Food Allergens and Their Control: Dr. J. S. Pai

Food allergies have affected human beings from early times. However, they were ignored by medical community and regulatory agencies until more recently. They are widely recognised in western countries. They are still not understood in many parts of the world especially in developing countries. Inadvertent exposure to allergen by sensitive individuals can be extremely serious and even deadly.

In the US, 3.5-4% (about 12 million) consumers are estimated to suffer from food allergies much more than about a decade ago. Even a larger percentage (10%) of households may perceive to have at least one member with food allergy. These consumers will make purchases based on these perceptions. Hence food allergies have become a serious issue for food industry.

This increased perception may be due to increased awareness rather than an actual increase in prevalence of food allergies. More allergic consumers have become assertive and making enquiries, creating increased interest in consumer product companies about food allergies and allergen control strategies in manufacturing their products.

There is still lack of clear understanding about food allergies by food industry professionals and other employees, regulatory officials and consumers. There are many myths about food allergies among consumers, many of whom attribute food intolerances or even food preferences to allergies. Distinction must be made between true allergies and other forms of food intolerances in food industry allergen management practice.

Food sensitivity is an abnormal physiological response to a particular food. The same food is safe for vast majority of consumers. Some people refer to any abnormal response to foods as allergy, however, allergies and other sensitivities have different mechanisms. Allergies are abnormal responses of immune system and allergens in food are typically naturally occurring proteins. In case of food intolerances also a limited number of individuals are sensitive to certain foods. However, intolerances do not involve immunologic mechanism. In most cases, food intolerances show less severe effects than allergies and frequently sensitive individuals can frequently tolerate some amount of offending food in their diets. Individuals with milk allergy cannot tolerate even small amounts of milk while those with lactose intolerance can drink a little milk or some types of fermented milk products.

Allergic Reaction

Allergen is a substance which when enters the body will cause an abnormal immunological response. Most allergens are proteins. Immune system only detects particles above a certain size as potentially allergenic. In small number of cases, body actually responds to molecules other than protein. These are much smaller than protein and are called haptens. By combining with protein molecules, haptens form larger complexes that can be detected by the immune system.

The allergen is detected by the B cells, which are special immune cells capable of producing antibodies. Antibodies are also proteins and capable of neutralising allergens. There are different types of antibodies that B cells can produce and when allergen is present in allergic individual, it forms IgE immunoglobulins that not only neutralise allergen but it attaches to mast cells and sends signals triggering release of histamine. This chemical substance is responsible for many symptoms of allergic reactions like muscle cramps and inflammation-like process with redness and swelling of mucous membranes. Besides certain foods, grass pollens, house dust etc. may cause allergic response in sensitive individuals.

Wide ranging symptoms from mild to life threatening can follow allergies. They can involve GI tract (nausea, vomiting, diarrhoea, abdominal cramping), skin (hives, dermatitis, eczema, oedema, itching etc.) or the respiratory tract (rhinitis, asthma, laryngeal oedema). Food allergies most cause first two types of symptoms while environmental allergies may cause mostly

problems related to respiratory tract. Most severe food allergies may cause anaphylactic shock involving GI tract, skin, cardiovascular system, with symptoms occurring in combination and developing rapidly and may even result in death.

Most IgE-related food allergies are due to small group of foods namely milk, eggs, fish, shellfish, peanuts, soybeans, tree nuts and wheat, accounting for over 90% of all allergies in the US and according to FAO, the most common causes of food allergy worldwide. As can be seen these are common foods consumed by most population and only a small percentage of the population may be sensitive to them. Also among the many proteins present in these foods, only one or a few may be capable to act as allergen.

Another type of allergy involves reactions mediated by tissue-bound immune cells and one example related to food is celiac disease occurring in certain individuals after eating wheat, rye, barley and perhaps oats. It results from abnormal response of the T lymphocytes in small intestine to gluten and related proteins resulting in tissue damage localised to small intestine. This may disrupt absorptive process affecting many other physiological functions. Symptoms include diarrhoea, bloating, weight loss, anaemia, chronic fatigue, weakness, muscle cramps and in children growth retardation. Severity is variable and symptoms develop 24 to 72 hours after ingestion lasting for days. Death from acute phase of celiac disease is not reported but patients are likely to develop malignant lymphomas. It is more prevalent in European countries than in the US but it rarely occurs in Asian and African populations.

Although symptoms of food allergies can be treated with antihistamines, epinephrine etc., the only prophylactic approach is specific avoidance diet. Hence, those who are allergic to peanuts must avoid ingesting peanuts. However, safe and effective way of avoidance of allergenic food is sometimes challenging. Since the allergens are found in protein fractions, all forms of food containing that protein must be avoided. People allergic to milk must avoid all dairy products as well as dairy ingredients like casein, caseinates, whey etc. Ingredient statement on the label provides critical information to food allergic individuals.

Allergic reactions may spur symptoms on exposure to small amounts of offending food. The small amount of allergen interacts with IgE antibodies on surface of mast cells that release massive quantities of histamine. This explains low degree of tolerance to allergens. Although threshold doses are unknown as little as 1 to 2 mg of offending food will elicit allergic reactions in sensitive individuals. Severity of symptoms will increase with the amount of allergenic food.

Sometimes allergic individuals that normally read food ingredients statements on labels carefully, may miss the “hidden” presence of offending food in the product. Examples are use of caseinates in products may be missed by individual looking for milk in ingredients list. Sometimes food ingredients are derived from allergenic source materials and may contain residues of the proteinaceous allergens from the sources. Sometimes ingredients are listed under collective terms and each ingredient within that may not be listed. Examples are flavours, spices, oils, starch and lecithin. Even when derived from allergenic sources, they do not always contain residues of allergens. Highly refines peanut and soybean oils may contain extraordinarily low amounts of proteins not enough to cause allergic reactions. Unexpected residues of allergenic foods in other foods are the result of formulation mistakes, packaging errors, unwise use of rework or inadequate cleaning of shared equipment. Although these are rare, consequences are serious.

Intolerance

Food intolerances on the other hand are due to metabolic food disorders impairing the ability to metabolise a food component. These may be often genetically acquired and common examples are lactose intolerance and favism. Lactose intolerance is cause by deficiency of lactase resulting in inability to metabolise lactose (milk sugar) to galactose and glucose, which then can be absorbed by intestine. Undigested lactose remains in the intestine and passes into the colon

where bacteria feed on it producing gas (CO_2) and causing bloating, flatulence, abdominal cramps and diarrhoea. This affects a large number of people world-wide and more frequently in certain ethnic groups.

Favism is an intolerance to broad beans (fava beans) occurring in individuals with a deficiency of erythrocyte glucose-6-phosphate dehydrogenase that prevents oxidative damage to erythrocyte membranes. Broad beans contain some oxidants like vicine and convicine that are capable of damaging erythrocyte membranes in deficient individuals. The result is acute haemolytic anaemia with pallor, fatigue, dyspnea, nausea, abdominal and/or back pain, fever and chills with more serious symptoms like haemoglobinuria, jaundice and renal failure occurring in rare cases. Here also certain ethnic communities are affected.

Designing Allergen Control Programmes

Food industry began allergen control activities in 1990s. Awareness and potential severity of allergies led to efforts that began over the past decade. Many companies have such programme in practice although effectiveness is variable due to complexity of the problem and the diversity of products and ingredients, range of products sharing equipment and facilities as well as feasibility of allergen cleaning and participation of suppliers and custom processors. Still many companies have effective allergen control programmes reducing the chances of allergy in consumers of their products.

Regulatory authorities also took notice in early 1990s and in mid-1990s there were many food allergen recalls. Retail surveys by FDA indicate that about 25% of products in certain categories contained undeclared residues of peanuts. This shows that some companies still lack effective control programmes.

Allergen control programme starts with risk assessment. True allergies cause serious illnesses. Large number of emergencies and many deaths occur annually from allergic reactions to foods. While most consumers with food allergy may not be at risk of such severe reactions, industry should focus on preventing severe reactions. Common allergenic foods (milk, eggs, fish, shellfish, peanuts, tree nuts like almonds, walnuts etc., soybeans and wheat) account for over 90% of allergic reactions so it would be wise to focus on these.

Even trace amounts of allergenic food can elicit reactions in susceptible individuals. Although minimal (threshold) dose eliciting reactions is not precisely known, evidence indicates that even 1-3 mg of peanut, milk and egg can elicit reactions in most sensitive individuals. By addressing these issues properly manufacturers and suppliers should prepare an approach to allergen management.

Comprehensive Strategy

Allergen control is everyone's job requiring total company commitment with appropriate role for everyone in the company. Core team may be developed to address various aspects.

Purchasing: Manufacturers must know the composition of all raw materials contained in formulations. Allergen content of all raw materials must be known. Checklists may be sent to suppliers to ascertain if raw materials contain any known allergens, ingredients derived from them or potential cross-contact allergens by shared equipment. Sometimes audit may be used with allergen test kits to detect residual allergens.

Receiving: Ingredients received must be carefully handled after allergens have been identified in them. Ingredients containing allergens may be segregated and handled, transported and stored separately in marked area to avoid contamination.

