

Healthy Foods for the Seniors: Prof. Jagadish Pai

Aging Population in India & World

India's population is currently over 120 crores and the life expectancy has been increasing steadily from about 60 years in 1997 to over 64 years in 2009. Consequently the geriatric population has also been on the rise. In 2009, percentage of people over 65 years is almost 5%. Thus currently, the estimated number of people over 65 years of age is more than 6 crores. Japan, Germany and Italy all have geriatric population over 20% and most European countries have the percentage between 15 and 20%, so this population is rapidly becoming a sizeable number in world population.

There are physiological changes that take place in people when they age and their nutritional requirements also change. Over the last couple of decades nutritionists have been seriously taking note of these developments and currently many different recommendations and products have been suggested for this group.

Physiological & Other Changes in Seniors

One significant change that is seen is a process of sarcopenia that is the age-related loss of muscle mass replaced with fat. This has several causes including decreased physical activity, physiological changes including decreased protein synthesis and dietary changes. Because of decreased BMR (Basal Metabolic Rate), caloric requirement decreases. So when food intake is lowered protein intake also gets proportionately reduced but the protein requirements do not decrease significantly. Physical activity also gets reduced.

Net effect being that fat replaces muscle together with decrease in body water and lean body mass declines. As muscle mass decreases, there is decrease in strength as well and difficulty in maintaining the balance during movement. Sarcopenia can be delayed or even reversed by resistance training so physical exercises are needed.

In addition to muscle changes, there is a progressive drop in bone mass. This accelerates for women during menopause. This change makes skeleton more vulnerable to fractures and osteoporosis. This along with decrease in muscle strength makes keeping balance during movement difficult and tendency to fall and incur fractures.

There are gastrointestinal changes also taking place such as reduction in digestion and absorption. Digestive hormones and enzymes secretion decreases. Gastric emptying time increases and there is deterioration of intestinal mucosa. There is also hypochlorhydria which reduces the vitamin B₁₂ absorption resulting in pernicious anaemia. GI motility is slowed down which along with lesser fluid intake and lesser physical activity causes constipation.

There is also decreased insulin secretion that causes carbohydrate intolerance. Renal function may also deteriorate. There are cardiovascular changes taking place with increased blood pressure making salt intake critical. There is also decrease in immune function resulting in lesser ability to fight infections and malignancy.

Finally there are sensory and oral changes taking place which need to be considered while planning diet for seniors. Salty and sweet tastes are perceived less that may make food less appetising. Lack of teeth or wearing dentures may also make chewing less efficient. This may make seniors to reject hard, chewy and fibrous food as these make swallowing difficult.

All these aspect need to be kept in mind as they directly or indirectly affect the nutritional status of seniors.

Nutritional Needs

The foods that are recommended for seniors are meant not only to maintain their nutritional requirements considering the changes in their physical and physiological changes but also aimed to delay the effects of aging and the associated diseases that commonly appear with aging. This was recognised by ancient health sciences such as Ayurveda by recommending preparations such as chyavanprash etc. as food supplements but also some of the food ingredients that would aid immunity, loss of memory and strength etc. Modern medicinal science was lagging somewhat in realisation of special needs of seniors but now that it has been established, there are specific dietary regimen aimed at improving health and fitness of seniors.

As BMR decreases along with the physical activity in seniors, the caloric requirement is reduced. ICMR has recently recommended about 400 calories less due to decreased BMR for seniors compared to their adult counterparts below 60 years. However, protein requirement remains almost the same at about 0.8 to 1g of protein per kg body weight. Thus if the food intake remains same, then weight increases and if intake is reduced, there is a likelihood of sarcopenia due to wasting of muscle protein. Hence food intake needs to be decreased without decreasing protein as protein synthesis is also decreased. Hence protein-rich foods are needed. Those individuals with infections or severe diseases and recovering patients have greater protein requirements. In such cases protein supplements may also be given.

Cardio-vascular problems and weight necessitates that there should be control over saturated fats, total fats and salt. However, there is a tendency for adding extra salt and sugar because taste sensations of salty and sweet are somewhat reduced. Thus fat, salt and sugar intake should be restricted. Thus foods should be more nutrient dense and containing less fat, salt and sugar. Lean meat, skim milk, baked rather than fried, fruits and vegetables should be included in diets. Snack foods should be restricted.

As sugars need to be controlled along with fat, about 60% of calories should come from carbohydrates that are neither simple sugars or simple carbohydrates. This increases the importance of dietary fibre. People should consume fruits and vegetables. Even fruit juices provide fibres although less than solid fruits and vegetable. Fibre helps in controlling blood sugar as well as it helps bowel movement to avoid constipation that is very common in seniors. Fruits, vegetables and juices also supply liquids that adds to the liquid water requirements. They also add other nutrients including vitamins and minerals fulfilling the requirements of nutrient dense foods.

Bone health requires adequate calcium and vitamin D. Although calcium may not improve the bone density at this age but it will prevent further losses of calcium from bone. This is particularly important for women after menopause. ICMR has recommended 200mg more calcium to post-menopausal women. Calcium intake through low fat milk products would be desirable. However, in case of lactose intolerance, buttermilk and curd or yogurt and other fermented milk products may be consumed. Vitamin D helps calcium absorption and as old people do not go out much exposure to sunlight is reduced markedly so diet needs to be supplemented with vitamin D.

In addition to calcium, iron is also deficient in many seniors' diets. Iron requirements are more for vegetarian diet especially when cereals contain phytates. Meats contain heme iron which is absorbed more easily and phytate problem is not there. Vitamin C enhances the uptake of iron so fruits will be very helpful here.

Vitamin B₁₂ absorption is reduced so there must be emphasis on it in diet. Meat, poultry, fish, eggs and dairy products need to be consumed. If one does not eat enough of these, then diet must be supplemented with it. Some of the other nutrients that need to be included in diet are zinc, vitamin C and E along with B₂ and B₆.

Additional Needs of the Aged

As old age approaches, a horde of ailments awaits for seniors. Besides those mentioned above such as heart disease, diabetes, osteoporosis and constipation, others such as Alzheimer's disease, Parkinson's disease,

cataract, cancer etc. are some of the ailments that afflict the seniors. It is now being realised that many of these diseases can be delayed or their severity could be reduced by some dietary ingredients. Some of these substances are present in our regular food and their benefits have been recognised but quite a few have been studied and their benefits are being realised and new substances with similar effects are being investigated. These nutraceuticals are substances with effects and benefits beyond traditional nutrition. They can reduce the risk of some of the diseases. These and the foods containing these called Functional Foods are now allowed by FSSA and soon government would notify rules and regulations governing their manufacture and marketing.

Some of them have been recognised and used in older medicinal systems including Ayurveda. Modern medicine is now realising the benefits and potential of these especially for the seniors who would otherwise be dependent on expensive medicines. If diets could prevent or minimise the effects of these diseases it would be a preferred way of tackling them. Some of them are as follows and their applications discussed briefly.

Omega-3 Fatty Acids

Omega 3 fatty acids like alpha linolenic acid (ALA), docosa hexaenoic acid (DHA) and eicosa pentaenoic acid (EPA) are present in certain common foods. ALA is present in flax seeds, soybean oil, nuts and seeds while DHA and EPA are commonly present in marine foods such as fish like sardine, mackerel and salmon as well as certain algae. There are several benefits of consuming omega 3 and they are reduction in all-cause mortality and various cardio-vascular disease and related death. They lower blood pressure and triglycerides in blood. They are useful in prevention and treatment of asthma both in adults and children. They are useful in reduction in joint tenderness in rheumatoid arthritis. They reduce risk of Alzheimer's disease. They are also found to be essential for brain development in fetus and infants. There are also studies that suggest benefits of omega 3 in osteoporosis and depression.

Physiological benefits are due to DHA and EPA and dietary ALA has to be first converted in body to EPA which in turn is converted to DHA. Only they are useful and provide the above benefits. This conversion is also quite small, so ALA needs to be consumed in large quantities for their benefits. It is better to consume DHA and EPA but these are present in marine fish like salmon, mackerel, sardine at 2000 to 2300 mg per 100g fish. Two or three servings per week are adequate to provide requirements of omega 3 fatty acids. Even certain marine algae have high levels of DHA.

Those who do not like or eat fish now have some foods enriched with omega 3. Hens fed with flax seeds lay eggs that have 400-500mg ALA and 100mg DHA. Even pork has shown enrichment due to feeding pigs with flax seeds. Meat contained over 400 mg ALA per 100g whereas control contained about half of this level. The levels in eggs could be increased by feeding hens with fish oils or marine algae. Such hens lay eggs having DHA amounts 150mg and also EPA 20mg per egg. The omega 3 are only present in egg yolk. One disadvantage of giving fish oils to hens is that when eggs are hard boiled or over-cooked, they give unpleasant fishy odour. Hens could also be fed with algae also give eggs with high levels of DHA and they have additional benefits of no fishy odour as well as their yolks are attractive dark yellow due to more carotenoids. DHA has been isolated from marine algae and is added to various food products as vegetarian DHA.

There are many ways the omega 3 can be useful in seniors' diet. Seniors have normally acquired many of the above ailments including heart disease, hypertension as well as joint pain and osteoporosis. They also are frequently depressed and are prone to memory loss and other problems of such diseases like Alzheimer's disease. Omega 3 have been quite useful in many of these along with other treatments that are carried out under the supervision of medical professionals.

Dietary Fibre

One of the constant problems for the seniors is constipation. Dietary fibre or also called roughage is the indigestible portion of plant foods has two portions, soluble and insoluble. Soluble fibre is found in legumes or

beans, oats, rye and barley, fruits and juices, sweet potatoes and onions, psyllium seed husk etc., while insoluble fibre is found in whole grains, bran, nuts and seeds, skins of vegetables and fruits, flax seeds, vegetables like green beans, cauliflower, etc. There are different benefits for both soluble and insoluble fibres.

Insoluble fibre accelerates passage of food through GI tract and it promotes bowel movement. As enzymes find it difficult to hydrolyse starch when insoluble fibre is present it slows down starch digestion and glucose absorption. Soluble fibre also delays glucose absorption so both fibres control rise of blood glucose which is helpful in diabetes. Soluble fibre also binds bile acids in intestine slowing its absorption so it lowers cholesterol in blood.

There is another big advantage of fibre. Since fibre with some absorbed water increases bulk in stomach and also provides satiety. This reduces intake of food and helps reduce weight while dieting. Fibre is also known to lower the risk of colon cancer.

Fibre, both soluble and insoluble, has been useful for seniors as they are concerned about cholesterol, cancer, weight management and most importantly diabetes. There are many products appearing with fibre added to it making it easier for seniors to consume.

Probiotics

There are many bacteria in GI tract and some have beneficial functions. Some prevent and control diarrhoea, lactose intolerance, gastritis and constipation. They fight pathogens and stimulate intestinal immune system. They reduce cholesterol levels in blood and may also reduce the risk of colon cancer. Most of the probiotics are lactic acid bacteria, mostly *Bifidobacter* and *Lactobacillus* species.

Since these bacteria are beneficial in intestines, they must pass through stomach without losing viability. However, according to one study by Reading University in UK hardly any bacteria can survive the stomach pH and enzymes. Some of the food ingredients like milk protein and lactose may protect them but enteric coating or micro-encapsulation will ensure their viability. Many fermented dairy products will have beneficial bacteria but especially when one has stomach ailments or when one is on antibiotics that destroy pathogens as well as useful bacteria, it is better to take supplements containing probiotics in large numbers to restore the healthy microbial flora of intestine.

Probiotics are often given with prebiotics. These are mostly soluble dietary fibre with fructo-oligosaccharides and inulin being found to be most effective. They are not digested and absorbed in the intestine so they are available as food for probiotics. This allows growth of probiotics in the intestine and ensures their prolonged presence there.

Seniors normally do like fermented products like yogurt, curd, buttermilk, etc. but now many products are appearing which are not fermented and do not have high acidity but contain large number of probiotics of proven benefits. These are more convenient to consume.

Antioxidants

These are substances or nutrients in foods which can prevent or slow oxidative damage to the body. Free radicals produced in the body can cause damage and antioxidants act as scavengers for free radicals preventing or repairing damage by them. Many health problems like heart disease, macular degeneration, diabetes, cancer are all contributed by oxidative damage. Antioxidants also enhance immune defence reducing the risk of cancer and infection.

