PFNDAI Bulletin (March 2012)

Protein Foods and Nutrition Development Association of India

22, Bhulabhai Desai Road ,Mumbai -400026(India)

Tel: +91 022 23538858

Email: pfndai@pfndai.org

Website: http://www.pfndai.com

Editorial

In the times of electronics and computers, everything is becoming easier. You can order things by computers. You can also pay your bills and carry out money transactions by internet. So one does not have to write a cheque and go to the office of the utility and put it in the drop box so in a few days, you would get a confirmation of payment being received.

Now one can instantly do so. It is also possible to get SMS from the bank regarding cheque being encashed or a deposit being made into your account and the balance in the account etc. This has made life much easier although it might have been healthier to go to the bank or the drop boxes and lose some calories in the process, but that is a different story.

There is only one problem that has arisen out of this. Bank account numbers used to be only three or four digits but now they are 11 digits. While depositing a cheque one has to make doubly sure that numbers are correctly written or someone else would be pleasantly surprised to have his or her account getting extra deposit.

Even when one is making a payment the companies now have customer number and bill number and other things having long series of numbers. We always find it a little irksome to ensure that correct numbers are filled in.

To make the matters worse, many companies have started login system for even making a payment of a bill. For that not only one needs a user name but also a password which has to be so complicated to ensure that nobody cracks it open and illegally pays your bills. The numbers when you make them difficult to crack they are also difficult to remember. They also tell you not to write down these passwords so others should not get illegal access. To remember so many user names and passwords for electricity, internet, email, gas, telephone, credit cards, bank login, etc. one needs a very sharp brain and fortunately we Indians are endowed with it.

To add to the woes, even scientific websites have started this. Many are now asking for registration (of course it is free) with user name and password. When one is accessing some many websites it is difficult especially when one is now beginning to forget quite easily. We feel that such difficulty should be removed. For PFNDAI website we have not kept this. Things might change in future. May be one could then introduce biometrics so even though memory may fail these features like eye scan and finger scan may be quite useful.

With season's greetings,

Prof. Jagadish Pai
Executive Director (executivedirector@pfndai.org)

Coming Events

Ahar Chennai 2012
25-27 August 2012
Chennai Trade Centre, Chennai
India Trade Promotion Organisation
T: 044 28415416

India Foodex 2012
25, 26, 27 August 2012
Palace Ground, GayathriVihar, Bangalore
Media Today
T: 011-2668 2045
W: www.indiafoodex.com

Fi India 2012
6-7, September 2012
CMP (United Business Media)
T: +91 22 66122600
W: www.ingredientsnetwork.com

Food Tech India 2012
Bakery Tech & Hotel Tech 11th International Exhibition for Food Processing, Bakery & Food Service Industry
September 7-9, 2012
Milan Mela Exhibition Complex, Kolkata
T: 011-4314 8888 & 033-2335 6130

International FoodTec India
Intl Exhi Food Processing & Packaging Tech
September 11-13, 2012
Bombay Exhibition Centre, NSE, Mumbai
Koelnmesse
T: +91 40 6570 7722
W: www.foodtecindia.com

BÉNÉFIQ 2012
September 25-27, 2012
Quebec City Convention Centre, Quebec
T: 418-656-2131 ext. 5862
E: helene.marceau@benefiq.ca
W: www.benefiq.ca

Foodpro Bangladesh
Intl Exhibition & Conference: Food & Bev Prods, Processing, Packaging Machinery & Allied Technologies
4-6 October 2012
BICC, Dhaka, Bangladesh
Contact: Cruz Expos (91-484-2320290
Extreme Exhibition & Event Solution (+880-2-8713440)
W: www.foodpro.com.bd

5th International Congress FSFB 2012
Food Science and Food Biotechnology in Developing Countries
October 24-26, 2012
Marival Resorts, Mexico
http://www.amecamex.org.mx/fsfb2012/
T: 52-818-3763044
E: santos@microbiosymas.com

Drink Technology India 2012
Pack Tech India 2012
November 6-8, 2012
Bombay Convention & Exhibition Centre, Mumbai
Organisers: MMI India (www.drinktechnology-india.com)
T: 022-4255 4710
Messe Dusseldorf India
W: www.messe-duesseldorf.de
T: +91 11 2697 1745

Applications of Biotechnology in Food

By: Prof. Jagadish Pai

Introduction

Since ancient times, microorganisms have been used for a variety of applications in food. Fermented beverages, cheese, bread etc. were produced using microbes although people were not aware of the role of microbes until Louis Pasteur showed about 200 years ago the cause of fermentation and spoilage and laid the foundation of microbiology. The word biotechnology was coined towards the end of World War I in reference to intensive agricultural methods. UN Convention defined it as any technological application that uses biological systems, living organisms or derivatives thereof to make or modify products or processes for specific use.

Although biotechnology has been used in pharmaceutical, medicine, non-food agriculture, cosmetics, textile, detergent, chemicals, fuel and environmental uses, it is commonly associated with agricultural food production and processing. Modern biotechnology is associated only to products or processes involving genetic engineering.

Global market for biotechnology products is already well over US $200 billion and is expected to reach well over US $300 billion by 2015. Currently most applications are in health care industry while agriculture and food applications are growing rapidly. Biotechnology seeds market reached over US $13 billion. Farmers throughout the world are cultivating improved seeds resistant to herbicides and insects. Major biotech crops are soybean, corn, cotton and canola with soybean accounting for almost half. The US has taken a lead in growing most of biotech soybean and corn. India has been one of the major countries growing biotech cotton.

Although concerns have been shown by some scientists and consumer activists about the health and environmental safety of biotech crops or genetically modified (GM) crops are set to rapidly grow in world market due. Global population has already reached 7 billion and there is no technology in sight that could offer a quantum jump in food production. The additional needs could be met by the use of biotechnology. Thus there is a choice between hunger or famine on one side and biotechnology on the other. The only option is to ensure that the food produced by biotech is safe.

Classical biotechnology

Wines were produced from fruit juices fermented by yeasts that would utilise sugars in juice converting them to alcohol. If in addition to yeast there are acetic acid bacteria then they would convert alcohol to acetic acid with the formation of vinegar. Lactic acid bacteria in milk would utilise lactose converting it to lactic acid lowering the pH of milk. When the pH lowers to 4.6 casein precipitates causing coagulation of milk to form curd. Enzymes in calf rennet also cause coagulation of milk by breaking casein bond. This curd is used in cheese making. As calf rennet is not acceptable to vegetarians microbial rennet is developed which has protein hydrolysing enzymes similar to calf rennet.

Microorganisms produce a large number of enzymes useful in food processing. Some of these enzymes were earlier obtained from plant sources such as papain, bromelain and ficin. Others such as rennet and pancreatic enzymes were obtained from animals. Most of the enzymes used in industry are now obtained from microbes. Preparations of corn syrup, maltodextrins, high fructose corn syrup, etc.

are carried out using microbial enzymes. Fruit products industry uses enzymes for juice clarification, increase in extraction of juice etc. Alcoholic beverages such beer used earlier only malt enzymes but now microbial amylases and proteases are used along with malt. Bread manufacturers use amylases in bread improvers.

All these enzymes were produced by natural microbes and some mutants that would produce large amounts of desirable enzymes. More and more work is being carried out on GM organisms as it helps produce desirable enzyme-producing organism in much shorter time and with less or no undesirable by-products. Calf rennet gene could be put in microbe so it would produce the desirable enzyme identical to original calf rennet.

Modern biotechnology

Genes have been known for quite some time and it was known that genetic traits are inherited from the parents by progeny. Children inherit the characteristics of parents such as colour of skin, eye, hair etc. as well as many other physical, physiological and mental capabilities. The genes of children are combination part of which coming from each parent. In plants also such hybrid could be achieved by mixing the genes from two different plants so the plantlet formed would inherit genes from each parent plant. However, since there is little control over which genes are inherited from which parent plant sometime the plantlet may be worse than the original parent plants so after many breeding experiments agro-scientists get the desirable plantlet which inherits good characteristics of each plant. This is laborious and lengthy process and success is not easy. If one could choose which genes are introduced into the new plant the chance of the success would be much higher. This is possible by genetic engineering.

Although biotechnology was being practiced for hundreds of years, the modern science of genetic engineering is just a few decades old. After the discovery of genes, there was a race to identify which sequence or portion of DNA was responsible for which gene and to map the genes and finally to genetically engineer the genes in a species or to introduce a desirable gene so the microbe or the place species would be better than the parents. The science of genetic engineering has progressed rapidly over the last few decades and now it is possible to cut a desirable gene sequence from one species and introduce it into similar or different species so desirable traits could be introduced into the genetically engineered or modified (GM) species either microbe, plant or animal.

Initially genetically modified microbes were prepared for producing the enzyme. Using such techniques many new microbes could produce commercially useful chemicals and enzymes. Initial experiments used similar species but later there were successful transfers of genes from one species into another. One such example is Bt cotton in which *Bacillus thuringiensis* gene from making a protein was introduced into cotton plant so the Bt cotton plant would produce this protein which is harmless to animals but it kills insects feeding on cotton leaves.

Applications

There are many applications of biotechnology right from better food and other agricultural crops to environment. Dr. Ananda Chakrabarty genetically engineered a bacterium which could consume the oil limiting the oil-spill damage to the environment. His GM organism received first-ever patent for a living organism. Bacteria are also used in mining of copper wherein specialised microbes leach copper sulphate from sulphide. Microbes are also used in domestic and industrial waste management making it highly cost effective process while treating at times highly dangerous waste products.

Fuel is produced by microorganisms from waste agricultural products. Many biogas plants are used by farmers even in India giving double benefit of waste management and producing renewable energy. Brazil has been producing alcohol from sugar cane a mixture of which with petrol could be used to run cars thus extending the fuel resource.

Many microbes are used in chemical industry for bio-conversion of chemicals. The advantages of microbes is that the conditions of temperature and pressure used are quite mild so there is energy saving. Microbes also normally produce no isomers and very little by-products and that too not hazardous so the process is not only energy efficient but also less hazardous. The process becomes environment-friendly. Although many industries like plastics, paints, fragrance, etc. can use microbial processes the largest applications have been in pharmaceutical industry where antibiotics, insulin, steroids and many other drugs are produced using microbes. Many enzymes are produced by microbes which are used in chemical industry. However, the biggest potential for biotechnology is in agriculture and in food industry.

Forensic applications involve identification of culprit by DNA finger-printing of blood or any tissue from the scene of the crime. This is also used for settling paternity issues. Gene therapy is still in experimental state. A defective gene may cause a disease like haemophilia, muscular dystrophy, sickle cell anaemia etc. Gene therapy is the use of DNA as pharmaceutical agent to treat the disease with the replacement of defective or mutated gene or in other ways. Although found to be very difficult with many failures, recent successes have raised hopes of treatment of many difficult diseases.

Improved crops

Earlier efforts to improve the crops were to prepare better crops from farmers' point of view. Crops with pest resistance, higher productivity, hardy crops withstanding droughts, herbicide resistance, improved capacity to utilise fertilisers, and many other properties farmers could really like. For centuries farmers have been crossbreeding plants to get specific beneficial traits they wanted in a crop and some that they wanted to avoid. Many new varieties were developed using this technique.

Some of the high-yielding varieties were developed that produced much higher produce per area planted although with lower pest resistance. This gave much higher crop production bringing in the Green Revolution. Scientists are now developing varieties with higher yield as well as greater resistance to pests and having drought resistance.

Cross breeding has the problems of non-selective combination of genes from parent plants. Thus breeding in desirable properties and breeding out the undesirable ones take many years. If one can select the desirable gene from one parent and put it in another plant having other desirable attributes then the problems of breeding would be highly curtailed. This is done in GM crops. Here another limitation of breeding needing only the same or related species is also not there. So bacterial gene can be inserted into cotton or soy bean plant to make it resistant to insects or calf gene could be inserted into yeast to make it produce rennet enzyme is possible with very little time. Here also there are some safety problems that need to be overcome.