Operations: Prevention of allergenic material entering inadvertently into foods is effected by separation and dedication. Separation is by removing food allergenic residues through good cleaning, sanitation and scheduling (preparing allergen-containing products last). Dedication is by having dedicated plant or dedicated lines where no allergens are allowed.

Manufacturing facilities are often shared by many products some containing allergens. Dedication, separation, scheduling and sanitation are important in allergen control in operations. If entire facilities cannot be dedicated, individual processing lines can be using colour coding to distinguish them. Bakery could have specific baking lines that are devoted to non-allergenic formulations. When dedicated lines are adjacent, additional precautions like heavy plastic separation panels are necessary to avoid dust transfer etc.

In the absence of dedication or separation, scheduling becomes important. Allergenic products should be manufactured on shared equipment after non-allergenic products. Allergen cleanup is necessary before starting non-allergenic production. Long runs will avoid frequent clean-ups and scheduling. Also introducing allergenic ingredient later into the process will expose lesser portion of the process line that may need cleanup.

Shared frying oil is common in processed food industry. There are no reports of allergic reactions attributed to shared frying oil. Most companies do not segregate frying oil and its use for multiple products is widely practiced. One safe practice would be us of filtration systems for shared frying oil, which would remove particulates that might contain allergen. It can also be established by analysing non-allergenic product fried after frying of allergenic product by immunoassay-based test kits for the absence of allergen.

Rework: Recalls have occurred from misuse of allergen-containing rework in products that were not supposed to contain allergen. Rework should be used only in the similar product on same day. Proper labelling also avoids misuse.

Reworking is commonly used in confectionery industry due to expensive ingredients. Chocolate coated material may be ground to salvage chocolate. Recycled chocolate may contain peanuts, tree nuts and dairy ingredients. Chocolate that contacted allergen substances above may pick up these allergens in small quantities. To avoid problems this chocolate must be kept separate from fresh chocolate. Most companies keep strict segregation. Employee training and education are critical in this matter and the consequences of mishap to sensitive consumers.

Sanitation: Some equipment is not designed for easy cleaning and becomes difficult to ensure proper sanitation to avoid allergen contamination especially in enrobers and baking ovens. Wet cleaning with hot water and detergent is preferable where feasible. Clean-in-place systems are ideal as they are consistent once validated. Dry systems are difficult but necessary where wet cleaning is impossible. Wiping and vacuuming are effective whereas air blowers simply spread allergen around.

Extent of cleanup also depends on probability of allergen contamination. If soy lecithin is the only probable source of soy protein in the formulation, cleanup after this production is unnecessary as lecithin will only contribute relatively low traces of soy protein. So normal cleaning would control contamination. Validation of sanitation using ELISA kits is necessary to ensure the effectiveness of any sanitation procedure.

Allergen-Safe Processing

Many manufacturers avoid potential problems by stating that the food “may contain” allergens or is processed in factory that also processes allergenic foods. Some companies do not use this escape route and ensure that no allergenic substances are used in or residues get into any of its products. They heavily review suppliers and co-manufacturers to ensure this. However,

sometimes it is very difficult to implement when similar grains are used. Oat products may contain wheat since both are transported and stored in common equipment. Cleaning wheat from oats is difficult due to similarity in size and appearance. Also removing soy from corn is difficult.

When facilities and equipment are used for both allergenic and non-allergenic food ingredients, strict protocols must be used. Scheduling may minimise but does not eliminate proper cleaning to avoid inclusion of residues. Proper cleaning followed by testing is necessary to avoid cross contamination. There are sensitive tests using ELISA principle available that can detect 2.5 to 25 ppm of allergen in foods. First non-allergenic food produced after processing allergenic ingredient containing food and cleaning to remove allergenic traces is tested for the presence of allergen.

Effective programme needs efforts and total commitment. Control programme may vary from company to company depending on nature of products, processes used and the equipment. The most important element is validation of effectiveness of control programme. Precautionary labelling like “may contain” do not supersede good manufacturing practices and are to be used when reliable control measures are not available or when dedicated facilities are not economically viable.

Functionally Fortified Infant Nutrition

Consumers in US have been demanding healthy food choices, whether organic, natural or functionally enhanced. Although it has taken time, demand has permeated into infant nutrition segment that has thrilled the parents wanting their babies to have such foods. The reason for the parents' interest in healthier and functional children's foods is the increased cases of child obesity, tooth decay, developments in products and increased acceptance of functional foods.

Baby food and drink sales were estimated at over $3.5 billion for 2006 of which powder and ready-to-drink formulas showed slight increase in sales from 2004-2006. This sector has benefited from the launch of products containing docosahexaenoic acid (DHA) and arachidonic acid (ARA) as well as other nutrients.

In the toddler food segment apparently manufacturers want mothers to spend more time in baby food and drink aisle by creating more toddler-specific products. This approach has been successful in the growth of the segment. Mothers intending to use toddler foods, the common reason has been fortification. Over 71% mothers used them as they were fortified with vitamins especially for toddlers. About 60% used them since they were easier for toddlers to hold or eat and over 52% said they were easier to prepare for the child.

Mintel's consumer research shows that there is an interest in organic baby products although "all natural" makes it more appealing, which mothers of 3 year old and below say is a very important attribute for selection of food or drink for their child. Market leaders have been Mead Johnson that makes Enfamil (35% market share) followed by Ross Products (who make Similac and Pedialyte) and Gerber.

Market Trends

Infant nutrition products generally fall into two categories namely those with significant levels of fortification and those with focus on inherent goodness of ingredients. Most of them focus on fortification that provides optimum nutrition to promote healthy growth and development of infants. It is also important that products fortification is carried out with ingredients that are naturally found in breast milk and ingredients promoting growth and development.

US is still to catch up with rest of the world especially in infant foods and formulas. US was one of the last to approve DHA that has been used elsewhere for years in formula. Most parents and especially parents of infants want pure and natural. Mothers take a lot of advice from their doctors and from other friends and family. When a child starts on solid foods, natural and pure are most important. When kids get older and more selective and more adamant, mothers get more interested in getting added nutrition into them at every opportunity so fortification becomes quite important.

Paediatric Probiotics and Prebiotics

Probiotics seems to be very popular at mass-market level. Recent paediatric symposium discussed gut immunity and enhancement of long-term health due to probiotics was discussed by renowned paediatricians including how intestinal microflora influence child's developing immune system and how its disruptions impact infections, inflammatory and allergic diseases.

Prof. Walker of Harvard Medical School talked about how pasteurisation and sterilisation of foods, use of antibiotics and more caesarean sections have reduced exposure to microorganisms. In infants this may increase disease burden as the mucosal immune system fails to develop properly. Appropriate colonisation correlates with development of many defences and prevention of diseases. Inadequate colonisation can be overcome by use of probiotics as "surrogate" colonisers.

Prof. Martin of UCLA School of Medicine discussed how the study of the role of intestinal microflora in health and disease is critical due to rise in allergic and autoimmune disorders in infants. He highlighted how probiotics have potential benefits on the gut and immune functions that are critical in development in infancy.

Prof. Isolauri of University of Turku, Finland emphasised that not all probiotics are equal in effectiveness. Breast milk contains bifidobacteria and certain species may promote healthy microbiota development. These species have been shown to exert positive benefits in GI tract infections and antibiotic-associated diarrhoea.

Last May, a starter infant formula with probiotic Bifidobacterium lactis was launched that was claimed to support healthy immune system. This formula was made with 100% whey partially hydrolysed for easy digestion and contained DHA and ARA for brain and eye development. Another company launched a family of products meant for feeding infants at different times of the day. This is similar to breakfast, mid-day meal, lunch, etc. Breakfast product contains whole grain and soluble fibre to release steady energy throughout morning, keeping them alert and energetic. At night, as babies grow more while resting, they need food containing high quality protein to build muscle. Evening food is formulated with prebiotic inulin to aid digestion by stimulating growth of good bacteria in baby's digestive system.

Mothers are keen to provide every advantage their child can get through food and nutrition. They want their infants to feed well and develop good eating habits for the future. They want nutrition with less of the bad stuff (added sugar, excessive sodium etc.) and more of good over and above coming from normal foods, for example that supporting brain and eye as delivered by say DHA.

Another company launched first baby cereal with probiotics being the only organic baby cereal with DHA, claiming to be the only baby cereal recommended by renowned paediatrician and best selling author, Dr. Robert Sears who helped develop its range of healthy meals for babies and toddlers. Dr. Sears says that strong brain, eye and immune advancements at the earliest stage are crucial in overall good health and wellbeing of children and this is possible with cereals with DHA and probiotics.

Food allergies are increasing and poor eating habits developing early in children. Deficient immune systems, asthma, attention problems and early age obesity are more common than ever before. Providing them with solutions through proper food with health-providing ingredients is necessary.

Varieties of baby cereals include oatmeal made from organic whole oats, rice made from organic brown rice and multi-grain made from organic oats, quinoa and amaranth. All are fortified with vitamins and minerals including iron, folic acid and zinc. In addition, DHA and probiotics have also been added.

