

Editorial

We have organised the Food Ingredients Conference Fi-India 2008 in October 2008 and alongside there will be a huge exhibition of over 100 exhibitors from various corners of India and abroad. The interest is so much in the event especially in the nutrients and nutraceuticals sector that it gives a feeling that industry is really concerned about the health of the consumers.

However, when we look at the nutritious and functional products that come into the market are only affordable by well-to-do if not elite. When one tries to buy the bread, the ordinary bread is around Rs.12 but the one with high fibre, multi-grain or whole wheat cost anywhere from Rs. 18 to 22. I can understand that when one uses the whole wheat flour or add fibre or other cereal flours to refined wheat flour the cost of ingredients and process goes up but should it go up so much?

Industry is not expected to do charity and that is probably government's job. There is an opportunity for industry to tap the middle and lower market that is made up of people who are knowledgeable and aware of nutrients but they do not have the luxury to pay excessively for the very expensive nutritious products. This market would not only be quite but also be useful in giving the industry stability.

One reason for this high cost of course is that many ingredients are imported. India produces large amounts of milk, cereals & pulses, fruits & vegetables etc. (this is heard now at almost every conference), so why there aren't many ingredients' manufacturers taking advantage of this and setting up units making these? This will certainly make the ingredients quite cost effective for most food manufacturers to use them.

There is also another possibility. The international can also get their overheads reduced by having some of the ingredients manufactured or at least processed here to some extent rather than bringing everything from abroad. Probably there are no suitable varieties growing here that they can use. However, this is not always true. Guar gum is produced here. It then goes out in lower value form and comes back in such forms that are having excellent properties and also the cost is phenomenal. Although some manufacturers of ingredients have started making finer products from guar gum but still it is too small a proportion.

There is technology and ingenuity available here that must be tapped. Investors have shown that Indians do not lag behind if the projects are right. Therefore instead of just trying to do as the west does, let us find out what we need and make them from our own materials that we grow. It will certainly be beneficial to Indian consumers but also there are many neighbours waiting to learn from us. Our producers can then supply many Asian and African countries that also need many nutritious ingredients. Probably some Ambanis and Tatas are needed in food and ingredients industry.

We welcome two corporate members Foods Fats & Fertilisers and G.C. Chemie Pharmie along with an associate member, Prof. Jeya Henry of Oxford Brookes University, UK. We hope they have a long, enjoyable and very fruitful association with us.

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Dietary Fibre: Dr. J. S. Pai

What is Dietary Fibre

This is plant material like carbohydrates and other substances that are resistant to digestion and absorption by humans and may include polysaccharide, oligosaccharide, lignin and associated substances. It promotes beneficial effects like preventing constipation, helping to manage cholesterol and glucose levels in blood. It is mainly found in cereal foods, legumes, fruits and vegetables. Modern diet is mostly consisting of products made of refined flours and of animal sources like meat, fish, poultry, eggs and milk products. All of these lack fibre and there are many ailments associated with lack of fibre are quite prevalent in modern society. Various organisations including American Dietetic Association, National Academy of Science, British Nutrition Foundation etc. have recommended increasing the dietary fibre in the diets recommending up to 35g fibre per day. US Food & Drug Administration has given approval for making health claims for fibre on labels of food products rich in it.

Types of Dietary Fibre

There are basically two types, insoluble and soluble fibre. The difference is based on solubility in water. There are three types of insoluble fibres: cellulose, hemicellulose and lignin. These are also sometimes referred to as roughage. Foods that contain good amounts of insoluble fibre include wheat bran, whole grain products, and vegetables. These help in promoting laxation preventing constipation.

Soluble fibres are mostly composed of gums, pectins and mucilages. These form gels with water and promote softer stool. They slow down the passage of food through the GI tract and this action is believed to help in regulation of cholesterol and glucose levels of blood by affecting their absorption rates. Good sources of soluble fibre are beans, oats, barley and many fruits and vegetables.

Although traditionally not thought of as fibre, resistant starch behaves in similar manner as dietary fibre. It is found in many cereals and pulses. Some amount of resistant starch is produced during processing of starch containing products like baking of bread and other cereal products.

Sources of Fibre

Soluble Fibre: Oatmeal, oat bran, nuts & seeds, legumes (dried peas, beans, lentils), fruits (apple, pear, strawberries, blueberries), vegetables (ladies fingers, guar)

Insoluble Fibre: Whole grain foods (whole wheat breads, barley, brown rice, whole grain breakfast cereals, wheat bran), nuts & seeds, vegetables (cucumber, green beans, cauliflower, celery, tomatoes)

Fibre Contents of Some Common Foods

Food, Standard Amount	Dietary Fiber (g)	Food, Standard Amount	Dietary Fiber (g)
Kidney beans, canned, ½ cup	8.2	Pumpkin, canned, ½ cup	3.6
Split peas, cooked, ½ cup	8.1	Spinach, cooked, ½ cup	3.5
Lentils, cooked, ½ cup	7.8	Almonds, 1 oz	3.3
Lima beans, cooked, ½ cup	6.6	Apple with skin, raw, 1 medium	3.3

White beans, canned, ½ cup	6.3	Brussels sprouts, cooked, ½ cup	3.2
Chickpeas, cooked, ½ cup	6.2	Banana, 1 medium	3.1
Cowpeas, cooked, ½ cup	5.6	Orange, 1 medium	3.1
Soybeans, mature, cooked, ½ cup	5.2	Guava, 1 medium	3.0
Sweet potato, baked, with peel, 1 medium (146 g)	4.8	Pearled barley, cooked, ½ cup	3.0
Green peas, cooked, ½ cup	4.4	Tomato paste, ¼ cup	2.9
Pear, 1 small	4.3	Broccoli, cooked, ½ cup	2.8
Mixed vegetables, cooked, ½ cup	4.0	Turnip greens, cooked, ½ cup	2.5
Raspberries, ½ cup	4.0	Carrots, 1 cup	3.0
Potato, baked, with skin, 1 medium	3.8	Okra, frozen, cooked, ½ cup	2.6
Soybeans, green, cooked, ½ cup	3.8	Peas, edible-podded, cooked, ½ cup	2.5
Figs, dried, ¼ cup	3.7	Brown rice, cooked, 1 cup	3.5
Dates, ¼ cup	3.6	Whole-wheat bread, one slice	1.9
Oat bran, raw, ¼ cup	3.6	Strawberries, 1 cup	3.0

From: USDA Dietary Guidelines 2005

Dietary fibre contents of some Indian varieties of certain common foods and given per 100g rather than per common household measure like cup show following values: wheat 12.5g, rice 4.1g, jowar 9.7g, bajra 11.3g, Bengal gram (dal) 15.3g, black gram (dal) 11.7g, lentil (whole) 15.8g, red gram (whole) 22.6g & (dal) 9.1g, agathi 8.4g, curry leaves 16.3g, drumstick leaves 9g, spinach 2.5g, carrot 4.4g, potato 1.7g, colocasia 3g, sweet potato 3.9g, bitter gourd 4.3g, brinjal 6.3g, broad bean 8.9g, cauliflower 3.7g, guar 5.7g, drumsticks 5.8g, ladies fingers 3.6g, green peas 8.6g, tomato 1.7g, coconut 13.6g, gingelly (sesame) seeds 16.8g, groundnut 11g, mustard 13.6g, cinnamon 48.5g, coriander seeds 47.4g, cumin seeds 30g, fenugreek 48.6g, turmeric 20g, papaya 2.6g, banana 1.8g, dates 7.7g, fig 5g, grapes 1.2g, guava 8.5g, pear 4.3g, apple 3.2g, sapota 10.9g. (Nutritive Value of Indian Foods by Gopalan and others, 2004).

Health Benefits of Dietary Fibre

Diets with high fibre contents have been considered to improve gastrointestinal health, improve glucose tolerance and the insulin response, reduce hyperlipidemia, hypertension and other coronary heart disease risk factors, reduction in the risk of developing some cancers and increase satiety and help to some degree in weight management. Evidence of dietary fibre reducing risks of colorectal cancer is mixed. Some studies have shown benefit while the others have not shown any benefits. However, there are benefits of fibre especially the insoluble type preventing constipation. This produces bulk and laxation. Soluble fibre makes stool softer. As fibre absorbs good amount of water, drinking plenty of water along with high fibre diet is necessary.

Another common disorder especially in older people is diverticulitis, an inflammation of intestine. Eating dietary fibre particularly insoluble fibre was associated with about 40% lower risk of diverticulitis. A high fibre diet also lowers risk of other disorders of GI tract such as irritable bowel syndrome and hemorrhoids.

Coronary heart disease is one of the leading cause of death for both men and women. There is cholesterol-filled plaque build up in arteries especially those supplying blood to heart. This causes atherosclerosis narrowing and hardening the arteries eventually causing blockage. When coronary artery gets blockage it produces heart attack. High dietary fibre has been linked to a lower risk of cardiovascular disease as has been shown in a number of large studies. High dietary fibre intake has been shown to reduce the risk of coronary heart disease by 40% compared to low fibre intake. Fibre intake has also been linked to many factors that increase the chances of developing heart disease and diabetes. They include high blood pressure, high insulin levels, excess weight, high triglyceride levels and low levels of HDL or good cholesterol. Higher intake of fibre alleviates all these problems lowering further the chances of heart disease.

Today, type 2 diabetes is the most common form of diabetes. In this insulin production is low and/or its effectiveness is reduced hence blood sugar is not controlled causing high levels. Besides several important factors like healthy weight, physical activity and not smoking that lower the risks of type 2 diabetes, dietary factors especially high fibre diet seems also to lower its risk. Soluble fibre is more effective in lowering both the risks of heart disease and diabetes since substances like gums and pectin have shown the ability to control both cholesterol and glucose levels in blood.

