey meals.

Food Product Design May 19, 2010

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Vitamin D May Reduce Breast Cancer Risk, Not Calcium

No associations were found between overall vitamin D or calcium intake and breast cancer risk; however, vitamin D from supplements was independently associated with reduced breast cancer risk, according to a study published in the ***American Journal of Clinical Nutrition*** (2010;91(6):1699-1707). Breast cancer cases aged 25 to 74 years (diagnosed 2002 to 2003) were identified through the Ontario Cancer Registry. Controls were identified by using random digit dialing; 3,101 cases and 3,471 controls completed epidemiologic and food-frequency questionnaires.

Vitamin D and calcium intakes from food only and total combined intakes (food and supplements) were not associated with breast cancer risk, although the mean intake of vitamin D was low. Vitamin D supplement intake more than 10 µg/d (400 IU/d) compared with no intake was associated with a reduced risk of breast cancer. No categories of calcium supplement intake were significantly associated with reduced breast cancer risk, but a significant inverse trend was observed ($P=0.04$). There were no significant interactions involving vitamin D, calcium or menopausal status.

Food Product Design May 24, 2010

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Vitamin E Intake Improves Fatty Liver Disease

Vitamin E has been shown effective in treating nonalcoholic steatohepatitis (NASH), an obesity-associated chronic liver disease that can lead to cirrhosis, liver cancer and death, according to a new study published in the *New England Journal of Medicine*. NASH also is related to or a part of type 2 diabetes, lipid disorders and cardiovascular disease.

"There is an increasing prevalence of nonalcoholic steatohepatitis in this country, something that is directly related to the obesity epidemic," said Dr. Joel Lavine, co-chair of the Network's steering committee and a co-author of the study. "The good news is that this study showed that cheap and readily available vitamin E can help many of those with the condition. We also looked at the drug pioglitazone, which showed some benefits, although not as dramatic as with vitamin E."

In the Pioglitazone or Vitamin E for NASH Study (PIVENS), investigators randomly assigned 247 nondiabetic adults with biopsy-confirmed NASH to receive vitamin E, pioglitazone or placebo. Vitamin E functions as an antioxidant while pioglitazone improves the sensitivity of cells to insulin, a hormone that controls both sugar and fat metabolism.

After 96 weeks of treatment, vitamin E improved all features of NASH with the exception of the amount of scar tissue in the liver; 43 percent of those treated with vitamin E met the primary endpoint of the trial, which was a composite of the scores for several features of NASH indicative of disease activity, compared with only 19 percent of those who received a placebo. Pioglitazone also improved many features of NASH and met the primary endpoint in 34 percent of individuals who received it but fell short of statistical significance. Pioglitazone treatment led to an average weight gain of 10 pounds over the 96-week duration of the study. Liver enzyme tests also improved in those who received either pioglitazone or vitamin E. Upon stopping the medications, the liver enzymes worsened again suggesting the need for long-term treatment.

Food Product Design May 3, 2010

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News in Health & Nutrition

Childhood obesity: a growing concern in Asia-Pacific

Research by the independent market analyst has found that in China, for example, although 15.9% of children aged between 5 and 13 are currently obese or overweight, this will rise by 9.4% year on year to 2014 as expenditure on confectionery and savoury snacks continues to soar.

Richard Parker, senior consumer analyst at Datamonitor, noted that junk food spend is particularly high in Australia: “It is surprising that Aussies are spending so much on both confectionery and savoury snacks. Our figures show that their expenditure is even higher than in the US.”

This reflects the popularity of crisps as a quick and easy treat for kids. Chocolate and sweets are also seen as more of an everyday item for kids in the Asia-Pacific region. “Consumers’ growing disposable incomes as well as their desire for convenience make crisps and sweets an appealing option for time-starved parents,” says Parker, based in London. Despite increasing junk food spend, Datamonitor research reveals that parents in Australia are particularly concerned about diet, with 69% of consumers with children reporting that they are trying to eat more healthily, compared to 59% in China and 44% in South Korea.

“While Australian kids are consuming high levels of chocolate and snacks, parents aren’t naïve when it comes to childhood nutrition,” adds Parker, based in London. Indeed, 54% of Australian parents are limiting the amount of processed food they eat. They are also the least likely in Asia-Pacific to trust food and drinks aimed at children.”