Plant tissue culture

One of the many techniques that were developed during the last few decades helped tremendously the development of agricultural biotechnology. The techniques herein are used to maintain or grow plant cells, tissues or organs under sterile conditions on nutrient culture media. A large number of plantlets

could be produced and grown with different conditions or treatments to see their effects in labs. This technique not only helped in research and development but also in getting large number of plants grown and cultivated boosting flower and horticulture crops as well as grain. Plants have totipotency i.e. they could be produced from a few viable cells from any part of the plant such as seeds, flower, stem, leaves, roots etc. and does not require normal course of pollination etc. when grown under controlled conditions in presence of certain nutrients and hormones.

This helps greatly when testing for producing plants that have better characteristics such as improved colour, flavour, appearance, nutrient content, resistance to disease or weather conditions etc. A large number of uniform plants could be grown in a short time to see the effects.

Production of Food Additives and Processing Aids

Although fermentation has been used for preparing exotic foods and beverages by microbes, they are used for preparing many food additives including acids such as citric acid and lactic acid, amino acids and their salts and derivatives such as monosodium glutamate, aspartame sweetener etc., gums like xanthan and dextran, and a large number of enzymes including amylases, lactase, rennet, glucose isomerase, lipase, proteases, pectinases, and others that are used in food processing industry for many products including bread, beer, dairy products, cheese, high-fructose syrup, fruit juices and many more.

Enzymes

Many enzymes have been used for preparing additives as well as processing foods. Amylases have been used to prepare corn syrup as well as bread production. Lactase has been used for producing low lactose milk and milk products for those who are lactose intolerant. Proteases have been used for producing hydrolysed proteins from milk and soy to make them more digestible as well as less allergenic. Pectinases have been used in many products including fruit juices for clarification. These enzymes along with cellulolytic enzymes have been used for getting more juice out of fruits. Lipases have been used for cheese making for flavour development.

Recently phytases have been used for degrading phytates which bind iron and other essential minerals making them less available. Use of phytase makes them more bioavailable. Although many of the enzymes were produced from natural organisms, genetic modification has allowed increased production as well as more efficient enzymes.

Concerns

Some express concerns about the effects of GM foods on people as well as on environment. While transferring genes from Brazil nut to soy the allergy producing genes were also transferred to soy thereby allergenic soy were produced. Of course such GM foods would be immediately rejected in the screening process for safety evaluation. GM foods undergo extensive testing to prove their safety. There is also fear that herbicide resistance of GM foods may be transferred to wild plants or weeds thereby making them difficult to control. It is extremely rare that this may happen but precautionary measures must be taken. In developing a GM organism some marker genes are transferred like antibiotic resistance. Whether this antibiotic resistance is transferred to any pathogens is another worry. There is concern about loss of biodiversity as well as possibility of a handful of big companies controlling seed market. All these concerns must be adequately addressed while developing and approving the GM crops or organisms. It has been shown that due to the use of Bt cotton the use of pesticide has come down significantly as this GM crop has in-built resistance to pest.

Biotechnology will touch many spheres of human activity in future and help in increasing our capability of feeding our rapidly increasing population as well as giving us better food products. Food safety is particularly important as our traditional foods have been time tested over not just decades but over centuries. Thus a long term testing has enabled us to use safe foods and some which may even contain some toxic materials e.g. cassava and certain beans. These materials have been consumed taking proper care that toxins are not consumed. GM foods also may have to be tested thoroughly before they are released for wider usage. Americans have shown that GM foods can be adequately tested and can be safe. With proper testing protocols it can be done.

Toothfriendly labeling introduced in India

By Kati Weiss

In the thirty years since it was launched, the Toothfriendly trademark has become a recognized quality seal for confectionery products in Europe. The label was introduced in India at the PFNDAI congress in Mumbai last February.

Established to distinguish confectionery products that are demonstrably safe for teeth, the Toothfriendly label was designed by an expert group of Swiss University Dental Institutes in 1982. Today, the registered trademark is licensed to nearly 60 companies worldwide covering a geographic area of some 40 countries.

The Toothfriendly standard – each product must be non-cariogenic and non-erosive under normal conditions of use – meets the toughest guidelines set by the dental profession.

"The Toothfriendly label is permitted only to companies whose products have undergone a pH-telemetry test", says Dr. Albert Bär of Toothfriendly International. The test method is unique in the world as it also takes into account both the cariogenic and erosive potential of foods and food ingredients.

"The pH-telemetry test is a necessity as it is often impossible to determine whether a product is toothfriendly only based on the recipe. Many sugar-free confectionery products contain relatively high amounts of citric and malic acids and only the pH-telemetry test will reveal if a critical amount is exceeded."

Currently, the pH-telemetry test is carried out by three appointed University Institutes. In addition to the long-standing test institute in Zurich, the Universities of Witten/Herdecke (Germany) and Beijing (China) have recently opened new testing facilities.

Swiss origin

Since the first Toothfriendly-certified chewing gum was launched in Switzerland in 1982, the trademark has been expanded to encompass other major confectionery categories, including lozenges, lollipops, mints, toffee and chocolate, as well as medical candies. In total, the Toothfriendly label is used on nearly 100 brands across Europe, Asia and Americas.

In 1989, a non-profit association called Toothfriendly International was formed to govern the licensing of the quality seal. The association engages with dental professionals and nutritionists and distributes literature designed specifically for an expert audience. Dr. Bär says professionals are open to listening to what Toothfriendly International has to say because of its not-for-profit and scientific nature.

Today, Switzerland remains the largest market for Toothfriendly labeling, and toothfriendly products dominate the country's confectionery market, accounting for about 90% of chewing gum sales and 50% in candies.

Toothfriendly's reputation overseas is growing, too, thanks to its network of national associations and interest groups abroad. The association has recently activated its presence also in India: the first official partnership was established with PFNDAI. "The PFNDAI congress held in Mumbai last February was an excellent platform for us to liaise with both nutrition professionals and key industry players", comments Dr. Bär. "It gave us a good insight into the challenges of the Indian confectionery industry and helped us to understand how we can support the local product developers."

Product formulation

One of the most common misconceptions among food and beverage manufacturers is that all sugar-free products can be labeled as toothfriendly. "Sucrose is not the only problematic ingredient in food and beverage formulations", says Dr. Bär. "Scientific studies show that even relatively low levels of other fermentable carbohydrates such as starch or oligosaccharides can lead to a drop of plaque pH in the mouth below the critical threshold value."

To be on the safe side, only toothfriendly sweeteners should be used to bring the sweetness to the desired level and that fructose- or glucose-containing elements such as fruit extracts may be used only very sparingly, if at all. Also, dairy elements cannot be used if they bring too much lactose in the final product.

All intense sweeteners, including stevia, can be used for formulating toothfriendly products. Also most polyols – sorbitol, maltitol, isomalt, xylitol, erythritol and mannitol – are suitable as sugar substitutes. The newcomer erythritol, especially, offers interesting prospects thanks to its very low calorie content and high digestive tolerability.

Besides polyols, two new non-cariogenic carbohydrates – isomaltulose and tagatose – can be used as bulk sweeteners in toothfriendly confectionery. Particularly isomaltulose has gained manufacturers' interest thanks to its pleasantly mild sweetness and non-laxative nature.

RESEARCH IN HEALTH & NUTRITION

What is it about coffee?

Remember when people (and their doctors) used to worry that coffee was bad for the heart, would give them ulcers, and would make them overly nervous? In excess, it can cause problems. But recent research has linked coffee to health benefits, not harm, including*possible* (it's not a done deal) protective effects from everything from Parkinson's disease to diabetes to some types of cancer. Look at some of the ingredients in coffee that might explain its possible positive effects:

Caffeine. Caffeine probably has multiple targets in the brain, but the main one seems to be adenosine receptors. A part of the brain affected by Parkinson's disease, called the striatum, is loaded with adenosine receptors. By docking on them, caffeine may have some protective effects against the disease. Caffeine has some negative short-term effects on the cardiovascular system, raising blood pressure and perhaps making arteries stiffer. But habitual use may cause some of those effects to wear off.

Cafestol and kahweol. Coffee contains oily substances called diterpenes; the two main types are cafestol and kahweol. They *may* have anticancer effects, but they also have a downside, increasing cholesterol levels. Coffee filters trap most of the cafestol and kahweol so they don't wind up in the beverage that people drink.

Antioxidants. Antioxidants are substances that sop up reactive molecules so they don't harm sensitive tissues like those that line the inside of blood vessels. Coffee contains a fair amount of antioxidants, including a powerful one called chlorogenic acid.

Vitamins and minerals. Coffee isn't a great source of vitamins and minerals, but it does contain small amounts of magnesium and potassium.

Harvard Health Letter January 2012

❁❁❁

How Added Sugar In Diet Leads To Obesity, Diabetes - New Clues About Fructose

Medical News Today: 29 Feb 2012

A new animal study published on Monday in the *Proceedings of the National Academy of Sciences*, offers new clues about the mechanism through which a diet high in fructose, such as from added sugar and high fructose corn syrup, may contribute to the development of obesity and diabetes. Previous studies have already shown that fructose intake from added sugar is linked with the epidemic rise in obesity, metabolic syndrome, and non-alcoholic fatty liver disease.

Metabolic syndrome is a group of risk factors that raises a person's risk for diabetes, heart disease, stroke, and other health problems. It currently affects more than one in four Americans. There is also evidence that fructose intake causes features of metabolic syndrome in animals and humans. This suggests, for instance, if you compared two diets of similar calorie intake, the one with more fructose, as opposed to more starch, will lead to greater accumulation of fat around organs and higher insulin resistance.

Using lab mice, the international team of researchers, led by senior author Dr Richard Johnson, Chief

of the Division of Renal Diseases and Hypertension at the University of Colorado School of Medicine, found that fructose is metabolized by two forms of an enzyme: fructokinase C and fructokinase A.

They discovered that the two forms of fructokinase appear to be responsible for two contrasting effects: one causing fatty liver, obesity, and insulin resistance, and the other protecting against these effects in response to sugar. "By reducing the amount of fructose for metabolism in the liver, fructokinase A protects against fructokinase C-mediated metabolic syndrome", write the authors, who conclude that: "These studies provide insights into the mechanisms by which fructose causes obesity and metabolic syndrome".

❁❁❁

How Vitamin D Inhibits Inflammation

26 Feb 2012 Medical News Today

Researchers at National Jewish Health have discovered specific molecular and signaling events by which vitamin D inhibits inflammation. In their experiments, they showed that low levels of Vitamin D, comparable to levels found in millions of people, failed to inhibit the inflammatory cascade, while levels considered adequate did inhibit inflammatory signaling. They reported their results in the March 1, 2011, issue of *The Journal of Immunology.**

"This study goes beyond previous associations of vitamin D with various health outcomes. It outlines a clear chain of cellular events, from the binding of DNA, through a specific signaling pathway, to the reduction of proteins known to trigger inflammation," said lead author Elena Goleva, assistant professor of pediatrics at National Jewish Health. "Patients with chronic inflammatory diseases, such as asthma, arthritis and prostate cancer, who are vitamin D deficient, may benefit from vitamin D supplementation to get their serum vitamin D levels above 30 nanograms/milliliter."

Current national guidelines suggest that people should maintain a minimum blood serum level of 20 ng/ml, although there is much scientific debate about optimum levels. Vitamin D has long been known to contribute to bone health by promoting the absorption of calcium. In recent years, much attention has been paid to its possible immune and inflammatory benefits. Low vitamin D levels have been associated with several diseases including asthma, cancer, diabetes, and arthritis.

In the current study researchers examined the specific mechanisms by which vitamin D might act on immune and inflammatory pathways. They incubated human white blood cells with varying levels of vitamin D, then exposed them to lipopolysaccharide (LPS), a molecule associated with bacterial cell walls that is known to promote intense inflammatory responses.