Commonly known antioxidants are vitamins and minerals like vitamin A and carotenoids present in carrots, tomatoes, mango, orange and other bright coloured fruits and vegetables, vitamin C present in citrus fruits,

berries, green leafy vegetables, vitamin E in nuts & seeds, whole grains, green leafy vegetables and selenium present in fish, shellfish, red meat, grains, eggs, etc.

Some antioxidants are present as flavonoids and polyphenols in soy, red wine, purple grapes, pomegranate, tea etc. Some carotenoids like lycopene and lutein are present in fruits and vegetables. There are also other antioxidants like coenzyme Q10, glutathione, superoxide dismutase etc. that have benefits.

Some studies have shown that lutein and zeaxanthin reduce the risk of chronic eye diseases including age-related macular degeneration (AMD) and cataracts whose incidences are growing with over 25 million people are affected. AMD is leading cause of blindness in seniors. Lutein and zeaxanthin are carotenoids that filter harmful high-energy blue wavelengths of light and act as antioxidants in eyes, helping protect and maintain healthy cells. Oxidation of lens losing its clarity is the major cause of cataract. Lutein and zeaxanthin neutralise free radicals that cause oxidation of lens reducing risk of cataract.

Studies have shown that some compounds of grape seed extract may be effective in conditions like hardening of arteries, high blood pressure, high cholesterol and poor circulation. It is also said to be useful in diabetes related nerve and eye damage and in macular degeneration and cancer.

Antioxidants have been widely used in dietary supplements and initial investigations for prevention of diseases like cancer, coronary heart disease etc. suggested that they may promote health, large scale clinical trials have provided mixed results. Antioxidants have also been investigated for treatment of neurodegenerative diseases including Alzheimer's diseases, Parkinson's disease and amyotrophic lateral sclerosis and noise-induced hearing loss. Targeted antioxidants may have better medicinal effects. There is also evidence that people who eat fruits and vegetables have a lower risk of heart disease and certain neurological diseases. Also that they may protect against some cancers. However, when antioxidant supplements have been tested there is no clear effect on the risk of chronic diseases like cancer and heart disease. This might mean that either long term studies are needed to provide conclusive evidence. Benefit of beta carotene on cognitive function was seen only after 18 years of follow-up study. Secondly there is abundant evidence of whole fruits, vegetables and whole grains, all rich sources of antioxidants provide protection against many of these diseases of aging. Possibly there are other substances present in them together with antioxidants may be providing the health benefits.

There are many other substances and ingredients having potential benefits on health. There is resveratrol from grape or wine useful to reduce risk of cancer and heart disease, oryzanol from rice bran oil and is beneficial for lowering LDL cholesterol while increasing HDL cholesterol, plant sterols from seeds and certain vegetables and reduce absorption of dietary cholesterol, all contribute to healthy life in seniors.

In Conclusion

The seniors have several physiological problems added to their changes in nutritional needs. It is very important to look at both while devising diets for seniors. They find it difficult to chew and swallow and prefer softer foods. They want more salt and sugar in their foods as these senses are somewhat dulled with age. They need nutrient dense foods with high quality protein and a lot of fibre to prevent muscle wasting and constipation. Calcium and vitamin D is important to prevent loss of bone density. Probiotics and omega 3 either through foods or supplements would greatly help ward off many diseases and build immunity against infections. They need to drink plenty of water and must physical activity along with food.

Whole fruits and vegetables as well as whole grain products have been established to be beneficial due to their healthy ingredients however, sometimes it might be a bit difficult for seniors to chew these so innovative products need to be developed or prepared the fortified products that give the same benefits as whole foods.

MICROBIOLOGICAL SAFETY OF STREET FOODS OF MUMBAI CITY - AN IMPENDING CONCERN!!!

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BRIEF ON BHAVAN'S RESEARCH CENTER (MICROBIOLOGY)



Bhavan's Research Center (Microbiology) (BRC), Department of Microbiology, Bhavan's College, Mumbai is a knowledge center instituted to enable fruitful academia and industry collaboration.

BRC undertakes sponsored R&D, need based consultancy, training and microbiological analysis in the field of food, hygiene and environmental microbiology.

The laboratory has NABL accreditation for ISO 17025:2005 and carries out routine & advanced microbiological analysis of cosmetic, disinfectants, food and water samples.

It plans to leverage the knowledge & experience gained in the last few years by working closely with corporates and government organizations, to expand in areas of rapid methods & automation in Microbiology to serve the needs of food & FMCG industries.

Street foods

Food is one of man's basic necessities and with civilization the form of food eaten by him has changed from raw to cooked food. Urbanization and a fast life have revolutionized the concept of cooked food and street food. As per a WHO report on Essential Requirements for Street Vended Foods (1996), about 74% of countries reported street-vended foods constitutes a significant part of the urban food supply and is thus picking momentum.

“Street food” may be defined as “ready to eat” food prepared for immediate consumption and sold by vendors or hawkers in fixed or make shift locations especially on streets. In the bygone days, street food outlets were common sites outside schools, bus terminus, cinema halls and railway stations, but now they have diversified to shopping malls, stadium, clubs and offices. In many tropical countries like India, street food is a common man's choice as they have the advantage of being served faster, can be eaten in transit and easy on pocket. They reflect the traditional local culture of the region yet have the ability to adopt newer cuisines by adding exotic flavors to the food, hence could grow in variety.

Street foods are a classic example of indigenous self generating revenue that increases the chances of self employment, develop business skills at a very low capital investment. It often acts as a major source of income for a vast number of persons particularly women. Surmounting to these advantages however, there are many undesirable facet to street foods. There is an inadequate public awareness of hazards posed by street foods. The vendors often are poor and uneducated. They lack appreciation for safe food handling and knowledge about microbial safety of raw materials and associated sanitary hygiene. The food handlers hence inadvertently introduce pathogens (disease causing germs) into the food during its processing when suffering from skin or respiratory infections, insanitary habits or by cross-contamination from raw materials. The dearth of potable water supply alleviates the insanitary conditions that make street food more labile to public health risk.

How safe is the Street Food of Mumbai?

To unravel the safety status of street foods, a collaborative study was under taken by PFNDAI (Protein Foods and Nutrition Development Association of India) and Bhavan's Research Centre (Microbiology), a NABL (National Accreditation Board for Calibrating and Testing Laboratories) accredited laboratory, to evaluate the microbial quality of some prioritized foods sold by the street vendors in Mumbai city. As there are no permissible reference data available on the microbial quality of most of the Indian foods, this study was devised to evaluate a few chosen subsets of foods for its microbial quality.

The different foods, sampled from the island city and suburbs of Mumbai included; thermally processed (batatawada), blend of cooked/uncooked foods (panipuri), uncooked food (chutney) and local frozen dessert (kulfi). Each of these foods were sampled from 7 different outlets in Mumbai some being makeshift, fixed vendor stalls and few local popular benchmark sites during 3 consecutive weeks in a pre Monsoon period. Each of the food was assessed by IS guidelines for its total microbial load along with intestinal and non intestinal pathogens which establish an index of safe food. All the microbiological tests were performed in duplicate.

The four popular street food viz., Batatawada, Pani puri, Coconut chutney and Kulfi were studied in context to the sample collection as per the regulation prescribed in the Food Safety and Standards Act, 2006 (Table 01), all the scores are relative and it reflects the hygienic status of the vendors. Each food item was surrendered to enumeration of total viable bacterial load (TVC), total coliforms, total *Escherichia coli*, presence of *Salmonella* and enumeration of non enteric pathogens associated with food poisoning; *Staphylococcus aureus*. Only chutney samples were studied for presence of *Bacillus cereus* while presence of *Listeria monocytogenes* was restricted to kulfi. To assess the status of panipuri with respect to presence of protozoans, cysts of protozoa were also studied from selected few samples.

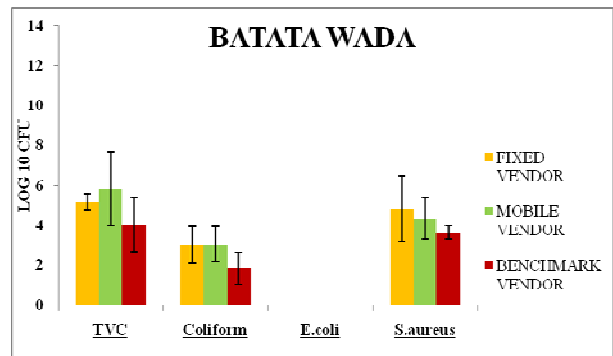
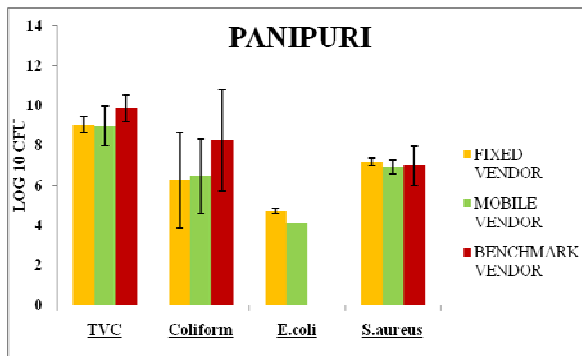
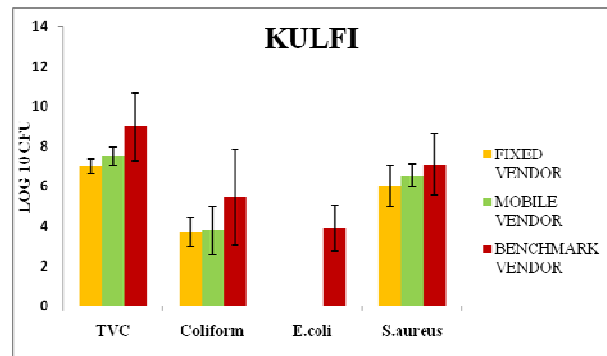
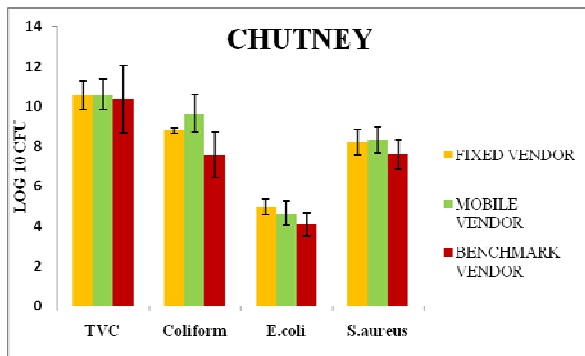
Table 1: Observations with respect to the regulation prescribed in the Food Safety and Standards Act, 2006

Few of the Sanitary and Hygiene Requirements for Street Hawkers			Location of the vending unit as a Potential source of contamination	Surface of vending carts	Protection from sun, wind and dust	Disposal of waste generated during vending	Water used for cleaning	Cooking, Storage and serving material	Use of handgloves/ aprons while cooking and serving	Status of person w.r.t. infections	general cleanliness of food handlers	Whether food was covered	Eating, Chewing, Smoking within premises
Mobile Vendors	Batatawada	Mobile Vendors	2	3	1	3	2	2	1	4	2	1	2
		Fixed location Vendors	2	3	3	3	3	2	1	4	2	1	3
		Representative- Benchmark Vendor	2	4	4	3	4	3	4	4	3	5	4
Fixed location Vendors	Pani puri	Mobile Vendors	3	2	2	3	1	3	1	4	3	1	3
		Fixed location Vendors	3	2	3	3	1	3	1	3	2	1	3
		Representative- Benchmark Vendor	4	4	4	4	4	4	4	4	3	5	4
Bench Mark-Representative	Chutney	Mobile Vendors	3	2	2	3	2	2	1	4	3	1	4
		Fixed location Vendors	4	3	4	4	3	3	1	3	2	2	4
		Representative- Benchmark Vendor	4	3	4	3	4	3	2	4	3	4	4
Bench Mark-Representative	Kulfi	Mobile Vendors	2	3	4	4	3	3	2	4	3	4	4
		Fixed location Vendors	2	3	4	4	3	3	2	4	3	4	4
		Representative- Benchmark Vendor	4	4	4	4	3	3	2	4	3	4	4

Key: 1: Worse, 2: Bad, 3: Average, 4: Good, 5: Excellent

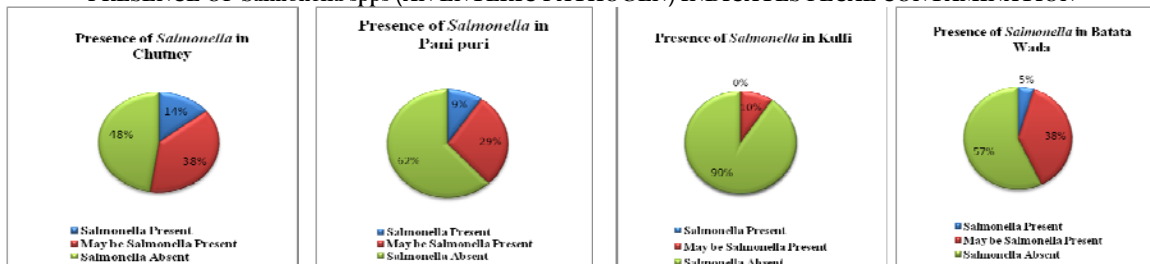
Outcome of the study

The study of 84 food samples brought to light the important milestones associated with quality of thermally processed, uncooked/cooked and frozen dessert. All vendor outlets studied (mobile and fixed) showed poor microbial quality of foods. The graphical representations indicate that uncooked food like chutney or blend of cooked/ uncooked food like panipuri have a high load of bacterial organisms (TVC). Kulfi uses pasteurized milk hence apparent decrease in microbial load, while batatawada scored less due to a thermal process in its making. Within a food sample no significant difference was found in the hygiene status of the foods from branded and the street outlets. Presence of intestinal pathogens and *Escherichia coli* ascertains the high probability of gastrointestinal disorders with consumption of such street foods.