“With few Australian parents trusting products aimed at children there is a danger of them being overwhelmed by the increasing number of health claims made by new brands and products, such as functional foods and drinks which promise to improve concentration and brain function.”

“Our research has found that simple health messages are more likely to win trust and encourage parents to buy. Simultaneously, children must be encouraged to like healthy products on their own merits, without parental influence to encourage long term healthy eating patterns,” concludes Parker.
From: Delphine Jersier" datamonitor 24 Jun '10
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Major retailers 'make reformulation progress'

A report detailing the progress that British retailers have made on reducing the levels of saturated fat, salt and sugar in their foods will be released today (April 28th). The Retailers' Commitment to Health: Reformulation Achievements, published by the British Retail Consortium (BRC) will give a comprehensive update to the reformulation work carried out on products by specific retailers.

In the latest report, it will show that some retailers have reduced the levels of saturated fat in cheese by as much as 50 per cent and in sandwiches by 30 per cent. The majority of retailers now have one per cent milk on sale in the UK, which contains around 73 per cent less saturated fat than whole milk. In soft drinks, the sugar levels have been slashed by four per cent too, the report will show.

"Retailers have the best record in the UK food industry on reducing fat, sugar and salt in products, providing nutritional information and delivering promotions on fresh food," said Andrea Martinez-Inchausti, assistant food director at the BRC. "Reformulating food products without comprising taste, safety and quality hasn't been easy." Last month, the British Food Standards Agency called on food manufacturers to reduce levels of saturated fat and sugar in their products.

Ingredients Network 28 April 2010

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Breakfast cereals 'portrayed in bad light'

According to the Irish Breakfast Cereal Association (IBCA), breakfast cereals have recently been portrayed badly and the "important beneficial aspects" to cereals have been ignored, it has been reported. Recently, mysupermarket.co.uk released a report showing that Crunchy Nut Cornflakes contains 13.6g of sugar per serving, which is 5g more than the sugar content of a jam doughnut. However, a spokesperson for the IBCA told the Irish Independent that comparing cereals to jam doughnuts or chocolate cake was "misleading" as it only looks at sugar content. "This does not help people make an informed choice about what to eat," the spokesperson added.

The report from mysupermarket.co.uk found that other cereals with high sugar content included Coco Pops, which contains 10.2g per

serving. Shreddies and Special K, Cornflakes and Rice Krispies all have more sugar and salt than many sweet snacks, the report discovered. People should look at a number of different factors in order to make a choice about breakfast cereals, including "portion size, fat, saturated fat, carbohydrate, sodium, fibre, vitamins and minerals and calories", the IBCA spokesperson said.

Ingredients Network **29 April 2010**

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Curries 'too high in salt'

Convenience foods such as supermarket curries include almost three-and-a-half times the maximum recommended daily intake of salt, according to a study. Data from the Consensus Action on Salt and Health (Cash) said that eating a curry, rice, naan, sag aloo and a poppadom and chutney can amount to as much as 20.5g of salt compared to the recommended daily maximum of 6g.

Cash chairman Professor Graham MacGregor, from the Barts and The London School of Medicine and Dentistry, said: "It is the very high levels of unnecessary salt that are added to our food that puts up our blood pressure and leads to thousands of people needlessly dying of strokes, heart attacks and heart failures every year." He urged all convenience food manufacturers to cut down on the amount of salt in their products immediately.

Earlier this week, it was reported that New York City has launched a voluntary National Salt Reduction Initiative, which will see food manufacturers such as Heinz committing to reducing salt levels in their products.

Food Product Design 30 April 2010

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Global Organic Food Market Reaches $60 Billion

The global organic food market grew nearly 10% in 2009 to reach a value of $60 billion, according to Datamonitor's "Organic Food: Global Industry Guide." Additionally, in 2014, the global organic food market is forecast to have a value of $96.5 billion, an increase of nearly 61% since 2009. The fruit and vegetables segment generated 31.5% of the global organic food market's overall revenues, according to the report, and the Americas accounts for about 49% of the global organic food market's value.