A high fibre diet may also help with weight management. High fibre foods usually need more chewing time giving body time to register when satisfied, so one is less likely to overeat. Also high fibre food remains in stomach longer so feeling of fullness is for a longer time. High fibre foods also will be having less calories for the same volume of food. All these help consume less food and calories, all amounting to weight management.

Dietary Guidelines & Recommended Fibre Intake

There are many scientific bodies recommending high intakes of dietary fibre. Indian traditional diets with many vegetables, whole grain cereals products including roti, chapatti, brown (parboiled) rice etc., dals and other pulses like kidney beans (rajmah), lentils (masoor), bengal gram (channa), peas, etc. along with fruits would give adequate amounts of both soluble and insoluble fibre. However, Indians have been slowly getting away from this traditional diet to more westernised diet with new lifestyle foods that have much less fibre. High fibre foods not only gave enough fibre but also contained other nutrients like vitamins and minerals. Thus diet was overall more nutritious and healthful.

There is a need for increasing fibre intake not only to prevent certain age-related diseases like diabetes and heart disease but also obesity that affects all ages. Childhood obesity can be curtailed to a great extent if fibre content of the diet is increased. Children feel full earlier and for a longer period and so tendency to overeating is reduced. Low fibre foods also have the tendency to increase the blood glucose sharply and then dropping it also sharply compared to high fibre foods of similar carbohydrate contents. This sharp drop also fails to supply energy for a longer time without replenishing again with more food.

When enough fibre is there, especially the soluble fibre, absorption of glucose from intestine to blood is more gradual and for a longer time. Hence there is a continuous supply of energy needed for mental and/or physical activity. Children especially need it as they are more active than adults. When they feel lacking in energy they eat or drink beverages supplying calories. Thus total caloric intake is much more and they put on weight.

American Dietetic Association has recommended 20-35g fibre per day for a healthy adult depending on the caloric intake. Children are recommended an intake equal to their age plus 5 (i.e. a six year old should take $6+5 = 11$ g per day). British Nutrition Foundation has recommended 12-24 g of fibre intake per day for healthy adults. National Academy of Sciences' Institute of Medicine has recommended up to 50 years of age, for men 38g and women 25g per day while older men are recommended 30g and women 21g.

Fibre Supplements

When it is difficult to get a meal containing good amount of fibre, it is possible to get fibre supplement that may be either consumed separately or use it to mix in the food being eaten to make it fibre rich. Psyllium seed husk is a rich source of fibre and may be taken to reduce risk of heart disease by lowering cholesterol levels. It also gives relief from irritable bowel syndrome and may be used as bulk forming laxative. Oat and barley fibre is also prepared as supplement containing beta glucans that might help in heart disease.

Fructooligosaccharide is also used as supplement and with its sweet taste it may be used both as a sugar substitute as well as fibre since it is not digested. It also has additional advantage of being a prebiotic, being able to allow proliferation of probiotic bacteria.

There are some gums that have been used as fibre supplements in food. Gums are easily dispersed in water or milk. Guar gum is used for cholesterol management and irritable bowel syndrome. Gum acacia has an advantage of not altering the viscosity of beverage much when added.

Some Adverse Effects of Dietary Fibre

While weight management requires feeling of fullness to come at the earliest, it can also be a negative aspect when young growing children need to be fed adequate food to supply energy for their high physical activity. Convalescing patients also need enough calories to regain their health. If the diet contains more fibre they feel full much earlier and may not consume enough of food that may be necessary. Thus depending on the situation feeling of fullness can be a benefit or an adverse effect.

There are some other adverse effects that may be experienced such as bloating, gastritis and flatulence accompanying high fibre diet. Dietary fibre also must be accompanied by adequate water intake or else they may cause impaction and intestinal obstruction due to lack of fluidity or softness. When persons not used to high fibre diets, they should gradually increase their fibre intake to avoid most of the above problems.

Conclusion

Dietary fibre is an essential part of the diet to maintain health and prevent many diseases. Due to the changes in dietary, there are deficiencies experienced in daily consumption of dietary fibre. This adds to other factors leading to many problems like obesity, GI tract diseases, possibly colon cancer, diabetes and cardiovascular diseases. Many of these may be prevented and some may even be managed by adequate dietary fibre intake through foods. Various foods give different types of dietary fibres effective for different physiological benefits. Consuming a wholesome diet containing many components like fruits, vegetables, whole grain products, pulses etc. may provide sufficient amounts of beneficial fibres. If diets do not provide enough fibre, there are supplements available that could be added to foods being consumed or taken like vitamin supplements.

Essential Fatty Acids – Dr. S. V. Padgaonkar

In contrast to the food supply available to man throughout most of history, the typical modern Western diet contains a large amount of fat. Fats are found in both plant and animal foods and there are several different types.

Saturated fats

These are found in animal foods such as meat, butter and cheese, and plant foods such as coconut oil and palm oil. Trans fats are unsaturated fats, which have undergone a chemical process called hydrogenation to turn them into saturated fats. They are found in packaged foods such as pastries, cookies, crackers and baked goods. High intakes of saturated fats are associated with an increased risk of many diseases. As little dietary fat as possible should come from these fats, with a maximum of 10%.

Monounsaturated fats

These include those found in canola, olive and peanut oils, and may also help to lower cholesterol and decrease platelet aggregation. They are also less susceptible to oxidation.

Polyunsaturated fats

These are found in oils of plant origin such as safflower, sesame, sunflower and corn, and may help to lower cholesterol and decrease platelet aggregation, thus reducing the risk of heart disease. However, polyunsaturated oils are susceptible to oxidative damage and may also lower beneficial HDL cholesterol levels. A high intake of polyunsaturated fats has been linked to an increased risk of cancer. Experts recommend that no more than 10% of dietary fat should come from polyunsaturated fats.

Omega-3 and omega-6 fatty acids

Linoleic acid is an omega-6 fatty acid and alpha linolenic acid is an omega-3 fatty acid. These terms refer to characteristics in the chemical structure of the fatty acids. Other omega-3 fatty acids are produced in the body using alpha linolenic acid as a starting point. These include eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Other omega-6 fatty acids can be produced in the body using linoleic acid as a starting point. These include gamma-linoleic acid (GLA), dihomogamma-linoleic acid (DHGLA) and arachidonic acid.

What do they do in the body

Essential fatty acids are involved in energy production, the transfer of oxygen from the air to the bloodstream, and the manufacture of haemoglobin. They are also involved in growth, cell division and nerve function. Essential fatty acids are found in high concentrations in the brain and are essential for normal nerve impulse transmission and brain function.

Cell membranes

Essential fatty acids are components of cell membranes. They are essential for many body functions, including oxygen use and energy production, control of the substances passing in and out of cells, cell to cell communication, and regulation by hormones. Cell membranes are partly made up of phospholipids, which contain fatty acids. The type of fatty acids in the diet will determine what type of fatty acids go to make up cell membranes. A phospholipid made from a saturated fat has different structure and is less fluid than one which incorporates an essential fatty acid. This loss of fluidity makes it difficult for the cell to carry out its normal functions, and increases the cell's susceptibility to injury and death. The relative amounts of omega-3 fatty acids and omega-6 fatty acids in cell membranes also affect their function.

Prostaglandins

Essential fatty acids are also involved in the manufacture of prostaglandins, substances which play a role in a number of body functions, including hormone synthesis, immune function, regulation of the response to pain and inflammation, blood vessel constriction, and other heart and lung functions.

There are various types of prostaglandins and these have different effects. Prostaglandins are divided into three main types; those of the 1 and 3 series are usually considered to have beneficial effects while those of the 2 series are usually considered to have harmful effects. EPA, the omega-3 fatty acid that is formed from alpha linolenic acid, is the precursor of the series 3 prostaglandins. Series 1 and 2 prostaglandins are formed from omega-6 fatty acid, linoleic acid. It can be converted to DHGLA, the precursor of the series 1 prostaglandins and to arachidonic acid, which is the precursor of the series 2 prostaglandins. The types of oils in the diet, including the balance of omega-6 to omega-3 oils, plays a role in determining whether DHGLA is converted to favourable series 1 prostaglandins or to harmful series 2 prostaglandins.

Series 1 and 3 prostaglandins act to dilate blood vessels, reduce clotting, lower harmful LDL cholesterol levels, raise beneficial HDL cholesterol levels and have anti-inflammatory actions. Series 2 prostaglandins have the opposite actions. The balance of prostaglandins in the body is affected by diet and can determine whether a person is at increased risk of disease.

Deficiency

Symptoms of essential fatty acid deficiency may include fatigue, dry skin, immune weakness, gastrointestinal disorders, heart and circulatory problems, growth retardation, mental problems and sterility. It is likely that a lack of dietary essential fatty acids plays an important role in the development of many common diseases.

Modern food production processes have had a large impact on the types of fat in foods. People now eat smaller amounts of essential fatty acids and more refined and unnatural fats and oils, such as trans fatty acids. The commercial refinement of fats and oils has led to a lower availability of essential fatty acids in the diet, and also transforms essential fatty acids into toxic compounds. Refined fats may also prevent the body from using the essential fatty acids that do remain in the diet.

Cardiovascular disease

There are many population studies demonstrating that people who consume omega-3 fatty acid-rich diets have a reduced risk of heart disease. This was first noticed in countries such as Greenland and Japan where fish consumption is particularly high. Studies in other countries have found similar effects. The evidence suggests that eating fish once a week will help prevent coronary heart disease and people with cardiac disease may benefit from eating two fish-containing meals per week.

In a study reported in the New England Journal of Medicine, researchers in Holland investigated the relationship between fish consumption and coronary heart disease in a group of men in town of Zutphen. Information about the fish consumption of 852 middle-aged men without coronary heart disease was collected in 1960. During 20 years of follow-up, 78 men died from coronary heart disease. The results showed that compared to those who did not eat fish, death from coronary heart disease was more than 50% lower in those who ate at least 30g of fish per day. These include the Health Professionals Follow-Up Study.