No street food analyzed in this study was relatively free from pathogens as indicated in the table below. Being a tropical country Kulfi samples did not show presence of pathogenic psychrophile *Listeria monocytogenes*, while *Bacillus cereus* was not detected in any of the chutney samples. Thus most samples showed presence of high levels of coliforms & *Escherichia coli* (considered indicator of fecal contamination). They also showed high counts of *Staphylococcus aureus*, indicating improper handling of these eatables. Presence of *Salmonella* in these samples makes them further unsafe, with potential of spreading enteric fever (typhoid) to consumer. It was surprising to observe presence of protozoan cysts in panipuri samples selected randomly. Table 02 reveals the percent prevalence of pathogens in the four food samples studied across the seven locations in the city of Mumbai

PRESENCE OF *Salmonella* spp (AN ENTERIC PATHOGEN) INDICATES FECAL CONTAMINATION



PRESENCE OF Coagulase positive *S aureus* CORELATES DIRECTLY TO THE HYGIENE STATUS

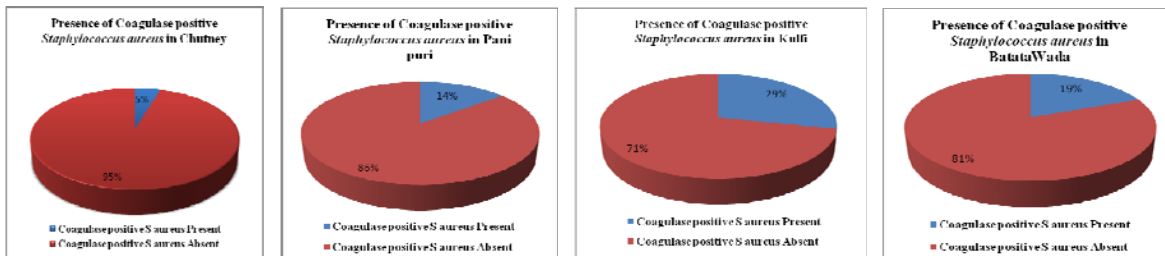


Table 2: Prevalence of pathogens in samples studies across seven locations in the city of Mumbai

Sample used in study	No of samples Studied	Number of Samples positive for(out of 21)					Inference drawn
		<i>E .coli</i>	<i>Salmonella</i>	Coagulase positive <i>S. aureus</i>	All pathogens	Both Enteric pathogens	
Chutney (Coconut based)	21	19	11	01	01	11	Bad raw material / hygiene
Kulfi	21	04	02	06	none	none	Bad contact
Panipuri (whole)	21	10	08	03	00	02	Bad hygiene, and contact of handler
Batatawada	21	01	09	04	none	none	Bad hygiene, and contact of handler
Total	84	34	30	14	01	13	Consumer at risk with Enteric pathogens
Percentage		40.47	35.71	16.66	1.19	15.47	

Safe street foods- A need of the hour

In India per se, Prevention of Foods Act, 1954, the prior regulatory body had laid standards but did not indulge to all local foods for assuring their microbial quality. There were no mandatory standards governing these foods and often the microbial quality of these street foods was not known and understandably could be a major potential concern in terms of food safety and public health. Availability of potable water (for cooking, mixing or cleaning eating utensils, and for use in drinking water) and personal hygiene of the hawkers aggravate the current scenario. The regulatory officials must check the sanitary practice and assist the vendors in improving the hygiene practice in food handling and preparation as well as implement the concepts of HACCP.

How to regulate and enhance safety of street vended foods

To enable official recognition and control of street foods it may be appropriate to develop Government guidelines or regulations specific to this food service sector. Many governments consider a Code of Hygienic Practice as an essential tool in this regard, which emphasizes on matters that relate directly to food safety rather than on those that are mainly aesthetic in nature.

Strategies for improving street food safety should be based upon studies of the local street food system and should include factors like Policy, regulation, registration and licenses, Infrastructure, services and vending unit design and construction, Training of food handlers and Education of consumers.

As part of strengthening the role of Indian government in ensuring the safe food and consumer safety, Food Safety and Standards Act of 2006 has been implemented which is at par with the international standards, thus initiating a new era in food safety in India. It will ensure improved quality of food for the consumers and censure misleading claims and advertisement by those in food business. The act is being chiefly executed by Food Safety and Standards Authority, which will broadly frame regulations to lay down the standards and guidelines for food items and specify an appropriate system of enforcing various standards. It will specify mechanisms for accreditation of certified bodies engaged in certification of food safety management system for food businesses, and procedures for accreditation of laboratories.

Thus, it will help the street vended food to shatter the “unhealthy” image and help re-organize the entire sector that will boast of an improved food quality and assured consumer safety. As predicted, this sector will never wither away into the sand of time and by ensuring and following the regulations laid in the ACT, the sector will attract consumers from all stratas of the society, thus broadening not only its consumer population but also proportionally envisage an increase in business potential along with CONSUMER SAFETY.

Conclusion

It is quite difficult to monitor the growing numbers of street food vending operations on account of their mobility and temporary nature. Many international reports reiterate that contaminated food in major countries is attributed to infected handlers, inadequately cleaned equipment and time and temperature abuse as cause of food-borne disease. A grading system delineating the hawkers' consortia into different graded groups based on its physicochemical and microbiological quality of food will further patronize the robustness of the Food Safety Act. In conclusion, a concerted effort by National regulatory bodies like MOFPI, FSSAI, local food authorities, Consumer forums, a dynamic public awareness program, education of food vendors and a robust grading system will reduce the risk and outbreak of food borne diseases by consumption of street food. The effort will only popularize the street foods and create a brand of its own in the unorganized sector.

Guilt-Free Snacks

It is easy to eat more snacks than one intends to. Hence, consumers may regret consuming empty calories, eating fats and salt they perceive as unhealthy. Fortunately there are certain strategies developers can try to formulate healthy snacks helping consumers stay lean.

Texture First

Limp wafer or soggy cracker is not appealing. The key for preparing guilt-free snack is the texture very similar to traditional snack. Getting right texture is not easy. There are a variety of textures preferred in snack foods ranging from 'crispy' to 'crunchy' and even something called 'crinchy' that has textural attributes of both groups.

To meet these requirements an understanding of how processing, formulation and additional ingredients affect texture is very important. Specialty starch snack texturisers can help manage the moisture content during the process, so a baked and sheeted cracker or fabricated potato crisp can form a uniform dough that is sheetable and not sticky, can be easily cut into shapes, be evenly baked and can help achieve desired product texture and eating experience.

Wheat or corn meal starch cannot manage water and create texture as native starches are inconsistent and hold less moisture. They can't deliver crunch and light crispiness that addition of 10 or 20% cold water-swelling specialty starch can. Specialty starches can also create gourmet snacks or signature textures using same equipment used for traditional products.

Fortifying with Fibre

Fibre is healthy for consumers but food developer views it as potential textural challenge. Corn bran for example can be added to tortilla chips, crackers and extruded snacks for label claim. It contributes 0.6 calories per gram and it has slight corn flavour and yellowish brown colour. In most applications it may be added at 5 to 15% without affecting texture. It can be added up to 40% in extruded snack but adjustments in formulation is necessary.

Corn bran needs more water for hydration (about 3ml per g) and takes longer mix time for complete hydration. If added above 30% in extruded snack modified starch is needed to increase the expansion as insoluble fibre tends to lower expansion. Even extra starch is needed to get puffing and to remain crisp like normal snack. Oat bran also behaves similarly needing more water and posing challenge for extruded snacks.

All granulations can be used in both snack and extrusion systems. Coarse bran gives more visible texture in dough of whole grain but too much can interfere with the dough structure and cause tearing. Finely milled bran would be useful and will not be visible in dough or in end product. It would also lower grit and mouthfeel at high concentrations.

Oat bran is produced by grinding clean oat groats or rolled oats and fractionating flour. Oat bran fraction is not more than 50% of flour and has total beta glucan content of at least 5.5% and total dietary fibre 16% so about 1/3 of total fibre is soluble. Oat bran is added for nutritional benefits. Beta glucan present in oat and barley has been recognised for heart health.

Oat-based products provide clear visual and health-oriented components in a snack mix. Milled form of flaked or rolled oats can be added to dough system, coated whole grains for bars and toppings and as oat-based clusters with other grains in multigrain format. These clusters can be sourced ready-to-use in multi-component visual, flavour or texture snack blends. Its simplicity allows multiple variety of products.

Depending on the market, whole-grain clusters can be further enhanced with sweeteners or fortified with vitamins, minerals, proteins, probiotics and prebiotics. Snack chips with multi-grain ingredients can be baked. Other new ingredients in this area are ancient grains, lentils, peas and local specialty items. Cooked black-bean powder can be used to replace a portion of grain used traditionally in a snack. When making extruded bean crisps, powder can be used at 100% of formulation. In addition, black bean grits can be incorporated in sheeted tortilla chips to provide whole-grain appearance. Cooked beans provide more protein and fibre in the final product. Bean powder requires additional liquid due to higher fibre content depending on the desired final texture.

Bean powder can be used singly or in combination with grains, starches, vegetables or fruit powders, sweeteners, proteins, cocoa powders etc. dark skin of black bean can impart colour and if this is objectionable light-coloured bean like navy bean can be used. Bean powder has a mild flavour that could be masked by traditional snack flavourings and seasonings.

Often maltodextrins are added to add bulk or carry colours or flavours in snack seasonings. Maltodextrin is okay for soft bar or sweet baked good as it has a tendency to hold moisture beneficial for maintaining shelf life. In crisp snacks it adds a soggy quality.

Consider the Oil

Snack flavouring is essential and more so when reducing sodium. Intended seasoning must stay with snack. When freshly fried snacks pass through tumbler seasonings stick easily. Baked snacks are more difficult to coat, so adherence needs specialty starch. Extruded snacks like cheese puffs are often flavoured with oil-based slurry.

Whatever the role of fat, frying, dough improvement, crisping or coating, labelling harmony is considered while selecting oil. Canola oil is currently promoted as healthy oil. Shelf-life and flavour profile are well-suited for snack-based products applied in baked goods or fried products. Canola oil is available in both genetically modified or non-GMO.

The amount of trans and saturated fat labelling must be aligned with marketing aims. Also fat must meet the functional requirements of product. Stability is related to saturation. Highly unsaturated oils degrade more rapidly during frying and lead to off flavours and lower shelf life. One may consider lower saturates and less-stable poly-unsaturates with increased mono-unsaturates. High oleic canola and sunflower oils have been developed for 50% longer fry life than other commercial oils. Also high oleic soybean oil provides oxidative and flavour stability in frying applications. Oxidative stability index (OSI) values of 40 to 60 hours have been achieved compared to 3 to 14 hours typically achieved by common soybean, corn, cottonseed, canola and sunflower oils. Palm oil is stable oil but it is overlooked because of saturated fatty acids. Research is disproving link between saturated fat and heart disease.