Cells incubated with no vitamin D and in solution containing 15 ng/ml of vitamin D produced high levels of cytokines IL-6 and TNF-alpha, major actors in the inflammatory response. Cells incubated in 30 ng/ml vitamin D and above showed significantly reduced response to the LPS. The highest levels of inflammatory inhibition occurred at 50 ng/ml.

Through a complex series of experiments, the researchers identified a new location where the vitamin-D receptor appears to bind directly to DNA and activate a gene known as MKP-1. MKP-1 interferes

with the inflammatory cascade triggered by LPS, which includes a molecule known as p38, and results in higher levels of IL-6 and TNF-alpha.

"This newly identified DNA-binding site for the vitamin-D receptor, and the specific pathways inhibited by higher levels of vitamin D provide a plausible mechanism for many of the benefits that have been associated with vitamin D," said Dr.Goleva. 'The fact that we showed a dose-dependent and varying response to levels commonly found in humans also adds weight to the argument for vitamin D's role in immune and inflammatory conditions."

❁❁❁

New Model To Evaluate Probiotic Survival In The Gut Shows Some Probiotics Have A Better Chance To Promote Health

23 Feb 2012 Medical News Today

Functional foods containing bacteria with beneficial health effects, or probiotics, have long been consumed in Northern Europe and are becoming increasingly popular elsewhere. To be of benefit, however, the bacteria have to survive in the very hostile environment of the digestive tract. A group of scientists from the Norwegian University of Life Sciences in As, Norway have developed a "model gastric system" for evaluating the survival of bacteria strains in the human digestive system, and determined that some bacteria strains survive better when consumed as fermented milks. Their results are published in the February issue of the *Journal of Dairy Science.*

"Most of the bacterial strains we tested have interesting functional properties related to food products. We wanted to evaluate whether these strains could contribute with beneficial health functions, or even have the potential as probiotics for human consumption," explains lead investigator Professor SivSkeie of the Department of Chemistry, Biotechnology, and Food Sciences.

Researchers tested 5 Lactococcus bacteria strains, including 4 Lc. lactis ssp. cremoris strains, which are found in ropy milks, traditional Nordic fermented milk products reported to have beneficial effects on consumer health, as well as 3 Lactobacillus strains, and one strain of Enterococcus hirae. The study tested whether the strains could survive exposure to acidic conditions and bile salts, the traditional method of evaluating the potential of probiotic bacteria. The bacteria were also subjected to a process that mimicked the human digestive system, incubating the bacteria in human gastric and duodenal juices at body temperature. The bacterial strains were tested both as pure cells from cultured media and in the form of fermented milk.

The initial in vitro testing in acid and bile salts found that Lactobacillus strains had a significantly higher acid tolerance than the lactococci strains and E. hirae. The model digestion experiments allowed researchers to simulate with more precision the multiple stress factors that might ultimately affect the survival and subsequent performance of bacteria in the gut. The lactobacilli strains showed the highest survival rate in the model digestive system, whereas the cocci, with some exceptions, performed similarly in both systems. Interestingly, while none of the lactococcal stains and the E. hirae strain survived in significant numbers after exposure to the gastric juices, their numbers increased in the subsequent duodenal phase.

"This could mean that lactococci and enterococci are able to resurrect their viability if they are exposed to more suitable conditions like those in the small intestine. This is very interesting because it is in the intestine that functional or probiotic bacteria confer their health benefit to the host," suggests Dr.Skeie.

In testing whether fermented milk gave protection to the bacteria through the digestive tract, the results were mixed. The Lactococcus strains Af-1 and ML-8 and Lb. paracasei INF448 showed lower numbers of viable cells compared with the digestion of pure bacterial cells. The other strains showed higher numbers of viable cells in comparison. In particular, the fermented milk improved the viability of the Lactococcus strains Ar-1, Bf-2, the active bacteria in ropy milk, and E. hirae INF E1 during incubation under gastric conditions.

"These results seem to confirm that foods, such as fermented milks, could be a protective matrix enhancing survival of some bacteria," Dr.Skeie concludes.

❁❁❁

Fructose Weight Gain Impact Same As Other Carbohydrates

21 Feb 2012 Medical News Today

Fructose does not make you gain more weight than other types of carbohydrates, Canadian researchers reported in the*Annals of Internal Medicine*. They found that a little extra fructose added to foods did not trigger weight gain, as long as the participants reduced the equivalent total calories from other carbs. In other words, fructose calories are no more fattening than the same number of calories in other carbohydrate foods.

The authors explained that fructose's contribution to excess bodyweight in Western societies is often mentioned, but no studies have clearly shown a connection. John L. Sievenpiper, MD, PhD., and team set out to determine what effect fructose might have on people's weight in controlled eating trials.

They gathered data on 41 controlled feeding trials which had lasted for at least seven days. 31 of them, involving 637 participants, compared the effect of free fructose and non-fructose carbohydrates in isocaloric trials. Isocaloric means with similar total calories. 10 studies, involving 119 participants were hypercaloric trials (high calories). They excluded trials that evaluated high-fructose corn syrup (42% to 55% free fructose).

They found that in the isocaloric trials, fructose made no overall difference to body weight, when compared to non-fructose carbohydrates. However, high calorie fructose diets did lead to increases in body weight.

Put simply: when people ate foods with fructose, and their meals had the same number of calories as people's with non-fructose carbohydrate, there was no significant different is body weight. However, high calorie fructose diets did make people put on weight.

The authors stressed that several of the trials available were not of very good quality. They suggested that in the fructose hypercaloric trials, weight gain may have simply been due to too many calories, rather than fructose itself.

In an Abstract in the same journal, the researchers concluded:

"Fructose does not seem to cause weight gain when it is substituted for other carbohydrates in diets providing similar calories. Free fructose at high doses that provided excess calories modestly increased body weight, an effect that may be due to the extra calories rather than the fructose."
❁❁❁

Malnutrition Threatens Nearly Half A Billion Children

17 Feb 2012 Medical News Today

According to a report entitled "A Life Free from Hunger: Tackling Child Malnutrition" by Save the Children, nearly half a billion children are at risk of permanent damage in the next 15 years as a result of malnutrition. Chronic childhood malnutrition has been largely neglected, despite worldwide efforts to address food security.
The report was released in light of the current emergency food crisis in the African Sahel.

Carolyn Miles, President and CEO of Save the Children, explained: *"Malnutrition is a largely hidden crisis, but it afflicts one in four children around the world. It wreaks lifelong damage and is a major killer of children. Every hour of every day, 300 children die because of malnutrition."*

According to the report, chronic malnutrition (lack of proper nutrition over time), is more lethal and significantly more extensive than the short-term acute malnutrition often observed during food crisis. Chronic malnutrition weakens the immune systems of young children, which can lead to malaria, diarrhea and pneumonia, all of which can result in death. Each year, chronic malnutrition kills 2 million children, three times as many as result from acute malnutrition.

In addition, children with chronic malnutrition are significantly more susceptible to extreme suffering and death from acute malnutrition in emergency food crises, as in the Horn of Africa and the Sahel at present. In total, malnutrition is responsible for 2.6 million child deaths each year, or one third of all child deaths.

Miles said: *"It's time for a paradigm shift. The world can no longer afford to wait until visibly emaciated children grab headlines to inspire the action these children need and deserve. Unfortunately for millions of the world's chronically malnourished children, permanent damage to their physical and intellectual development is not as obvious, and so it's too often overlooked."*

The organization requests that action should be taken on proven solutions that would help all children affected by malnutrition and hunger and prevent these deaths. Compared to the significant advances made on other worldwide health crises, progress on reducing malnutrition has been considerably slow for two decades.

Children who are well-nourished perform better in school and earn significantly more as adults, on average, compared to adults who were malnourished as children. According to recent evidence, nutritional interventions can raise the amount adults earn by 46%. Several developing countries spend an estimated 2-3% of their GDP as result of malnutrition. In addition, malnutrition impedes global economic growth at a critical time and extends the cycle of poverty.

Miles explains: "World leaders are searching for ways to strengthen their economies over the long term, so why not achieve that through helping children get the healthy start they deserve?"

World leaders have inspired much-needed support to increase agricultural productivity while addressing food security, however, they have not yet made nutrition central to their efforts. In 2009, President Obama helped start the L'Aquila Food Security Initiative, which resulted in $22 billion in pledges at the G20 and G8 meetings. However just 3% of these pledges and less than 1% of pledges fulfilled so far have gone towards nutrition.

Miles said: *"Investment in agriculture is clearly important to making sure production keeps up with a growing population. But let's not forget, right now the world produces enough food to feed everybody, and yet one third of children in developing countries are malnourished. Clearly, just growing more food is not the answer. The United States has shown great leadership on nutrition, but now must call on other powerful nations to make it a global priority."*

President Obama will host this spring's G8 meeting in Chicago, and many expect that he will address food security again. Save the Children is requesting that G8 extend food security funding at current levels for 3 years while paying greater attention on nutrition.

Seminal research published in the Lancet medical journal in 2008, reveals that the vast majority of malnutrition, especially in the vital 1,000-day window between conception and age 2, could be prevented by a set of 13 basic interventions, such as proper introduction of varied foods for infants, vitamin supplementation, fortification of basic staples, and encouraging breastfeeding to avoid contaminated water.

According to an estimate by The World Bank, the cost of getting these solutions to 90% of the children who need them would cost $10 billion per year and save 2 million children. Save the Children says, split among developing and developed countries, that figure is manageable. Save the Children explains that if the world does not act and the current rate of progress of reducing chronic malnutrition continues at less than 1% each year, 450 million children will be affected in the next 15 years.

❁❁❁

Green Tea Protects Against Functional Disability Linked To Aging

06 Feb 2012 Medical News Today

Regular green tea drinkers have a lower risk of developing functional disability, researchers from Tohoku University Graduate School of Medicine, Sendai, Japan, reported in the *American Journal of Clinical Nutrition*. Functional disability refers to problems with daily chores and activities, such as bathing or dressing.

As background information, the authors explained that prior studies had found that consuming green tea reduced the risk of diseases associated with functional disability, such as osteoporosis, cognitive impairment and stroke. Although most experts believed the risk of incident functional disability would be lower for regular green tea drinkers, no direct studies to prove this had ever been carried out.

Yasutake Tomata and team set out to determine whether regular green tea consumption might reduce incident functionality disability in older people.

In 2006, they gave out questionnaires regarding daily tea consumption, as well as other lifestyle factors and gathered data on 13,988 respondents. All the respondents were at least sixty-five years of age. They used the public Long-term Care Insurance database for information on functional disability.

They found a close inverse link between functional disability risk and the consumption of green tea -

the more people drank green tea, the lower their risk. Nearly 13% of those who consumed less than one cup of green tea each day developed functional disability, compared to slightly more than 7% among those consuming five cups or more.

The authors stressed that their study in no way proves that it is just the green tea that protects against functional disability as people age. They also noticed that the heavy green tea drinkers also ate more fruit and vegetables, consumed more fish, were less likely to smoke, had fewer strokes and/or heart attacks, and tended to have a higher level of education. They were also found to have sharper cognitive function.

The greater tea drinkers tended to have a wider circle of friends and more family members around them. However, even when all those above-listed factors were taken into account, there was still a link between regular green tea drinking and less functional disability risk. Nobody is yet certain why green tea offers these benefits. The authors mentioned one prior study which demonstrated that green tea extracts help maintain leg muscle strength in elderly females.

They warn that there is a chance green tea extracts, such as caffeine and vitamin K, might interfere with how anticoagulant drugs work. In an abstract in the journal, the authors wrote: *"Green tea consumption is significantly associated with a lower risk of incident functional disability, even after adjustment for possible confounding factors. "*

Japanese green tea

Green tea (Ryokucha) is common throughout Japan, and is simply known there as tea (ocha). Historians say green tea was originally used in China during the Song Dynasty (A.D. 960-1279). A Japanese Buddhist priest, Myōan Eisai (A.D. 1141-1215), who also set up the Rinzai school of Zen Buddhism, brought green tea to Japan.