In a study reported in 1989, researchers examined the effects of dietary changes in the prevention of further heart attacks in 2033 men who had recovered from one attack. Some of the

men were given various pieces of dietary advice, one of which was to increase the consumption of fatty fish to around two to three portions per week. Those advised to do this had a 29% reduction in death from all causes and a 33% reduction in death from heart attack compared with those who were not advised to eat fish. These beneficial effects may be due to the anti-arrhythmic effects of omega-3 fatty acids.

Results from the Western Electric Study showed a reduced risk of coronary heart disease mortality and non-sudden cardiac death but not a reduced risk of sudden cardiac death with increasing fish consumption. This study involved around 2000 middle-aged men followed up for around 30 years. The results of this study differ from those obtained from the US Physicians' Health Study published in 1998 in which researchers investigated the links between fish consumption and the risk of sudden death from heart attack in 20,551 US male physicians aged from 40 to 84. The follow-up period was 11 years, and in that time there were 133 sudden deaths. The results showed that men who ate fish at least once per week had around half the risk of sudden cardiac death when compared with men who consumed fish less than once a month. Neither dietary fish consumption nor omega-3 fatty acid intake was associated with a reduced risk of total heart attack, non-sudden cardiac death, or total cardiovascular mortality. However, fish consumption was associated with a significantly reduced risk of death from all causes. The difference in sudden death definition may explain the different results obtained in the two studies. In this study, the association between fish consumption and sudden cardiac death was stronger than that between omega-3 fatty acid intake and sudden cardiac death. It is therefore possible that other substances present in fish may be exerting protective effects.

However, in a 1995 study, researchers at the University of Washington examined the links between risk of heart attack and the consumption of fatty acids from seafood, and assessed both directly and indirectly through examination of blood samples. The study involved 334 patients with primary cardiac arrest and 493 population-based control cases, matched for age and sex. The results showed that an intake of 5.5g of omega-3 fatty acids (equivalent to one fish-containing meal a week) reduced the risk of heart attack by 50%. Their results also showed a correlation between higher red blood cell levels of omega-3 fatty acids and reduction in risk of heart attack. Those with the highest levels had a 70% reduction in risk compared to those with the lowest levels.

Research done in Finland suggests that a high intake of fish and omega-3 fatty acids is associated with an increased risk of coronary death. In one study, a high intake of local lean fish was associated with a high intake of mercury which may outweigh the benefits of an increase in omega-3 fatty acid intake. High intakes of omega-3 fatty acids are also associated with a lower risk of strokes.

Cancer

The results from some, but not all, epidemiological studies indicate that the level of dietary fat intake and the types of fatty acids consumed influence cancer risk and disease progression. High intakes of omega-6 fatty acids seem to increase the risk of cancers while high intakes of omega-3 fatty acids may provide protection. The fatty acid composition of fat tissue reflects the dietary consumption of essential fatty acids over a period of years. These observations are supported by results from animal studies, which demonstrate that polyunsaturated omega-6 fatty acids stimulate carcinogenesis and tumor growth and metastasis, whereas long-chain omega-3 fatty acids have inhibitory effects. Reducing total fat intake and increasing the ration of omega-3 to omega-6 fatty acids in the diet may be particularly useful for groups at a relatively high risk of cancer, and may also be useful after surgery to help prevent disease recurrence.

Prostate cancer

Dietary intake of essential fatty acids may play a role in prostate cancer cell proliferation. Epidemiological studies have demonstrated that men whose dietary intake is high in omega-6

fatty acids have a higher incidence of clinical prostate cancer. Diets high in omega-3 fatty acids may have a protective effects.

Breast cancer

In a 1994 study done in France, researchers assessed the links between the levels of various fatty acids in breast fat tissue, and the spread of tumours in 121 patients with cancer. The results showed that a low level of alpha linolenic acid was linked to tumour invasion of other tissues.

Other research suggests that omega-3 fatty acids inhibit breast cancer and that the degree of this inhibition depends on background levels of omega-6 fatty acids. Results from the European Community Multicentre Study on Antioxidants, Myocardial Infarction, and Cancer (EURAMIC) study published in 1998, suggest that an increase in the ratio of omega-3 fatty acids to total omega-6 fatty acids in fat tissue decreases the risk of breast cancer. In this study, total levels of omega-3 or omega-6 fat were not consistently associated with breast cancer.

Colon cancer

Population and laboratory studies suggest that omega-3 fatty acids may help to prevent and inhibit colon cancer. In a study published in 1995, death rates for colorectal cancer in 24 European countries were correlated with current fish and fish oil consumption and with consumption 10 and 23 years previously. In men, there was a reduced risk of death from colorectal cancer and current intake of fish, a weaker link with fish consumption ten years earlier, and none with consumption 23 years earlier. The researchers concluded that fish consumption is associated with protection against the later stages of colorectal cancer, but not with the early initiation stages.

Rheumatoid arthritis

A low intake of omega-3 fatty acids may contribute to the development of rheumatoid arthritis. Omega-3 fatty acids have an anti-inflammatory action, most likely due to effects on prostaglandin metabolism. In a population-based case-control study published in 1996,

Sensory Evaluation Techniques

Manufacturers and processors constantly ask how changing formulations, using different sources of ingredients, packaging, storage conditions and transportation affect their products. They also want to know how their products compare with competition. They also wonder sensory attributes are critical to consumer making the choice. How consistent is product from different units and batches? They would also like to know effects of new packaging on shelf life. All these can be answered using sensory analysis of food products.

Every product has unique sensory fingerprint i.e. a detailed analysis precisely identifying the perceived sensory attributes of a product and measuring it quantitatively. Learning to be quite familiar with its inherent sensory characteristics including aroma, feel, flavour, appearance and other properties, it is possible to discover and identify its unique characteristics. With that one develops ability to discriminate desirable sensory characteristics with scales for measuring. Once fully acquainted with a product, calibrated trained sensory panellists test it and generate unique sensory data 'fingerprints' for the product.

In one study with 30 potato-based snacks, 80 individual sensory characteristics were identified for measurement. Each product had unique profile separating it from others.

A peeled orange is rated about 6 or 7 for orange flavour using accepted scales whereas undiluted orange drink has a much stronger flavour, earning higher intensity score than peeled orange. Such universal scales allow testers to measure taste, smell or texture of one product in relation with those of another. One can even compare flavour intensity of a cheddar cheese in relation with the fried potato flavour of potato chip.

Attributes are scored between 0 and 15, with 0 indicating the absence of an attribute and 15 indicating very intense presence of it. Scale was established after an extensive sensory review of products that showed a certain attribute. Sensory evaluation techniques are given in ASTM Manual 26, Sensory Testing Methods, 2nd Edition, Chambers (ed.) 1996 and ASTM Manual on Descriptive Analysis Testing for Sensory Evaluation, Hootman (ed.) 1992. Using such methods, customised references can be developed for manufacturers using trained panellists providing reference standards against each product attribute. Judges use same reference standards to calibrate, standardise and measure product characteristics.

Many factors affect the scope of any descriptive analysis project. These are number of product attributes to be tested, broadness of testing, complexity of product preparation, number of panellists involved, number of replicates of each sample to be tested, physical factors such as strong tastes or aromas affecting the testing and the budget.

Ultimate Marketing Tool

Sensory analysis is the ultimate marketing tool and selling depends on a sensory experience. If a consumer does not like a product, he or she won't buy it, so the item won't be successful. One sensory analysis research centre at North Carolina State University undertaking contractual work for manufacturers and processors focuses on dairy products and ingredients, dairy ingredients applications, and how flavour varies with processing and storage.

The centre undertakes designs and implements analytical sensory tests, including difference tests, threshold tests and descriptive sensory analysis. It also designs and provides consumer panels and focus groups, performs consumer acceptability testing, offers statistical reporting and analysis, and conducts on-site workshops and panel training at plants. They develop defined sensory languages and then use them for better product understanding, links to volatile compounds and better consumer understanding.

Using descriptive analysis, consumer testing and preference mapping, the Centre analyses and documents flavour availability, variability, stability and sources of off-flavours. Instrumental analysis is also used, including GC, olfactoscopy, MS etc. relating sensory properties to chemical components. Sensory analysis is integral to food processing. There are quantitative, qualitative, objective and subjective parts to it. When proper test is applied and managed properly, it becomes a powerful and sensitive tool to optimise consumer acceptance of a product.

Avoiding Failure

Sensory analysis is essential for consumers to get the best product and for manufacturers to develop and sell the best product. Manufacturers do not want to waste money on products that consumer may reject. Cost of failure is very high. Sensory evaluation helps avoid product failure at launch and facilitates development of optimal product. Cost of research and development and marketing are rising dramatically, so it is better to make sure before launch that consumers would want the product.

Companies are blending science and creativity to clarify project objectives. Methods are used for finding relations between product looks, feel, smell, taste and sound and the consumer response. Key attributes are called drivers. These properties make consumers like a product and help them decide about the desirability of product. Examples of such characteristics are creamy texture, pleasing taste or perceived healthfulness. After determining key attributes, sensory signals are built that consumers will find desirable.

Descriptive analysis involves documenting sensory attributes of the products with a trained panel. This helps map the products and attributes that can be used to design efficient and effective consumer research. Merging consumer understanding and product understanding using sophisticated statistical techniques creates a roadmap for developing key sensory properties that drive liking, quality and other consumer benefits. In addition, sensory analysts can guide in uncovering new product opportunities and help create products that will be liked by consumers.

Colouring Outside the Lines

Sensory researchers design new sensory methods and new ways of understanding consumers. In this it is sometimes okay to colour outside the lines instead of strictly following classical sensory methods. Creative and innovative methods become legitimate if they get successful results.

One company developed a technique called Perfect Brand that uses consumer rapid prototyping. In this method, consumers currently using the product are brought to find out reasons for liking or not liking the product. With their help the problems are fixed. Consumers learn to define product changes needed to make the product perfect. They tell the developers what sensory attributes need to be enhanced or reduced for improvement. Developers then make consumer-driven changes necessary for making the product better that is re-evaluated. The whole process allows the new product to be on the shelves within a few weeks.