The report includes detailed data on market size and segmentation, textual analysis of the key trends and competitive landscape, and profiles of the leading companies. It also provides expert analysis on a global, regional and country basis, covering the global, European and Asia-Pacific markets, as well as individual chapters on five major markets (France, Germany, Japan, the UK and the U.S).

Nutraceuticals World Breaking News May 3, 2010

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Herbal Supplement Sales Increase to $5 Billion in Sales in the U.S.

Sales of herbal dietary supplements in the U.S. increased by almost 5% in 2009, reaching a total estimated figure of just over $5 billion, according to the American Botanical Council (ABC), Austin, TX. The statistics are conclusions of a new report published in the current issue of *HerbalGram*, ABC's quarterly journal.

Sales in the mainstream market channel (e.g., drugstores, etc.) experienced particularly strong growth, increasing more than 14% over 2008 sales. "This news is really remarkable," said *HerbalGram* editor Mark Blumenthal. "In the most economically difficult market in over 70 years, when almost all consumer goods experienced a drop in sales, consumers voted strongly with scarcer dollars for herbal dietary supplements."

The *HerbalGram* report is based on herb supplement sales statistics from market research firms Information Resources Inc. (IRI), *Nutrition Business Journal* (*NBJ*), and SPINS.□□*NBJ* estimated the total herb supplement sales figure for 2009 based on data derived from company surveys, interviews with major retailers and industry experts, and various published and unpublished secondary material.

IRI, a Chicago, IL-based market research firm, determined herb supplement sales in the mainstream market channel as being $336 million for 2009, an increase of more than 14% over the previous year.□"The 14% growth spurt is the largest sales increase in the mainstream market in recent memory," said Mr. Blumenthal, who is also the founder and executive director of ABC. IRI's figure includes grocery stores, drugstores and mass market retailers, but it does not include Wal-Mart, Sam's Club, other large warehouse buying clubs, or convenience stores.

SPINS, a Schaumburg, IL-based market research firm, found sales of botanical dietary supplements in the natural and health foods channel to be nearly $250 million, an increase of 4.5% over 2008 sales in this channel. SPINS' figure does not include sales from the natural foods store Whole Foods Markets.

In addition to the mainstream market and the natural and health foods channel, herbal dietary supplements are sold in the United States through mail order catalogs and Internet sites, radio and television direct sales outlets, multi-level marketing firms that sell directly to the consumer, health professionals who sell supplements from their offices, and various other channels.

The 5 top-selling single herbal supplements of 2009 in the health and natural foods channel, according to SPINS, were aloe (*Aloe vera*), flaxseed oil (*Linum usitatissimum*), wheat grass and barley grass (*Triticum aestivum* and *Hordeum vulgare*), açaí (*Euterpe oleracea*), and turmeric (*Curcuma longa*). The top-selling herbal singles of 2009 in the food, drug, and mass market channel, according to IRI, were cranberry (*Vaccinium macrocarpon*), soy (Glycine max), saw palmetto (*Serenoa repens*), garlic (*Allium sativum*), and echinacea (*Echinacea spp.*). These rankings do not include combinations containing multiple herbs.

Nutraceuticals World Breaking News May 7, 2010

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HFCS Fighting Uphill Battle

A recent ***New York Times*** article delved into the ongoing battle between makers of high-fructose corn syrup (HFCS) and critics who want the sweetener removed from food and beverage products. HFCS opponents have jumped on the social media bandwagon, including Facebook, Twitter and YouTube, to wage a viral war on the corn-based sweetener, while HFCS makers and the Corn Refiners Association have taken to advertising the science behind the product and why it is as healthy as sugar and a cheaper alternative. On the product side, a number of leading food and beverage brands, including Heinz, Kraft, Gatorade, Wheat Thins and Pepsi, have rolled out products sweetened with regular sugar instead of HFCS.

Food Product Design May 7, 2010

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Snacks, the new 'meal' restaurants are serving up

Recent research from Mintel Menu Insights found that snacking is the new way to order at restaurants. Menu items that contain the descriptors "snack," "snackable," or "snacker" have increased by a staggering 170% since 2007 and growth is expected to carry on as restaurants continue to explore this new trend.

"Snacks are providing a huge opportunity right now for restaurants ranging from quick service to fine dining," said Eric Giandelone, Director of Foodservice Research at Mintel. "By innovating menus with various snacking options, restaurants can boost sales throughout the day and drive guest traffic during non-peak hours."