In Japan, green tea is graded, according to its quality, what part of the plant it comes from, and how it is processed. The country's best green tea comes from the Yame region of Fukuoka Prefecture, as well as the Uji region of Kyoto. There are several names for different types of Japanese green tea, including Gyokuro, Kabusecha, Sencha, Fukamushicha, Tamaryokucha, Bancha, and Kamairicha.

Ingredients in green tea

Green tea is known to contain the following:

- Polyphenols - especially catechins (epigallocatechingallate)
- Vitamin C (ascorbic acid) and vitamin K
- Carotenoids
- Several minerals - including zinc chromium, selenium, and manganese
- Tocopherols
- Certain phytochemical compounds

Green tea is said to have more antioxidant properties than black tea. However, black tea has theaflavin, which green tea does not.

❁❁❁

During Pregnancy, Consuming Fish Improves Offspring's Cognitive Development And Prosocial Conduct

02 Feb 2012 Medical News Today

Can pregnant women improve their progeny's intelligence by eating fish? A study recently submitted to the *American Journal of Clinical Nutrition* and coordinated by the University of Granada professor Cristina CampoyFolgoso revealed that infants born to mothers who consumed more fish during pregnancy score higher in verbal intelligence and fine motor skill tests, and present an increased prosocial behavior.

This study was conducted within the framework of the NUTRIMENTHE project ("Effect of diet on offspring's cognitive development"), which received funding of 5.9 million Euros from the European 7th Framework Programme (7PM). This study was coordinated by the University of Granada professor Cristina Campoy Folgoso. Fish oil is the primary source of long-chain Omega-3 fatty acids as docosahexaenoic acid (DHA), the main component of brain cell membranes. The European Commission has confirmed and supports the healthy effects of DHA as "it contributes to the normal development of the brain and eye of the fetus and breastfed infants".

Effects of Fish Intake

The NUTRIMENTHE project is focused on the effects that genetic variants and maternal fish intake have on the offspring's intellectual capacity. The researchers mainly focused on polymorphisms in the fatty acid desaturase (FADS) gene cluster that encodes the delta-5 and delta-6 desaturase enzymes involved in the synthesis of long-chain fatty acids of the series omega-3 and omega-6. The researchers collected blood samples from 2 000 women at 20 gestational weeks and from the umbilical cord of the infant at birth, and analyzed concentrations of long-chain fatty acids of the series omega-3 and omega-6. Then, they determined the genotype of 18 polymorphisms in the FADS gene cluster. The aim of this study was to assess the effects of maternal fish intake -as a source of Omega-3 and Omega-6 fatty acids- on fetal development, and to determine how the different genotypes affect long-chain fatty acid concentrations in the fetus.

Dr. Pauline Emmett (University of Bristol), Dr. Eva Lattka (Helmholtz ZentrumMünchen, the German Research Center for Environmental Health) and their research teams have determined how FADS gene cluster polymorphisms affect long-chain polyunsaturated fatty acid concentrations in women during pregnancy.

Maternal Genotypes

According to the researchers, fatty acid concentrations in umbilical cord blood depend on maternal and offspring genotypes. Accordingly, maternal genotypes are mainly related with omega-6 fatty acid precursors, and offspring genotypes are related with the more highly elongated fatty acids of the omega-6 series. The study also revealed that concentrations of docosahexaenoic acid (DHA) of the Omega-3 series -main component of brain cell membranes- depend on maternal and offspring genotypes. Dr Lattka states that "the fetal contribution of long-chain polyunsaturated fatty acids of the omega-6 series is more relevant than expected; fetal DHA concentrations depend on maternal and fetal metabolism", and concludes that "the amount of DHA transmitted to the fetus through the placenta might be crucial for fetal development".

In a previous study, this research team proved that fish intake during pregnancy is correlated with the IQ in 8-year old children. But, what causes that effect? The study revealed that fish intake is correlated with maternal blood DHA concentrations. However, it has not been clarified whether maternal DHA concentrations are directly correlated with the offspring's IQ. The NUTRIMENTHE project - which is expected to conclude in 2013- is aimed at elucidating this question.

❁❁❁

A Glass Of Milk A Day Could Benefit Your Brain

01 Feb 2012 Medical News Today

Pouring at least one glass of milk each day could not only boost your intake of much-needed key nutrients, but it could also positively impact your brain and mental performance, according to a recent study in the International Dairy Journal.1 Researchers found that adults with higher intakes of milk and milk products scored significantly higher on memory and other brain function tests than those who drank little to no milk. Milk drinkers were five times less likely to "fail" the test, compared to non milk drinkers.

Researchers at the University of Maine put more than 900 men and women ages 23 to 98 through a series of brain tests - including visual-spatial, verbal and working memory tests - and tracked the milk consumption habits of the participants. In the series of eight different measures of mental performance, regardless of age and through all tests, those who drank at least one glass of milk each day had an advantage. The highest scores for all eight outcomes were observed for those with the highest intakes of milk and milk products compared to those with low and infrequent milk intakes. The benefits persisted even after controlling for other factors that can affect brain health, including cardiovascular health and other lifestyle and diet factors. In fact, milk drinkers tended to have healthier diets overall, but there was something about milk intake specifically that offered the brain health advantage, according to the researchers.

In addition to the many established health benefits of milk from bone health to cardiovascular health, the potential to stave off mental decline may represent a novel benefit with great potential to impact the aging population. While more research is needed, the scientists suggest some of milk's nutrients may have a direct effect on brain function and that "easily implemented lifestyle changes that individuals can make present an opportunity to slow or prevent neuropsychological dysfunction."

New and emerging brain health benefits are just one more reason to start each day with lowfat or fat free milk. Whether in a latte, in a smoothie, on your favourite cereal, or straight from the glass, milk at breakfast can be a key part of a healthy breakfast that help sets you up for a successful day. The 2010 Dietary Guidelines for Americans recommend three glasses of lowfat or fat free milk daily for adults and each 8-ounce glass contains nine essential nutrients Americans need, including calcium and vitamin D.

❁❁❁

DIET RICH IN SOY LOWERS LDL CHOLESTEROL

TORONTO—Consuming a diet rich in soy foods may help lower low-density lipoprotein (LDL) cholesterol in individuals whose bodies are able to convert it to an estrogen-like compound called equol, according to a study published in the ***American Journal of Clinical Nutrition***. The findings also suggest individuals considered equol producers had the added cardiovascular benefit of maintaining higher high-density lipoprotein (HDL) cholesterol concentrations than those seen in equolnonproducers.

Researchers at the University of Toronto in Canada conducted a study to examine whether equol status determines the effectiveness of soy foods to lower LDL cholesterol and to raise HDL cholesterol. For the study, 85 hypercholesterolemic men and postmenopausal women participated in one of three studies that represented a range of soy interventions and followed the same general protocol at a Canadian university hospital research center.

Soy foods were provided for one month at doses of 30 to 52 grams per day for the three studies as follows: 1) soy foods with either high-normal (73 mg/d) or low (10 mg/d) isoflavones, 2) soy foods with or without a prebiotic to enhance colonic fermentation (10 g polyfructans/d), or 3) soy foods with a low-carbohydrate diet (26% carbohydrate). Studies 1 and 2 were randomized controlled crossover trials, and study 3 was a parallel study.

At the end of the study, 33 equol producers' HDL stayed about the same, while the non-equol producers' dropped from about 48 mg/dL to about 46 mg/dL.Theequol producers' LDL fell from about 169 mg/dL to about 152 mg/dL. The non-equol producers' fell from about 174 mg/dL to about 153 mg/dL.

February 28, 2012 **Food Product Design**

❁❁❁

DIET LOW IN OMEGA-3S ACCELERATES MEMORY LOSS

LOS ANGELES—A diet lacking in omega-3 fatty acids, found commonly found in fish, may cause an individual’s brain to age faster and lose some of its memory and thinking capabilities, according to a new study published in the journal ***Neurology***. The study found people with lower levels of omega-3 fatty acids have lower brain volumes—equivalent to approximately two years of structural brain aging.

Researchers at the Easton Center for Alzheimer's Disease Research and the Division of Geriatrics, University of California at Los Angeles conducted a study of 1,575 dementia-free study subjects (average age 67) who underwent MRI brain scans and were given tests measuring mental function, body mass and omega-3 fatty acid levels in their red blood cells. They found participants whose docosahexaenoic acid (DHA) levels were in the bottom 25% had lower brain volumes than those with higher DHA levels. Those whose levels of all omega-3 fatty acids were in the bottom 25% also scored lower on tests of visual memory and executive function, including problem-solving, multi-tasking and abstract thinking.
February 28, 2012 **Food Product Design**
❁❁❁

Cocoa Flavonols Boost Brain Function

February 17, 2012 Food Product Design

VICTORIA, Australia—Older individuals who consume chocolate or cocoa powder containing high levels of flavonols been shown to have better brain performance and as easier time completing

memory tasks compared to those who do not eat chocolate, according to a study published in the journal *Physiology & Behavior*.

Researchers at Swinburne University conducted a study to investigate whether chocolate or cocoa powder containing higher amounts of cocoa flavanols can positively influence brain performance in healthy middle-aged individuals naturally.

For the study, 63 middle-aged volunteers aged between ages 40 and 65 years were administered a daily chocolate drink containing 250mg or 500mg cocoa flavanols versus a low cocoa flavanol (placebo) drink over a 30-day period. Participants were tested at baseline as well as at the end of the treatment period on a test of Spatial Working Memory. Steady State Probe Topography (SST) was used to assess neurocognitive changes associated with cocoa flavanol supplementation during the completion of the Spatial Working Memory task.

Changes in the amplitude and phase of the SSVEP response after 30 days were compared between treatment groups. Behavioral measures of accuracy and reaction time were not found to be significantly different between treatment groups, while average SSVEP amplitude and phase differences at a number of posterior parietal and centro-frontal sites were found to be significantly different between groups during memory encoding, the working memory hold period and retrieval.

In the absence of significant behavioral effects, the differences in brain activation can be interpreted as evidence of increased neural efficiency in spatial working memory function associated with chronic cocoa flavanol consumption.

❁❁❁

Curcumin Slows Prostate Tumor Growth

February 10, 2012 Food Product Design

PHILADELPHIA—Curcumin, an active component of turmeric, may help slow down tumor growth in castration-resistant prostate cancer patients on androgen deprivation therapy (ADT), according to a study from researchers at Jefferson's Kimmel Cancer Center. Curcumin was found to suppress p300 and CPB, two nuclear receptor activators that help tumor cells bypass ADT, thus squashing the success of the therapy. ADT aims to inhibit the androgen receptor—an important male hormone in the development and progression of prostate cancer—in patients.

For the study, prostate cancer cells were subjected to hormone deprivation in the presence and absence of curcumin with "physiologically attainable' doses. (Previous studies, which found similar results, included doses that were not realistic.) Curcumin augments the results of ADT, and reduced cell number compared to ADT alone, the researchers found. The spice was also found to be a potent inhibitor of both cell cycle and survival in prostate cancer cells.

"This study sets the stage for further development of curcumin as a novel agent to target androgen receptor signaling," said Karen Knudsen, Ph.D., a Professor of Cancer Biology, Urology and Radiation Oncology at Thomas Jefferson University. "It also has implications beyond prostate cancer since p300 and CBP are important in other malignancies, like breast cancer. In tumors where these play an important function, curcumin may prove to be a promising therapeutic agent."

❁❁❁

Scientists Unlock Secret of Resveratrol

February 3, 2012 Food Product Design

BETHESDA, Md.—Scientists have discovered how resveratrol, a naturally occurring chemical found in red wine and other plant products, may impart health benefits, a finding that may one day lead to resveratrol-based medicines, according to a study published in the journal *Cell*.