A consumer lab helps developers ideate with consumers. Selected ideas are converted into real products and finally tested with independent consumers to validate the success of the ideas. There are strategic and creative ways to use consumers in sensory analysis. Sensory evaluation can be raised to new level for product development and marketing. Developers and marketers need to go further to do the right test at the right time with right people to get information leading to consumer insights for developing successful products.

From: article by Linda Leake from Food Technology August 2007.

Nutrition & Health News

Too Much Water Can Be Very Dangerous

Dehydration increases the risk of muscle cramps, heat exhaustion, and heat stroke during exercise in warm weather. And even in mild weather, dehydration can leave exercisers groggy for hours afterward.

We've all been told it's important to drink plenty of fluids during exercise. But now it seems too much water can be very dangerous. So which is right? Both. Good hydration is important, but overhydration can be hazardous, even lethal. Common sense and moderation can help protect you from both extremes, reports the July 2008 issue of Harvard Men's Health Watch.

Dehydration increases the risk of muscle cramps, heat exhaustion, and heat stroke during exercise in warm weather. And even in mild weather, dehydration can leave exercisers groggy for hours afterward. When the hazards of dehydration became apparent, experts began to encourage drinking fluids during exercise. Guidelines were formulated to meet the needs of elite male athletes whose high-intensity exercise produced lots of fluid loss in sweat. As a result, athletes began to increase fluid intake, and some drank too much, leading to water intoxication and hyponatremia (low blood sodium levels). Hundreds of cases and a number of deaths have been recorded in medical journals.

Caution is justified, but it's not easy to drink enough to get into trouble. The typical victim of water intoxication is a runner who is out on a marathon course for over four hours and who consumes enough fluids to gain weight during the race.

So, how much should you drink? Harvard Men's Health Watch suggests that you plan to drink two to three cups of water an hour, but boost the amount if you are sweating heavily. Unless you get way behind in your fluid replacement, sports drinks won't be any better than water. Drink when you feel thirsty, but don't force down huge amounts. Remember, if you gain weight, feel bloated, or experience nausea and vomiting, you're on your way to trouble.

<http://www.nutritionhorizon.com/home/viewhealthnutrition.rails?Id=&pageNo=62>

89 percent of children's food products provide poor nutritional quality

Nine out of ten regular food items aimed specifically at children have a poor nutritional content – because of high levels of sugar, fat or sodium - according to a detailed study of 367 products published in the July issue of the UK-based journal *Obesity Reviews*. Just under 70 per cent of the products studied - which specifically excluded confectionery, soft drinks and bakery items - derived a high proportion of calories from sugar. Approximately one in five (23 per cent) had high fat levels and 17 per cent had high sodium levels. Despite this, 62 per cent of the foods with poor nutritional quality (PNQ) made positive claims about their nutritional value on the front of the packet.

"Children's foods can now be found in virtually every section of the supermarket and are available for every eating experience" says Professor Charlene Elliott from the University of Calgary, Canada, and a Trustee of the Canadian Council of Food and Nutrition.

"Parents may have questions about which packaged foods are good for their children. Yet certain nutritional claims may add to the confusion, as they can mislead people into thinking the whole product is nutritious."

Only 11 per cent of the products Professor Elliott and her colleagues evaluated provided good nutritional value in line with the criteria laid down by the US-based Center for Science in the

Public Interest (CSPI), a non-profit agency that received the Food and Drug Administration's highest honour in 2007.

The CSPI nutritional standards state that healthy food should not derive more than 35 per cent of its calories from fat (excluding nuts and seed and nut butters) and should have no more than 35 per cent added sugar by weight. They also provide guidance on sodium levels, ranging from 230mg per portion for snacks through to 770mg per portion for pre-prepared meals.

CSPI's standards are adapted from those developed by the National Alliance for Nutrition and Activity, a coalition of some 300 health and nutrition organisations in the USA. The organisation states that its standards represent a compromise approach. They allow for the marketing of products that may not be nutritionally ideal, but that provide some positive nutritional benefits that could help children meet the US Government's Dietary Guidelines for Americans.

The 367 products included in the study were bought from a national supermarket chain stocking 50,000 food and non-food items in December 2005. Each had to meet very specific criteria.

"We included food products and packaging that were presented in such a way that children were the clear target audience" explains Professor Elliott, whose research was funded by the Canadian Institutes of Health Research. "They included products that promoted fun and play, had a cartoon image on the front of the box or were linked to children's films, TV programmes and merchandise."

Each product was subjected to a 36-point analysis that included the nutritional content and how the packaging was designed to appeal to children and their parents.

Key findings included:

- 63 per cent of all the products surveyed made some sort of nutritional claim, including 62 per cent of the products that could be classed as poorly nutritious, due to high levels of sugar or fat or sodium. A low percentage (eight per cent) carried some kind of nutrition mark or seal. Other claims included that products were low fat, a source of calcium, contained no artificial flavours or colours or provided a number of essential nutrients.
- Products with high sugar levels accounted for 70 per cent of the goods with PNQ. Despite this, 68 per cent included some sort of nutritional claim on the package, such as a source of whole grains, source of iron or low in fat. Cereals and fruit snacks were particularly likely to make nutritional claims and have high levels of sugar.
- Just under 23 per cent of the products had PNQ because of their high fat content. Yet 37 per cent had some sort of nutritional claim on the package. For example peanut butter mixed with chocolate claimed to be a "source of six essential nutrients" and a pizza product claimed to be a "source of calcium".
- High sodium levels meant that 17 per cent of the products analysed were classified as being of PNQ. Despite this, almost 34 per cent made some sort of nutritional claim on the package. Crackers and pizza products were among the worst offenders.
- A fifth of the products featured a cartoon image engaged in some sort of healthy physical activity on the front and a quarter showed these on the back or side of the box. Activities included skateboarding, basketball and biking.

"Assessing the levels of sugar in the selected food products was a methodological challenge, because milk sugars and fruit sugars occur naturally in foods" says Professor Elliott. "The Nutrition Facts label only displays total sugars and the quantity of added sugars is not always provided by the manufacturer. This means that the percentage of foods categorised as poorly nutritious due to high levels of sugar is higher than it would have been if information on naturally occurring sugars had been available."

The problem of accurately separating figures for quantities of natural and added sugars in manufactured products has also been encountered by other researchers and acknowledged as an issue by CSPI, so it is not unique to this study. "Despite this, the findings still give us cause for concern" says Professor Elliott. "While caregivers are likely to purchase products that they hope their children will like, it clearly can result in a less nutritious diet than they may realise. Having a healthy diet is especially important given the current rates of childhood obesity."

Excess body weight affects up to 35 per cent of children across Canada, the United States and Europe and is linked to a range of health problems including type 2 diabetes, high blood pressure, heart disease and some forms of cancer. Overweight children can also suffer from psychological and social consequences because of their weight.

Professor Elliott believes that policy attention needs to be directed towards the nutritional claims made by products aimed at children and the images they use to sell the products. "If a parent sees a product that makes specific nutritional claims, they may assume that the whole product is nutritious and our study has shown that that is definitely not true in the vast majority of cases" concludes Professor Elliott. "Using cartoon characters engaged in sport can also create the illusion of a healthy product."

<http://esciencenews.com/articles/2008/07/14/89.percent.childrens.food.products.provide.poor.nutritional.quality>

Fresh Blended Healthy Drinks

Nutri-Vend machine adds a new wrinkle to selling and marketing healthy beverages.

Most people are familiar with coffee vending machines—slip some coins into a slot and out pops a cup. Then, after a few seconds of splashing and whirring, there's a steaming hot cup of Joe (or cappuccino or hot chocolate) ready for sipping. While hot beverage machines aren't exactly a good fit for the gym and health club crowd, Bessemer City, NC-based Vendweb.com thought a cold nutraceutical drink machine might be.

The company's Nutri-Vend 1000 is capable of dispensing any powder-based nutraceutical drink mix—be it protein, weight loss, low-carbohydrate meal replacement, high carbohydrate meal replacement, recovery or energy supplement—in the form of a chilled beverage. The company guarantees great tasting, healthy nutraceutical and energy drinks delivered cold to the consumer in 30 seconds, all at the touch of a button.

In theory, the machine bears some basic similarities to the hot beverage-type vending machines found in hospitals and cafeterias, however it is marketed as the only nutraceutical vending machine that has a web-based touch screen kiosk. The consumer-friendly kiosk enables consumers to obtain more information about the nutraceutical beverages they are about to consume; it also has the capacity to be configured to take orders for products via the Internet with next day delivery.

The brains behind the machine is company designer Jeffrey Badin, who recognized a need at gyms as well as other outlets for a drink machine that could mix the different protein drinks

without having to have a staff member behind the counter to do so. "Many times you go to a supply store and have no way of tasting the different flavors that are offered before you buy the product. With the Nutri-Vend 1000 you can try before you buy the many different products available," said Lindel Creed, president, Vendweb.Com.

The touch screen came about when the company saw an opportunity to give the owner of the machine or operator of the machine a means to generate advertising revenue. "With the touch screen a location can run ads from local or national partners," he said. "In other words, the nutraceutical vending machine becomes an electronic advertising vehicle and is the only nutraceutical vending machine that can post advertising (up to 20 advertisers with six-second clips) and provide cross-advertising and cross-selling worldwide."

The touch screen also provides a great way to showcase details about the products being dispensed by the machine. "Let's say a new product comes out and a supplier wants to get a promo going on that product right away," said Mr. Creed. "With the touch screen addition, a location can have that promo up and running in a matter of minutes to all its locations that have a Nutri-Vend 1000 machine. Manufacturers of the different products have said that is a great idea and would be a big benefit in launching new products."