As the Market Grows Up

With the infant nutrition segment has accepted functional fortification beyond the standard vitamins and minerals, future looks promising at least from the product development point of view. The childhood obesity problem will also be in focus in future of baby foods. According to the study several baby food and drink manufacturers address this problem through educational efforts. It is expected that infant weight control will be used more in marketing of baby foods in coming years.

2005 study of consumers showed 40% families with children 3 years and under used baby formula, while 41% used baby food/cereal/juice with strongest usage is among families with children up to 1year. With products specifically directed to them being introduced, this segment will grow significantly.

Condensed from an article by Joanna Cosgrove in Nutraceuticals World January 2008

Watch What You Say: Todd Harrison

The following criteria can help guide companies when marketing their dietary supplements.

Criterion 1: A claim may not suggest that the product has an effect on a specific disease or class of disease.
Examples of impermissible claims under this criterion include:
• Reduces the pain and stiffness associated with arthritis.
• Helps alleviate the pain associated with migraine headaches.
• Helps alleviate the blues associated with emotional despair (i.e., despair=depression).
Examples of claims that do not violate this criterion include:
• Helps alleviate the occasional blue feeling everyone experiences from time to time.
• Helps maintain joint health and flexibility.
• Helps maintain a healthy heart.
Criterion 2: A claim may not refer to a characteristic sign or symptom of a disease or class of disease
Examples of impermissible claims under this criterion include:
• Lowers serum cholesterol levels.
• Lowers blood pressure.
• Relieves painful joints.
• Lowers blood sugar levels.
FDA considers these claims impermissible because they are so associated with specific disease conditions or risk of disease, (i.e., risk of heart disease, hypertension, arthritis, and diabetes, respectively).
Examples of claims that are permissible under this criterion include:
• Helps maintain healthy LDL cholesterol levels (FDA has questioned whether this claim is permissible.
• Helps maintain proper joint function.
• Helps maintain healthy blood sugar levels.
• Helps alleviate minor aches and pains associated with daily life.
Criterion 3: References to signs and/or symptoms of natural states are permissible as long they are not uncommon or can cause significant harm if left untreated.
Examples of impermissible claims under this criterion include:
• Helps control proper inflammatory response in the prostate.
• Helps alleviate BPH.
• Helps alleviate endometriosis.
• Helps alleviate chronic constipation.
• Helps alleviate male potency problems (implied impotency claim).
Examples of permissible claims under this criterion include:
• Provides optimal nutritional support during menopause.
• Alleviates mood swings and hot flashes associated with menopause.
• Alleviates the pain associated with exercise.
• Alleviates symptoms associated with PMS.
• Alleviates occasional constipation.
• Alleviates occasional gas.
• Promotes sexual vigor and performance.
Criterion 4: A claim may not be disguised as a product name.
Examples of impermissible product names include:
• Arthritis Formula.
• Cho-less-terol.
• Arthex.
• Migraine Relief.
There is no restriction, however, on the use of a product name that merely mentions a part, organ, structure, or function of the body.

Examples of permissible product names include:
• Mood Health.
• Joint Flex.
• Heart Health.
Criterion 5: A claim may not refer to a supplement's formulation if the statement suggests that the product is/was an FDA-regulated drug. For example, L-carnitine is an FDA-approved active drug for

use in certain heart patients. L-carnitine is also a permissible dietary ingredient, and may be used in dietary supplements as long as its FDA-drug status is not referred to on the product label or in promotional materials. Thus, the label and labeling of a dietary supplement could not mention carnitine use as an FDA-approved drug (e.g., “This product contains L-carnitine—formerly only available as a prescription drug”).

Criterion 6: Citations to an article that refers to a disease in its title is permissible if the labeling taken as a whole does not imply a disease prevention or treatment claim. Reference to an article that refers to a disease is not permitted on the product’s label or immediate packaging. To ensure compliance with this criterion, the article (1) should not be characterized in the copy; (2) should appear at the end of the promotional materials as part of a bibliography of other articles; and (3) the article should be balanced.

Moreover, a bibliography that contains more than an insignificant amount of articles that refer to a particular disease would be considered suspect by FDA and should be avoided.

Criterion 7: The use of the terms disease, diseases, antiviral, antibacterial, antiseptic, antibiotic, analgesic, diuretic, antidepressant, vaccine, or any other word that would suggest that the product belonged to a class of products intended to cure, treat, or prevent disease, is not permitted.

Examples of impermissible claims include:

• Stimulates the body’s antiviral capacity.

• Helps alleviate depression.

Examples of permissible claims include:

• Helps maintain proper immune function.

• Helps reduce stress and tension.

• Helps alleviate occasional constipation.

• Helps maintain regularity.

Criterion 8: The use of pictures, vignettes, symbols, or other means in a manner that would otherwise suggest the presence of a disease condition is not permitted. For example, a picture of a hand with the joints highlighted in red may be considered an implied “disease” claim because the red highlight could be interpreted as a sign of pain or arthritis. Alternatively, however, a picture of a hand standing alone would probably not be considered a “disease” claim because it does not reference a particular endpoint

—joints and pain. The preamble to the final rules indicates that use of the heart symbol on product label and labeling is an impermissible heart disease prevention claim.

Criterion 9: A claim may not suggest that the supplement or its ingredients belong to a particular class of drugs or is a substitute for a particularly therapy.

Examples of impermissible claims include:

• Herbal antidepressant.

• Helps maintain joint health without the use of NSAIDs.

Criterion 10: A claim may not suggest that a product is useful as a companion to regular drug therapy, or that it prevents or treats adverse events associated with a disease if the adverse events are also disease conditions.

Examples of impermissible claims include:

• Helps maintain blood sugar levels in insulin dependent people.

• Helps stimulate the immune system when undergoing chemotherapy.

Examples of permissible claims include:

• Use as part of a healthy diet to help maintain normal blood sugar levels.

• Helps alleviate nausea associated with chemotherapy.

Criterion 11: FDA adds a final “catchall” criterion that simply prohibits the use of a claim that “otherwise” suggests a disease or disease condition. It appears that FDA has decided to use this last criterion to find a number of otherwise permissible claim to be impermissible. Indeed, in a host of recent courtesy letters, the agency seems to be back-tracking considerably from its initial interpretation of the rules, leaving many companies confused regarding the permissible scope of structure/function claims.

From: Nutraceuticals World January 2008

Shapes of Things to Come

The IFT Expo, 2007 showcased products that demonstrated various shapes and forms. Prototypes displayed at the Expo comprised cheese sauces in solid forms, hot dogs in Panini style, cereals looking like blueberry waffles, chicken in the shape of fries and products that were a combination of beverages and desserts. Murgh makhani, a less-familiar concept, also known as Butter Chicken, was introduced in a more familiar format such as meatballs, and Vanilla Crème Brulee, an upscale dessert, was reintroduced as a snack.

These prototypes demonstrated the fact that formulators at present think outside the box and use new forms and shapes to achieve a defined purpose, ranging from creating a unique identity for a particular product, or providing an association to other foods, or contributing to convenience. The focus on new shapes and forms of food may provide a broad platform to evaluate trends that determine future directions that food formulating will take, especially in the application of ingredients.

The prototypes displayed at the IFT 2007 Food Expo represent changing trends in the format and appearance of food products, as well as a gradual exploration into regional cuisines and newer flavors among other aspects.

Foods with a Twist

Well-known classic foods Vanilla Crème Brulee and Blueberry Waffles have been recreated as snacks and cereal respectively. Kerry Ingredients, Beloit, Wis. has created the prototype Vanilla Crème Brulee Healthy Pops, bringing the richness, flavours, and an indulgent mouthfeel sensation of the dessert in snack form. Its proprietary base has been prepared from corn and sweet potato, and is extruded not fried. Blueberry Waffle Bites is a product of the process of hot extrusion cereal enrobing and custom bits.

Mediterranean Herb Crisp, a snack prototype, contains a substrate that is baked and is said to offer a texture that is unique as compared to traditional snack bases. Sante Fe Fiesta Chicken Fries, another prototype, is a product of cold-form extrusion and contains complex Southwest flavours and a masa tortilla breader system which comprises tortilla pieces, real masa, and a base blended with coloured soy hulls.

D.D. Williamson & Co., Inc., Louisville, Ky. and colorMaker introduced bite-sized cheesecakes with colour. These two companies conducted a review of the technical characteristics of the colours used in their prototypes along with a comparison of qualities of anthocyanins, carotenoids, betalains, apart from other natural colorants, comprising caramel, chlorophyll, carmine/cochineal, titanium dioxide, and turmeric. The study included aspects such as colour sensitivity to light, heat, and pH, interaction with other ingredients, and the existing regulatory status of natural colorants.

Regional Flavours of the US

Virginia Dare, Brooklyn, NY 11232 brought to the Expo flavours from different regions of the United States of America with focus on health, wellness, and indulgence factors. Prototypes comprised ice cream toppings, beverages, healthy cereal bars, and baked snacks.