Consumers are more likely to visit restaurants in the early and late afternoon for snacks, the 3 p.m. to 6 p.m. time slot being most popular with 37% of Mintel's respondents. Spending, however, peaks in the early evening. Only 19% of respondents purchased snacks from a restaurant between 6 p.m. and 8 p.m., but the average amount spent is $4.26 per person versus only $3.79 across all other time periods.

The majority of snackers (64%) look for a beverage when snacking, whereas 61% opt for something portable. Meanwhile, just over half (52%) crave an indulgent snack and 50% want something salty to nibble on. Only 32% of snackers choose a healthy option, which counteracts the health-conscious trend that is being seen in the restaurant industry.
IFT Newsletter May 19, 2010

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Emerging trends which are hitting shelves in Asia-Pacific region

- A natural appetite suppressant said to help consumers with weight loss and oral health care, Pinno Thin is a new ingredient added to the confectionery sector. 'Ador Chocolate', launched in Japan and other markets, is the first in the chocolate space to use pine nut oil as a functional additive and the first to use the branded Pinno Thin ingredient.
- "Exciting new creations", – fruits and nuts paired with single origin chocolate, herbs and spices – will be the new flavour in Australia. The most amazing combination in the Baru Chocolate Paired Dragees range is the chocolate, almond and olive blend which should attract the more adventurous consumer.
- 5g of protein and 1.5g of fiber per 500ml serving is the new drink recipe designed to "bridge the hunger gap" between meals. WH2Ole is the brand name of a range of Functional Water drinks available in New Zealand which are said to aid the feeling of fullness.

- Adding “A little sparkle…to pep up the most jaded soul” is the claim of the Australian Caves Road B Vitamin Enhanced Waters from Margaret River Beverages. The drink, which is said to enhance the mood of the consumer, is available in Lemon Lime & Bitters, Berry, and Green Apple & Ginger.

Cesar Pereira, Research Manager at Product Launch Analytics, said: “New products containing innovative ingredients such as Pinno Thin, with its weight loss and oral health care benefits, are important in helping to predict trends. We expect more products containing these innovative ingredients to be filling shelves in Asia-Pacific soon”.

Delphine Jersier Datamonitor 23 Jun '10

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New Vitamin D Recommendations for Older Men and Women

The International Osteoporosis Foundation (IOF) has released a new position statement on Vitamin D for older adults which makes important recommendations for vitamin D nutrition from an evidence-based perspective.

Vitamin D is important for bone and muscle development, function and preservation. For this reason it is a vital component in the maintenance of bone strength and in the prevention of falls and osteoporotic fractures.

The objective of this statement, published in the leading bone journal, *Osteoporosis International (OI DOI 10 1007/s00198-010-1285-3),* was to use and examine all available evidence to support new recommendations for optimal vitamin D status.

The best available clinical indicator of vitamin D status is serum 25OHD and vitamin D intake and effective sun exposure are the major determinants of this level. Serum 25OHD levels decline with ageing but the response to vitamin D3 supplementation is not affected by age or by usual calcium dietary intake.

Preventing vitamin D deficiency has a major impact on falls and osteoporotic fractures. Vitamin D deficiency is associated with decreased muscle strength in older men and women and supplementation improves lower limb strength and reduces risk of falling. Vitamin D affects fracture risk through its effect on bone metabolism and on falls risk.

Key recommendations:

- The estimated average vitamin D requirement of older adults to reach a serum 25OHD level of 75 nmol/l (30ng/ml) is 20 to 25 µg/day (800 to 1000 IU/day).
- Intakes may need to increase to as much as 50 µg(2000IU) per day in individuals who are obese, have osteoporosis, limited sun exposure (e.g. housebound or institutionalised), or have malabsorption.
- For high risk individuals it is recommended to measure serum 25OHD levels and treat if deficient.

The lead author of the statement, Professor Bess Dawson-Hughes of Tufts University, US, stated that, "Global vitamin D status shows widespread insufficiency and deficiency. This high prevalence of suboptimal levels raises the possibility that many falls and fractures can be prevented with vitamin D supplementation. This is a relatively easy public health measure that could have significant positive effects on the incidence of osteoporotic fractures."