If consumers like the beverage they purchase, they can also use the touch screen kiosk's Internet portal to order and ship additional product to the location of their choosing. "We wanted to provide a convenient way for the consumer to try and buy all the great products that are offered through the Nutri-Vend 1000," said Mr. Creed. "The Nutri-Vend 1000 can be connected to the Internet by way of wireless or wired connection, and the consumer can access a secure website we have set up to take and process orders right from the machine screen."

There is also a size benefit. In comparison to a traditional beverage dispenser, the Nutri-Vend 1000 has a much smaller footprint space. "The amount of space needed for the product storage is a lot less than bulky cans or bottles," noted Mr. Creed, who added that a variety of locations could benefit from this type of technology, such as gyms and health clubs, schools and employee break rooms.

Although the cost of the Nutri-Vend 1000 is dependent upon the optional features included in the machine, which can be customized to fit unique needs and budgets, Mr. Creed said the price typically ranges from \$8,000 to \$10,000. The uniqueness and exposure benefits, however, are priceless.

From: Report by Joanna Cosgrow in Nutraceuticals World June 2008

Study Finds Spice-Rich Marinades Can Reduce Harmful Compounds When Grilling

Antioxidant-rich spice and herb marinades may actually decrease the formation of heterocyclic amines (HCAs) -- potentially cancer-causing compounds often produced in meat cooked at high temperatures.

Marinating that steak before tossing it on the grill may offer a whole lot more than just increased flavor. Antioxidant-rich spice and herb marinades may actually decrease the formation of heterocyclic amines (HCAs) -- potentially cancer-causing compounds often produced in meat cooked at high temperatures -- by up to 88 percent, according to a new study in the August issue of the Journal of Food Science.

Simulating typical home cooking conditions, researchers from Kansas State University immersed steaks for one hour in marinades prepared from three varieties (Caribbean, Southwest and Herb) of pre-packaged marinade mixes. These steaks, as well as non-marinated steaks and steaks in non-spice marinades, were then grilled at 400 degrees Fahrenheit for five minutes per side. After

grilling, researchers compared levels of HCAs in all steaks and found substantial decreases in HCAs in the steaks marinated with antioxidant-rich spices and herbs.

"When the various steaks grilled in the study were compared, it was clear that the spice and herb marinades were responsible for the most dramatic reduction in HCAs," said Hamed Faridi, PhD, Vice President of Research & Development for McCormick & Company, Inc. "These results are attributed to the antioxidant-rich qualities of the spices and herbs."

Pre-packaged spice and herb marinade mixes like McCormick Grill Mates make it easy and convenient to add flavor and protective health benefits to this summer's cookouts. The Grill Mates line-up offers pre-mixed simplicity with favorite flavor combinations like Southwest, Zesty Herb, Mesquite and more.

For those who prefer to create their own antioxidant-rich marinades from scratch, McCormick has identified key spices and herbs with the highest antioxidant capacity. These "Super Spices" are: cinnamon, oregano, red pepper, ginger, rosemary, thyme, and yellow curry. Did you know that just a half teaspoon of dried oregano packs about the same antioxidant power as a quarter cup of almonds or almost four cups of fresh spinach?

To begin enjoying healthful homemade marinades, simply mix up a quick blend of antioxidant-rich spices and herbs, then add a few simple ingredients -- including other antioxidant superstars like green tea or pomegranate juice -- and you're just minutes away from six deliciously different marinades, each bursting with flavor and antioxidants. "Encouraging Americans to grill with spice and herb marinades may be one more nutritious way we can help promote good health -- in a way that's both easy and delicious," said nutrition expert Wendy Bazilian, DrPH, RD, author of the newest edition of The SuperFoodsRx series, The SuperFoodsRx Diet: Lose Weight with the Power of SuperNutrients (Rodale, 2008).

From: Nutrition Horizon, Nutrition & Health News July 31, 2008

GMA Releases Science Policy Paper on Aspartame

Non-nutritive sweeteners, including aspartame, are used in a variety of food and beverage products. Today, aspartame is approved for use in more than 100 countries, including the United States, Canada, countries in the European Union, Japan, Australia and New Zealand. The aspartame database now contains more than 500 studies. It has been extensively studied in animals and humans since its discovery more than four decades ago. Few ingredients have been subject to the extent of research that has been conducted on aspartame. In addition to hundreds of individual studies on animals and humans, extensive literature reviews have been conducted to summarize the existing research.

During more than three decades, research has shown aspartame to be safe. Despite certain pseudoscientific claims on the Internet, well-designed peer-reviewed research overwhelmingly shows that aspartame does not cause cancer, abnormal neural function, seizures, memory loss, headaches, diminished learning abilities or allergic reactions.

It is the position of the American Dietetic Association that consumers can safely enjoy a range of nutritive and non-nutritive sweeteners when consumed in a diet that is guided by current federal nutrition recommendations, such as the Dietary Guidelines for Americans and the Dietary Reference Intakes, as well as individual health goals.

Beyond a well established safety track record, peer-reviewed studies have shown aspartame effective in helping people lose weight and reduce calorie intake. This review summarizes scientific research, regulatory history, consumption and uses in foods and beverages, with attention to refuting misinformation commonly disseminated by a small but vocal group of anti-aspartame activists. Consumers deserve balanced, scientific information about non-nutritive

sweeteners, including aspartame. The extensive peer-reviewed research over time, as well as regulatory agency and expert committee reviews, speaks to aspartame's safety as a non-nutritive sweetener.

From: Science Policy Paper: A Guide for Consumers, Policymakers & the Media by GMA (Grocery Manufacturers Association) 2008 www.gmaonline.org

NuVal Nutritional Scoring System

Designed to empower the average consumer, this rating system for foods, beverages and recipes is set to sweep the nation.

Bombarded by an overload of nutritional information for decades, consumers will soon be armed with what many experts view as the world's most sophisticated standard in measuring nutritional quality. Three major U.S. supermarket chains, which have yet to be named, will adopt the NuVal Nutritional Scoring System this September, launching the Overall Nutritional Quality Index (ONQI), which weighs 30 different nutrient markers through a proprietary algorithm, onto supermarket shelves.

"The world of nutritional information is hopelessly befuddling," admitted David Katz, MD, MPH, who led a panel of about a dozen medical and nutrition experts from leading North American universities and health organizations in developing the ONQI over a two-year period. "But it occurred to me we have the wherewithal to fix that. Our mission was to develop the best possible nutrition guidance system. And we built the best model science would allow."

This comprehensive rating system measures a food's nutritional value on a scale of one to 100 based on a complex set of factors that includes levels of fiber, folate, vitamins A, C, D, E, B12, B6, potassium, calcium, zinc, omega 3 fatty acids, carotenoids, magnesium, iron, saturated fat, trans fat, sodium, sugar, cholesterol, fat quality, protein quality, energy density and glycemic load. A higher ONQI score reflects foods with higher nutritional value, offering consumers the opportunity to evaluate products within and across specific food categories. So shoppers can literally compare apples to oranges, or almonds to apricots, strawberries to yogurt, chocolate to, well, anything. By the way, for those of you keeping score at home, strawberries win with an ONQI rating of 100.

Perhaps at the heart of the equation, the ONQI accounts for a range of epidemiological information, including weighted coefficients for prevalence and severity of various diseases and health conditions affecting the population. "Sodium is a nutrient consumed in excess in this country and it is associated with high blood pressure," Dr. Katz offered as an example. "But on the other hand it is an essential nutrient. What you want to penalize is the excess of sodium, so a certain amount is exonerated." These coefficients and the inherent precision of the ONQI algorithm help contribute to its validity and utility.

Dr. Katz explained the basic formula is based on Dietary Reference Intakes (DRIs), FDA Nutrition Facts Panel, USDA MyPyramid, Dietary Guidelines for Americans (2005) and relevant international standards. "Every nutrient entered is entered from a 'diet-eye-view.' It's not about one individual food, but the pattern of diet over a typical day," he added. "How is this food contributing to the overall pattern of your diet? The ONQI answers the question 'How does the concentration of a particular nutrient in a food compare to the recommended amount of that nutrient in a healthy diet?'" The answer is quantified through a novel, patent-pending concept called the "trajectory score."

While scientists have spent the past two years developing this sophisticated tool designed to empower the average consumer, the idea stems back to 2003, when the U.S. Secretary of Health & Human Services convened a group to share ideas, generally, for improving dietary

intake patterns in the U.S., and, specifically, for stemming the spread of obesity. At that time Dr. Katz offered his idea for a comprehensive nutritional rating system. "There was philosophical support for the concept," he recalled. "But it requires a great deal of political will to do this."

Absent that will, Dr. Katz would tap other resources in the medical and academic sector, teaming up with Griffin Hospital, a Yale-affiliated, non-profit community hospital in Derby, CT—and home to Yale University's Prevention Research Centre—which agreed to offer financial and material support. An all-star panel of health professionals convened in late 2005, and the first draft of the ONQI algorithm was created in February 2006. A similar panel of experts currently serves as the Science Advisory Board, responsible for managing the scientific integrity of the system.

Ultimately, by developing this algorithm, the group's mission was to put power back into the hands of the public, offering them a means to improve dietary intake patterns, and thereby health, one food choice at a time. "With great power comes great responsibility," Dr. Katz said. "If we want to empower consumers we have the responsibility to offer them information they can understand."

Partnering with Griffin Hospital in the effort to release the ONQI was Topco Associates, LLC, Skokie, IL, a privately held company that provides innovative solutions for its food industry member-owners and customers, which include supermarket retailers, wholesalers, and foodservice companies. NuVal, LLC, is the joint venture between Topco and Griffin Hospital, formed to bring the ONQI to market. The NuVal Nutritional Scoring System itself is designed to have applications at point of purchase in retail supermarkets and online. Ultimately, the NuVal score will be available on food packaging and in restaurants.