Ice cream toppings included Lemon Trifle, Peach Cobbler, and Pineapple Upside Down Cake while beverages came in a variety of flavours including Southern-style Sweet Tea and Soy-based Sweet Potato Pie Smoothie. In the category of healthy cereal bars, there were Apple-Cranberry Cobbler Healthy Cereal Bar and Pecan Healthy Baked Snack among others.

To determine consumer awareness and preference for traditional regional flavours, foods, and beverages from the US, Virginia Dare conducted extensive research. The study into different

types of regional cuisines (including Barbecue, Traditional American, Cajun/Creole/New Orleans, and Hawaiian/Polynesian cuisines) found consumer interest centred on regional foods that provide a comfort factor while enhancing health and nutritional values.

Products for Different Life Stages

Children and Baby Boomers, both at different stages of life, share the common need for food products that meet requirements of taste and nutrition. Prototype food and beverages developed by Archer Daniels Midland Co., Decatur, Ill. demonstrated how the challenges posed by these requirements of the two individual markets were overcome. Whole grains, meat alternatives, phytosterols, lipids, and cocoa powder are a few of the many ingredients included in the formulation of these food products.

The findings of a research conducted into the eating habits of school-age children have pointed to meals tending to be “on-the-go” foods that keep up with their schedules. Keeping this in mind, ADM formulated breakfast foods that included a Cinnamon-Honey-flavoured Cereal Snack (with Fibersol-2 soluble dietary fibre) and an Apple-flavoured Cereal Bar (made with Kansas Diamond® white whole-wheat flour). Dessert options included products with enhanced fibre such as Strawberry-Vanilla-flavoured Drinkable Soy Yogurt and Reduced-sugar Gelatin Dessert (both containing Fibersol-2 soluble dietary fibre).

Baby Boomers, representing a market worth $2.1 trillion are, according to studies, in search of new dining experiences, with a balance of indulgence and nutrition. ADM offers applications such as Chicago-style Hot Dog Panini containing Kansas Diamond white whole-wheat flour), Cheese Torte (with Fibersol-2 soluble fibre). Chick’n Caesar Wrap and Thai Ginger Soup feature Midland Harvest® soy-based ingredients).

Crossover Flavours and Foods

Emerging trends for 2007 and beyond according to Wild Flavours, Inc., Erlanger, Ky. are reflected in their products. Incorporating crossover flavours, bringing the flavours of ethnic regions, increasing application of chocolate, and getting away from traditional formats in the area of vegetable formats in product formulations were demonstrated in this company’s food and beverage prototypes.

A variation on Butter Chicken was provided by Wild’s prototype Curried Chicken Meatballs with Indian Butter Sauce in a more familiar form viz. meatballs and sauce. It had a taste modification system called SavorCrave™ incorporated into it to improve perception of taste and mouthfeel.

A beverage formulation, Mayan Mocha Milk, containing Natural Mexican Mocha and Natural Milk Flavours brought about a combination of regional flavour with creamy texture. This product possesses both healthful properties and an indulgence factor.

Moroccan Carrot Soup represented a low-sodium application that featured an ingredient system known as SaltTrim™, supposed to add a lot of the taste and texture unique to salt to the product. A combination of potassium chloride and SaltTrim™ can remove up to 50 per cent of salt present in formulations while increasing perception of salt and mouthfeel.

Grilled Appearances

Watson Inc., West Haven, Conn. introduced meltable films, providing not only a consistent and controlled flavor, color, and texture to hot moist food products (comprising hamburger, poultry, fish, beef, steamed vegetables, and pastas) but also a unique appearance to microwaved foods.

Being soft, pliable, and edible, meltable films can be applied in the cooking process directly to food, transferring customized blends of flavours, seasonings, and spices to food. These sheets

are soluble in water and are activated by temperature. Examples of flavours used for these meltable films include Herb and Garlic, and Chili Pepper. Grill marks embossed on food from a meltable film can provide the appearance, flavour, and aroma of grilled foods to microwaveable items on which they are applied.

Egg Alternatives

Shelly McKee, Professor of Poultry Science, Auburn University, observed during a press conference held by the American Egg Board that a hypothesis exists that eggs require more than a simple one-to-one replacement with egg alternatives to acquire similar ingredient functionality. In a presentation, McKee also discussed how new research applied physical and sensory analysis to compare the effectiveness of using eggs as ingredients within products to that of various egg alternatives. Thorough study was conducted of egg attributes comprising aeration, coagulation, emulsification, coating and binding, humectancy, flavour, and colour.

One of the examples within the study—a yellow cake system—showed that at a replacement of 100 per cent, egg substitutes were unable to imitate the attributes of whole eggs such as volume, contour, hardness, springiness, and colour. In egg noodles, it was found that, as egg improves the cooking quality, colour, and nutritional value of pasta and noodles, it was not possible to replace whole egg entirely with any of the egg substitutes studied without there being a loss of quality. On the other hand, partial replacement of eggs was competitive in regard to the physical and sensory properties evaluated.

The study maintains that eggs are necessary not only for obtaining the desired volume, texture, and colour in food products but also in terms of gaining nutritional benefits that they provide.

Gluten-free Brownies

Gum Technology Corp., Tucson, Ariz. created gluten-free brownies using a special gum blend called Coyote Brand Stabilizer ST-101. The gum blend, developed by Gum Technology Corp., is made up of xanthan and guar gums. These ingredients work together in a synergy to allow use of this blend at levels much lower than xanthan by itself.

Fruit Smoothies

FMC BioPolymer, Philadelphia, Pa. created frozen fruit smoothies which featured the Gelstar stabilizer technology. When it comes to frozen desserts with high fruit concentrates, this system helps to maintain the desired body, texture, and mouthfeel. It consists of microcrystalline cellulose coprocessed with carboxymethyl cellulose and when activated completely in the aqueous phase, a stronger and more uniform three-dimensional network is produced by the stabilizer.

Preservation: Food Safety and Taste

To increase safety and shelf stability of finished food without compromising its taste, Purac America, Inc., Lincolnshire, Ill. developed natural preservation systems. Purac America displayed an array of applications comprising Mediterranean Hummus featuring Purac® Fresh (a lactic acid specialty blend) and a Tuscan Chicken and Turkey Meatball made with Purasal® Powder S (a sodium lactate powder blended in the seasoning).

Other solutions provided by the company include the addition of healthy minerals to foods without causing an impact on its sensory properties and the enhancement of flavors while avoiding side effects such as a gritty mouthfeel.

Solid Sauces

Sauces solid at refrigerated temperatures that can swiftly transform into sauce-like consistency temperatures seem fantastical but were introduced as a new line of cheese-based sauces by Sargento Food Ingredients, Plymouth, Wis. Custom Melts™ according to Kevin Delahunt, the company's President, consisted of sauces and not melted cheeses.

This product, when refrigerated, is available in shredded, diced, cubed, or sliced formats. The degree of melt and thickness of sauces depend on the application. A particular sauce's characteristics are influenced by two factors: food components and the method used to heat the sauce. A variety of cheese flavours provided by Custom Melts include Cheddar/American, Pepper Jack, and Blue Cheese. Culinary flavours include Alfredo, Garlic-Herb, Creamy Tomato Basil, and Strawberry Cream.

Concentrates and Purees

Vegetable Juices, Inc., Bedford Park, Ill. introduced Natural Ingredient Solutions™ in varied forms comprising Soft-Frozen Purees, Fire-Roasted Purees, and Non-Thermal Concentrates.

Products of a proprietary freezing technology, Soft-Frozen Purees are said to thaw at a speed of more than four times the speed of hard-frozen products. Types of purees include garlic, onion, lemongrass, roasted red pepper, and ginger purees. These can be used in a variety of applications including soups, sauces, marinades, and salsas among others.

Fire-Roasted Purees are created from premium raw ingredients and roasted directly over fire. They provide a smoky flavour and aroma to applications, and may be used in soups, sauces, and salad dressings among other products.

A proprietary separation technology provides Non-Thermal Concentrates a natural clarity. It also retains naturally high levels of vitamins, minerals, and antioxidants, thus helping these products to preserve flavour, colour, and nutritional value of natural concentrates and juices.

Texturizing

A new line of texturizers under the brand name N-Dulge™ were introduced at the Expo by National Starch Food Innovation, Bridgewater, N.J. N-Dulge™ uses a "co-texturizer" approach which involves a standard, base viscosifier as the foundation of the texture. A non-viscosifying starch-based ingredient is added to provide particular sensory attributes to products that use these texturizers.

At present, this line consists of four products:

- C1 provides full mouthcoating, thick, slow meltaway, and "caramel sauce-like" texture.
- CA1 provides a firm, creamy, even mouthcoating, even meltaway, and a "peanut butter-like texture."
- C2 provides slight mouthcoating, slippery and even meltaway, and a "chocolate sauce-like" texture.
- GA1 provides a clean spoon cut, slightly firm, "custard-like" creamy texture with a rapid meltaway.