Snacking Fruitfully

Pectin, fruit pieces and granulates can be incorporated into sweet puffed or extruded baked snacks as well as in trail mixes and bars. They reduce calories, increase fibre and overall nutritional content and contribute to clean-label information. Fruit ingredients can help reduce fat and omit high-fructose corn syrup. Fat plays important roles including altering perception of moistness. Apple sauce can replace some or all oil in baked goods. Apple and pear concentrates replace HFCS and are popular due to cost and lack of overpowering flavours.

Pectin also can mimic mouthfeel of full-fat product as gel pectin provides plump, full mouthfeel in extruded snack or bar. Fruits don't replace fat but can add flavour and texture to compensate for reduced fat sensation. Infused fruit pieces have sweetness suitable for trail mixes. Water activity will have to be matched with other ingredients otherwise textural and shelf-life issues arise.

Blueberry goodness is used to promote snacks of all types from salty-sweet and baked, fried to trail mixes, bars and crackers. These are easy to formulate, available year-round in fresh, frozen and dried as well as puree, concentrate and juice and from whole fruit to powder. Blueberry concentrate can add sweetness and colour. They are nutritionally dense with fibre, vitamins, minerals and antioxidants.

Nuts are also useful in trail mixes and bars. Walnuts and almonds provide healthful connotation delivering protein, fibre and healthy fat. Walnuts provide magnesium, phosphorus, omega-3 fatty acid ALA along with vitamin E and valuable antioxidants. Due to polyunsaturated fatty acids, walnuts need to be refrigerated or frozen. Nut butters from almond, cashew and peanut provide natural organic filling in sandwich cracker or provide fat and protein to cracker or baked snack formulation.

Expanding on Extrusion

Extrusion expands snack possibilities with range of products as vast as imagination and snacks come in many styles and shapes: flat or ridged chips, dipping chips, filled snacks with soft or crispy shells. Snack bars can be flatbread style or co-extruded with soft filling tucked inside a crunchy cereal bar. Inclusion can add fibre and flavour.

Extrusion process is simple combination of heat and mechanical shear transforming ingredients into finished snacks of various shapes. Basic formulas require flour, liquid, flavouring/colouring with complex recipes containing many ingredients. Extruder can process various grains corn, wheat, rice, oats etc. to sweet potato and other root vegetables and recipes can be created with health, flavour or ethnic profiles.

Incorporation of whole requires adjustment of process due to fat and fibre contents.

Snack pellets are partially processed snacks finished by end-user by frying or hot air treatment. They are shelf stable for 12 months. Legume-based crisps are new developments in micropellet line and includes whole grains and whole multigrain combinations. Three varieties of rice-potato-corn based ripple fries: plain, spinach and tomato can be enriched with vitamins and minerals for a credible claim. These gluten-free formulations can contain a variety of vegetables that appeal not only to school-lunch programmes but individual consumers as well. They taste great. One will be glad they are on guiltless list.

Condensed from an article by Cindy Hazen, Food Product Design July 2011

Nutrition & Health News

Babies fed fruits, veggies early may eat more later in life

A study published in *Public Health Nutrition* shows that babies fed home-cooked fruits and veggies may be more likely to eat them when they are older. Researchers from England analyzed data from 7,866 mothers of children born in 1991 and 1992. The mothers completed self-reported questionnaires at six months and seven years postpartum, containing questions about their child's fruit and vegetable intake.

The researchers found that children who were given home-cooked fruit or vegetables more often at six months were more likely to be eating a higher proportion of fruits and vegetables at seven years than those who were given them less often. Interestingly, there was no association with the consumption of ready-prepared fruits or vegetables at six months to the consumption at age seven.

In addition, the researchers found that babies weaned earlier, between four and six months, and exposed to fruit and vegetables regularly, had the highest level of consumption at age seven. However, those babies given home-cooked fruit and vegetables at a later age but given them more frequently, had similar levels of consumption as those given them earlier.

The researchers concluded that the findings support the concept that exposure to fruits and vegetables is important in the early weaning period. The finding that consumption of ready-prepared fruits and vegetables was not positively associated with their consumption later needs to be further investigated, with reference to theories of exposure, modeling, and parental food choices. If vegetables are introduced later in weaning, they need to be fed frequently, to ensure adequate exposure.

IFT Weekly Newsletter July 27, 2011



Whey protein may assist in weight management

A study published in the *Journal of Nutrition* shows that whey protein may help improve body weight and composition. The researchers tracked body weight, body composition, and waist circumference data from 73 overweight and obese adults assigned to consume a 200-calorie beverage, consisting of 28 g of whey or soy protein plus carbohydrate or carbohydrate alone, twice a day for 23 weeks. No other dietary direction was given.

While there were no significant differences at the start of the trial between groups, at the end of the trial, the whey protein group's body weight was approximately 4 lbs lower than the carbohydrate group, and their body fat was 5 lbs less than the carbohydrate group. Additionally, the whey protein group's waist size was nearly an inch smaller than both the carbohydrate and soy protein groups. Those who consumed soy protein did not exhibit significant differences from the carbohydrate group.

Study data indicate that all groups compensated for the additional 400 calories per day by cutting back on other foods, as none gained a significant amount of weight during the 23-week period. However, the whey protein group likely made up for the added calories from the beverage more effectively, since they showed improvements in body weight and composition compared to the carbohydrate group. This could be related to enhanced satiety with whey protein, as participants in the whey protein group showed significantly lower levels of the hunger-stimulating hormone, ghrelin, compared to the other two groups.

While more research is needed to fully understand this effect, these results do help to shed light on specific benefits of whey protein. This study was funded by the U.S. Whey Protein Research Consortium and the U.S. Department of Agriculture's Agricultural Research Service.

IFT Weekly Newsletter July 20, 2011



Healthy Food Choices Linked to Mindset

July 27, 2011 Food Product Design

PASADENA, Calif.—When it comes to choosing the foods we eat, the choice is a complex neurological exercise that can be influenced by using self control to make healthier decisions, according to a study published in the *Journal of Neuroscience*.

Researchers at California Institute of Technology (Caltech) suggest we make food choices based on how our brains feel about a food's taste versus its health benefits versus its size or even its packaging; however, it needs to decide the importance of each of those attributes relative to the others.

Previous research found that while everyone uses the same area of the brain—the ventral medial prefrontal cortex, or vmPFC—to make value-laden decisions like what to munch on, there's a second brain area—the dorsolateral prefrontal cortex, or dlPFC—that seems to come to life when a person is using self-control during the decision-making process. When the dlPFC is active, it allows the vmPFC to take into account health benefits as well as taste when it assigns a value to a particular food.

For this study, the researchers sought to show ways to help kickstart the dlPFC through the use of "external cues" that allow us to exhibit more self-control than we might have otherwise. They examined data from a brain-imaging experiment conducted with 33 adult volunteers, none of whom were following a specific diet or trying to lose weight for any reason. Each volunteer was shown 180 different food items—from chips and candy bars to apples and broccoli—through a set of video goggles while in a functional magnetic resonance imaging (fMRI) machine.

Participants who fasted for at least three hours prior to the experiment were given up to three seconds to respond to each picture with a decision about whether or not they'd want to eat the food shown after the experiment was over. They could give the food a "strong no," a "no," a "yes" or a "strong yes." Once all of the images had been flipped through, a single food image was chosen at random; if the volunteer had said "yes" or "strong yes" to the idea of eating that food, he or she was served that item.

Before every 10 food choices, an instruction would come on the screen for five seconds telling the subjects either to "consider the healthiness," "consider the tastiness" or "make decisions naturally." This meant that of the 180 decisions, the subjects made 60 in each of the three "instruction conditions." This was meant to shift the subject's attention during the experiment and, potentially, shift the way in which they made decisions.

The subjects were asked to rate the same foods on both a tastiness scale (very untasty, untasty, tasty, very tasty) and a healthiness scale (very unhealthy, unhealthy, healthy, very healthy). That way, the researchers were able to associate the choices the subjects made during the brain scan with their stated perceptions of those foods' attributes—showing that a subject who chose broccoli during the "consider the healthiness" portion of the test might think of it nonetheless as untasty.

The researchers classified the foods for each subject based on that subject's rating—unhealthy-untasty, healthy-untasty, unhealthy-tasty, and healthy-tasty.

Participants chose healthy-tasty foods no matter where their attention had been directed. When thinking about healthiness, subjects were less likely to eat unhealthy foods, whether or not they deemed them to be tasty, and more likely to eat healthy-untasty foods. Being asked to think about healthiness led subjects to say "no" to foods more often than they did when asked to make decisions naturally. There were no real differences between the choices made during the "consider the tastiness" and "make decisions naturally" portions of the experiment.

After examining the fMRI results, they found that the vmPFC was, as predicted, "more responsive to the healthiness of food in the presence of health cues. The robustness of that response was due to the influence of the dlPFC—that bastion of self-control—which was much quieter when the study's subjects were thinking about taste or their own personal choice than when they were asked to throw healthiness into the equation.

"This increased influence of the health signals on the vmPFC results in an overall value for the food that is based more on its health properties than is the case when the subject's attention is not focused on healthiness," they said.

Sources: California Institute of Technology: Think healthy, eat healthy: Caltech scientists show link between attention and self-control



Dietary Fiber Cuts Breast Cancer Risk

July 27, 2011 Food Product Design

SUZHOU, China—Women who follow a high-fiber diet may significantly reduce their risk of breast cancer, according to a new study published in the *American Journal of Clinical Nutrition*.

Using relevant studies from a PubMed database search through January 2011, Chinese researchers identified 10 prospective cohort studies of dietary fiber intake and risk of breast cancer involving 16,848 cases and 712,195 participants were indentified. The combined relative risk of breast cancer for the highest compared with the lowest dietary fiber intake was 0.89, and little evidence of heterogeneity was observed. The association between dietary fiber intake and risk of breast cancer did not significantly differ by geographic region, length of follow-up or menopausal status of the participants.

Dose-response analysis showed that every 10-g/d increment in dietary fiber intake was associated with a significant 7% reduction in breast cancer risk.



High-Protein, Low GI Snacks Increase Weight Loss

July 18, 2011 Food Product Design

MADRID, Spain—Diabetics who consume specific low-glycemic index, moderately high-protein foods for breakfast, morning and afternoon snacks may experience increased body weight and fat-mass loss without altering biochemical parameters and cardiovascular risk-related factors, according to a new study published in the *Nutrition Journal*.

Researchers studied the potential functionality of a series of low glycemic index (GI) products with a moderately high-protein content, as possible coadjutants in the control of type 2 diabetes and weight management following a chronologically planned snacking. A total of 17 volunteers participated in a single-group, sequential, longitudinal study with two consecutive periods of four weeks each. The first period was a free living period, with volunteers' habitual ad libitum dietary pattern, while the second period was a free-living period with structured meal replacements at breakfast, morning snack and afternoon snack, which were exchanged by specific products with moderately high-protein content and controlled low GI, following a scheduled temporal consumption.

A modest but significant ($P=0.002$) reduction on body weight (1 kg) was observed during the intervention period, mainly due to the fat mass loss. The weight reduction was observed without apparently associated changes in total energy intake. None of the biochemical biomarkers measured was altered throughout the whole study. Researchers concluded small changes in the habitual dietary recommendations in type 2 diabetes patients by the inclusion of specific low-GI, moderately high-protein products in breakfast, morning and afternoon snacks may promote body weight and fat-mass loss without altering biochemical parameters and cardiovascular risk-related factors.



Vitamin C Keeps Cataracts at Bay

July 15, 2011 Food Product Design

NEW DELHI, India—Individuals who eat foods rich vitamin C may have a lower risk of developing cataracts, especially among older individuals who live in lower-income countries, according to a new study published in the journal *Ophthalmology*.

Researchers in India evaluated more than 5,600 Indian adults age 60 and up for cataracts. They also interviewed them about their diets and lifestyle habits, and measured their blood levels of vitamin C.

More than 73% of the study participants suffered from cataracts; however, the risk decreased 39% among those who had the highest levels of vitamin C compared to those who had the lowest.

They also found vitamin C levels were very low across all participants. More than 50% were deficient, and the bottom 30% had vitamin C concentrations below the level of detection.