ScienceDaily (May 10, 2010) —

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Regulatory News

FDA Seeks Comment on Front-of-Package Labeling

FDA has requested comments and information from the public and other interested parties about front-of-package nutrition labeling and on shelf tags in retail stores. The agency is seeking public participation as it deliberates about how to enhance the usefulness to consumers of point-of-purchase nutrition information. This includes information on the main display panel of food products, called "front-of-pack" labeling, as well as information on shelf tags in retail stores.

FDA wants to learn more about:

• the extent to which consumers notice, use and understand nutrition symbols on front-of-pack labeling of food packages or on shelf tags in retail stores

• research that assesses and compares the effectiveness of particular approaches to front-of-pack labeling

• graphic design marketing and advertising data and information that can help develop better point-of-purchase nutrition information

• how point-of-purchase information may affect decisions by food manufacturers to reformulate products.

The front-of-pack nutrition labeling effort aims to maximize the number of consumers who readily notice, understand and use point-of-purchase information to make nutritious choices for themselves and their families.
Nutraceuticals World Breaking News April 30, 2010

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FDA takes steps to increase food safety during transport

The U.S. Food and Drug Administration (FDA) is asking commercial food transporters to follow new guidance the agency is issuing to reduce the chances of physical, chemical, biological, and other risks during transportation of foods while the agency reviews current food safety transportation regulations.

In an advance notice of proposed rulemaking (ANPRM) published in the April 30 *Federal Register*, the FDA has requested input on writing the new rules from all interested parties, including the food and transportation industries and consumer interest organizations. The ANPRM is the first step in creating new regulations to govern sanitary practices by shippers, carriers by motor vehicle or rail vehicle, receivers, and others engaged in the transportation of food products for people and animals.

The new industry guidance covers safety measures that should be employed while the regulations are being written and finalized. They include ensuring that food in transit is maintained at appropriate temperatures; that such food is closely monitored for pests; that the vehicles used to transport foods are sanitary and in proper working condition; that pallets used are of good quality; and that sanitary measures are followed in the loading and unloading of foods.

"Our aim is to look at every component of the system to assess hazards, and to take science-based action where appropriate to maximize the safety of our food from farms all the way to consumers' tables," said FDA's Associate Commissioner for Food Protection, Jeff Farrar. "Although contamination of food product during commercial transport is relatively infrequent, the potential harm can be widespread and serious."

After evaluating comments received in response to the ANPRM, the FDA will propose specific regulations. The FDA will coordinate with the U.S. departments of Agriculture and Transportation in the rulemaking process.

IFT Newsletter May 5, 2010

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Fears persist that consumers will struggle to understand EFSA's "clinical" health claims

The European Commission has met with EU member states in a bid to tackle the increasingly contentious issue of the wording of health claims.

The conference took place amid rising concern that claims approved by the European Food Safety Authority — which is evaluating claims submitted for assessment under the EU's Nutrition & Health Claims Regulation — are sometimes framed in language few consumers could be expected to understand.

Perhaps the highest profile example of this was provided by Fruitflow, the tomato extract for which UK-based Provexis gained a positive health claims opinion in May 2009. Provexis had applied for the claim: "Helps to maintain a healthy blood flow and benefits circulation." But EFSA said the evidence did not reflect this wording and instead approved the claim: "Helps maintain normal platelet aggregation" — leading to fears consumers would not understand it.

Mark Tallon, founder of UK-based consultancy NutriSciences, said the wording of claims was presenting the European Commission with a thorny problem. "Gaining a health claim is one thing but gaining one that makes sense to the general public is another," he said. "As part of the general conditions of Article 13 claims a health claim must be 'well understood by the average consumer.' Claims must also protect the consumer from being misled, and balancing these two issues is causing some difficulties."

Tallon, who reported news of the meeting between the Commission and member states on his blog, said the discussion covered a host of ingredients with health claims approvals including biotin, calcium and vitamin D, copper, fluoride, iron and lactase enzyme.

The wording for one claim approved by EFSA for biotin, which is a B vitamin, is: "Biotin contributes to normal energy-yielding metabolism." Tallon said the group discussed whether consumers would understand the phrase 'energy-yielding metabolism' and ways of tackling this. The meeting also addressed EFSA's frequent use of the word 'normal' in claims, and whether consumers would better understand the word 'healthy' instead.