National Institutes of Health researchers found evidence that resveratrol does not directly activate sirtuin 1, a protein associated with aging. Rather, resveratrol inhibits certain types of proteins known as phosphodiesterases (PDEs), enzymes that help regulate cell energy.

“Resveratrol has potential as a therapy for diverse diseases such as type 2 diabetes, Alzheimer’s disease, and heart disease," said lead study author Jay H. Chung, M.D., Ph.D., chief of the Laboratory of Obesity and Aging Research at the NIH's National Heart, Lung, and Blood Institute. “However, before researchers can transform resveratrol into a safe and effective medicine, they need to know exactly what it targets in cells."

Previous studies suggested resveratrol’s primary target is sirtuin 1; however, the researchers found resveratrol activity required another protein called AMPK. This would not be the case if resveratrol directly interacted with sirtuin 1.

For the study, the researchers traced out the metabolic activity in cells treated with resveratrol and identified PDE4 in the skeletal muscle as the principal target for the health benefits of resveratrol. By inhibiting PDE4, resveratrol triggers a series of events in a cell, one of which indirectly activates sirtuin 1. To confirm that resveratrol attaches to and inhibits PDE proteins, the researchers gave mice rolipram, a drug known to inhibit PDE4. Rolipram reproduced all of the biochemical effects and health benefits of resveratrol, such as preventing diet-induced obesity, improving glucose tolerance, and increasing physical endurance.

The researchers noted that because resveratrol in its natural form interacts with many proteins, not just PDEs, it may cause not-yet-known toxicities as a medicine, particularly with long-term use. The levels of resveratrol found in wine or foods are likely not high enough to produce significant health benefits or problems. Convincing clinical studies in humans have used about 1 gm of resveratrol per day, roughly equal to the amount found in 667 bottles of red wine.

Results also suggest that inhibitors of PDE4 may offer the benefits of resveratrol without the potential toxicities arising from resveratrol's interactions with other proteins. One PDE4 inhibitor called roflumilast has already been approved by the FDA for the treatment of COPD (chronic obstructive pulmonary disease).

❁❁❁

Eating Citrus Fruit May Lower Women's Stroke Risk

A compound in citrus fruits may reduce your stroke risk, according to research reported in *Stroke: Journal of the American Heart Association*. Eating higher amounts of a compound in citrus fruits, especially oranges and grapefruit, may lower ischemic stroke risk. Women who ate high amounts of the compound had a 19 percent lower risk of ischemic stroke than women who consumed the least amount.

This prospective study is one of the first in which researchers examine how consuming flavonoid subclasses affects the risk of stroke. Flavonoids are a class of compounds present in fruits, vegetables, dark chocolate and red wine.

"Studies have shown higher fruit, vegetable and specifically vitamin C intake is associated with reduced stroke risk," said Aedín Cassidy, Ph.D., the study's lead author and professor of nutrition at Norwich Medical School in the University of East Anglia in Norwich, United Kingdom. "Flavonoids are thought to provide some of that protection through several mechanisms, including improved blood vessel function and an anti-inflammatory effect."

Cassidy and colleagues used 14-years of follow-up data from the Nurse's Health Study, which included 69,622 women who reported their food intake, including details on fruit and vegetable consumption every four years. Researchers examined the relationship of the six main subclasses of flavonoids commonly consumed in the U.S. diet -- flavanones, anthocyanins, flavan-3-ols, flavonoid polymers, flavonols and flavones -- with risk of ischemic, hemorrhagic and total stroke.

As expected, the researchers didn't find a beneficial association between total flavonoid consumption and stroke risk, as the biological activity of the sub-classes differ. However, they found that women who ate high amounts of flavanones in citrus had a 19 percent lower risk of blood clot-related (ischemic) stroke than women who consumed the least amounts.

In the study, flavanones came primarily from oranges and orange juice (82 percent) and grapefruit and grapefruit juice (14 percent). However, researchers recommended that consumers increase their citrus fruit intake, rather than juice, due to the high sugar content of commercial fruit juices.

A previous study found that citrus fruit and juice intake, but not intake of other fruits, protected against risk of ischemic stroke and intracerebral hemorrhage. Another study found no association between yellow and orange fruits and stroke risk, but did link increased consumption of white fruits like apples and pears with lower stroke risk. An additional study found that Swedish women who ate the highest levels of antioxidants -- about 50 percent from fruits and vegetables -- had fewer strokes than those with lower antioxidant levels. More studies are needed to confirm the association between flavanone consumption and stroke risk, and to gain a better understanding about why the association occurs, the authors said.

Science Daily (Feb. 23, 2012)

❁❁❁

Love, Chocolate Good for the Heart, Says Cardiologist

Being involved in a healthy, loving relationship is good for the heart, says Vanderbilt Heart and Vascular Institute cardiologist Julie Damp, M.D. "There are a couple of different theories behind why that might be," Damp said. People who are married or who are in close, healthy relationships tend to be less likely to smoke, are more physically active and are more likely to have a well-developed social structure, she said. They are also more likely to have lower levels of stress and anxiety in their day-to-day lives.

"There is a theory that people who are in loving relationships may experience neuro-hormonal changes that have positive effects on the body, including the cardiovascular system," Damp said, explaining that there are certain hormone levels in the body that vary depending on the level of an individual's stress and anxiety.

"This has not been proven, but the idea is that being in a relationship that is positive may have positive effects on your cardiovascular system over long periods of time," Damp said. In fact, studies have shown that relationships that involve conflict or negativity are associated with an increase in risk for coronary artery disease.

Giving your loved one a box of dark chocolates and a bottle of red wine won't hurt either. Studies suggest they are good for the heart, as well.

Dark chocolate contains flavonoids, which are antioxidants. Antioxidants have positive effects on many different body systems including the cardiovascular system. The high concentration of cocoa in dark chocolate appears to be what offers the flavonoid benefit.

"Dark chocolate has been shown to be associated with lower blood pressure, lower blood sugar levels and improvement in the way your blood vessels dilate and relax," Damp said. Further study is needed to know exactly which type of chocolate and how much of it is the most beneficial, but studies have shown that people who eat chocolate more than once a week have lower risks of heart disease and stroke compare to people who eat it less frequently. "Fat and calorie content of chocolate also needs to be taken into consideration and kept consistent with a healthy, balanced diet," Damp said.

Flavonoids are also present in red wine. Multiple observational studies have shown that moderate alcohol consumption, which is one drink a day for women and one to two for men, is associated with lower rates of cardiovascular events such as heart attacks.

However, Damp cautions that there is not enough evidence to encourage people who don't currently drink to start drinking. There are potential negative health effects of long-term alcohol use, and the flavonoids found in red wine can be found in other food and drink like fruits and vegetables and grape juice, she said.

"A good message is that these things should be done in moderation and in conjunction with your physician's plan for you to lower your cardiovascular risk," Damp added.

Science Daily (Feb. 13, 2012)

❁❁❁

New Diet: Top Off Breakfast With -- Chocolate Cake?

When it comes to diets, cookies and cake are off the menu. Now, in a surprising discovery, researchers from Tel Aviv University have found that dessert, as part of a balanced 600-calorie breakfast that also includes proteins and carbohydrates, can help dieters to lose more weight -- and keep it off in the long run.

They key is to indulge in the morning, when the body's metabolism is at its most active and we are better able to work off the extra calories throughout the day, say Prof. Daniela Jakubowicz, Dr. Julio Wainstein and Dr. Mona Boaz of Tel Aviv University's Sackler Faculty of Medicine and the Diabetes Unit at Wolfson Medical Center, and Prof. Oren Froy of Hebrew University Jerusalem.

Attempting to avoid sweets entirely can create a psychological addiction to these same foods in the long-term, explains Prof. Jakubowicz. Adding dessert items to breakfast can control cravings throughout the rest of the day. Over the course of a 32 week-long study, detailed in the journal *Steroids*, participants who added dessert to their breakfast -- cookies, cake, or chocolate -- lost an average of 40 lbs. more than a group that avoided such foods. What's more, they kept off the pounds longer.

The scale tells the tale

A meal in the morning provides energy for the day's tasks, aids in brain functioning, and kick-starts the body's metabolism, making it crucial for weight loss and maintenance. And breakfast is the meal

that most successfully regulates ghrelin, the hormone that increases hunger, explains Prof. Jakubowicz. While the level of ghrelin rises before every meal, it is suppressed most effectively at breakfast time.

Basing their study on this fact, the researchers hoped to determine whether meal time and composition impacted weight loss in the short and long term, says Prof. Jakubowicz, or if it was a simple matter of calorie count.

One hundred and ninety three clinically obese, non-diabetic adults were randomly assigned to one of two diet groups with identical caloric intake -- the men consumed 1600 calories per day and the women 1400. However, the first group was given a low carbohydrate diet including a small 300 calorie breakfast, and the second was given a 600 calorie breakfast high in protein and carbohydrates, always including a dessert item (i.e. chocolate).

Halfway through the study, participants in both groups had lost an average of 33 lbs. per person. But in the second half of the study, results differed drastically. The participants in the low-carbohydrate group regained an average of 22 lbs. per person, but participants in the group with a larger breakfast lost another 15 lbs. each. At the end of the 32 weeks, those who had consumed a 600 calorie breakfast had lost an average of 40 lbs. more per person than their peers.

Realistic in the long run

One of the biggest challenges that people face is keeping weight off in the long-term, says Prof. Jakubowicz. Ingesting a higher proportion of our daily calories at breakfast makes sense. It's not only good for body function, but it also alleviates cravings. Highly restrictive diets that forbid desserts and carbohydrates are initially effective, but often cause dieters to stray from their food plans as a result of withdrawal-like symptoms. They wind up regaining much of the weight they lost during the diet proper.

Though they consumed the same daily amount of calories, "the participants in the low carbohydrate diet group had less satisfaction, and felt that they were not full," she says, noting that their cravings for sugars and carbohydrates were more intense and eventually caused them to cheat on the diet plan. "But the group that consumed a bigger breakfast, including dessert, experienced few if any cravings for these foods later in the day."

Ultimately, this shows that a diet must be realistic to be adopted as part of a new lifestyle. Curbing cravings is better than deprivation for weight loss success, Prof. Jakubowicz concludes.

Science Daily (Feb. 7, 2012)

❁❁❁

Regular Use of Vitamin and Mineral Supplements Could Reduce the Risk of Colon Cancer, Study Suggests

Could the use of vitamin and mineral supplements in a regular diet help to reduce the risk of colon cancer and protect against carcinogens? A study published in the *Canadian Journal of Physiology and Pharmacology* (*CJPP*) found that rats given regular multivitamin and mineral supplements showed a significantly lower risk of developing colon cancer when they were exposed to carcinogens.

"It has been unclear whether multivitamin supplementation to cancer patients is helpful, has no effect, or is even detrimental during therapy," commented Dr. Grant Pierce, Editor of *CJPP*. "This study is

important because it gives some direction to cancer patients in desperate need of guidance on the value of multivitamins and minerals administered during cancer."

The authors studied rats that were fed a high-fat diet (20% fat) over a 32 week period. The rats were divided into 6 groups, which were exposed to different combinations of supplements and carcinogens; the colon carcinogenisis induced in the study rats has characteristics that mimic human colon cancer. Rats fed a high-fat plus low-fibre diet and exposed to carcinogens developed pre-cancerous lesions; whereas, rats undergoing similar treatment, but provided with daily multivitamin and mineral supplements, showed a significant (84%) reduction in the formation of pre-cancerous lesions and did not develop tumours.

The authors conclude that "multivitamin and mineral supplements synergistically contribute to the cancer chemopreventative potential, and hence, regular supplements of multivitamins and minerals could reduce the risk of colon cancer."
Science Daily (Feb. 3, 2012)
❁❁❁

Fish oil supplements may reduce infant eczema risk, study finds
Net Doctor 31 January 2012

Infants whose mothers took omega-3 fish oil supplements during pregnancy may be less likely to develop eczema and some food allergies, according to a large clinical trial by scientists in Australia.