Omega-3s Reduce Anxiety, Inflammation

July 14, 2011 Food Product Design

COLUMBUS, Ohio—Increasing daily consumption of omega-3 fatty acids, a main compound present in fish oil, reduces inflammation and anxiety in healthy young adults, according to a study published in the journal *Brain, Behavior, and Immunity*.

Researchers at Ohio State University conducted a study on 68 first- and second-year medical students who were given supplements that contained four or five times the amount of fish oil found in daily serving of salmon. Half the students received omega-3 supplements while the other half were given placebo pills.

Psychological surveys showed students receiving the omega-3 experienced a 20% reduction in anxiety compared to the placebo group. An analysis of the of the blood samples from the medical students showed a 14% reduction in the amount of the proinflammatory cytokine interleukin-6 (IL-6) in the blood serum among the students receiving the omega-3.

“Anything we can do to reduce cytokines is a big plus in dealing with the overall health of people at risk for many diseases,” said Ron Glaser, study co-author and professor of molecular virology, immunology and medical genetics and director of the Institute for Behavioral Medicine Research.



Dairy Improves Metabolic Health, Cuts Diabetes Risk

July 13, 2011 Food Product Design

ROSEMONT, Ill.—Eating the recommended three servings a day of dairy improves metabolic health and reduces the risk of type 2 diabetes, according to two new studies published in the *American Journal of Clinical Nutrition* and the *European Journal of Clinical Nutrition*.

In the first study, published online ahead of print in the *American Journal of Clinical Nutrition* and administered by the Dairy Research Institute™, researchers conducted a clinical trial in which 40 overweight and obese adults with metabolic syndrome were randomly assigned to consume either a low dairy or adequate dairy (at least three servings per day) weight maintenance diet for 12 weeks. They found adequate dairy intake significantly improved multiple health indicators compared to low intake. Markers of both oxidative and inflammatory stress in subjects with metabolic syndrome were

reduced. High blood pressure and insulin resistance also showed improvement, while fat mass and waist circumference decreased with no significant change in body weight for either group.

For the second study, published in the European Journal of Clinical Nutrition, Chinese researchers conducted a systematic review and meta-analysis of seven prospective studies examining the association between dairy product consumption and type 2 diabetes. They found higher dairy intake was associated with a 14% reduction in type 2 diabetes risk compared with those with the lowest intakes. Low-fat dairy consumption was associated with an 18% reduction in type 2 diabetes risk; yogurt consumption was associated with a 17% reduction in type 2 diabetes risk. They also found type 2 diabetes risk was decreased 10% with an additional daily serving of low-fat dairy.

“Although additional research is needed, evidence is growing that indicates dairy’s positive role not only in improving health and nutrition but also in reducing risk of chronic disease,” said Gregory Miller, Ph.D., president of the Dairy Research Institute and executive vice president of the National Dairy Council.



Fiber Doesn’t Help Diverticulosis

July 11, 2011 Food Product Design

CHICAGO—According to research findings presented at the 2011 Digestive Disease Week meeting, which took place during May in Chicago—and as reported by [Gastroenterology & Endoscopy News](#)—adhering to a high-fiber diet does not help protect against developing asymptomatic diverticulosis. This research was conducted, and presented, by Dr. Anne Peery, fellow in gastroenterology and hepatology, University of North Carolina, Chapel Hill.

Such findings fly in the face of what to date was considered conventional wisdom—that a fiber-rich diet had a protective effect. Quite to the contrary, Perry’s findings demonstrate that patients who have higher levels of fiber in their diet actually showed a dose-dependent increased predilection for the disease. She notes that “those on a high-fiber diet were 30% more likely to have diverticulosis than those on a low-fiber diet.”

Perry’s study analyzed data from three colonoscopy-based studies conducted between 1998 and 2010 at University of North Carolina hospitals, involving 2,104 patients, of which 878 had diverticulosis cases and 1,226 did not.

Peers from the medical community have called Perry’s findings compelling, but note that further research is required to formulate definitive statements about the connection between fiber and diverticulosis.



High-Protein Diets Reduce Hunger

July 11, 2011 Food Product Design

COLUMBIA, Mo.—Increasing dietary protein helps reduce hunger and increase satiety in overweight and obese men who are trying to lose weight, according to a study published in the journal [Obesity](#).

Researchers at the University of Missouri found higher-protein diets containing 18% to 35 % of daily calorie intake from dietary protein are associated with reductions in hunger and increased fullness throughout the day and into the evening hours.

For the study, two groups of participants ate either 25% or 14% of calories from protein, while the total calories and percent of calories from fat stayed the same between the higher-protein and normal-protein diet patterns. The researchers also conducted an eating frequency sub-study in which the 27 participants on both normal- and higher-protein diets consumed either three meals or six meals per day. Eating frequency had no effect on appetite and satiety on the normal-protein diet; however, subjects on the higher-protein diet who ate three meals per day experienced greater evening and late-night fullness than those who ate six meals per day.



Eggs Cut Cancer, Heart Disease Risk

July 7, 2011 Food Product Design

EDMONTON—Raw eggs contain almost twice as many antioxidant properties as an apple and about the same as a half of a serving of cranberries, which may help reduce the risk of cancer and cardiovascular disease, according to a new study published in the journal *Food Chemistry*.

Researchers at the University of Alberta examined egg yolks produced by hens fed typical diets of either primarily wheat or corn. They found the yolks contained two amino acids, tryptophan and tyrosine, which have high antioxidant properties. After analyzing the properties, they found that two egg yolks in their raw state have almost twice as many antioxidant properties as an apple and about the same as half a serving (25 grams) of cranberries. They also discovered when the eggs were fried or boiled, antioxidant properties were reduced by about half, and a little more than half if the eggs were cooked in a microwave.

"Ultimately, we're trying to map antioxidants in egg yolks so we have to look at all of the properties in the yolks that could contain antioxidants, as well as how the eggs are ingested," said lead researcher Jianping Wu.

In previous research, the team found that egg proteins were converted by enzymes in the stomach and small intestines and produced peptides that act the same way as ACE inhibitors, prescription drugs that are used to lower high blood pressure. That finding defied common wisdom and contradicted the public perception that eggs increased high blood pressure because of their high cholesterol content.



Probiotics Boost Brain Health

July 7, 2011 Food Product Design

LUBBOCK, Texas—New research conducted at the Texas Tech University Health Sciences Center reveals neurochemicals delivered directly to the gut via probiotic intestinal microbiota benefit brain health as well as digestive health.

The research paper, published in the journal *BioEssays*, proposes a new field of microbial endocrinology where microbiology meets neuroscience. Lead researcher Professor Mark Lyte proposes a unifying process of microbial endocrinology, which would mean that neurochemical-producing probiotics could act as a delivery mechanism for neuroactive compounds.

Lyte said probiotics play a role in producing, absorbing, and transporting neurochemicals, such as serotonin, dopamine and nerve growth factor, which are essential for healthy brain and nerve function. Therefore, improving probiotic microflora in the intestines may be an important key to treating mental health conditions.

“There is already evidence to suggest that the connection between gut microbes and the nervous system represents a viable route for influencing neurological function. A recent study in mice, for example, showed that the presence of neurochemicals such as serotonin in the bloodstream was due to direct uptake from the gut,” he said.

In a commentary piece in the same issue Dr. Gregor Reid from the University of Western Ontario, outlines some of the potential clinical implications of this research.

“The research presents an idea for selecting probiotic strains with neurological applications and linking this with immunomodulatory effects, while highlighting the fact that microbial strains already being widely ingested in fermented food can produce neurochemicals,” he said. “Could this mean that adjunct treatment for people suffering from certain types of mental health problems is a fecal transplant? Food for thought.”



High Folate Intake Thwarts Colon Cancer

July 6, 2011 Food Product Design

BETHESDA, Md.—Increasing dietary intake of folate, a B vitamin found in foods such as green leafy vegetables, legumes and oranges, may help reduce the risk of colorectal cancer, according to a new study published in the journal *Gastroenterology*.

Researchers from the American Cancer Society investigated the association between folate intake and colorectal cancer among 99,523 participants in the Cancer Prevention Study II Nutrition Cohort. The study was the first to examine the association of folate with colorectal cancer risk with follow-up entirely after the mandatory fortification of the U.S. diet with folate. A total of 1,023 participants were diagnosed with colorectal cancer between 1999 and 2007, a period entirely after folate fortification began. Neither higher nor lower risk was observed during the first two years of follow-up (1999 to 2001), but during 2002 to 2007, high folate intake was associated with a reduced risk of colorectal cancer. No increased risk of colorectal cancer was found for the highest intake levels, suggesting that the high levels of this vitamin consumed by significant numbers of Americans should not lead to increased incidence rates of this cancer in the population.

"We found that all forms and sources of folate were associated with lower risk of colorectal cancer," said Victoria Stevens, PhD, of the American Cancer Society and lead author of the study. "The strongest association was with total folate, which suggests that total folate intake is the best measure to define exposure to this nutrient because it encompasses all forms and sources."



Vitamin E Protects Brain After Stroke

July 6, 2011 Food Product Design

COLUMBUS, Ohio—A natural form of vitamin E called alpha-tocotrienol can trigger production of a protein in the brain that flushes toxins from nerve cells, preventing those cells from dying after a stroke, according to a new study published in the journal *Stroke*. The findings suggest natural vitamin E may be more potent than drugs targeting single mechanisms for preventing stroke-induced brain damage.

Researchers at Ohio State University built on their previous research that found the tocotrienol (TCT) form of vitamin E protects the brain after a stroke by blocking an enzyme from releasing toxic fatty acids and inhibiting activity of a gene that can lead to neuron death.

For the study, the team first clarified the role of a protein called MRP1, or multidrug resistance-associated protein 1, which clears away a compound that can cause toxicity and cell death when it builds up in neurons as a result of the trauma of blocked blood flow associated with a stroke.

To determine the role of MRP1 in protecting brain cells, the researchers compared the effects of an induced stroke in two groups of mice—normal mice and animals that were genetically modified to be deficient in the MRP1 protein. Those with the protein deficiency had greater stroke damage from decreased blood flow to the brain. They also had a 1.6-fold higher level of a toxin called GSSG, or glutathione disulfide that causes brain cell death and is released after a stroke occurs.

“This is one of the first studies to provide evidence that a safe nutrient—a vitamin—can alter microRNA biology to produce a favorable disease outcome,” said Chandan Sen, professor and vice chair for research in Ohio State’s

Department of Surgery and senior author of the study. “Here, a natural nutritional product is simultaneously acting on multiple targets to help prevent stroke-induced brain damage. That is a gifted molecule.”

A previous study published in the Journal of Atherosclerosis and Thrombosis found natural tocotrienol supports cardiovascular health by lowering triglyceride levels by 28% in the blood of human subjects after two months of supplementation. The study participants also showed a decrease in average weight, body fat mass, body fat percentage and waist measurement.



Resveratrol Benefits Sedentary Lifestyle

July 1, 2011 Food Product Design

BETHESDA, Md.—Drinking a glass of resveratrol-rich red wine daily may help individuals ward off the negative effects of sedentary lifestyles, according to a new study published in the *FASEB Journal*.

The researchers studied rats that underwent simulated weightlessness by hindlimb tail suspension and were given a daily oral load of resveratrol. The control group showed a decrease in soleus muscle mass and strength, the development of insulin resistance, and a loss of bone mineral density and resistance to breakage. The group receiving resveratrol showed none of these complications.

The study results further demonstrated some of the underlying mechanisms by which resveratrol acts to prevent the wasting adaptations to disuse-induced mechanical unloading. It also suggested that the compound might be able to prevent the deleterious consequences of sedentary behaviors in humans.



Whey Protein Brings Better Health in Later Life

Nutrition Horizon

7/8/2011 --- Nutritional beverages made with an innovative whey protein concentrate from Arla Foods Ingredients are a promising new way to tackle the rising incidence of protein malnutrition among the elderly.

Recent estimates have put protein malnutrition among elderly hospital patients as high as 60%. In the UK, a survey has revealed that 42% of home care residents are at risk. Particularly elderly patients recovering from a fracture or illness or with a chronic disease are in the danger zone.

Supplemented with Lacprodan DI-7017 whey protein concentrate, acidic and neutral beverages can help reverse the negative trend, held responsible for declining life quality and even death.