One suggestion made at the meeting, said Tallon, was that member states should be able to look at the EFSA opinions and try to suggest more meaningful claims based on the scientific evidence. EFSA would then be asked to verify the new wording. In any case, said Tallon, the meeting showed that "already there are significant issues in relation to member states accepting the clinical nature of EFSA wording."

The meeting closed with an agreement that further guidance for member states on wording would be produced by the Commission. However, Tallon added: "Whatever the guidance one major concern is that every change in EFSA's approved claim has the potential to take wording further away from the substantiated meaning of the claim. The fallout could make the process of enforcement and harmonisation of any claims throughout the EU more difficult and complex."

Meanwhile, trade body the Federation of Associations of Health Product Manufacturers (EHPM) has renewed calls for the European Commission to prevent Article 13.1 health claims to be adopted in staggered batches. Speaking at a workshop held at the European Parliament in Brussels, Peter Van Doorn, EHPM chairman, said: "The batch-wise approach to the adoption of the Article 13 community list of generic health claims distorts competition in the market and is one of the many concerns that our industry has on the current implementation process of this regulation." An industry impact assessment was underway with preliminary results this due summer, he added.

Functional Ingredients Magazine May 11, 2010

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Dairy Industry Complains to FDA Over Use of Term "Milk" for Soy, Other Beverages

A decade after it first asked the federal Food and Drug Administration to crack down on the misappropriation of dairy terminology on imitation milk products, the National Milk Producers Federation today sent another petition to the FDA (http://nmpf.org/files/file/NMPF%20Misbranding%20Letter%20to%20FDA%204-28-10.pdf), asserting that the practice has gotten worse in the past 10 years.

In its petition submitted April 29th, NMPF contends that not only have the terms "soy milk" and "soymilk" continued to proliferate, but also other dairy-specific terms like "yogurt," "cheese," and "ice cream" are now being used by products made out of a wide variety of non-dairy ingredients.

"The FDA has allowed the meaning of 'milk' to be watered down to the point where many products that use the term have never seen the inside of a barn," said Jerry Kozak, President and CEO of NMPF. "You don't got milk if it comes from a hemp plant, you can't say cheese if it's made from rice, and faux yogurt can't be made from soy and still be called yogurt," he said.

This matter was originally brought to the attention of the FDA in February 2000, when NMPF sent a letter asking that the agency make clear to manufacturers of imitation dairy products that product names permitted by federal standards of identity, including dairy terms such as "milk," are to be used only on foods actually made from milk from animals like cows, goats, and sheep. The FDA has failed to act on that petition, so NMPF "is again asking our regulators to defend the letter and the spirit of regulations intended to prevent false and misleading labeling on consumer products," Kozak said. "The use of these terms shouldn't just be determined by the common and convenient vernacular that marketers prefer; they should be used according to what the law allows."

As NMPF had predicted ten years ago when it first brought this issue to the attention of FDA, soy "milks" continue to be marketed and sold right along with dairy milks, and now, a bevy of new artificial dairy products has reached store shelves in the past decade. In many cases, these products don't contain the equivalent levels of nutrients that real milk does.

NMPF's petition cites examples including imitation milks made from hemp, rice, almonds, and other plants, legumes and vegetables; yogurts made from soybeans and rice; and cheeses made from soy, rice, and nuts. In some cases, marketers use superficial word changes, such as "cheeze," in an apparent attempt to skirt the standards of identity regulations.

Non-dairy products "can vary wildly in their composition and are inferior to the nutrient profile of those from dairy milk - although they are marketed as replacements for foods that consumers are familiar with and which have a healthful image," Kozak said. "Although some phony dairy foods may have a passing resemblance to their authentic counterparts, they are very different in nutritional value, composition, and performance from standardized dairy products."

Examples of products that exploit the lax enforcement of dairy product labeling can be found here: www.facebook.com/theydontgotmilk. Consumers who have examples of what they believe are improperly-labeled imitation dairy products can post examples at that Facebook page. Additionally, consumers can use a webform on the NMPF website to send examples directly to the Food and Drug Administration and/or urge the agency to take action on the matter at: www.nmpf.org/fda-form.