Flavours of the Mediterranean

Though Mediterranean cuisine is diverse within its various regions, it is characterized primarily by ingredients comprising vegetables, grains, fish, fruit, olive oil, wine, pulses such as beans, peas, and lentils, along with regional spices and flavours. Griffith Laboratories, Alsip, Ill. brought to the Expo a wide variety of Moroccan, Spanish, Italian, Grecian, and Lebanese flavours in various prototype dishes. Flavours, spices, and marinades developed by the company were used to create dishes such as Chicken Souvlaki, which is a Grecian marinated chicken with peppers and onions, topped with tzatziki sauce on a pita.

The company included a list of various seasonings that provide a Mediterranean taste to proteins and snacks in their brochure titled “Mediterranean Culinary Technovations.” Some examples include flavours from Greece such as Souvlaki Protein Topical Seasoning consisting of lemon, garlic, white wine, and honey, and flavours from Morocco comprising Kefta Protein Seasoning which had onion, garlic, cinnamon, and cilantro.

Reduced Salt, Enhanced Taste

Salt reduction without compromise on formulation’s taste and functionality was provided by many taste potentiators at the Expo.

- Cargill, Wayzata, Minn. provided sodium-reduction systems under the name SaltWise that deliver taste parity to salt in prepared foods, frozen meals, and other products. These systems reduce sodium levels by 25-50 per cent without compromising the salt flavour.
- Morton Salt, Chicago, Ill showcased Morton Lite Salt Mixture that is an equal blend of salt and potassium chloride at 50:50.
- DSM Food Specialties, from the Netherlands, have developed next-generation taste potentiators that have resulted from the application of yeast-based technology.
- Ocean’s Flavour Low Sodium Sea Salts, Ashville, N.C. have introduced two products: a lower-sodium sea salt OF-45LSN, which provides greater stability and shelf life when compared to ordinary salt and a less-sodium sea salt, OF-57LSB, to which potassium chloride has been added.

Flavor Innovations

Kraft Food Ingredients Corp., Memphis, Tenn. introduced soups, appetizers, entrees, and desserts using a wide assortment of KFIC ingredients to meet challenges in product development. The spotlight was on cheese truffles in a variety of flavours such as Jalapeno Cheese Truffle Dusted with Smoky Paprika, and Bacon Crusted Cheddar Cheese Truffle among others.

A new proprietary blend of cheeses, Pasteurized Premium Cured® Cheddar Blend, provides an authentic balanced aged cheddar profile. This cheese blend works well in sauces, soups, side dishes, and entrees.

KFIC’s Flavours of Cooking™ line introduced Fire-Roasted Flavour that can be applied to chicken, beef, pork, fish, vegetables, among other products to impart a fatty, savoury brown, smoked taste. Organic Grill Flavour® can be added when formulating various organic products from meats to soups to dressings to provide a charbroiled, savoury, smoky flavour associated with cooking over charcoal.

Raising Product Quality

Cognis Nutrition and Health, LaGrange, Ill. introduced several innovations to enhance structure, shelf life, and taste in foods such as baked products and desserts.

- Spongolit® 560 is an aerating emulsifier which enhances the volume, crumb texture, and shelf life of cakes made from whipped batters, while providing them elasticity and strength to absorb moisture.
- *Lamequick® CE 7203* is a non-hydrogenated but highly functional whipping agent. It is suitable for ready-to-eat mousses and provides basic functionality for aerated desserts, cake shortening, cream fillings, and soft-serve ice cream.

- Intended for yeast-raised bakery applications, A DATEM (Di-Acetyl Tartrate Ester of Monoglyceride) emulsifier Lametop® S 80 helps to stabilize dough, improve mixing and fermentation tolerance, and increase the final product's volume.
- Natural spices and herbs have been combined to create Cegemett® Fresh, which inhibits mold, prolongs freshness of products, and extends their shelf life.

Decadent Foods

Highlighting the indulgence factor to bread applications, Cargill, Wayzata, Minn. introduced two unique breads featuring inclusion systems for the purpose of imparting customized flavors, textures, and colours. One of the two, Chocolate Hazelnut Bread, contained Gerkens® cocoa powder and Peter's chocolate to bring about the feeling of rich indulgence. The other, Mango Peach Bread, comprised inclusions from Wilbur™ bakery.

TransEND 390 shortening was used by Cargill in the formulation of trans fat free doughnuts, delivering the taste, texture, and colour as per consumer expectations.

Cargill innovations were showcased within other categories such as beverage, confection, dairy, snacks, and cereals to demonstrate how using innovative ingredients can assist in the development of new products or enhance existing brands. For instance, Fibre Krunch crisp provided a long-lasting crunchy texture to chocolate-coated ice-cream, one of the prototype applications displayed in the Expo.

Functional Fibres

Promitor, under which Tate & Lyle, Decatur, Ill. introduced a new line of fibre ingredients offered processing benefits without an impact on taste or texture. Two ingredients in this line are described below.

- Classified as an RS3 (re-crystallized), a resistance starch adds fibre to breakfast cereals, extruded or sheeted snacks, low-moisture cookies, and pasta among other products. This ingredient is derived from corn and has low water-holding properties to allow the preservation of crisp textures and assist the ability to withstand strenuous processes.

- A soluble corn fibre may be potentially used as a substitute for traditional full-calorie sweetener systems. While being highly soluble, this ingredient provides a clean flavour and clear colour. It also demonstrates stability at low pH and under harsh processing conditions.

Rice Innovations

Riviana Foods, Inc., Houston, Tex. created a new low-moisture parboiled brown rice, BP-106, for use in rice mixes where instant brown rice can be packaged with seasoning without the problem of clumping. This product rehydrates in ten minutes and is a new addition to a portfolio that includes rice-based inclusions, instant rices (available in white, brown, wild, and blended forms), and a wide line of rice flours.

Seasonings

Fuchs North America, Owings Mills, Md. introduced a variety of seasonings that focused on pairing together flavours for different meals.

- A sticky bun that imparts the flavour of vanilla cappuccino seasoning.
- Gazpacho seasoned with a combination of watermelon and tomato.

- Chicken in a mojo marinade exuding flavours of a combination of lime, herbs, garlic, and onion.
- Snacks with a combination of flavours such as pomegranate-BBQ tortilla chips or a green tea yogurt party mix.

New Concepts: An Analysis

With an eye towards the future of food products, innovation has been driven by factors comprising health considerations, functionality, convenience, taste, texture, appearance, and strategic partnerships and their focuses. Crossover trends, usually applied to the transfer of flavour or textures from a traditional application to a non-traditional one, must be considered when trying to determine the shape of things to come. With crossover trends themselves crossing over to new territories, the way formulating is traditionally perceived is constantly being shaped or reshaped.

Condensed from article by Donald E. Pszczola in Food Technology September 07

Research Notes

Garlic powder left dry and high in allicin

Garlic is used worldwide as a seasoning, spice and in herbal remedies. It possesses a wide range of biological functions including antimicrobial, antithrombotic, antioxidant and immune system-improving properties. Garlic also has the ability to lower serum lipid and glucose levels, and blood pressure. It is therefore an important nutritional supplement.

The bioactivity of garlic has been linked to the thiosulfinates, particularly allicin. The characteristic flavours of fresh garlic are also associated with thiosulfinates and the volatile compounds formed by the action of the enzyme alliinase. Disruption of the garlic tissue, by cutting for example, brings the enzyme into contact with its natural substrates. As the major substrate in garlic is the non-protein amino acid alliin, allicin is the main thiosulfinate comprising 60–80% of total garlic thiosulfinates.

Garlic products are popular in Japan and Western countries and more recently have been marketed as healthy foods with beneficial physiological effects. However the harsh processing undergone by many garlic products such as powder is thought to influence their quality. Although high-quality garlic slices can be produced by freeze-drying dehydration, this process is expensive with high capital and operating costs. A microwave-vacuum drying process has been developed as a potential method for producing high quality dried foodstuffs with improved energy efficiency. However, there is little information about the use of this process for garlic.

A study by Li *et al*.[1] evaluated the use of the microwave-vacuum drying method combined with vacuum drying to produce high potency, allicin-containing garlic powder. The garlic powder was microencapsulated to protect alliinase activity throughout the human stomach and improve the rate of alliin transformation into allicin. Optimal drying conditions were 3 minutes at microwave power 376.1 W, then 282.1 W for 3 minutes, 188.0 W for 9 minutes and then 94.0 W for 3 minutes, which gave 90.2% retention of thiosulfinates. Microencapsulation allowed controlled release of allicin in the intestines.

Reported in *Journal of Food Engineering* **83** (1) 76–83 (2007)
(http://www.foodsciencecentral.com/fsc/ixid15051)

Phylloquinone and bone health

Vitamin K acts as a co-factor for vitamin K-dependent carboxylase, which is involved in the synthesis of several coagulation factors such as anticoagulants and prothrombin. The maintenance of plasma prothrombin concentration formed the basis for the recommended dietary intake value of 1 µg phylloquinone (vitamin K_1) per kg of body weight per day set in the USA in 1989 and the UK in 1991.

More recently, studies have identified γ-carboxyglutamyl residue-containing proteins in bone, generating interest in the role of vitamin K in bone metabolism and bone health. The relative risk of hip fracture has been linked to phylloquinone intake, with low dietary phylloquinone intakes associated with low bone mineral density in elderly subjects. However, evidence has suggested that a phylloquinone intake that is sufficient to maintain normal blood coagulation may be suboptimal for bone health. Vitamin K may also have a possible role in atherosclerosis and cognitive function.