Widespread deficiency

“Protein malnutrition is the result of a dietary protein intake that is continuously below the recommended daily allowance for adults of 0.8g per kilo body weight,” explains Erik Adamsen, Arla Foods Ingredients nutritionist.

“In some areas, research shows that as many as 41% of adults have a dietary protein intake below the RDA.”

Documented, long-life nutrition

Scientific studies indicate that protein-rich nutritional supplements such as Lacprodan DI-7017 may boost weight and muscle tissue and reduce the number of health complications in elderly patients.

Tolerant of ultra-high temperature processing (UHT), Lacprodan DI-7017 is suitable for the production of appealing

protein beverages with a long shelf life.

High-quality protein source

“Until recently, nutritional supplementation with dairy proteins primarily made use of caseinates. The growing move towards whey supplementation follows extensive international research, which has revealed the high nutritional quality of whey protein,” Adamsen adds.

Apart from improving quality of life for the elderly, whey protein strategies that counter protein malnutrition are a means to reduced health care costs for the community.



Eating Nuts Daily Could Help control Type 2 Diabetes and Prevent Complications

Nutrition Horizon

7/13/2011 --- Eating nuts every day could help control Type 2 diabetes and prevent its complications, according to new research from St. Michael's Hospital and the University of Toronto.

In the research, published online by the journal Diabetes Care, a team of researchers led by Dr. David Jenkins (University of Toronto Department of Nutritional Sciences; St. Michael's Hospital Risk Factor Modification Centre) reports that consuming two ounces of nuts daily as a replacement for carbohydrates proved effective at glycemic and serum lipid control for people with Type 2 diabetes.

"Mixed, unsalted, raw, or dry-roasted nuts have benefits for both blood glucose control and blood lipids and may be used as part of a strategy to improve diabetes control without weight gain," said Dr. Jenkins, who also has appointments with St. Michael's Division of Endocrinology and Metabolism and the U of T's Department of Medicine. He also serves as Canada Research Chair in Nutrition and Metabolism.

Jenkins and his colleagues provided three different diet supplements to subjects with Type 2 diabetes. One group was given muffins, one was provided with a mixture of nuts including raw almonds, pistachios, walnuts, pecans, hazelnuts, peanuts, cashews, and macadamias, and one group was given a mixture of muffins and nuts.

Subjects receiving the nut-only supplement reported the greatest improvement in blood glucose control using the glycosylated hemoglobin (HbA1c) test. The nut diet subjects also experienced a reduction in low-density lipoprotein cholesterol (known as LDL, or "bad cholesterol"). The subjects provided the muffin supplement or mixed muffin-and-nut supplement experienced no significant improvement in glycemic control but those receiving the muffin-nut mixture also significantly lowered their serum LDL levels.

"Those receiving the full dose of nuts reduced their HbA1c [the long-term marker of glycemic control] by two-thirds of what the U.S. Food and Drug Administration recognizes as being clinically meaningful for therapeutic agents. Furthermore, neither in the current study nor in previous reports has nut consumption been associated with weight gain. If anything, nuts appear to be well suited as part of weight-reducing diets," Dr. Jenkins said.

"The study indicates that nuts can provide a specific food option for people with Type 2 diabetes wishing to reduce their carbohydrate intake."



Natural Chemical Found in Grapes May Protect Against Alzheimer's Disease

Nutrition Horizon

Jul 18 2011 --- Researchers at Mount Sinai School of Medicine have found that grape seed polyphenols a natural antioxidant may help prevent the development or delay the progression of Alzheimer's disease. The research, led by

Giulio Maria Pasinetti, MD, PhD, The Saunder Family Professor in Neurology, and Professor of Psychiatry and Geriatrics and Adult Development at Mount Sinai School of Medicine, was published online in the current issue of the Journal of Alzheimer's Disease.

This is the first study to evaluate the ability of grape-derived polyphenols to prevent the generation of a specific form of β -amyloid ($A\beta$) peptide, a substance in the brain long known to cause the neurotoxicity associated with Alzheimer disease. In partnership with a team at the University of Minnesota led by Karen Hsiao Ashe, MD, PhD, Dr. Pasinetti and his collaborators administered grape seed polyphenolic extracts to mice genetically determined to develop memory deficits and $A\beta$ neurotoxins similar to those found in Alzheimer's disease. They found that the brain content of the $A\beta^{*56}$, a specific form of $A\beta$ previously implicated in the promotion of Alzheimer's disease memory loss, was substantially reduced after treatment.

Previous studies suggest that increased consumption of grape-derived polyphenols, whose content, for example, is very high in red wine, may protect against cognitive decline in Alzheimer's. This new finding, showing a selective decrease in the neurotoxin $A\beta^{*56}$ following grape-derived polyphenols treatment, corroborates those theories.

"Since naturally occurring polyphenols are also generally commercially available as nutritional supplements and have negligible adverse events even after prolonged periods of treatment, this new finding holds significant promise as a preventive method or treatment, and is being tested in translational studies in Alzheimer's disease patients," said Dr. Pasinetti.

The study authors emphasize that in order for grape-derived polyphenols to be effective, scientists need to identify a biomarker of disease that would pinpoint who is at high risk to develop Alzheimer's disease.

"It will be critical to identify subjects who are at high risk of developing Alzheimer's disease, so that we can initiate treatments very early and possibly even in asymptomatic patients," said Dr. Pasinetti. "However, for Alzheimer's disease patients who have already progressed into the initial stages of the disease, early intervention with this treatment might be beneficial as well. Our study implicating that these neurotoxins such as $A\beta^{*56}$ in the brain are targeted by grape-derived polyphenols holds significant promise."



Magnesium Deficiency Linked to Higher Risk of Osteoporosis, Says Doctor

Nutrition Horizon

Jul 28 2011 --- A magnesium deficiency reduces the absorption and metabolism of calcium and prevents the proper amount of calcium being directed toward building stronger bones. According to Dr. Carolyn Dean, MD, ND, magnesium expert and Medical Director of the nonprofit Nutritional Magnesium Association, the effectiveness and benefits of calcium with respect to bone health and the prevention of osteoporosis are greatly impaired in the absence of adequate levels of magnesium in the body.

"Magnesium keeps calcium dissolved in the blood. Without the proper balance of magnesium to calcium, about a 1:1 ratio, calcium ends up depositing in your kidneys and can create kidney stones, in your coronary arteries resulting in clogged arteries, and in joint cartilage, rather than in your bones where you need it most. The more calcium you take without the balancing effect of magnesium, the more symptoms of magnesium deficiency and calcium excess you are liable to experience," Dr. Dean says.

Soda Pop and Bone Fractures

It is important to note that osteoporosis begins in the teen years. Girls achieve 42 percent of their total body bone mass between the ages of 12 and 18, and yet according to Dr. Rodger H. Murphree II, DC, CNS, adolescent girls consume only 14 percent of the Recommended Dietary Allowance (RDA) for calcium, 31 percent of vitamin A, and only 18 percent of the RDA for magnesium.

"Adolescence is therefore a crucial time for bone development, and any factors adversely impacting on bone acquisition

during this time can potentially have long-standing detrimental effects," comments pediatrician Neville Golden from Albert Einstein College of Medicine in New York.

There are several culprits that are causing most women, both young and old, to have a magnesium deficiency. Our typical Western diet is depleted of minerals due to modern farming practices and food processing procedures, and this fact greatly contributes to the general deficiency in magnesium. An additional reason can be attributed to soft drink consumption, which can leach vital minerals, including magnesium, out of the body.

In a recent Harvard study, researchers examined the relationship between the soda-drinking habits, activity levels, and history of bone fractures of 460 adolescent girls and found that ninth- and tenth-grade girls who drink soda pop have three to five times the risk of bone fractures compared with those who do not drink carbonated drinks.(1)

"Our findings have implications both for the health of teenagers and for the health of women at later ages," says Grace Wyshak of the Harvard School of Public Health and Harvard Medical School. Wyshak conducted two earlier studies on soda pop and bone fractures, one on postmenopausal women, the other on teenagers, and reached the same conclusion. In teenagers, she found that two or more sodas a day are enough to cause bone weakening.

Magnesium and Bone Quality

In an April 2011 study published in the journal *Biological Trace Element Research*, the magnesium intake in healthy young adults and its relation to bone quality was evaluated.(2) A total of 484 healthy young women in their early twenties were enrolled into the study, which found that "improving dietary intake of magnesium may positively impact bone quality in this population."

"Magnesium is a vital nutrient that works synergistically with both calcium and vitamin D," says Dr. Dean. "Adequate levels of magnesium in the body are essential for the absorption and metabolism not only of vitamin D but of calcium, because magnesium converts vitamin D into its active form so that it can help calcium absorption. Magnesium also stimulates a particular hormone, calcitonin, which helps to preserve bone structure and draws calcium out of the blood and soft tissues back into the bones, impacting the possibility of osteoporosis, some forms of arthritis and kidney stones."



Seaweed as a Rich New Source of Heart-Healthy Food Ingredients

ScienceDaily (July 21, 2011) — In an article that may bring smiles to the faces of vegetarians who consume no dairy products and vegans, who consume no animal-based foods, scientists have identified seaweed as a rich new potential source of heart-healthy food ingredients. Seaweed and other "macroalgae" could rival milk products as sources of these so-called "bioactive peptides," they conclude in an article in ACS's *Journal of Agricultural and Food Chemistry*.

Maria Hayes and colleagues Ciarán Fitzgerald, Eimear Gallagher and Deniz Tasdemir note increased interest in using bioactive peptides, now obtained mainly from milk products, as ingredients in so-called functional foods. Those foods not only provide nutrition, but have a medicine-like effect in treating or preventing certain diseases. Seaweeds are a rich but neglected alternative source, they state, noting that people in East Asian and other cultures have eaten seaweed for centuries: Nori in Japan, dulse in coastal Europe, and limu palahalaha in native Hawaiian cuisine.

Their review of almost 100 scientific studies concluded that that some seaweed proteins work just like the bioactive peptides in milk products to reduce blood pressure almost like the popular ACE inhibitor drugs. "The variety of macroalga species and the environments in which they are found and their ease of cultivation make macroalgae a relatively untapped source of new bioactive compounds, and more efforts are needed to fully exploit their potential for use and delivery to consumers in food products," Hayes and her colleagues conclude.



Vegetarian Diet May Protect Against Common Bowel Disorder

ScienceDaily (July 20, 2011) — Vegetarians are a third less likely to get a common bowel disorder (diverticular disease) than their meat eating counterparts, finds a new study published on the *British Medical Journal* website.

Diverticular disease has been termed a "disease of western civilisation" because of the higher numbers of cases in countries like the UK and the US compared with parts of Africa. The condition affects the large bowel or colon and is thought to be caused by not consuming enough fibre. Typical symptoms include painful abdominal cramps, bloating, wind, constipation and diarrhea.

Previous research has suggested that a low fibre diet could lead to diverticular disease, and that vegetarians may have a lower risk compared with meat eaters, but there is little evidence to substantiate this.

So Dr Francesca Crowe and her team from the Cancer Epidemiology Unit at the University of Oxford set out to examine the link between a vegetarian diet and intake of dietary fibre with the risk of diverticular disease.

Their findings are based on 47,033 generally health conscious British adults who were taking part in the European Prospective Investigation into Cancer and Nutrition (EPIC)-Oxford study. Of those recruited, 15,459 reported consuming a vegetarian diet.

After an average follow-up time of 11.6 years, there were 812 cases of diverticular disease (806 admissions to hospital and six deaths). After adjusting the factors such as smoking, alcohol and body mass index (BMI), vegetarians had a lower risk of diverticular disease compared with meat eaters.

Furthermore, participants with a relatively high intake of dietary fibre (around 25g a day) had a lower risk of being admitted to hospital with or dying from diverticular disease compared with those who consumed less than 14g of fibre a day.

Consuming a vegetarian diet and a high intake of dietary fibre are both associated with a lower risk of diverticular disease, say the authors. The 2000-1 UK National Diet and Nutrition Survey showed that 72% of men and 87% of women were not meeting the recommended average intake for dietary fibre of 18 g per day and so the proportion of cases of diverticular diseases in the general population attributed to a low fibre diet could be considerable, they add.

These findings lend support to the public health recommendations that encourage the consumption of foods high in fibre such as wholemeal breads, wholegrain cereals, fruits and vegetables, they conclude.