The first three grocery chains to use the NuVal system will be named publicly in September, marking the first wave of an education program that is expected to expand nationwide by this time next year. NuVal's double-hexagon emblem, bearing the score of each individual product, will appear on shelf tags next to the price. Retailers will use banners, shelf-talkers, brochures, associate training and other forms of in-store communication to tell the NuVal story. "Consumers want clear information about the nutritional value of the foods they eat, and NuVal scores are going to give it to them," said NuVal president Nancy McDermott. "We've got the scientific foundation, the logistical ability and the retail partners needed to bring this important education to consumers coast to coast."

On average, there are approximately 40,000 products in a typical U.S. supermarket, and the NuVal system intends to rate all of them by September 2009. An online database where consumers can view ONQI scores for foods, beverages and recipes is also expected to launch later this summer or early fall. The database will continue to grow with updates and "recipe makeovers," according to Dr. Katz, who said he also expects an ONQI handbook to be released around March 2009.

So far, Dr. Katz said his team has received overwhelmingly positive feedback from consumers and health professionals. "Most of the feedback was 'What took you so long?' We've had dieticians rubbing their hands together in glee. I think it will be overwhelmingly embraced." While it is not the first nutrition rating system, Dr. Katz argues that the ONQI is the "world's most sophisticated standard in measuring nutritional quality."

In 2006, Portland, ME-based Hannaford Bros. launched its Guiding Stars rating system throughout its 164 supermarkets across New England and New York. Developed by nutrition scientists and other health experts, products receive a rating of one, two or three stars, based on the presence of vitamins, minerals, dietary fiber and whole grains. The system also factors for added sugar and levels of saturated fat, cholesterol and sodium.

More than 70% of the products evaluated received no stars at all, which, Dr. Katz points out, really doesn't give consumers much direction. Yet sales of products with stars have spiked, at points by large margins, compared to those without. Similarly, Dr. Katz hopes that widespread adoption of the ONQI system will have an impact on consumer buying patterns, and consequently, food manufacturers' formulation practices. "We really want to influence demand and supply," he said. "Any food manufacturer that improves the nutritional quality of a product will get credit on the ONQI scale."

From: Report by Sean Moloughney in Nutraceuticals World July 2008

Obesity on the Rise as Southern Europe Abandons Mediterranean Diet

ROME -- Obesity is on the rise across southern Europe, North Africa and the Middle East as people on the shores of the Mediterranean abandon the lean diet of their ancestors and opt for fatter and faster foods, a U.N. agency said Tuesday. The Rome-based Food and Agriculture Organization said that in the 40 years to 2002 daily calorie intake in countries including Greece, Italy and Spain has increased by 30 percent, more than the 20 percent recorded in northern EU countries.

This has made Greece the EU country with the highest prevalence of overweight and obese people: 75 percent. More than half of the Italian, Spanish and Portuguese populations are overweight too, according to a paper presented at a recent workshop by U.S. and EU academic institutions. The report says the typical Mediterranean diet based on olive oil, fish and vegetables also is declining in the Middle East and North Africa, where eating habits are changing and calorie intake increasing.

Mediterranean people have used higher incomes to add a large number of calories from meat and fats to a diet that was traditionally light on animal proteins, said FAO senior economist Josef Schmidhuber, who authored the paper. What they now eat is "too fat, too salty and too sweet," he said.

The country that registered the most dramatic increase was Spain, where fat made up just 25 percent of the diet 40 years ago but now accounts for 40 percent.

The report also attributed the change in eating habits to other factors, including the rise of supermarkets and fast food restaurants at a time when a more sedentary lifestyle means fewer calories are needed. The agency noted that many in the Mediterranean are no longer following the diet of their ancestors, even as Spain and other countries push to have the traditional regimen put on the U.N.'s list of protected world cultural treasures.

From: Soyatech eNews July 29, 2008

Reverse engineering for competitive advantage

Perhaps you were one of those obsessively inquisitive kids who took apart the kitchen toaster to explore the heating coil and the pop-up button. Despite your parents' frustration with a kitchen drawer of 'extra parts' that never made it back into the appliance, this exploratory process, in business, is known as 'reverse engineering.'

Reverse engineering competitors' formulations is legal, can be ethical and can benefit a company's strategic position in the marketplace — if it is pursued in the right way. As such, reverse engineering is a powerful product-development tool that can be used to trump even

patent-protected formulations or proprietary compounds, thus enhancing a company's place in the marketplace.

Reverse engineering is a truly modern development primarily originating within the world of technology and with the need to achieve interoperability. Originally, it provided a way to either find out if a competitor was violating your patent, or a way to map a path around a competitor's product to avoid violating its patent. In those cases where patent holders do discover infringement, it is common to stop the breach through legal action, possibly collecting damages, and then putting the infringer under a mandatory royalty-bearing license — sometimes called 'stick licensing.' IBM is known for inventing the practice of mapping out infringers and then threatening to sue them if they don't accept a royalty-bearing license to atone for their violation. Beginning in the early 1990s with \$30 million in annual intellectual-property royalties, today IBM is known to receive largely stick-licensing royalties in excess of \$2 billion a year.

The foundations for the kind of law we are talking about are found in the US Constitution. The framers borrowed from English law to create a system of intellectual-property law that encouraged the "useful arts and sciences" in the greater interest of society. In return for the grant of the limited monopoly of a patent, patent holders would allow the public disclosure of their invention to increase the society's store of knowledge and to inspire further invention. Today, reverse engineering is sanctioned under the law because it serves this public interest and fulfills the public-policy objectives of disseminating ideas and promoting invention, the arts and creativity in society to augment civilization.

In the US and many other countries, an invention, a formulation or composition, or a process can be reverse engineered so long as it has been obtained for reverse-engineering study in a legal manner (eg, purchased in the marketplace).

Taking a page from technological and scientific reverse-engineering practices, food, beverage and dietary-supplements manufacturers can analytically study competitors' products with an eye to creating either more competitive or complementary entries. That is what Pepsi-Cola did when it entered the soft-drinks marketplace to compete with Coca-Cola. It studied the product to understand its secrets, and then put it back together again, ostensibly to copy Coca-Cola, but inevitably it put it back together in a slightly different way because it couldn't obtain the same ingredients.

Dietary supplements, functional foods, unique ingredients and proprietary or patented formulations can be 'taken apart,' so to speak, to understand their workings. Some companies mistakenly attempt to 'knock off' competitive products, thus risking legal action, possible claims of intellectual-property infringement, unjust enrichment and even costly legal proceedings.

Reverse engineering is more strategic than merely copying a competitor's product. It teaches the researcher how the invention was conceived and thereby stimulates his or her imagination to conceive of new ways to fulfil consumer demand or stimulate marketplace competition. It is this creativity that leads to competitive advantage. Of course, creativity is what all organisations strive for to win in the marketplace. In highly competitive markets, creativity often provides the strategic edge necessary to establish new differentiation in the marketplace, and more sustainable competitive advantage.

Taking your competitors' products apart invariably causes them to get put back together in new and better ways.

From: Report by Lindsay Moore in Functional Ingredients June 2008

Research Notes

Caffeine impressively refuels muscles after workouts

There is a new recipe for growing faster and stronger, and it involves coffee. Lots and lots of coffee. Muscles regained 66% more glycogen in the four hours after intense exercise when athletes took the equivalent of five or six cups of coffee with carbohydrates than when they ate carbohydrates alone, reported John A. Hawley, Ph.D., of the Royal Melbourne Institute of Technology University.

In a nutshell (thanks to reader Chris's fine tuned sense of summarizing), here's what the study found: one hour after exercise, muscle glycogen levels had replenished to the same extent whether or not the athlete had the drink containing carbohydrate and caffeine or carbohydrate only. Four hours after exercise, the drink containing caffeine resulted in 66% higher glycogen levels compared to the carbohydrate-only drink. Throughout the four-hour recovery period, the caffeinated drink resulted in higher levels of blood glucose and plasma insulin.

The study found: "Glycogen, the muscle's primary fuel source during exercise, is replenished more rapidly when athletes ingest both carbohydrate and caffeine following exhaustive exercise." "If you have 66 per cent more fuel for the next day's training or competition, there is absolutely no question you will go farther or faster," said Dr Hawley.

The research found during the placebo-controlled double-blind study that one hour after exercise, muscle glycogen levels had replenished to the same extent whether or not the athlete had the drink containing carbohydrate and caffeine or carbohydrate only. But, after 4 hours - the caffeine resulted in much higher levels of blood glucose and plasma insulin - leading to a faster recovery.

The catch? A whole lot of caffeine was used to see the results. The researchers used a high dose of caffeine to establish that it could help the muscles convert ingested carbohydrates to glycogen faster. However, because caffeine is not always the best thing if you are intolerant, suffer from sleeplessness or already have had caffeine throughout your day, the next step is for the researchers is to try the study without downing 8 mg of caffeine per kilogram of body weight, or the equivalent of drinking 5-6 cups of strong coffee.

Dr. Hawley said he does not know exactly how this all works. However, the higher circulating blood glucose and plasma insulin levels are likely to play a part, as well as the rise in activity of several signaling enzymes, including the calcium-dependent protein kinase and protein kinase B (also called Akt), which have a part in the refueling of muscles.

<http://www.examiner.com/x-281-Caffeine-Examiner~y2008m7d2-Caffeine-impressively-refuels-muscles-after-workouts>

Red wine ingredient wards off effects of age on heart, bones, eyes and muscle

Large doses of a red wine ingredient can ward off many of the vagaries of aging in mice who begin taking it at midlife, according to a new report published online on July 3rd in *Cell Metabolism*, a Cell Press publication. Those health improvements of the chemical known as resveratrol—including cardiovascular benefits, greater motor coordination, reduced cataracts and better bone density—come without necessarily extending the animals' lifespan. Sinclair and de Cabo's team further show evidence that resveratrol mimics the beneficial effects of eating fewer calories. In mice, they found that resveratrol induces gene activity patterns in multiple tissues that parallel those induced by dietary restriction and every-other-day feeding.