Because of these findings, recommendations for the daily dietary intake of phylloquinone have been upwardly revised by the US Food and Nutrition Board. However, there are limited data on dietary intake of phylloquinone in European populations. Information about the biochemical vitamin K status of healthy Irish adults is scarce. As post-menopausal women are of increased risk of osteoporosis, older women may represent a population group with suboptimal phylloquinone intake and status.

A study by Collins *et al*.[1], therefore investigated the habitual intakes and adequacy of the intakes of phylloquinone in 97 healthy post-menopausal Irish women (aged 50-75 years). Circulating serum undercarboxylated osteocalcin levels were also determined. Most phylloquinone was obtained from food, with vegetables and vegetable dishes contributing 67% of the total intake. Broccoli, cabbage and lettuce were the main sources. With 20% of the women having an intake below the UK daily recommendation of 1 µg phylloquinone/kg and 34% below that of the US (90 µg/kg), the habitual intake of phylloquinone of a large percentage of this population group may not be adequate.
Reported in *British Journal of Nutrition* **95** (5) 982-988 (2006).
(http://www.foodsciencecentral.com/fsc/ixid14585)

Acrylamide in Food May Increase the Risk of Breast Cancer

Acrylamide is formed when frying, roasting, grilling or baking foods with carbohydrates at temperatures above 120°C and is found in bread, wafers, French fries and coffee. Animal tests have shown acrylamide to be carcinogenic, but no study directly linked acrylamide in foods and cancer in humans. First such study using biological markers for measuring acrylamide exposure and reporting positive association between acrylamide and breast cancer was carried out by scientists at National Food Institute at Technical University of Denmark. The study comprised postmenopausal women 374 that developed breast cancer and 374 healthy controls. All were included in Danish Cancer Society's cohort study with almost 30,000 women of ages between 50 and 64 during 1993-1997.

The previous studies were based on food frequency questionnaires. This study used biological markers for more accurate determination of acrylamide levels ingested by women in the study. Women's blood was analysed for level of acrylamide bound haemoglobin in red blood cells. Findings show positive association between increased acrylamide-haemoglobin level and the development of breast cancer after adjustment for smoking behaviour. The risk of breast cancer doubles with a tenfold increase in acrylamide-haemoglobin level, which corresponds to difference measured between women with lowest and highest exposure. The findings strengthen the concern that acrylamide is carcinogenic in the quantities to which ordinary people are exposed through their diet.

International Journal of Cancer, volume 122 issue 9, pp 2094-2100 (2008) published online Jan 08

IFT Newsletter January 08

Nutraceuticals encapsulated with cyclodextrin and modified starch

These researchers encapsulated nutraceuticals (thymol and geraniol) in β-cyclodextrin and modified starch by spray- and freeze-drying. Tests revealed that the monoterpenes enclosed in the cyclodextrin were protected against oxidation, remaining intact in temperatures at which free monoterpenes were oxidized. Solubility studies showed that the inclusion complexes of thymol and geraniol with cyclodextrin are more soluble in water than the free molecules themselves.

The group concluded that the terpene complexes with β-cyclodextrin and modified starch can be used as additives to the foods, to which they are normally added as flavors, with the advantage of higher stability.

Polyphenols may counter unhealthy effects of high-fat foods

A research report published in the January 2008 print issue of The FASEB Journal indicates that consuming polyphenols (found in red wine, fruits, and vegetables) simultaneously with high-fat foods may reduce health risks associated with these foods.

"We suggest a new hypothesis to explain polyphenols," said Joseph Kanner, senior author of the report. "For the first time, these compounds were demonstrated to prevent significantly the appearance of toxic food derivative compounds in human plasma."

For the study, six men and four women were fed three different meals consisting of dark meat turkey cutlets. One meal, the control, consisted of turkey meat and water. The second meal consisted of turkey meat with polyphenols added after cooking (one tablespoon of concentrated wine) followed with a glass of red wine (about 7 ounces). The third meal consisted of turkey meat with polyphenols added before cooking and then followed by a glass of wine.

At various points during the study, researchers took blood and urine samples to measure levels of malondialdehyde (MDA), a natural byproduct of fat digestion known to increase the risk for heart disease and other chronic conditions. The researchers found that MDA levels nearly quintupled after the control meal, while MDA was nearly eliminated after subjects consumed the meals with polyphenols.

"As long as deep fried candy bars are on menus, scientists will need to keep serving up new ways to prevent the cellular damage caused by these very tasty treats," said Gerald Weissmann, MD, Editor-in-Chief of The FASEB Journal. "This study suggests that the time will come where people can eat french fries without plugging their arteries."

Fingerprinting fruit juices

In fruit juices the most common type of adulteration is mixing the original juice with juices from other, cheaper fruits (mainly grapefruit, grape or pear); in other words falsifying the juice.

In order to confirm the authenticity of the fruit juices, researchers at the Department of Analytical Chemistry of the University of the Basque Country are trying to identify juices, using polyphenols, a family of chemical compounds present in all fruit. There are thousands of polyphenols amongst the various species in the vegetable kingdom, with differences both in the number of particular polyphenols present in each vegetable species as well as in the quantities found. Thus, different fruits have specific polyphenolic differences or “fingerprints.”

In order to analyze polyphenols present in each for each fruit, the researchers used high-performance liquid chromatography in combination with mass spectroscopy. This allowed them to first gather information about what particular polyphenols are present in each fruit and in what quantity and then to confirm the polyphenols profiles of each juice.

Beatriz Abad, a researcher with the group, found an exclusive marker for lemon and three for grapefruit. She has also shown that using several markers instead of one increases the probability in detecting the food fraud. Moreover, she observed key differences in various “prints” and, using certain statistical tools, showed that such differences provide a reliable degree of accuracy in the detection of some mixtures of juices. For example, detecting the presence of grapefruit in orange juice is very sure and relatively easy; detecting the presence of lemon juice in orange juice is also quite accurate; but detecting the presence of mandarin oranges in orange juice is much more difficult and not very reliable, given that the mandarin and the orange are very similar in their profiles.

For more, see http://www.eurekalert.org/pub_releases/2008-01/ef-h010708.php.

China to introduce food nutrition labeling

According to a Reuters news report, China is planning to require basic nutritional information on food labels starting May 1, 2008. The labels will be required to show how much protein, fat, carbohydrate and sodium is in a food, and may also show the cholesterol, sugar, and vitamin content. According to the report, the country will also clamp down on health claims labeling. Companies will not be allowed to say their products are high in calcium, iron or low in fat unless they meet criteria.

Using irradiation on antimicrobial-coated packaging

Researchers at Texas A&M investigated the effect of electron beam irradiation, storage conditions, and model food pH on the release characteristics of trans-cinnamaldehyde incorporated into polyamide-coated low-density polyethylene (LDPE) films.

Their study demonstrated that irradiation may serve as a controlling factor for release of active compounds, with potential applications in the development of antimicrobial packaging systems.

Other News

FDA declines to define 'natural'

Despite receiving petitions from the US Sugar Association and food giant Sara Lee in 2007 requesting it define the term 'natural' in relation to foodstuffs, the US Food and Drug Administration has indicated no definition is forthcoming.

An FDA labelling spokesperson told Foodnavigator-usa.com the agency's limited resources were better employed elsewhere despite the consumer confusion and labelling abuse that occurs in the absence of a formal definition. "The bottom line is we'd have to have consumer research that shows overwhelmingly that people are being misled," said an FDA spokesperson who added it was not in possession of such research. "Even if people interpret it in different ways it doesn't mean there is confusion out there," she said. "If there was, then we would definitely raise it as a priority".

The Sugar Association expressed disappointment at the FDA position. "There are several things that are of concern to us," said Sugar Association president and CEO, Andy Briscoe. "First is the claim that it is not a consumer issue; second is the fact the Agency says consumer research is needed before it can make a ruling; and finally is the Agency's contradictory stance on the issue of natural over the years."

It noted the surge in demand for all things organic and natural backed by 2007 Mintel market surveys that revealed 'All Natural' as the second most frequent claim made on US food product launches, appearing on 2,023 products and 405 beverages.

The Sugar Association said it was unrealistic to call for consumer research because consumers could not be expected to keep abreast of food technology developments and new ingredients and therefore would often be unaware if they were being misled. "We hope that the FDA will reconsider defining the term 'natural' as a priority. This is the appropriate time to clearly define 'natural' and protect consumers from misleading claims," Briscoe said. "After all, the FDA has established regulatory guidelines for the term 'healthy,' why can't the same be done for 'natural?'"

Indeed, in the 1993 Nutrition Labeling and Education Act final rule, the FDA stated it "believed that if the term 'natural' were adequately defined, the ambiguity in the use of this term, which has resulted in misleading claims, could be abated."

The FDA ignored research submitted to it by the Sugar Association in its petition that found 83 per cent of 1000 people surveyed favoured regulating 'natural' claims. A 2006 Harris Interactive survey found consumers believe FDA should provide an official definition for making a 'natural' claim.