In an accompanying editorial, researchers from Nottingham University Hospital discuss the implications for the health of the population and the individual.

Based on these findings, David Humes and Joe West estimate that "about 71 meat eaters would have to become vegetarians to prevent one diagnosis of diverticular disease."

They add: "Overall the opportunity for preventing the occurrence of diverticular disease and other conditions, such as colorectal cancer, probably lies in the modification of diet, at either a population or an individual level." However, they stress that "far more evidence is needed before dietary recommendations can be made to the general public."



Soy/Milk Protein Dietary Supplements Linked to Lower Blood Pressure

ScienceDaily (July 19, 2011) — Milk and soy protein supplements were associated with lower systolic blood pressure compared to refined carbohydrate dietary supplements, in a study reported in *Circulation: Journal of the American Heart Association*.

The study's results suggest that partly replacing refined carbohydrates with foods or drinks high in soy or milk protein may help prevent and treat high blood pressure, said Jiang He, M.D., Ph.D., lead researcher of the study.

The randomized, controlled clinical trial is the first to document that milk protein lowers blood pressure for people with pre-hypertension and stage-1 high blood pressure.

Study participants who took a milk protein supplement had a 2.3 millimeters of mercury (mmHg) lower systolic blood pressure, compared to when they took a refined carbohydrate supplement.

Participants who took a soy protein supplement had a 2.0 mmHg lower systolic blood pressure when compared to the refined carbohydrate supplement.

Systolic blood pressure is the top number in a blood pressure reading and gauges the pressure when the heart contracts. Refined carbohydrate supplements were not linked to a change in systolic blood pressure.

The 352 adults in the study were at increased risk of high blood pressure or had mild cases of the condition.

Previous studies have shown that a diet rich in low-fat dairy products reduces blood pressure. Almost 75 million Americans have high blood pressure, a "silent killer" that can cause heart attacks, heart failure, strokes, kidney damage and other potentially fatal events.

"Some previous observational research on eating carbohydrates inconsistently suggested that a high carbohydrate diet might help reduce blood pressure," said He, an epidemiologist at Tulane University School of Public Health and Tropical Medicine in New Orleans, La. "In contrast, our clinical trial directly compares soy protein with milk protein on blood pressure, and shows they both lower blood pressure better than carbohydrates."

Participants were age 22 or older, with systolic blood pressure ranging from 120 to 159 mmHg and diastolic blood pressure from 80 to 95 mmHg. Each was randomly assigned to take 40 grams of soy protein, milk protein or a refined carbohydrate supplement every day, for eight weeks each. The supplements used were formulated in a way that allowed researchers to compare the effects of soy protein, milk protein, and refined complex carbohydrate on blood pressure without changing sodium, potassium, and calcium.

Each eight-week phase was followed by a three-week washout period when study participants did not take supplements. They took the three supplements as identical powder supplements dissolved in liquid.

Blood pressure readings were taken three times at each of two clinical visits before and two clinical visits after each eight-week phase, yielding a net blood pressure change for each supplement period. The study results showed no decrease in diastolic blood pressure.

"The systolic blood pressure differences we found are small for the individual, but they are important at the population level," He said.

Based on previous research, a 2 mmHg decrease in systolic blood pressure could lead to 6 percent fewer stroke-related deaths, a 4 percent lower rate of heart disease deaths and a 3 percent reduction in overall deaths among Americans.

Long-term studies would be needed to make specific recommendations for dietary changes, He said.



Twin Study Shows Lifestyle, Diet Can Significantly Influence Course of Macular Degeneration

ScienceDaily (July 6, 2011) — Eating a diet high in vitamin D, as well as the nutrients betaine and methionine, might help reduce the risk of macular degeneration, according to new research conducted by Tufts Medical Center scientists. Their study of identical twins from the US World War II Twin Registry also found that the more a person smoked, the higher their risk of developing macular degeneration.

The study, "Smoking, Dietary Betaine, Methionine, and Vitamin D in Monozygotic Twins with Discordant Macular Degeneration: Epigenetic Implications" published in the journal *Ophthalmology* on July 1, is the first to look at identical twin pairs in which one twin had early age-related macular degeneration (AMD), and the other had late stage AMD.

AMD is highly heritable, with genetic factors determining up to 71 percent of the disease's severity as determined by a previous study of this twin registry by this same research team. By examining identical twins with the same genes but whose disease was at different stages, researchers were able to identify environmental and behavioral factors that may contribute to severity of the disease. "We wanted to know why, if they have the same genes, do they have different stages of the disease?" said lead researcher Johanna M. Seddon, MD, ScM, Director of the Epidemiology and Genetics Service, Tufts Medical Center, and Professor of Ophthalmology, Tufts University School of Medicine.

"Eat a healthy diet with lots of fruits and vegetables, and that can make a difference -- even if you have a genetic susceptibility to macular degeneration," said Seddon, a specialist in macular degeneration, and, of course, don't smoke."

Macular degeneration is one of the leading causes of vision loss in older Americans. It occurs when cells in the macula, the part of the eye responsible for clear central vision, gradually die. Macular degeneration can progress so slowly it takes years for serious vision loss to occur but it can also develop rapidly, causing severe vision loss that can make it difficult to drive, read or conduct daily tasks.

Each twin completed a questionnaire about nutritional and health behaviors. The study found that twins whose macular degeneration was at the early stages tended to consume more vitamin D from dietary sources such as fish or milk than their brothers. Vitamin D may reduce the risk of macular degeneration because it has anti-inflammatory properties. It may also block the formation of new blood vessels that can grow under the macula, leaking blood and causing vision loss in the more severe stages of the disease. Similarly, Dr. Seddon's research team also found that higher intakes of betaine and methionine were linked to a slower progression of the disease. These nutrients have also been linked to epigenetic mechanisms, which is a change in DNA, not attributable to a change in the actual DNA sequence. Betaine is found in fish, grains and spinach, while methionine is found in poultry, fish and dairy foods.

The study also found that among the pairs of twins, the twin who was the heavier smoker tended to have the more severe case of macular degeneration. These results indicate that both genetic susceptibility and environmental factors are important, that epigenetic factors may also be involved, and further underscores the importance of modifiable behaviors, especially avoiding smoking and eating a healthy diet, to help prevent or delay the progression of macular degeneration.

The study evaluated pairs of elderly male twins and used a survey of personal dietary and health habits to determine variations.



Increasing Vegetable Intake By Hiding Vegetables In Children's Foods

Medical News Today 26 Jul 2011

Preschool children consumed nearly twice as many vegetables and 11 percent fewer calories over the course of a day when researchers Penn State added pureed vegetables to the children's favorite foods.

"Childhood obesity rates are on the rise, and at the same time children are not eating the recommended amount of vegetables," said Barbara Rolls, holder of the Helen A. Guthrie Chair in Nutritional Sciences. "Vegetables have been shown to help lower calorie intake. The problem is getting kids to eat enough vegetables."

In their study, the researchers served vegetable-enhanced entrées to 39 children between the ages of 3 and 6 on three separate days. They tested three familiar foods -- zucchini bread for breakfast, pasta with a tomato-based sauce for lunch and chicken noodle casserole for dinner. The team modified the standard recipes for these foods by adding a variety of pureed vegetables to reduce the calories in the entrées by 15 percent and 25 percent.

"We incorporated several vegetables into the dishes, including broccoli, cauliflower, zucchini, tomatoes and squash," said Maureen Spill, a post-doctoral fellow in nutritional sciences and the study's lead author. "We were pleased to find that the children found the vegetable-enhanced versions to be equally acceptable to the standard recipes."

According to Spill, the children ate the same weight of food regardless of the vegetable content of the entrées. And when they ate the vegetable-enhanced entrées as opposed to the standard-recipe entrées, their daily vegetable intake nearly doubled while their calorie intake decreased by 11 percent. The team's findings are online today in the *American Journal of Clinical Nutrition*.

Rolls and Penn State colleagues Alexandria Blatt, a recent Ph.D. recipient and Liane Roe, a researcher, both in nutritional sciences, found similar results when they served vegetable-enhanced entrées to adults. That work appeared in the April 2011 issue of the *American Journal of Clinical Nutrition*.

"Regarding children, some people argue that hiding vegetables in foods is deceptive and that doing so suggests that whole vegetables are not acceptable," said Rolls. "But I don't agree. Parents modify recipes all the time. For example, it is well-accepted that applesauce can be used to replace oil in cake batter."

Spill noted that serving vegetables both within entrées and as side dishes is a great way to increase daily vegetable intake even more. "Preparing vegetable-enhanced entrées is a technique that should be used with other strategies, such as providing vegetables as snacks and side dishes. Together these strategies can substantially increase children's vegetable intake while also teaching them to like vegetables."



Nutritional Use Discovered For Dry Onion Skin

Medical News Today 15 Jul 2011

More than 500,000 tonnes of onion waste are thrown away in the European Union each year. However, scientists say this could have a use as food ingredients. The brown skin and external layers are rich in fibre and flavonoids, while the discarded bulbs contain sulphurous compounds and fructans. All of these substances are beneficial to health.

Production of onion waste has risen over recent years in line with the growing demand for these bulbs. More than 500,000 tonnes of waste are generated in the European Union each year, above all in Spain, Holland and the United Kingdom, where it has become an environmental problem. The waste includes the dry brown skin, the outer layers, roots and stalks, as well as onions that are not big enough to be of commercial use, or onions that are damaged.

"One solution could be to use onion waste as a natural source of ingredients with high functional value, because this vegetable is rich in compounds that provide benefits for human health", Vanesa Benítez, a researcher at the Department of Agricultural Chemistry at the Autonomous University of Madrid (Spain), tells SINC.

Benítez's research group worked with scientists from Cranfield University (United Kingdom) to carry out laboratory experiments to identify the substances and possible uses of each part of the onion. The results have been published in the journal *Plant Foods for Human Nutrition*.

According to the study, the brown skin could be used as a functional ingredient high in dietary fibre (principally the non-soluble type) and phenolic compounds, such as quercetin and other flavonoids (plant metabolites with medicinal properties). The two outer fleshy layers of the onion also contain fibre and flavonoids.

"Eating fibre reduces the risk of suffering from cardiovascular disease, gastrointestinal complaints, colon cancer, type-2 diabetes and obesity", the researcher points out.

Phenolic compounds, meanwhile, help to prevent coronary disease and have anti-carcinogenic properties. The high levels of these compounds in the dry skin and the outer layers of the bulbs also give them high antioxidant capacity.

Meanwhile, the researchers suggest using the internal parts and whole onions that are thrown away as a source of fructans and sulphurous compounds. Fructans are prebiotics, in other words they have beneficial health effects as they selectively stimulate the growth and activity of bacteria in the colon.

Sulphurous compounds reduce the accumulation of platelets, improving blood flow and cardiovascular health in general. They also have a positive effect on antioxidant and anti-inflammatory systems in mammals.

"The results show that it would be useful to separate the different parts of onions produced during the industrial process", explains Benítez. "This would enable them to be used as a source of functional compounds to be added to other foodstuffs".



Regulatory & Safety News

Mandated Calorie Counts Changing Ordering Habits

July 27, 2011 Food Product Design

NEW YORK—A 2008 New York City's law requiring restaurant chains to prominently post calorie counts on their menus has resulted in one in six consumers noticing the nutrition labels and basing their food purchases on calorie counts, according to a new study published in the *British Medical Journal*.

The city of New York and the Robert Wood Johnson Foundation conducted cross-sectional surveys at 168 randomly selected locations of the top 11 fast-food chains in New York City in Spring 2007 and Spring 2009 (one year before and nine months after full implementation of regulation requiring chain restaurants' menus to contain details of the energy content of all menu items). They found that while overall calorie consumption did not change, Au Bon Pain, McDonald's and KFC saw significant reductions in the amount of calories ordered. Customers on average bought 44 fewer calories at McDonald's, 80 fewer calories at Au Bon Pain and 59 fewer calories at KFC.



Codex Decides on Key Issues for Food Supplement Sector

Nutrition Horizon

Jul 18 2011 --- The Codex Alimentarius Commission (CAC) has agreed on a way forward for key issues in the food supplement sector – Steviol Glycosides, Nutrient Reference Values, Genetically Modified Organisms and fish oils, IADSA can report.

At its meeting earlier this month in Geneva, the CAC, the highest decision-making body in Codex, adopted firstly, the 'General Principles for Establishing Nutrient Reference Values (NRVs) of Vitamins and Minerals for the General Population'.