SoyTech eNews April 29, 2010

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EFSA: CLA Safe for Food

European Food Safety Authority (EFSA) concludes that the safety of **Tonalin® CLA** has been established for defined uses as a food ingredient. The EFSA scientific opinion marks a major step to gaining novel food approval for Tonalin CLA in Europe.

Cognis was the first company in Europe to seek novel food approval for CLA, and the EFSA safety opinion is a necessary step towards obtaining it. In the next and final step of the approval process, the European Commission will present a draft decision to the Standing Committee on the Food Chain and Animal Health, which will make a final decision on the application. Tonalin CLA has already been granted FDA GRAS status in the U.S. for multiple food applications. It is also the only CLA to achieve novel food approval in China, making it the only product of its kind authorized for use in food products for the rapidly growing Chinese market. In addition, Cognis has recently enhanced Tonalin CLA’s taste and sensory properties by incorporating an additional purification step during manufacturing.

“We have been eagerly awaiting this opinion from the EFSA,” says Dr. Arne Ptock, Global Product Line Manager for Tonalin. “It represents a significant milestone for Cognis and for our customers towards gaining novel food approval for Tonalin CLA. We are confident that we will soon be able to take this final step and we are prepared to support the European market with extensive food application expertise. Our Tonalin CLA is already used in functional food products in different regions and recognized by consumers as a premium brand.”

“The issues of weight management and body fat reduction are ever-present in the minds of consumers,” comments Andreas Bais, Marketing Manager Nutrition & Health, Europe. “The demand for Tonalin CLA will continue to grow as consumers become more aware of the limitations of ‘quick solutions’ and of the need for a well-balanced and sustainable approach to body composition.”

Food Product Design May 21, 2010

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New Regulations May Require Healthier Foods in School Vending Machines

Crispy edamame, fresh bananas, fruity organic waters and pomegranate spiked nut clusters could replace sweets and sports drinks in school vending machines thanks to a crop of healthier products and government initiatives. A provision in the Child Nutrition Act passed by the Senate would give the U.S. Department of Agriculture authority to regulate nutrition standards not just for the

lunchroom, but for foods in the a la carte lines and vending machines as well. That bill is under consideration by the House.

Although the department won't detail what those standards might look like, it has promoted voluntary standards through its new HealthierUS Schools Challenge, and representatives say it will also take cues from "states that have already developed standards for" these kinds of foods. These states -- most notably New York and California -- have spurred food manufacturers to develop healthier vending items just to remain competitive in the arena. This spring the Alliance for a Healthier Generation reported an 88 percent decrease in beverage calories shipped to schools from the first half of 2004-05 to 2009-10, mostly due to calorie reformulations and reduced container sizes.

This growing line of healthier products and stricter regulations could drastically change the school snacking landscape, and eventually the taste preferences of American school kids. The vending machines of the near future were on display at the recent National Automatic Merchandising Association Show in Chicago, where fresh fruit, lightly flavored organic waters and natural sweets were creating a buzz. Many vending machine food-makers at the show said they would welcome a single set of federal regulations over the patchwork of state and district laws.

Illinois tightened its vending machine rules for elementary and middle schools in 2006, with a ban on fruit drinks that contained less than 50 percent real juice, fried vegetables, confections and snacks with more than 200 calories. In high schools, the state rules did not change, but some districts, such as Naperville, which banned drinks with high fructose corn syrup, have beefed up their own high school vending rules.

Chicago Public Schools recently switched from another sports drink brand to All Sport, sold in a 12-ounce, 90-calorie portion. The drink's second ingredient is high fructose corn syrup and it includes artificial flavors and red dye 40, but the 12-ounce portion conforms to CPS standards. Those standards, however, don't match the guidelines of the USDA's HealthierUS School Challenge. The federal program encourages schools to voluntarily adopt healthier practices in exchange for certifications and federal money.

CPS officials have announced their intentions to gain "gold" status under the program next year, but the sports drinks would disqualify any school that sells them. The district also fails to match up with the HealthierUS Schools vending guidelines by allowing snacks that derive 40 percent of their weight from sugar, according to CPS documents. The USDA program limits sugar to 35 percent.