Researchers at the University of Adelaide recruited 706 pregnant women at five maternity hospitals.

Approximately half of the women were given fish oil capsules (providing 900mg of omega-3 fatty acids per day) from 21 weeks' gestation until birth, while the others received a placebo (dummy treatment).

Analysis revealed no difference between the two groups in the percentage of infants with immunoglobulin E-associated allergic disease at one year of age.

However, the percentage of infants diagnosed with eczema was lower among those whose mothers took fish oil supplements than in the placebo group.

The researchers also found evidence to suggest that fish oil supplementation may reduce the risk of allergy to egg.

Lead researcher Professor Maria Makrides, whose findings are published in the British Medical Journal, said: 'Our results imply that for pregnant women with allergies and living in industrialised societies, it is possible to reduce the chances of her baby developing atopic eczema or atopic dermatitis in the first year of life by taking about 1g of fish oil fatty acids in the last half of pregnancy.'

NHS figures show that about one in five children in the UK has eczema, with the majority of cases developing before the age of five.
❁❁❁

Fiber May Reduce Periodontal Disease Progression

Nutraceuticals World February 27, 2012
Benefits of higher intake of high-fiber foods, especially fruits, on slowing periodontal disease progression are most evident in men aged 65 and older, according to a new study published in the *Journal of the American Geriatrics Society*. This prospective, observational study included 625

community-dwelling men participating in the Department of Veterans Affairs Dental Longitudinal Study.

Dental and physical examinations were conducted every 3 to 5 years. Diet was assessed using food frequency questionnaires (FFQs). Mean follow-up was 15 years (range: 2–24 years). Periodontal disease progression on each tooth was defined as alveolar bone loss (ABL) advancement of 40% or more, probing pocket depth (PPD) of 2 mm or more, or tooth loss. Good and excellent fiber sources provided 2.5 g or more of fiber per serving. Multivariate proportional hazards regression estimated hazard ratios (HRs) and 95% confidence intervals (CIs) of periodontal disease progression and tooth loss in relation to fiber sources, stratified according to age younger than 65 versus 65 and older, and controlled for smoking, body mass index, calculus, baseline periodontal disease level, caries, education, exercise, carotene, thiamin and caffeine intake, and tooth brushing.

In men aged 65 and older, each serving of good to excellent sources of total fiber was associated with lower risk of ABL progression (HR = 0.76, 95% CI = 0.60–0.95) and tooth loss (HR = 0.72, 95% CI = 0.53–0.97). Of the different food groups, only fruits that were good to excellent sources of fiber were associated with lower risk of progression of ABL (HR = 0.86 per serving, 95% CI = 0.78–0.95), PPD (HR = 0.95, 95% CI = 0.91–0.99), and tooth loss (HR = 0.88, 95% CI = 0.78–0.99). No significant associations were seen in men younger than 65.

❁❁❁

VITAMIN D CUTS BODY FAT, BOOSTS HEART HEALTH

TEHRAN—Increasing **daily intake of vitamin D3** can significantly improve high-density lipoprotein (HDL) cholesterol and help reduce body fat mass in overweight or obese individuals, according to a new study published in the ***British Journal of Nutrition***.

Researcher at the Tehran University of Medical Sciences investigated the effect of vitamin D3 supplementation on cardiovascular risk factors in women. Study participants included 77 overweight and obese women with an average age of 38 who were randomly assigned to receive either the daily vitamin D3 supplements or placebo for 12 weeks. Blood pressure, serum lipoproteins, apolipoproteins and anthropometric parameters were recorded. Dietary intake was recorded using 24-hour food recall and food frequency questionnaire' physical activity was assessed by the International Physical Activity Questionnaire.

Mean total cholesterol concentrations increased in the vitamin D group, but declined in the placebo group, and a significant effect was observed. In the vitamin D group, mean HDL-cholesterol concentration increased, whereas it decreased in the placebo group. Mean apoA-I concentration increased in the vitamin D group, although it decreased in the placebo group. Mean LDL-cholesterol:apoB-100 ratio augmented in the vitamin D group, while this ratio declined in the placebo group. Body fat mass was significantly decreased in the vitamin D group more than the placebo group.

The findings showed **supplementation with vitamin D3** can significantly improve HDL-cholesterol, apoA-I concentrations and LDL-cholesterol:apoB-100 ratio, which remained significant in the multivariate model including anthropometric, dietary and physical activity measures.

February 29, 2012 **Food Product Design**

❁❁❁

Geriatric Patients At High Risk Of Vitamin D Deficiency

06 Feb 2012 Medical News Today

The great majority of geriatric patients in a German rehabilitation hospital were found to have vitamin D deficiency. In order to establish the vitamin D status in geriatric patients in Germany, the researchers measured 25-OH vitamin D in 1578 patients in the geriatric rehabilitation hospital in Trier after they had been examined on admission.

Insufficiently high concentrations were found in 89% of patients, and 67% had severe vitamin D deficiency. Vitamin D affects the calcium and bone metabolism, and it is also attributed with numerous other effects. A sufficiently high concentration of vitamin D, and its effects on the muscles, seems to help reduce the risk of falls and thus of fractures.

Older people seek exposure to the sun less often than young people; the risk of skin cancer is another reason for restricting sun exposure. In contrast to the fluctuations in vitamin D levels between the summer and winter halves of the year that is observed in young people, the old patients in this study (average age 82) did not display any seasonal fluctuations. According to the recommendations of the Institute of Medicine, daily supplementation with 800 IU of vitamin D is therefore advisable in people older than 70.

❁❁❁

Researchers Clarify Link Between Salt And Hypertension

13 Jan 2012 Medical News Today

A review article by researchers at Boston University School of Medicine (BUSM) debunks the widely-believed concept that hypertension, or high blood pressure, is the result of excess salt causing an increased blood volume, exerting extra pressure on the arteries. Published online in the *Journal of Hypertension*, the study demonstrates that excess salt stimulates the sympathetic nervous system to produce adrenalin, causing artery constriction and hypertension.

The research was led by Irene Gavras, MD, and HaralambosGavras, MD, both professors of medicine at BUSM.

"The purpose of this paper is to correct an erroneous concept that has prevailed for many years, even though scientific evidence has mounted against it," said Irene Gavras, who is also a physician in Boston Medical Center's Hypertension practice.

The term "volume-expanded hypertension" implies that excess salt leads to the retention of extra fluid within the arterial circulatory system, causing an increase in blood volume and added pressure on the arterial walls. However, research has shown that conditions characterized by the expansion of blood volume from other causes, such as the secretion of antidiuretic hormone or the excessive elevation of blood sugar, do not cause a rise in blood pressure because the extra fluid is accommodated by the distention of capillaries and veins.

"The body's circulatory system is a highly flexible vascular system with the capacity to open up new

capillaries and distend veins in order to accommodate increased fluid volume," said Irene Gavras.

Through a review of numerous studies, the researchers demonstrated that the mechanism of hypertension resulting from the excessive consumption and retention of salt stimulates the sympathetic nervous system in the brain to increase adrenaline production. The increased adrenalin being circulated throughout the body causes the arteries to constrict, which results in resistance to blood flow and a decrease in circulatory volume.

The over-activation of the sympathetic nervous system - part of the autonomic nervous system that helps maintain the body's homeostasis - has been recognized clinically as a characteristic of hypertension that accompanies renal failure, which is the most typical example of elevated blood pressure from excessive salt retention. Diuretics, which remove excess salt, are widely used to treat this type of hypertension. However, this study provides convincing evidence that the sympathetic nervous system should be the focus of further investigations into treatments for hypertension.

"The implication of our findings shows that the optimal treatment for hypertension, for cases associated with renal failure, should not only include diuretics but also the use of drugs that block the central sympathetic nervous system," said Irene Gavras.

❁❁❁

Shift Workers New Occupational Hazard - Unhealthy Eating

05 Jan 2012 Medical News Today

According to an investigation published in last month's *PloS Medicine*, unhealthy eating among shift workers should be considered a novel occupational health hazard. The study highlights prior studies published in the journal, which demonstrated a connection between rotating patterns of shift work in nurses in the U.S., and an increased risk of developing type 2 diabetes. In both the developed and developing world, shift-work is currently an extremely prevalent pattern of work. Approximately 15-20% of working individuals in the US and Europe engage in shift work.

In the health care industry shift work is particularly common. Shift work is notably linked to poor eating patterns, which is made worse by the convenience of junk food in comparison to healthier food options. According to the researchers, shift work should be considered a specific risk factor for developing type 2 diabetes and obesity, which in the developed work are currently at epidemic proportions, and likely to soon reach these levels in developing countries.

They advise that tough action is required in order to address this problem, i.e. that "governments need to legislate to improve the habits of consumers and take specific steps to ensure that it is easier and cheaper to eat healthily than not." The researchers suggest that a poor diet could legally be considered one of the latest forms of occupational hazard. In addition they advise that workplaces, particularly those who employ shift workers, should lead the way in eradicating this problem.

❁❁❁

Overall Fatness, Not Just BMI, Weight, for Measuring Obesity?

04 Jan 2012 Medical News Today

A new *JAMA* study published online on Wednesday suggests that when people consistently eat more calories than their bodies can burn each day, it appears they gain body fat and lose lean muscle if their diet is low in protein. Experts commenting in the same issue of the journal say this means in tackling obesity we need to focus on people's overall fatness and not just body mass index or body weight.

Lead author George A. Bray, of the Pennington Biomedical Research Center in Baton Rouge, Louisiana, USA, and colleagues recruited 25 healthy individuals who agreed to spend time in a controlled setting and be randomized to overconsume diets containing different levels of protein.

They found that:

- Participants on the low-protein diet gained less weight compared to counterparts on the normal and high-protein diets,
- Calories alone, and not protein, appeared to account for an increase in body fat, however
- Protein did account for changes in energy expenditure and lean body mass.

In their introduction, Bray and colleagues explain that in order to tackle the growing obesity crisis where nearly two in three American adults are overweight and nearly one in three is obese, we need more information from research, and they set out to do this study because the "role of diet composition in response to overeating and energy dissipation in humans is unclear".

The 25 volunteers who took part in the study were healthy, American men and women aged from 18 to 35, with a body mass index ranging from 19 to 30 (normal to overweight/nearly obese). They were recruited to an inpatient metabolic unit where they agreed to stay and be kept under "controlled conditions". The first recruit joined the study in June 2005 and the last in October 2007 and they stayed in the unit for about 10 to 12 weeks.

At first, the participants followed a "weight-stabilizing" diet for between 13 and 25 days. After that, the researchers randomly allocated them to one of three diets: low protein (where 5% of the energy in their diet came from protein), normal protein (15% of energy from protein), and high protein (25% of energy from protein).

They overfed on these diets for about 8 weeks of their stay in the inpatient metabolic unit, that is, they consumed around 40% more energy than they did on the weight-stabilizing diet, or about 954 extra calories a day.

The results showed that:

- All the volunteers put on weight and there was no difference between the men and the women.
- The participants on the low protein diet put on less weight than their counterparts on the normal and high protein diets (average 6.07 lbs or 3.16 kg compared to 13.3 lbs, 6.05 kg and 14.4 lbs, 6.51 kg respectively).
- Body fat increased in all three groups.
- The increase in body fat represented between 50% and more than 90% of the excess stored calories.

- In the low protein diet group, resting energy expenditure, total energy expenditure and body protein did not increase during the overfeeding phase.
- However, lean body mass (body protein) **decreased** in the low protein diet group during the overfeeding phase, whereas it **increased** in the normal and high protein diet groups.
- The low protein diet group lost 1.5 lbs, 0.70 kg of lean body mass on average during the overfeeding phase, compared to a gain of 6.3 lbs, 2.87 kg in the normal protein diet group and 7 lbs, 3.18 kg in the high protein diet group.
- And, unlike the low protein diet group where there was no change, resting energy expenditure increased significantly in the normal and high protein diet groups (up by 160 and 227 calories per day respectively).