"From a health point of view, the quality of life of these mice at the end of their days is much better," said Rafael de Cabo of the National Institute on Aging. It suggests that resveratrol may "extend productive independent life, rather than just extending life span."

"I was most surprised by how broad the effects were in the mice," added David Sinclair of Harvard Medical School. "Usually, you focus on slowing down or ameliorating one disease at a time. In this case, resveratrol influences a whole series of seemingly unrelated diseases associated with aging." Sinclair said he expects some of the effect seen in the mice would have even greater impact if they hold in humans. That's because, unlike people, mice usually don't die as a result of heart disease, or suffer from weakening bones.

Earlier studies showed that reducing calorie intake by 30% %, or eating a nutritious diet every other day, can delay the onset of age-related diseases, improve stress resistance, and decelerate functional decline, the researchers said. Although dietary restriction has beneficial effects in humans, such a diet is unlikely to be widely adopted and would pose a significant risk to the frail, critically ill, or the elderly.

Therefore, the researchers are on a quest for "dietary restriction mimetic" compounds that provide some of the benefits without cutting calories. One contender has been compounds like resveratrol that activate SIRT1, a protein linked to long life in many species, from yeast to mammals.

Indeed, studies have shown resveratrol can extend the lives of yeast, worms, flies and fish. It also improves the health and survival of obese mice fed a high-calorie diet. Now, de Cabo and Sinclair show that those effects do indeed seem to take place by inducing the physiology of dietary restriction. They placed one-year-old mice on a standard control diet or every-other-day feeding with or without resveratrol.

Resveratrol produced changes in the gene expression profiles of key metabolic tissues, including liver and muscle, that closely resemble those induced by dietary restriction, they report. Overall, the animals' health improved under all dietary conditions, as reflected by a reduction of osteoporosis, cataracts, vascular dysfunction, and declines in motor coordination. However, the mice lived longer only when they were fed a high-calorie diet, consistent with earlier reports.

" In conclusion, long-term resveratrol treatment of mice can mimic transcriptional changes induced by dietary restriction and allow them to live healthier, more vigorous lives," they wrote. "In addition to improving insulin sensitivity and increasing survival in [high-calorie fed] mice, we show that resveratrol improves cardiovascular function, bone density, and motor coordination, and delays cataracts, even in nonobese rodents. Together, these findings confirm the feasibility of finding an orally available dietary restriction mimetic."

Resveratrol treatment is already being tested in clinical trials for type II diabetes, the researchers noted, and more potent molecules with effects similar to resveratrol are also under development.

From: Esience News July 3, 2008

Lowering Blood Cholesterol With Fish Oil And Red Yeast Rice Instead Of Statins

A great deal of scientific evidence shows that cholesterol-reducing medications known as statins can help prevent coronary artery disease. Although the safety of these medications has been well documented, as many as 40 percent of patients who receive a prescription for statins take the drug for less than one year.

Doctors believe that several factors -- including cost, adverse effects, poor understanding of statin benefits and patients' reluctance to take prescription medications long term -- may explain why some patients stop taking these medicines. In the July issue of Mayo Clinic Proceedings, a group of researchers from Pennsylvania examine whether an alternative approach to treating high blood cholesterol may provide an effective treatment option for patients who are unable or unwilling to take statins.

Researchers followed 74 patients with high blood cholesterol who met standard criteria for using statin therapy. Patients were randomly assigned to either the alternative treatment group or the statin group and followed for three months.

The alternative treatment group participants received daily fish oil and red yeast rice supplements, and they were enrolled in a 12-week multidisciplinary lifestyle program that involved weekly 3.5-hour educational meetings led by a cardiologist, dietitian, exercise physiologist and several alternative or relaxation practitioners. Red yeast rice is the product of yeast grown on rice. A dietary staple in some Asian countries, it contains several compounds known to inhibit cholesterol production.

The statin group participants received 40 milligrams (mg) of Zocor (simvastatin) daily, as well as printed materials about diet and exercise recommendations. At the end of the three-month period, participants from both groups underwent blood cholesterol testing to determine the percentage change in LDL cholesterol.

The researchers noted that there was a reduction in LDL cholesterol levels in both groups. The alternative treatment group experienced a 42.4 percent reduction, and the statin group experienced a 39.6 percent reduction. Members of the alternative therapy group also had a substantial reduction in triglycerides, another form of fat found in the blood, and lost more weight.

"Our study was designed to test a comprehensive and holistic approach to lipid lowering," notes the study's lead author, David Becker, M.D., a Chestnut Hill Hospital and University of Pennsylvania Health System cardiologist. "These results are intriguing and show a potential benefit of an alternative, or naturopathic, approach to a common medical condition."

Dr. Becker acknowledges that a larger, multicenter trial with longer follow-up is necessary to determine long-term compliance with the alternative regimen, because previous studies involving diet and exercise have found a high rate of patients unable or unwilling to follow lifestyle recommendations. "The excellent adherence in the alternative group was undoubtedly related to the intensive follow-up, education and support provided for this group," says Dr. Becker.

From: Science Daily July 10, 2008

Prebiotic Oligosaccharides Found in Milk Reduce the Risks of Allergies and Infections in Newborn Babies and Young Children

The results clearly demonstrate that the protective effect of this prebiotic mixture is lasting beyond the intervention period, suggesting that an immune modulating effect through the intestinal flora modification may be the principal mechanism of action.

Adding prebiotic oligosaccharides to infant formula may substantially reduce the incidence of allergies and infections in newborn babies and young children, claim researchers in the Journal of Nutrition. The benefits lasted long after the babies had stopped having formula and had been weaned and were still evident after two years.

Child healthcare specialists hailed the new study as very promising, building on earlier evidence that this specific mixture of prebiotic oligosaccharides can encourage the balance of healthy bacteria in the gut and so enhance the development of the immune system in early life.

"Our hypothesis was that this mixture of prebiotic oligosaccharides could mimic the immune modulatory function of human milk, leading to a reduction in the incidence of allergic manifestations, such as atopic dermatitis, and infections in formula-fed infants," said Dr Guido Moro, Professor of Neonatology at the Centre for Infant Nutrition, University of Milan, Italy.

The results show that, compared to placebo, this prebiotic oligosaccharide-enriched milk:

- halved the cumulative incidence of atopic dermatitis (AD) (from 27.9 per cent to 13.6 per cent)
- reduced total infections by 30 per cent (from 5.9 episodes per infant to 4.1 per infant)
- reduced antibiotic prescriptions by a third (from 2.7 courses of antibiotics per infant to 1.8 per infant)
- reduced episodes of fever by 43 per cent (3.9 episodes per infant to 2.1 per infant).

The results clearly demonstrate that the protective effect of this prebiotic mixture is lasting beyond the intervention period, suggesting that an immune modulating effect through the intestinal flora modification may be the principal mechanism of action.

"Although these oligosaccharides are not identical to those present in human milk, when added to formula milk and fed to pre-term and term babies they have been shown to result in softer and more frequent stools, and create an intestinal flora similar to that found in breast-fed infants" concluded Professor Moro.

The study also shows a 63 per cent reduction in recurrent wheezing (from 20.6 per cent to 7.6 per cent), an 85 per cent reduction in allergic urticaria (from 10.3 per cent to 1.5 per cent) and a reduction by a third in upper respiratory tract infections (URTIs) (3.2 per infant to 2.1 per infant).

Breastfeeding remains the best form of nutrition for infants, providing natural insurance against the risk of allergy and common childhood infections. But for many mothers who cannot, or choose not to breastfeed, this research suggests that using formula milk enriched with prebiotic oligosaccharides can help boost their babies' resistance to common allergic reactions and infections.

<http://www.nutritionhorizon.com/home/viewhealthnutrition.rails?Id=&pageNo=45>

Nutritional Requirements By Gender

Diet can strongly influence how long you live and your reproductive success, but now scientists have discovered that what works for males can be very different for females. In the first study of its kind, the researchers have shown that gender plays a major role in determining which diet is better suited to promoting longer life or better reproductive success.

In the evolutionary "battle of the sexes", traits that benefit males are costly when expressed in females and vice versa. This conflict may have implications for human diet, aging and reproduction, says a team of scientists from UNSW, the University of Sydney and Massey University.

"When it comes to choosing the right diet, we need to look more closely to the individual, their sex and their reproductive stage in life," says Associate Professor Rob Brooks, Director of the Evolution and Ecology Research Centre at the University of New South Wales. "It may be, for example, that women in their child-bearing years need a different diet to those who are post-menopausal.

"It also underlines the important lesson that what we want to eat or, if you like, what we're programmed to eat, is not necessarily best for us." The researchers are conducting long-term studies on Australian black field crickets and have discovered that the lifespan of both males and females is maximised on high-carbohydrate, low-protein diets, they say in the latest issue of *Current Biology*.

But reproductive success differs dramatically between the sexes when the carbohydrate-protein balance is changed: males live longest and have the greatest reproductive success with a diet that favours carbohydrates to protein by eight-to-one, whereas females have greatest success when the ratio is just one-to-one. Given a choice, however, females eat only a small amount more protein than males. The shared ability to sense and choose food dooms both males and females to eat a diet that is a compromise between what is best for each sex.

"Male and female crickets maximise their fitness on different diets," says UNSW's Dr Alexei Maklakov, the study's lead author. "Despite that, the dietary preferences of the sexes are very similar. Instead of selecting foods in a sex-specific manner, males and females select 'intermediate' diets that are less than optimal for both sexes.

The researchers believe the sexes share most of their genes and this fact can constrain the evolution of sex differences in traits such as diet choice, because many of the same genes are likely to be responsible for trait expression in both sexes.

Significance for humans - "Men and women invest differently in reproduction, a difference that is even more marked than that between male and female crickets," says Rob Brooks. "Think of the tremendous amounts of energy and protein required of a mother in carrying a baby to term and breastfeeding. We also know that men and women need to eat different diets - think of the careful attention we pay to what expectant mothers eat.