But the natural products industry has not been quick to respond to this issue either. Darrin Duber-Smith, President, Green Marketing Inc, was instrumental in forming a task force of 26 industry organizations in 2003 called the International Association of Natural Products Producers with a mission to develop a complete and enforceable definition for natural so that, in the absence of government regulation the industry could self regulate. "I have been very disappointed at the overall apathy with regard to this issue over the years," he said. "It has been very difficult to represent this industry at mainstream conferences when we can't even define the term that describes our industry. We must first define what natural means and then determine what constitutes a natural product."

http://www.functionalingredientsmag.com/fimag/articleDisplay.asp?strArticleId=1553&strSite=FFN Site

Science Shows Soyfoods May Help in Weight Loss Battle

Scientists have found soyfoods may be a valuable weapon in the weight loss battle. Protein-rich soyfoods, when replacing other sources of protein, may help individuals lose weight and fat—while lowering LDL (bad) cholesterol. An evidence-based review by Dr. David Allison and Dr. Mark Cope at the University of Alabama at Birmingham, and Dr. John Erdman at the University of Illinois at Champagne-Urbana, finds soyfoods are equal to other protein sources, such as dairy or meat, in helping to battle weight by promoting fat loss.

This comprehensive review, published in the November issue of Obesity Reviews, examines current research on animals, human populations, and clinical trials related to soy protein and weight control. Researchers sought to determine the strength of the evidence on four proposed mechanisms by which soy may aid weight control: 1) soy increases weight loss when consumed at an equal calorie level as other foods, 2) soy aids weight and fat loss by decreasing caloric intake, 3) certain soyfoods benefit glucose control and heart health during weight loss, and 4) certain soyfoods will minimize the loss of bone mass during weight loss.

The review, including results from eight human studies, finds that individuals lost equivalent amounts of weight and, in some cases, equal inches of fat around the waist, using soy protein, dairy milk meal replacements, beef or pork at equal calorie levels. This illustrates the value of soy protein in a varied diet for weight control. Findings also support the possibility that soy protein decreases short-term appetite and calorie intake. Extensive follow-up trials are needed to prove the satiety, or feeling of fullness, factor of soy protein.

Researchers also examined whether soy isoflavones reduce diabetes by stopping fat tissue build up and enhancing fat breakdown. Limited animal trials and human studies suggest soy-based diets and isoflavones may lower blood glucose and insulin levels. If proven effective, a soy-based meal replacement could provide additional benefits to diabetics during weight reduction. Researchers confirmed soy-based diets, compared to other low calorie diets, reduce LDL (bad) cholesterol and triglycerides and raise HDL (good) cholesterol. Findings indicate soy may reduce bone loss in women, but additional clinical trials on soy and bone loss are needed.

Consumers battling extra pounds should try soyfoods to curb cravings and replace foods high in calories, saturated fat and cholesterol. Armed with soyfoods, dieters may be a step ahead in the weight loss battle.

The Soyfoods Association of North America is a non-profit trade association that has been promoting consumption of soyfoods in the diet since 1978. SANA is committed to encouraging sustainability, integrity and growth in the soyfoods industry by promoting the benefits and consumption of soy-based foods and ingredients in diets.
Reproduced from Soyatech eNews, January 24, 2008

Wearable Vitamins: Joanna Cosgrove

Vitamin-enriched garments – can they really promote good health?

At first glance, they look like ordinary clothing, but a quick look at the label (and more noticeably, the price tag) will reveal that these garments are far from ordinary – they are made with fiber that's impregnated with vitamins. The technology has been in development for many years in Japan and Germany and the end result of all that research is finally beginning to filter into the U.S. premium clothing scene.

According to an article published last year by Taipei Times, a Japanese company, Fuji Spinning Co. Ltd., garnered some raised eyebrows when it launched a range of "wearable vitamin technology" textiles called V-Up, which are impregnated with pro-vitamin substances that turn into vitamin C when they react with chemicals in the skin. The microencapsulated nutrients in the fabric open and release their contents when rubbed, pressed or warmed by body heat. However, wearing and laundering the clothing over 30 times reduces the number of capsules in the fabric and eventually renders the clothing about as nutraceutically functional as standard garments. To that end, the company also sells packets containing a supply of capsules that can be sprayed on the clothing after it has been washed to reinvigorate the pro-vitamin benefits.

Company spokesperson Makoto Suzuki said a t-shirt containing the equivalent of two lemons in its fiber would be released in the near future. "By wearing the T-shirt, people can ingest vitamin C through their skin," he said. Fuji applied for a patent on the textile, which is odorless and has the same texture as regular cotton. "We aim to sell the product early next year, targeting people interested in health, especially female customers who pay special attention to looking after their skin," he said.

Closer to home, one of the most talked about components of the new Green Collection from Tehama Inc., a Denver, CO-based luxury golf apparel company, is the line of Vitamin C shirts. Said to "promote a healthy lifestyle," the garment's fabric is infused with "vitamin C nutrients," which are released onto the wearer's skin. "Vitamin C being a water soluble vitamin, it is easily absorbed through the skin when it comes in contact with moisture," said Anne Ingham, Tehama's vice president of design, who added that the company is currently testing the products to determine actual absorption rates.

According to the company, in addition to promoting good health, the vitamin C in the garments relieves skin dryness by offering "a natural hydration." The fabrics themselves have a "soft drapey hand" and provide "UPF 30" (or, Ultraviolet Protection Factor) protection to "block out harmful UV rays from the sun and elements. The shirts retail for approximately $70

"People are looking for added value in products today, hence the introduction of vitamin C to all different products. The concept of Vitamin C is that it promotes good health no matter how you get it," said Ms. Ingham. "In principal, it would provide similar benefits but perhaps to a lesser rate then internally absorbed Vitamin C."

In terms of laundering the Vitamin C shirts, Ms. Ingham said that they are cared for just as any other garments are cared for. "Machine wash cold, dry on low heat, no bleach or fabric softeners, no dry cleaning. The finish will last at least 10 home washings," she said, noting that Tehama is also exploring vitamins E, B6, B12, and silver-infused garments for possible future introductions.

Western Australian leisurewear company Abi and Joseph, merged the health benefits of vitamins with the holistic benefits of fitness with the launch of an exercise wear range infused with vitamin C and essential oils. The apparel line makes use of technology from pharmaceutical giant Bayer, along with leading Italian fabric manufacturers. Like the collection from Fuji, the fabric has undergone a process of microencapsulation, whereby essential oils and vitamin C are infused into the garment. The company claims the infusion "enables the wearer's skin to be gently

moisturized and protected by subtly fragranced essential oils. Additionally, the vitamin C, with its antioxidant and regenerative properties, helps to nourish and support the skin's surface." This microencapsulated treatment lasts for up to 15 washes. Beyond that, the company recommends consumers "recharge" the garment with its "Wash In Wellness" sachets – packets of perfumed, essential oils that are added to cold water in which the garments are to soak for 30 minutes. And in keeping with the theme of skin protection for the health conscious consumer, the fabric is also said to provide protection from UV rays with SPF50.
In the end, the question of whether this wearable vitamin technology can actually impact the health of its wearer is unanswered. However, if topical cosmetics can impart the benefits of vitamins to the skin, perhaps some of the claims made by the makers of these garments aren't so far off base.
From: Nutraceuticals World January 2008

Diets High in Lutein, Zeaxanthin and Vitamin E Associated With Decreased Risk of Cataracts

Women who have higher dietary intake of lutein and zeaxanthin—compounds found in yellow or dark, leafy vegetables—as well as more vitamin E from food and supplements appear to have a lower risk for developing cataracts, according to a report in the January issue of Archives of Ophthalmology, one of the JAMA/Archives journals.

"The oxidative hypothesis of cataract formation posits that reactive oxygen species can damage lens proteins and fiber cell membranes and that nutrients with antioxidant capabilities can protect against these changes," the authors write as background information in the article. Vitamin E, vitamin C, beta carotene, lutein and zeaxanthin are all believed to have antioxidant properties. Lutein and zeaxanthin are the only carotenoids—yellow plant pigments—present in the lens of the human eye and may also protect against cataracts by filtering harmful blue light.

William G. Christen, Sc.D., of Brigham & Women's Hospital and Harvard Medical School, Boston, and colleagues analyzed dietary information from 35,551 female health professionals who enrolled in the Women's Health Study in 1993. The women were then followed for an average of 10 years, and the diets of those who developed cataracts were compared with the diets of those who did not.

A total of 2,031 women developed cataracts during the study. When the participants were split into five groups based on the amount of lutein and zeaxanthin they consumed, those in the group who consumed the most (about 6,716 micrograms per day) had an 18 percent lower chance of developing cataracts than those who consumed the least (1,177 micrograms per day). The one-fifth who consumed the most vitamin E from food and supplements—about 262.4 milligrams per day—were 14 percent less likely than the one-fifth who got the least (4.4 milligrams per day).