The authors write:

"In summary, weight gain when eating a low protein diet (5 percent of energy from protein) was blunted compared with weight gain when eating a normal protein diet (15 percent of energy from protein) with the same number of extra calories. Calories alone, however, contributed to the increase in body fat. In contrast, protein contributed to the changes in energy expenditure and lean body mass, but not to the increase in body fat. "They say the key finding of the study is that when you look at what contributes to increase in body fat when healthy people consume more calories than they burn, then calories appear to be more important than protein.

In an accompanying editorial, Zhaoping Li and David Heber, of the University of California, Los Angeles, write that these findings inform "primary care physicians and policy makers about the benefits of protein in weight management. "They note the results suggest overeating on a low protein diet may result in gaining less overall body weight, but it appears to increase body fat and decrease lean body mass.

Because of its apparent effect on body fat, a Western diet (like the low protein one of the study) may raise the health risks of overeating beyond that which we can detect through just using BMI. This means we could be underestimating the method used to assess the obesity epidemic , they add.

"Clinicians should consider assessing a patient's overall fatness rather than simply measuring body weight or body mass index and concentrate on the potential complications of excess fat accumulation. The goals for obesity treatment should involve fat reduction rather than simply weight loss, along with a better understanding of nutrition science," they write.

❁❁❁

Grapes Slow Age-Related Macular Degeneration

January 17, 2012 Food Product Design

NEW YORK—Eating grapes may help slow or prevent age-related macular degeneration (AMD), according to a study published in the journal *Free Radical Biology and Medicine*. Researchers at Fordham University compared the incidence of the condition between mice with grape-enriched diets, additional lutein diets and normal diets. They found the mice fed a diet rich in grapes were protected against oxidative damage of the retina, which prevented blindness. Lutein was found to be effective; however, grapes offered more protection, likely due to their antioxidant properties.

“The protective effect of the grapes in this study was remarkable, offering a benefit for vision at old age even if grapes were consumed only at young age," said principal investigator Silvia Finnemann. “A lifelong diet enriched in natural antioxidants, such as those in grapes, appears to be directly beneficial for retinal health and function."

❁❁❁

Natural Trans Fats Reduce HDL in Overweight Women

January 13, 2012 Food Product Design

QUEBEC—Natural *trans* fats produced by ruminant from dairy and beef cattle has no significant effect on low-density lipoprotein (LDL), but may be associated with a reduction in plasma high-density lipoprotein (HDL) cholesterol concentrations, particularly in overweight women, according to a study published in the *American Journal of Clinical Nutrition*. Ruminant *trans* fat is naturally-occurring, found in meat and dairy foods. Industrial produced *trans* fat is a component of partially hydrogenated vegetable oils that have been associated with cholesterol and coronary heart disease.

Researchers at Laval University investigated the effects of a butter naturally enriched in ruminant *trans* fats (rTFAs), of which vaccenic acid is the predominant isomer, on plasma lipid concentrations among healthy women. In a double-blind, randomized, crossover controlled study, 61 healthy women ages 19 to 70 years were fed two isoenergetic diets lasting four weeks each. The two diets were defined as moderately high in rTFAs (3.7 g/d, 1.5% of daily energy) and control (0.9 g/d, 0.3% of daily energy).

They found no significant effect of the rTFA diet was found on total plasma cholesterol, LDL cholesterol, apolipoprotein B, apolipoprotein A-I, and triglyceride concentrations compared with the control diet. There was a small yet statistically significant reduction in plasma HDL-cholesterol concentrations with the rTFA diet (−2.8%; P = 0.004), which was significant (P for the BMI × treatment interaction = 0.006) among women with a BMI (in kg/m2) ≥25 (-5.2%; P = 0.004; n = 18) but not among women with a BMI <25 (-1.2%; P = 0.13; n = 43).

The results suggest that an increase in dietary rTFAs equivalent to ~1% of daily energy has no significant effect on LDL but may be associated with a reduction in plasma HDL-cholesterol concentrations, particularly in overweight women.

❁❁❁

Low GI Diet Reduces Inflammation

January 12, 2012 Food Product Design

SEATTLE—Overweight and obese adults who consume a diet rich in slowly digested carbohydrates, such as whole grains, legumes and other high-fiber foods, significantly reduces markers of inflammation associated with chronic disease, according to a new study published in the *Journal of Nutrition*. The findings also suggest a low-glycemic diet, which does not cause blood-glucose levels to spike, also increases a hormone that helps regulate the metabolism of fat and sugar.

“This finding is important and clinically useful since C-reactive protein is associated with an increased risk for many cancers as well as cardiovascular disease," the researchers said. “Lowering inflammatory factors is important for reducing a broad range of health risks. Showing that a low-glycemic-load diet can improve health is important for the millions of Americans who are overweight or obese."

Researchers at the Fred Hutchinson Cancer Research Center conducted a controlled, randomized feeding study, which involved 80 healthy Seattle-area men and women—half of normal weight and half overweight or obese. Among overweight and obese study participants, a low-glycemic-load diet reduced a biomarker of inflammation called C-reactive protein by approximately 22%.

Study participants completed two 28-day feeding periods in random order—one featuring high-glycemic-load carbohydrates, which typically are low-fiber, highly processed carbs such as white sugar, fruit in canned syrup and white flour; and the other featuring low-glycemic-load carbohydrates, which are typically higher in fiber, such as whole-grain breads and cereals. The diets were identical in carbohydrate content, calories and macronutrients. All food was provided by the Hutchinson Center's Human Nutrition Laboratory, and study participants maintained weight and physical activity throughout.

The found among overweight and obese study participants, a low-glycemic-load diet increased blood levels of a protein hormone called adiponectin by about 5%. Adiponectin plays a key role in protecting against several cancers, including breast cancer, as well as metabolic disorders such as type2 diabetes, nonalcoholic fatty liver disease and hardening of the arteries.

"The bottom line is that when it comes to reducing markers of chronic-disease risk, not all carbohydrates are created equal. Quality matters," the researchers said.

The researchers suggested simple dietary changes such as choosing carbohydrates that are less likely to cause rapid spikes in blood glucose, including whole grains; legumes such as kidney beans, soy beans, pinto beans and lentils; milk; and fruits such as apples, oranges, grapefruit and pears.

❁❁❁

FOOD SCIENCE & INDUSTRY NEWS

Sugar Coating Helps Probiotics Survive

FERMOY, Ireland—The health benefits of probiotics are many, but just how the bacteria survive the harrowing trek through the digestive system is still somewhat of a mystery. Scientists from the Alimentary Pharmabiotic Centre, University College Cork, Ireland, have uncovered one key to how probiotics survive long enough to provide their many physiological benefits, including boosting the immune system and improving gut health.

The researchers found that the outer polysaccharide coating surrounding the probiotic *Bifidobacteriumbreve* UCC2003 plays a key role in its survival in the gut, its evasion of the immune system and is also involved in reducing infection levels of a gut pathogen.

"In this study we have shown that the outer EPS (exocellular polysaccharide) coating of *Bifidobacteriumbreve* UCC2003 protects the bacteria from acid and bile in the gut and shields the bacteria from the host immune response. Mutants in which the EPS genes have been deleted were found to evoke stronger immune responses. The EPS coating was also shown to prevent colonisation by a gut pathogen *Citrobacterrodentium* in mice. This surface EPS-dependent pathogen defence represents an exciting new avenue for probiotic research" said Douwe van Sinderen, senior author on the publication. "This research has led to an improved understanding of how probiotic bifidobacteria contribute to human and animal health, thereby will help to support their inclusion in functional foods."

Food Product Design January 25, 2012

❁❁❁

Global Nutraceutical Sector to Reach $23B in 2015

February 22, 2012 Food Product Design

ROCKVILLE, Md.—Driven by demand for functional foods and beverages, the global nutraceutical ingredients sector is predicted to increase 7.2% annually to $23.7 billion in 2015, according to a new report from MarketResearch.com. Hot growth areas include products addressing adult and pediatric nutritional needs.

According to the "World Nutraceutical Ingredients" report, proteins, fibers and various specialized functional additives, will remain the top-selling group of nutraceutical ingredients, increasing 6.7% annually to $10.4 billion in 2015. Proteins will post the fastest gains as food and beverage makers introduce new high value-added nutritional preparations. Functional additives and fiber nutrients also will fare well in the global marketplace. Demand for these ingredients will gain upward momentum from increasing clinical evidence of health benefits and expanding specialty applications in health foods and beverages, dietary supplements and nutritional preparations.

Globally, developing regions will achieve much faster growth in both consumption and production than the developed regions. Increasing economic prosperity will enable countries such as China, Brazil, India, Mexico, Poland, Russia and South Korea to expand and diversify their food, beverage, nutritional and pharmaceutical industries. Based on projected investment levels in these industries and rising consumer income, China will evolve into the largest global producer and consumer of nutraceutical ingredients by 2020, passing up the United States and Western Europe.

Maturing markets will slow the supply and demand of nutraceutical ingredients in the developed countries, and food, beverage and drug makers will continue to pursue opportunities in conventional and specialty nutritional products and natural medicines, and remain major customers for a broad range of nutraceutical ingredients.

World demand for naturally derived substances, consisting of herbal and botanical extracts and animal- and marine-based derivative, is projected to increase 8.9% annually to $7.3 billion in 2015. Omega-3 fish oils will lead gains, reflecting clinically proven cardiovascular benefits and expanding use in dietary supplements and nutritional therapies. The rising popularity of homeopathic remedies will impact favorably on global demand for numerous other natural nutraceutical ingredients, including cranberry, garlic, ginkgo biloba, ginseng and saw palmetto extracts.

World demand for minerals and vitamins consumed in nutraceutical applications is forecast to reach $6 billion in 2015, up 6.2% annually from 2010, fueled by growth in food and beverage fortification, adult and pediatric nutritionals, and dietary supplements. Widespread acceptance of health and wellness benefits will keep minerals and vitamins among the most widely used nutraceutical ingredients.

❁❁❁

Harvard Scientist Developing Edible Food Packaging

February 21, 2012 Food Product Design

CAMBRIDGE, Mass.—A Harvard University scientist has developed a new edible packaging technology that allows individuals to eat and transport food without plastic. Called WikiCells, the packaging encloses food and liquid in an edible membrane.

WikiCells was developed by David A. Edwards who also developed inhalable chocolate, inhalable caffeine and a tuberculosis vaccine in the form of a spray. For this project, he wanted to create a bottle based on how nature creates bottles, citing grapes as an example of one of nature's "bottles." WikiCells imitate such natural packaging by enclosing food and liquid in an edible membrane. The membrane, which is comprised of a charged polymer and food particles, is in turn protected by a hard shell which can be broken away much like that of an egg.

Edwards and his team have developed a variety of different platforms for WikiCells that can be served as meals, drinks and snacks, including a tomato membrane containing gazpacho soup that can be poured over bread; an orange membrane filled with orange juice that you can drink with a straw; smaller grape-like membrane holding wine; and a chocolate membrane containing hot chocolate.

Edwards plans to develop WikiCells further so they will someday be commercially available to the broader public. "In the near term, we will be encountering WikiCells in restaurant settings," he said. After that, Edwards plans to expand WikiCells to specialty stores and supermarkets. Eventually, he hopes to develop a product platform for WikiCells that would allow individuals to produce their own edible bottles.

❁❁❁

Do You Know Konjac?

If you follow which diet trends are "in," you might have noticed a growing interest in Shirataki noodles, especially in weight-loss, low-carb and gluten-free regimes. The main ingredient in these traditional Japanese noodles is *konjaku*, or konjac. But, functionally speaking, this hydrocolloid

ingredient has much more to offer than weight management. Not only are researchers examining konjac's health benefits, product developers are finding it a valuable tool to improve the properties of a wide range of finished products.