"What men and women need to eat might be more dramatically different than we had realised. However, men and women eat very similar diets and our results suggest that our tastes and food preferences could be a shared compromise, as they are in crickets."

From: Medical News Today July 17, 2008

Limiting fructose may boost weight loss, UT Southwestern researcher reports

One of the reasons people on low-carbohydrate diets may lose weight is that they reduce their intake of fructose, a type of sugar that can be made into body fat quickly, according to a researcher at UT Southwestern Medical Center.

Dr. Elizabeth Parks, associate professor of clinical nutrition and lead author of a study appearing in a current issue of the *Journal of Nutrition*, said her team's findings suggest that the right type of carbohydrates a person eats may be just as important in weight control as the number of calories a person eats.

Current health guidelines suggest that limiting processed carbohydrates, many of which contain high-fructose corn syrup, may help prevent weight gain, and the new data on fructose clearly support this recommendation. "Our study shows for the first time the surprising speed with which humans make body fat from fructose," Dr. Parks said. Fructose, glucose and sucrose, which is a mixture of fructose and glucose, are all forms of sugar but are metabolized differently.

"All three can be made into triglycerides, a form of body fat; however, once you start the process of fat synthesis from fructose, it's hard to slow it down," she said.

In humans, triglycerides are predominantly formed in the liver, which acts like a traffic cop to coordinate the use of dietary sugars. It is the liver's job, when it encounters glucose, to decide whether the body needs to store the glucose as glycogen, burn it for energy or turn the glucose into triglycerides. When there's a lot of glucose to process, it is put aside to process later.

Fructose, on the other hand, enters this metabolic pathway downstream, bypassing the traffic cop and flooding the metabolic pathway. "It's basically sneaking into the rock concert through the fence," Dr. Parks said. "It's a less-controlled movement of fructose through these pathways that causes it to contribute to greater triglyceride synthesis. The bottom line of this study is that fructose very quickly gets made into fat in the body."

Though fructose, a monosaccharide, or simple sugar, is naturally found in high levels in fruit, it is also added to many processed foods. Fructose is perhaps best known for its presence in the sweetener called high-fructose corn syrup or HFCS, which is typically 55 percent fructose and 45 percent glucose, similar to the mix that can be found in fruits. It has become the preferred sweetener for many food manufacturers because it is generally cheaper, sweeter and easier to blend into beverages than table sugar.

For the study, six healthy individuals performed three different tests in which they had to consume a fruit drink formulation. In one test, the breakfast drink was 100 percent glucose, similar to the liquid doctors give patients to test for diabetes – the oral glucose tolerance test. In the second test, they drank half glucose and half fructose, and in the third, they drank 25 percent glucose and 75 percent fructose. The tests were random and blinded, and the subjects ate a regular lunch about four hours later.

The researchers found that lipogenesis, the process by which sugars are turned into body fat, increased significantly when as little as half the glucose was replaced with fructose. Fructose given at breakfast also changed the way the body handled the food eaten at lunch. After fructose consumption, the liver increased the storage of lunch fats that might have been used for other purposes.

"The message from this study is powerful because body fat synthesis was measured immediately after the sweet drinks were consumed," Dr. Parks said. "The carbohydrates came into the body as sugars, the liver took the molecules apart like tinker toys, and put them back together to build fats. All this happened within four hours after the fructose drink. As a result, when the next meal was eaten, the lunch fat was more likely to be stored than burned.

"This is an underestimate of the effect of fructose because these individuals consumed the drinks while fasting and because the subjects were healthy, lean and could presumably process the fructose pretty quickly. Fat synthesis from sugars may be worse in people who are overweight or obese because this process may be already revved up."

Dr. Parks said that people trying to lose weight shouldn't eliminate fruit from their diets but that limiting processed foods containing the sugar may help. "There are lots of people out there who want to demonize fructose as the cause of the obesity epidemic," she said. "I think it may be a contributor, but it's not the only problem. Americans are eating too many calories for their activity level. We're overeating fat, we're overeating protein; and we're overeating all sugars."

http://www.eurekalert.org/pub_releases/2008-07/usmc-lfm072308.php

New Study Shows Calcium Significantly Improves Children's Bone Health

A recent study published in the journal *Bone* found that higher intakes of calcium, such as those recommended by the USDA, may significantly improve bone health in children.

Researchers used an evidence-based approach to assess data from 21 randomized clinical trials with more than 3,800 children to determine how the intake of dietary calcium affects bone mineral content (BMC), a marker for bone strength, in children. Statistically pooled data revealed that those children who had inadequate calcium consumption prior to the start of these studies experienced a substantial increase in their total body BMC that was approximately 25 times greater than children who already consumed adequate amounts of calcium. Equally important, the study suggests the existence of a calcium threshold for bone health – that is, the level of calcium intake that triggers a significant effect.

“Dairy and other foods that are rich in calcium are thought to be important for the growth and strengthening of bones in children and adolescents,” said Michael Huncharek MD, MPH, Director of the Meta-Analysis Research Group and lead author of the study. “In the US, dairy products tend to be the preferred source of calcium since diets that exclude dairy are often deficient in this important nutrient. The new findings show that for those children who have inadequate calcium intake, increasing dietary calcium has a significant impact on bone development. Since most children don’t get enough calcium, meeting calcium recommendations may help to prevent future osteoporosis.”

Currently, a large majority of children and adolescents in the U.S. do not meet the daily recommended calcium intake. According to the USDA, seven out of 10 boys and nine out of 10 girls are not consuming the calcium they need for strong bones. Including at least 3 servings of low-fat or fat-free dairy foods each day as part of a healthy diet, as recommended by the 2005 Dietary Guidelines for Americans, helps reduce the risk for osteoporosis.

“The evaluation of randomized controlled trials was critical to understand the effects of calcium and dairy on children’s bone health,” noted Joshua Muscat, Ph.D., Professor of Public Health Sciences at Penn State College of Medicine and co-author of this study. “The literature has been unclear in this area because of the different ways researchers have measured bone health or inconclusive because many studies examined the effects of supplementation in children who were already consuming adequate amounts of dairy foods.”

“It’s never too early to make bone health a priority. These findings continue to support the research that shows milk is an important source of calcium which helps build and maintain strong bones, muscles and teeth in children,” said Ann Marie Krautheim, R.D., senior vice president of Nutrition Affairs for the National Dairy Council. “Consuming 3 servings of low-fat or fat-free dairy foods each day gives children not only the calcium they need, but also eight other essential nutrients, including potassium, phosphorus and protein.”

From: National Dairy Council July 30, 2008

Compound That Helps Rice Grow Reduces Nerve, Vascular Damage From Diabetes

You may want to soak your brown rice.

Researchers have found that a compound that helps rice seed grow, springs back into action when brown rice is placed in water overnight before cooking, significantly reducing the nerve and vascular damage that often result from diabetes. "You have to let it grow, germinate a little bit," says Dr. Robert K. Yu, director of the Institute of Molecular Medicine and Genetics and Institute of Neuroscience at the Medical College of Georgia. "Some of the active ingredients generated as a result of the germination process are beneficial to you."

Germinated brown rice's ability to help diabetics lower their blood sugar has been shown but how it works remained unknown. New research, published online in the Journal of Lipid Research,

shows the growth factor acylated steryl glucosides or ASG, helps normalize blood sugar and enzymes that are out-of-whack in diabetes. "The advantage of knowing this key ingredient and its structure is we can now make a ton of it; you don't have to rely on rice to produce it or eating rice to get this beneficial effect," says Dr. Yu, the paper's corresponding author.

Studies were done in animal models of type 1 diabetes with two different blood sugar levels that reflect patients' varying blood sugars. They were fed diets of white, brown or pre-germinated brown rice. Unlike white rice, less-processed brown rice still has some of the germ or growth structure that, after about 24 hours in water, resumes activity. Scientists watched as the resurrected ASG, a growth factor and lipid, helped normalize metabolism. "When blood sugar levels increase, the metabolic balance changes," says Dr. Seigo Usuki, neurobiologist in the MCG School of Medicine and the paper's first author. "Part of the way we know this growth factor works is by increasing levels of good enzymes that are decreased in diabetes."

Dr. Usuki is talking about enzymes such as ATPase, which help maintain nerve membranes so they can conduct electricity and communicate. Decrease of ATPase is a hallmark of the nerve damage that accompanies diabetes. Also reduced in diabetes is homocysteine-thiolactonase, or HTase, an enzyme that decreases levels of homocysteine, a known risk factor for vascular disease. The liver produces a low level of homocysteine but that level is elevated in diabetes while the enzyme that controls it decreases. Unchecked, homocysteine makes oxidative stress compounds that injure and kill cells. HTase is one way HDL, the so-called "good cholesterol," helps protect blood vessels from disease. A regular diet of pre-germinated brown rice diet helps get both back to a healthier level.

Fancl Hatsuga Genmai Co., Ltd., in Yokohama, Japan, which funded the studies and supplied the pre-germinated rice, already is working with Dr. Usuki on a supplement that can provide consumers who prefer not to soak – or eat – rice with the benefits of ASG.

The MCG research team reported in December 2007 in *Nutrition & Metabolism* that pre-germinated brown rice was better at protecting nerves from diabetes than un-soaked brown or white rice. They showed a then-unidentified lipid helped protect the nerve membrane and increase activity of HTase and the good cholesterol. Germination also is known to increase levels of the neurotransmitter GABA, which is believed to have many beneficial health effects such as lowering blood pressure, improving cognition and lowering blood glucose levels. However the MCG scientists have shown the lipid has a more powerful impact on HTase activity. The germ layer activated by soaking brown rice contains many vitamins and minerals in addition to the bioactive ingredient that would be beneficial to everyone, Dr. Yu says. The roughage of the rice grain also is helpful.

From: Soyatech eNews July 28, 2008