"In conclusion, these prospective data from a large cohort of female health professionals indicate that higher intakes of lutein/zeaxanthin and vitamin E are associated with decreased risk of cataract," the authors write. "Although reliable data from randomized trials are accumulating for vitamin E and other antioxidant vitamins, randomized trial data for lutein/zeaxanthin are lacking. Such information will help to clarify the benefits of supplemental use of lutein/zeaxanthin and provide the most reliable evidence on which to base public health recommendations for cataract prevention by vitamin supplementation."
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Food Processing Scenario

Food processing industry in India has not yet taken off despite a Union Ministry to this effect having been created in 1988, about two decades ago, to provide specialised focused attention to the all round growth of this sector. The 'then' Prime Minister Rajiv Gandhi had envisaged food processing as a sunrise sector and constituted a dedicated Ministry of Food Processing Industry in that year. Even after 19 years of existence of such a ministry, the food processing industry has still not grown up. As can be seen only 2.2% of the fruits and vegetables produced in the country are processed and 60% of the produce go waste.

Besides, processing level of milk is 35%, meat 21% and poultry product 6% only. Reasons for such dismal performances of food processing industry are lack of basic infrastructural facilities of food processing, food preservation, cold storages, cold chain facilities, warehouses, stringent quality control, international food standards, test laboratories and export facilities.

Producing farmers of fruits, vegetables and cereals do not get remunerative prices of their produce because of their inability to sell all of their produce due to lack of food processing facilities. Farmers continue to suffer on account of immense fluctuation in prices of their produce. The Ministry of Food Processing Industry has failed as a catalyst for guiding, helping and creating a favourable environment for healthy growth of the food processing industries. Inadequate infrastructural facilities, lack of quality control, testing facilities, seasonality of raw material and cultural preferences of Indians for fresh food have marred the growth of food processing industries in the country.

Added to these, food processing industry is following the western path of food processing like biscuits, jams, sauces, breads, milk, cold drinks, meat, fish and poultry. At the same time, India lacks in test laboratories for these items for quality control of food standards of international level. This is one major reason why India is not able to export its processed foods and the country's share in the world trade in this regard, is a dismal 1.6% only. Unless the Government of India addresses these basic shortcoming in the quality control of food standards, the country will not be able to export its processed food items to the international market.

The other discomfiture to the growth of food processing industries in the country has been a meagre budgetary support to this sector, which needs to be looked into, if the country has to grow in sector. The Government should allocate adequate funds so that ongoing schemes of food processing do not suffer on this account. When contacted, official sources in the Government revealed that problems confronting the food processing sector would be addressed during the Eleventh Plan period, which has already commenced since April 1, 2007.

Meanwhile, the Government has prepared a vision for growth of food processing industries up to 2015, which envisages increase in processing level of perishable goods from 6% to 20%, in value addition from the existing level of 20% to 34%, and share in global trade up from 1% to 3%. The vision statement, taking note of increase in food, envisages generation of direct employment of 28 lakh and indirect employment of 74 lakh persons by 2015.

With the materialisation of the vision, the agricultural sector will be commercialised. It will increase the incomes of farmers, generate employment and earn the foreign exchange through export of agro-food. This could be achieved with adequate budgetary allocations to accomplish the target as envisioned.

With the National Food Processing Policy on the anvil, the broad objectives of the policy like infrastructure development, linkages with farming system, increase in level of processing, enhancement in value addition and generation of employment in this sunrise industry could be achieved.

Domestic market of food and vegetable processing has also not improved. Domestic consumption of value added fruits and vegetable products are low compared to the primary processed food in general and fresh fruits and vegetables in particular. Lower capacity utilisation, infrastructural constraints, inadequate farmer processors linking, dependence upon intermediaries, smallness of units and their inability to promote in the market are some of the major problems afflicting the growth of domestic market. This needs to be addressed by the Government on a war footing.

Official circles are exuding confidence that with the enactment of the Food Safety and Standards Act 2006, a Food Safety and Standards Authority is being set up to regulate quality control and food standards. It will lay down food standards, regulate manufacture, import, storage, distribution and sale of food to ensure consumer safety and promote global trade, pool infrastructure, manpower and testing facilities for better standard fixation and enforcement through their proper redeployment and rationalise and strengthen existing mechanism. In addition, the Government also endeavours to enhance availability of technical and other information relating to food processing sector to enable prospective entrepreneurs to access essential information for their requirements.

M.Y. Siddiqui, National Herald, N. Delhi 16.12.2007

Cranberries Combat Urinary Tract Infections in Women

Recently, it was found that cranberry NDM may also act as an anti-cancer agent. The scientific research methods behind the research have been patented by Tel Aviv University.

Cranberry juice, long dissed as a mere folk remedy for relieving urinary tract infections in women, is finally getting some respect. Thanks to Prof. Itzhak Ofek, a researcher at Tel Aviv University's Sackler Faculty of Medicine, the world now knows that science supports the folklore. Prof. Ofek's research on the tart berry over the past two decades shows that its juice indeed combats urinary tract infections. And, he's discovered, the refreshing red beverage has additional medicinal qualities as well. Prof. Ofek has found that cranberry juice exhibits anti-viral properties against the flu, can prevent cavities, and lessens the reoccurrence of gastric ulcers. Unhappily for half the human race, however, new research published this year in the journal Molecular Nutrition & Food Research on ulcers, suggests that, like urinary tract infections, the healing power of cranberries apply only to women.

Medicinal "Teflon"

The remarkable healing property in cranberries stems from a heavy molecule known as non-dialyzable material or NDM. This molecule, isolated by Prof. Ofek and his colleagues, seems to coat some bodily surfaces with Teflon-like efficiency, preventing infection-causing agents from taking root. Surprisingly, NDM appears to have no effect on some of the good bacteria in our bodies, says Prof. Ofek. His seminal research on the subject, in collaboration with Prof. Nathan Sharon from the Weizmann Institute, appeared in the world's leading medical journal, the New England Journal of Medicine, in 1991. "We understood that there was something in cranberry juice that doesn't let infections adhere to a woman's bladder," Prof. Ofek says. "We figured it was a specific inhibitor and proved this to be the case."

A Unique Mouthwash

After the 1991 study, Prof. Ofek conjectured that if cranberries could protect against bacterial invasion in the bladder, "Could they work wonders elsewhere"" He took the question Tel Aviv University's School of Dental Medicine, and together with Prof Ervin Weiss, produced positive results. "We found that NDM inhibits adhesion of oral bacteria to tooth surfaces and as a consequence reduced the bacterial load that causes cavities in the mouth," says Prof. Ofek. "And after a clinical trial, we formulated a mouthwash based on cranberries which was patented by Tel Aviv University."

From Mouth to Midsection

But Prof. Ofek wasn't content to stop at cavities. Working with Prof. Ervin Weiss and Prof. Zichria Rones at Hadassah Medical and Dental School, he found that NDM inhibits the flu virus from attaching to cells and prevented experimental flu infections in animal models. Most recently, Prof. Ofek collaborated with Dr. Haim Shmuely, a resident physician at the Beilinson Hospital and lecturer at Tel Aviv University, to find that cranberry also inhibits two-thirds of the "unhealthy" bacteria that clings to gastric cells, which lead to ulcers.

"The results were very interesting," says Prof. Ofek. "Cranberry helped reduce the load of this bacteria, Helicobacter pylori, in the gut. In combination with antibiotics, it reduced repeat ulcers from approximately 15 percent to about 5 percent."

Ladies Only

The one drawback to this research is that it only holds true for women, showing once again cranberry's affinity for the female. "The whole thing with cranberries seems to be female-oriented," admits Prof. Ofek. He continues, "The take-home message is that God created this fruit with a polyphenolic material. We still don't know its chemical formula, but it seems to target a fraction of bacteria and viruses."

Today, a cranberry research team comprised of scientists from across Israel, and headed by Professors Ofek and Weiss, are investigating the berry's healing powers. Recently, it was found that cranberry NDM may also act as an anti-cancer agent. The scientific research methods behind the research have been patented by Tel Aviv University. Prof. Ofek's recommendation is that women drink two glasses a day to treat certain infections. And because "there is still so much we don't know about cranberries, I would suggest that men also drink two glasses a day," he concludes.

Health & Nutrition News, Nutrition Horizon January 14, 2008

Vitamin E May Reduce Diabetic Heart Risk

An Israeli study suggests that vitamin E supplements can reduce the risk of heart attacks and related deaths for some Type 2 diabetics. Researchers at the Technion-Israel Institute of Technology and Clalit Health Services found that Type 2 diabetics who took 400 IUs of vitamin E daily had more than 50 percent fewer heart attacks, strokes, and related deaths than Hp 2-2 patients who took a placebo pill, the American Technion Society said Friday in a release.

The report said 40 percent of people with diabetes carry the Hp 2-2 gene. The findings were published in the Nov. 21 online edition of the journal Arteriosclerosis, Thrombosis, and Vascular Biology. Dr. Andrew Levy of the Technion Faculty of Medicine said the study suggests that genetic testing for the Hp 2-2 gene may be useful to identify those who might benefit from taking vitamin E supplements.
(http://www.soyatech.com/news_story.php?id=6380)