Konjac has been used in Asia for thousands of years, and is becoming more widely used in the west as an natural ingredient in conventional foods, as well as in functional foods and nutraceutical supplements. More and more mainstream manufacturers are formulating with konjac. The USDA recently approved konjac for use in meat products and has allowed it on the NOP list of organic-compliant ingredients. It is also on the Whole Foods Market list of allowable ingredients. All of this indicates growing consumer acceptance of this hydrocolloid.

Jac of all trades

Konjac is derived from the tuber of the Amorphophallus konjac plant. The plant's shape—its stem above ground and the tuber below—resembles an elephant's foot; therefore, the tuber is called the "elephant yam." It grows mainly in China and Japan on konjac farms. The tuber is harvested, then sliced, dried and ground. It is then blended to specification to yield its highly functional properties as an emulsifier, gelling agent, texturant and nutraceutical ingredient.

Konjac is often called by its molecular name, glucomannan. This long-chain, water-soluble polysaccharide of high molecular weight (200,000 to 2,000,000) consists of a chain of mannose and glucose units in a ratio of 1.6:1 connected with β (1,4) linkages. Acetyl groups are present at some of the sugar units. There is usually one acetyl group for every 60 to 20 sugar units.

Removing these groups by raising the pH to 9.5 or higher and heating will cause konjac to form an irreversible gel. This makes konjac versatile for the formulator, as a gel former (reversible or irreversible), and as a highly viscous, nongelling product, as well. Once fully hydrated, these gels and viscous solutions are salt-tolerant and will hold up in low-pH systems.

Konjac also combines synergistically with other hydrocolloids to create a wide range of mouthfeels, textures and gel strengths. Xanthan, carrageenans, tara gum and starch each create different properties when blended with konjac. Food scientists can create just the right gel set for any application that requires a structure to hold it together. The gel sets can range from true gels (a gel that retains the shape of a mold it sets in) to pseudo gels (amorphous structures) to sets, which are almost undetectable but provide a subtle structure.

Konjac and xanthan combinations provide a set that is elastic enough to replace gluten in a gluten-free pasta, allowing for the dough to pass through an extruder without breaking apart. This stabilizer blend also prevents the pasta from becoming too soft and mushy on a steam table. Konjac and xanthan blends are also used in meat and fish analogs to hold a veggie burger together as it is grilled and help create a bit of a chewiness that mimics a meat product.

Konjac, xanthan and starch provide even greater elasticity for, say, a cheese stick-type application that needs just the right amount of bounce in the bite, plus stringiness. Furthermore, the stabilizer will prevent moisture migration from the cheese to the breading.

When konjac is synergized with microcrystalline cellulose and xanthan, it creates a more-effective fat mimic than microcrystalline alone. Together, the three hydrocolloids form a rich, creamy mouthfeel that mimic fats or oils in reduced-fat applications. The combination of these three components can also form a strong three-dimensional matrix without heating. Most gels require heat, then set upon cooling. However, this system can gel simply when shear is applied, so it can be used in both cold- and hot-processed applications.

As a highly functional hydrocolloid, konjac is more effective in controlling a greater amount of water than many other gums. It can bind up to about 200 times its own weight in water. vs. guar, which can hold about 60 times its weight in water, or certain starches, which can bind about 8 times their weight. This makes konjac useful for preventing water and oil separation. Its water-binding ability also makes konjac a good choice for providing freeze/thaw stability, as it controls the water in a product from migrating from one “layer" to another through multiple freeze/thaw cycles. (With hydrocolloids, "binding water" refers to organizing, controlling and holding water, and thus preventing its migration, rather than reducing water activity levels.)

Hitting the health jac-pot

In recent years, manufacturers of health and wellness products have incorporated konjac into many functional-food formulations. This is, in part because it contains 85% to 95% soluble dietary fiber. In addition, many studies indicate konjac may have a beneficial effect in improving blood lipid profiles, reducing serum cholesterol levels and improving systolic blood pressure in high-risk diabetics.

One meta-analysis from the University of Connecticut, Storrs, CT, analyzed 14 studies involving capsules, energy bars and biscuits made with glucomannan. Results showed that the glucomannan significantly lowered low-density lipoprotein levels and kept blood glucose under control. (*American Journal of Clinical Nutrition*, 2008; 88(4):1,167-1,175). The analysis also found a slight effect on lowering body weight; satiety is a notable characteristic of konjac consumption.

Increasingly, consumers are seeing konjac listed on the labels of functional foods designed for health and wellness, and are drawing the conclusion that konjac must be good for health.. This is a good thing for manufacturers who want to take advantage of not just konjac's functional properties, but also its health halo.

February 13, 2012 Food Product Design Joshua Brooks, Contributing Editor

❁❁❁

Food Scientists Fortify Goat Cheese With Fish Oil to Deliver Healthy Omega-3 Fatty Acids

Fish oil is an underused ingredient in the food industry because of its association with a strong odor and aftertaste. A new study in the February issue of the *Journal of Food Science*, published by the Institute of Food Technologists, shows that fish oil can be added to goat cheese to deliver high levels of heart-healthy omega-3 fatty acids without compromising taste or shelf-life.

Fish oil delivers higher levels and more balanced proportions of omega-3 fatty acids compared to other sources such as flax and algal oil. Unfortunately, fish oil oxidizes more quickly making food fortification a challenge.

Dairy has been shown to be a good matrix for fish oil fortification because it is commonly consumed and has unique properties that seem to protect fish oil. Soft goat cheese has lower fat than other cheeses making it appealing for those looking for healthy flavorful food choices.

Further research is ongoing by the University of Maine food scientists who conducted this study to assess the stability and consumer acceptance of fish oil fortified baked snack products, as well as to explore uses for naturally flavored fish oil from fishery by-products.

Science Daily (Feb. 16, 2012)

❁❁❁

REGULATORY & SAFETY NEWS

Nanoparticles In Food, Vitamins Could Harm Human Health, Warn Researchers

20 Feb 2012 Medical News Today

Billions of engineered nanoparticles in foods and pharmaceuticals are ingested by humans daily, and new Cornell research warns they may be more harmful to health than previously thought. A research collaboration led by Michael Shuler, a professor of Chemical Engineering and chair of Biomedical Engineering at Cornell University, studied how large doses of polystyrene nanoparticles - a common, FDA-approved substance found in substances ranging from food additives to vitamins - affected how well chickens absorbed iron, an essential nutrient, into their cells. The results were reported online in the journal *Nature Nanotechnology.*

According to the study, high-intensity, short-term exposure to the particles initially blocked iron absorption, whereas longer-term exposure caused intestinal cell structures to change, allowing for a compensating uptick in iron absorption. The researchers tested both acute and chronic nanoparticle exposure using human gut cells in petri dishes as well as live chickens and reported matching results. They chose chickens because these animals absorb iron into their bodies similarly to humans, and they are similarly sensitive to micronutrient deficiencies.

Shuler said the research serves to underscore how such particles, which have been widely studied and considered safe, cause barely detectable changes that could lead to, for example, over-absorption of other, harmful compounds.

Human exposure to nanoparticles is only increasing, Shuler said. "Nanoparticles are entering our environment in many different ways. We have some assurance that at a gross level they are not harmful, but there may be more subtle effects that we need to worry about."

❁❁❁

New Rapid Analysis of Foodborne Pathogens

February 14, 2012 Food Product Design

ATLANTA—Georgia Tech researchers, in collaboration with the Centers for Disease Control and Prevention (CDC) have developed a new software for the rapid analysis of foodborne pathogens. The Computational Genomics Pipeline (CG-pipeline) software platform can be used to analyze any microbial genome sequence, and already has been applied to bacteria that cause a variety of infectious diseases, including cholera, *Salmonella* and bacterial meningitis.

“Determining the order of DNA bases for an entire genome has become relatively cheap and easy in recent years because of technological advancements," said the researchers. “The hard part is figuring out what the genome sequence information means. Our software takes that next step. It analyzes the sequences, finds the genes and provides clues as to which genes are involved in making people sick. Manually, this process used to take weeks, months or a year. Now it takes us about 24 hours."

The CG-pipeline software has been used to analyze last summer’s outbreak of severe *Escherichia coli* infections that started in Germany and eventually led to illnesses in 16 European countries, Canada and the United States. It was one of the largest *E. coli* outbreaks in history, causing 50 deaths and

4,075 confirmed worldwide cases. The bacterium was traced to sprouts. The software was used to determine that genetic material from two previously distinct strains of *E. coli* was combined in a new, hyper-virulent strain. The resulting hybrid strain seems to be more lethal than either of the parent strains.

The software also was used to analyze last year's outbreak of *listeriosis* in the United States. That outbreak was traced back to cantaloupes from a single farm in Colorado that were tainted with *Listeria*. Over the span of several months, there were 146 confirmed cases of listeriosis and 30 deaths, making it the deadliest outbreak of foodborne illness in the United States. Using the CG-pipeline, the researchers identified an important epidemiological genomic marker that will help track invasive strains of *Listeria*.

❁❁❁

FSA consults on the use of lactic acid to prevent surface contamination of beef

31 Mar 2012

The Food Standards Agency (FSA) has launched a short consultation asking businesses to provide their views on the use of lactic acid to reduce microbiological surface contamination on beef carcasses, as proposed in a draft EU regulation.

The FSA has already consulted widely to inform the UK voting position on the EU draft regulation, and would like to consult further in order to assess the likely impact on UK businesses. If authorised, the use of lactic acid on beef carcasses would be permissive rather than mandatory. A vote on the Commission regulation is expected in spring 2012.
Businesses in England, Wales, Northern Ireland and Scotland are now asked to submit their views and the FSA will then review the responses to determine whether a formal Regulatory Impact Assessment is necessary.

Key points:

• Regulation (EC) No 853/2004 provides that substances other than potable water (or clean water, where permitted) cannot be used to remove surface contamination from foods of animal origin unless the use of the substance has been approved. At present no approvals have been granted. In the USA, on the other hand, a range of substances are permitted to be used to reduce surface contamination. However, as there are no substances approved for use in the EU, meat produced using these substances is not currently allowed to be imported into the EU.

• The US Department of Agriculture (USDA) submitted a dossier for the evaluation and approval of the use of lactic acid for the decontamination of beef carcases, cuts and trimmings, in December 2010. The USDA dossier was assessed by an EFSA panel of independent scientists who concluded that the lactic acid treatment would be of no safety concern provided that the substance used complies with EU specifications for food additives.

• The FSA Board agreed to advise Ministers that the UK should support the Commission proposal in principle as an intervention of public health benefit. However, this UK support for using lactic acid would be subject to safeguards to ensure that the use of lactic acid in raw beef production "should be integrated into good hygienic practices and HACCP-based systems". The FSA Board agreed that the use of lactic acid in raw beef production will be another possible intervention to reduce foodborne pathogens and as such should be integrated into the FBO's food safety management system based on HACCP principles.

• The latest version of the draft regulation was presented for discussion at the Standing Committee

meeting held 22 February 2012. The indications are that the proposal may be voted on in April 2012.

NFU position:

On the basis of the scientific evidence and safety grounds presented, the NFU are minded to support the proposals for the use for lactic acid but for the decontamination of beef carcases only as part of the range of intervention methods available to help reduce the incidence of foodborne pathogens. However, the NFU is concerned that as this change to the UK's current position effectively opens up the market to the potential for new imports, the approval of lactic acid must not be seen as an intervention that can be used in isolation and thus allow the import of goods into the UK that fall short of adhering to the UK's existing package of good hygiene practices. For this reason the NFU's support for the proposal is only given on the basis that the approval for the use of lactic acid must be used as a spot treatment (as opposed to all bovine carcasses) and must form part of good hygienic practices and HACCP-based systems. We see this as essential both from the point of view of maintaining a level playing field for businesses and trade and for the maintenance of good hygienic standards.

❁❁❁