"The snack policy and beverage vending guidelines are under review, so we are considering other beverage alternatives," CPS spokeswoman Monique Bond said.

In New York City, education officials have laid down some of the toughest vending standards in the country. In addition to restrictions on sugar and fat, officials have set salt limits and fiber minimums, while restricting high school beverages to 25 calories per serving and elementary school drinks to 10 calories. The man in charge of filling the New York snack machines is John Murn. His company, The Answer Group, won the vending machine contract for the huge district last year, which made him a very popular guy at the Automatic Merchandising Association Show here.

He walked the floor pointing out companies that will be supplying at least 500 New York vending machines with sliced apples, fresh bananas, baby carrots, nut clusters, naturally flavored licorice and fruity waters. He also showed off a machine that displays nutrition information on a LCD screen when a student is choosing a snack.

Murn said he still contends with complaints that the machines should be banned from schools or that they should only operate for limited hours. But he believes that if the machines sell healthy foods, they can raise much-needed money for schools while establishing good eating habits. "We believe that healthy snacks should be available to the kids all day so that they can pick up a healthy snack at any time. Otherwise they will just go to another venue," Murn said.

Last week The Answer Group rolled out a test batch of 10 refrigerated fruit machines in middle schools and high schools in the Bronx, Queens and Manhattan. "I wasn't sure the kids were going to eat the fruit but on the first day we sold out of watermelon and mango slices," he said.

Del Monte, also at the show, officially introduced its line of fresh fruit machines late last year and tested them in four Chicago locations, said Marketing Director Vidya Samsundar. "The response has been exciting, with college students preferring the bananas and vegetables and schoolchildren going for the fruits," she said.

In a challenge to drink innovators, the New York City Department of Education dropped Snapple last year and put out a call for what seemed like an impossible beverage. It demanded a drink with no more than 25 calories per 8 ounces, no caffeine, no artificial sweeteners and no carbonation. Oh, and it also had to appeal to high school kids.

At least two manufacturers -- SoNu and Inko's-- came up with drinks that fit the bill, both of which were on display at the recent show and are on sale in New York public schools. Organic SoNu fruit waters haven't sold as well as Snapple and conventional drinks did, but representative Kara Schnabel believes in time more schoolchildren will come around.

"I think it's fantastic because it's training them at an early age," said Schnabel, who reports that she's gotten orders from Chicago schools. "And they will have no choices but healthy choices. You can't control what they eat at home but you can at school. And they like it." It's also training manufacturers to get used to a new reality.

"Between what's happening in New York and D.C. (with federal anti- obesity efforts) we tell all the manufacturers that this is the new norm," said Murn. "And so either they change the product or we don't sell them."

Beyond schools, some institutions serving large groups of children are switching to healthier vending machines, seeking to spark a transition. Evanston's McGaw YMCA contracted with Yo-Naturals for products like Pirate's Booty, organic sandwich cookies, Clif Bars, fruit juices, kettle corn, natural root beer and organic milk. Prices at that machine are 30 to 60 percent higher than regular machines down the hall at the Y. "We put in the new machine about nine months ago because we want to offer members healthier options," said Juliet Garrard, spokeswoman for the YMCA. "Right now we are in a transitional stage, but members, particularly parents with kids, are very interested."

Report by Monica Eng from Soy Tech eNews May 18, 2010

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STEVIA FSE™ Granted GRAS Status

HealthCo, a division of NOW Health Group, has been granted GRAS status for its STEVIA FSE™ for use as a food ingredient in bulk powder, private label consumer sizes and foodservice bulk packets.

STEVIA FSE, which uses whole leaf stevia, is enzymatically treated to remove bitter aftertaste and provides a better-rounded sweetening profile that is ideal for numerous food applications. The natural enzyme treatment enhances its organoleptic properties. Stevia FSE is 60-100 times sweeter than sugar (sucrose). Stevia FSE is also NOP Certified Organic and kosher.

“Our knowledge of the natural products consumer made it imperative that our stevia ingredient be a far more natural offering than the products which are starting to mainstream,” said Michael Lelah, technical director. “GRAS status makes our branded whole leaf stevia extract available to manufacturers of food products now.”

Food Product Design May 19, 2010

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