It also adopted a 'Compilation of Codex texts relevant to the Labelling of Foods Derived from Modern Biotechnology', following a decision from its food labelling committee to discontinue work on definitions and labelling conditions for Genetically Modified Organisms (GMOs) following no agreement, and to develop the compilation of existing Codex texts instead.

Thirdly, the CAC endorsed the decision of its Codex Committee on Fats and Oils (CCFO) to develop a 'Standard for Fish Oils', which will cover oil from fish and shellfish, and on the additives front, it agreed a maximum level for the use of Steviol Glycosides (INS 960) as an additive in food supplements, at the level of 2,500 mg/kg as proposed by IADSA. This level and use applies only to chewable food supplements.

"This week's meeting has seen significant developments," said IADSA's Regulatory Affairs Director David Pineda Ereño. "We are pleased that the CAC has accepted our scientific and technological justification for the retention of Steviol Glycosides, and in terms of nutrient reference values, the agreed text includes changes consistent with IADSA position."

"The decision to finalise the work on definitions and labelling for GMOs too ends years of discussion," he continued, "with some countries proposing process-based GMO labelling and others proposing GMOs to be declared on the label only when they are present in the final product."



New Processing Technique Improves Ice Cream

July 14, 2011 Food Product Design

EDE, The Netherlands—High-pressure (HP) processing has successfully been applied as a tool to improve the functionality of milk proteins in ice cream. The findings may allow ice cream manufacturers to reduce the use of additives and make better low-fat products, according to a new study published in the *International Dairy Journal*.

Scientists from NIZO food research, University College Cork and the University of Guelph who discovered the mechanisms responsible for the changes said HP treatment could have several important benefits for ice cream manufacturers, including the improvement of reduced-fat in ice cream and the possibility of making products without the additives that are normally included to prevent ice crystallization. HP treatment may also allow ice cream manufacturers to cut raw material costs by reducing the protein content without compromising texture or mouthfeel. The benefits are a result of the increased viscosity and higher resistance to melting induced by the HP processing.

“Transmission electron micrographs showed the presence of a network of micellar fragments, arising from HP-induced disruption, in the HP-treated mix and ice cream prepared there from. The network of micellar fragments is believed to be responsible for the increased viscosity and reduced melting, and is hypothesized to occur as a result of calcium-induced aggregation of caseins on decompression,” they said.



Finger Millet Flour Improves Bakery Texture

July 13, 2011 Food Product Design

KARNATAKA, India—Replacing 100% wheat flour with 60% finger millet flour in muffins increases the nutritive value and significantly improves the viscosity of batter characteristics and overall quality, flavor and texture of the muffins, according to a new study published in the *Journal of Texture Studies*.

Researchers at the Central Food Technological Research Institute also found the addition of emulsifiers and hydrocolloids significantly improves the quality of the muffin batter mix.

The team studied the effect of replacement of wheat flour with 0%, 20%, 40%, 60%, 80% and 100% finger millet flour (FMF), 60% FMF, emulsifiers and hydrocolloids on the batter microscopy, rheology and quality characteristics of muffins. The amylograph peak viscosity, breakdown and setback values decreased as the level of FMF increased. The muffin batter microscopy showed that addition of above 60% FMF in blend decreased the number of air cells, indicating poor air incorporation. With the increase in the FMF level from 0% to 100%, the muffin batter density, viscosity, volume and total score decreased, whereas crumb firmness increased. Adverse effect on the quality characteristics of cake was observed above 60% FMF.

Use of a combination of polysorbate-60 and hydroxypropylmethylcellulose significantly improved batter characteristics of muffins with 60% FMF, with respect to viscosity, overall quality of muffin with reference to volume, grain and texture.



Antioxidants' Nutritional Role

June 20, 2011 Food Product Design

Science is uncovering the advantages of consuming dietary antioxidants, from vitamins C and E to phytochemicals found in fruits and vegetables, like quercetin and anthocyanins.

Antioxidants significantly decrease the adverse effects of reactive oxygen and nitrogen species (free radicals) on normal physiological functioning and modify cell-signaling pathways. Free radicals are produced during normal cellular metabolism and are both beneficial and harmful to human health. Overproduction of free radicals, in conjunction with a deficiency in antioxidants, can lead to oxidative stress and, consequently, damage to cellular lipids, proteins and DNA (*Chemico-biological Interactions*, 2006; 160:1-40; *Cardiovascular Research*, 1992; 26:641-655).

The human body has several defense systems, including antioxidant defenses, which protect it from free-radical damage. However, our internal antioxidant defense systems can be overwhelmed when the production of free radicals increases rapidly by, among other things, high exposure to pollutants and excessive exercise (*Journal of Anatomy*, 2000; 197:539-541; *American Journal of Respiratory and Critical Care Medicine*, 2004; 171:379-387).

Distinct benefits

Three of the most-prominent dietary antioxidants are vitamins C and E, and the carotenoids. Vitamin C protects molecules in the body, including proteins, fats, carbohydrates, DNA and RNA, from free-radical damage, and it may also help regenerate other antioxidants, such as vitamin E (*American Journal of Clinical Nutrition*, 1999; 69:1,086-1,107).

Vitamin E is found throughout the body in cellular and subcellular membranes, where it prevents the oxidation of PUFAs in cell membranes, a process that disrupts membrane structure and function, and cell function. Among the eight isomers of vitamin E, gamma-tocopherol is the most-prevalent isomer found in the diet, yet approximately 90% of the vitamin E found in plasma is alpha-tocopherol, the isomer considered to be the most biologically important (Institute of Medicine (IOM). Food and Nutrition Board. "Dietary Reference Intakes: Vitamin C, Vitamin E, Selenium, and Carotenoids." Washington, DC: National Academy Press, 2000).

Though diets high in carotenoid-rich produce are associated with a reduced risk of cardiovascular disease and some cancers, clinical trials indicate that beta-carotene supplementation may not reduce the risk of cardiovascular disease and cancer, and high-dose supplementation may actually increase the risk of lung cancer in some populations, notably smokers and persons exposed to asbestos (*Evidence Reports/Technology Assessments*, 2006; 139:1-117). Therefore, the Institute of Medicine states that "beta-carotene supplements are not advisable for the general population" ("Vitamin A and Carotenoids," National Institutes of Health).

The carotenoid lycopene is best known for its potential role in protecting against prostate cancer. Animal studies have found that lycopene inhibits tumor growth (*Journal of Nutrition*, 2005; 135:287-290), and human clinical trials have also found that tomato sauce, which is naturally rich in lycopene, may help suppress the progression of prostate cancer (*Nutrition and Cancer*, 2003; 47:40-47). Lycopene may also protect low-density lipoprotein (LDL) from oxidation, therefore protecting against atherosclerosis (*Archives of Biochemistry and Biophysics*, 2010; 504:26-33).

Two additional carotenoids, lutein and zeaxanthin, are the only two antioxidants found in the macula of the eye, the part of the retina responsible for central vision. These two carotenoids protect the retina from oxidative stress and filter harmful blue rays. And higher plasma levels of lutein and zeaxanthin are associated with a decreased risk of age-related macular degeneration (*Investigative Ophthalmology & Visual Science*, 2006; 47:2,329-2,335; *Investigative Ophthalmology & Visual Science*, 2003; 44:2,461-2,465).

In addition to vitamins C and E and the carotenoids, many other antioxidants may play important roles in human health. For instance, pterostilbene, a derivative of resveratrol, suppresses an enzyme that activates processes that cause cancer (*Carcinogenesis*, 2010; 31:1,272-1,278; *Cancer Prevention Research*, 2009; 2:650-657), and it can help lower LDL cholesterol and triglycerides (*Journal of Agricultural and Food Chemistry*, 2005; 53:3,403-3,407; *USDA Agricultural Research Magazine*, 2006; 54(11-12):6-7). Quercetin and resveratrol protect cells from oxidative damage and may have some cardioprotective functions and anti-tumor properties, although long-term clinical trials are necessary (*Lancet*, 1993; 341:1,103-1,104; *Anticancer Agents in Medicinal Chemistry*, 2009; 9:138-161).

Anthocyanins are non-selective Cox-1 and Cox-2 inhibitors (*Journal of Natural Products*, 1999; 62(2):294-296), and cellular and animal studies indicate that anthocyanins can inhibit LDL oxidation and lipid peroxidation and reduce markers of inflammation (*Journal of Nutritional Biochemistry*, 2002; 13:282-288; *Journal of Food Science*, 2008; 73:H113-H121). In addition, 240 ml anthocyanin-rich tart cherry juice consumed twice daily for 14 days improved

plasma measures of antioxidant defenses in healthy older adults (*Journal of Nutrition*, 2009; 139:1,896-1,900). A few additional studies have found that tart cherry juice can help significantly decrease strength loss and pain compared to placebo after a bout of eccentric (muscle-damaging) exercise (*British Journal of Sports Medicine*, 2006; 40:679-683), and helped runners tame inflammation and recover isometric strength significantly faster than a placebo after a marathon (*Scandinavian Journal of Medicine & Science in Sports*, 2010; 20:843-852).

Certain antioxidants may be beneficial, but more isn't necessarily better and, in some instances, antioxidants can become pro-oxidants. In addition, antioxidant supplementation may prevent cellular adaptations to chronic exercise by inhibiting cellular signaling pathways involved in muscular adaptations to exercise (*American Journal of Clinical Nutrition*, 2011; 93:1,373-1,383; *The Journal of Physiology*, 2011; 589:2,117-2,118; *The Journal of Physiology*, 2011; 589:2,119-2,127).

The research on antioxidants continues to unfold in the literature, but we still have much to learn. However, in addition to the aforementioned benefits associated with specific antioxidants, experts recommend consuming antioxidant-rich foods with each meal to prevent postprandial oxidative stress (*Nutrition*, 2007; 26:170-181). Therefore, food manufacturers should consider formulating products with antioxidant-rich foods to improve consumer intake and, potentially, various aspects of health.



Mangos Trim Body Fat, Control Blood Sugar

June 14, 2011 Food Product Design

STILLWATER, Okla.—Incorporating mango in the diet may help to reduce body fat and control blood sugar and ultimately lower the risk for developing metabolic syndrome, which can lead to obesity, diabetes and cardiovascular disease, according to new research conducted at Oklahoma State University.

“Mango contains many nutrients and other bioactive compounds that can provide various health benefits aside from what we investigated,” said lead researcher Edralin Lucas. “It is high in fiber, vitamins A and C, as well as other minerals and phytochemicals. In addition to the positive effects on body fat, blood lipids and glucose, it is not associated with serious side effects such as negative effects on bone that is linked with the use of rosiglitazone, a drug commonly used to lower blood sugar.”

OSU researchers conducted a study to determine the effectiveness of powdered mango flesh in modulating blood glucose and lipid values in mice fed a high-fat diet to induce obesity. They formulated six diets with various additives including a regular mouse diet, which had 4% total calories from fat, and five high-fat diets with 35% total calories from fat. One diet was only high fat, while the other four high-fat diets also contained 1% mango powder, 10% mango powder, fenofibrate or rosiglitazone. After adjusting the high-fat diets to have similar carbohydrate, fiber, protein, fat, calcium and phosphorous content, the team assigned eight mice to each of the six diets and allowed them to eat and drink at will for two months.

After a 2-month follow-up, they found no statistically significant differences in body weight among the mice, but the amount of body fat was varied according to the diets. Both diets containing mango had comparable effects with those of rosiglitazone and fenofibrate in reducing body fat. The mice consuming diets with mango or the two drugs had body fat levels similar to those mice eating the standard control diet. The mango-containing diets also exhibited glucose and cholesterol-lowering properties. The 1% mango diets had a similar or even a more pronounced effect in reducing blood glucose than the diet containing rosiglitazone.

The researchers also determined mango affected several factors involved in fat metabolism including a reduction in the circulating level of the hormone leptin. Mice that received high-fat diets containing mango had significantly lower levels of leptin than mice eating the high-fat diet alone.

Mangos also have been found to lower the risk of breast and colon cancer. A study conducted by [Texas AgriLife Research food scientists tested mango polyphenol extracts in vitro on colon, breast, lung, leukemia and prostate cancers](#). Although the mango created some difference against lung, leukemia and prostate cancers, it was most effective on common types of breast and colon cancers.

