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Protein Foods and Nutrition Development Association of India

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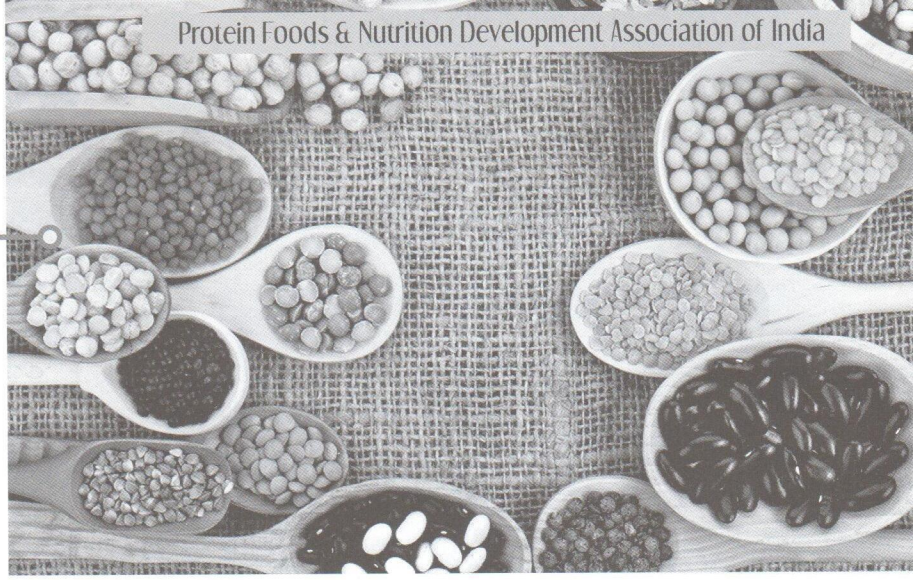
Editorial



Protein is the most important macronutrient that is needed by all animals and more so the humans. It is essential for many reasons. About 75% of our body dry weight is protein so in order to maintain it from wear and tear proteins are needed in our diet. The protein not only is part of our muscles and all part of the body, it is needed by infants and children both for growth and for development of brain. Deficiency at this stage will cause mental retardation. Proteins are also needed as enzymes and hormones besides being instrumental in transporting oxygen and lipids to different tissues. It also helps fight disease as antibodies and also useful in clotting of blood so a cut may not cause death due to bleeding. Thus proteins are useful in many ways.

In India, good proportions of people are vegetarians so they need to be extra careful to not only get enough proteins but to get good quality of proteins which contain all the essential amino acids in adequate amounts. With vegetarian diet it is difficult to get enough protein and also since there are some limiting amino acids it further lowers the quantity of useful amounts. One way of course is to include milk in the daily diet which has complete protein and also improve the quality of vegetarian diets.

From the surveys it is clear that Indian diets are deficient in protein not only in quantity but also in quality. The problem is more severe considering that children need more of high quality protein and so do pregnant and lactating women.

Many Indians are non-vegetarian and get high quality proteins. Meat, fish and poultry as well as eggs contain high quality proteins and when combined with cereals, pulses, fruits and vegetables, gives complete meal with adequate amounts of high quality protein. Even soya products can make it better quality but somehow this has not picked up so far.

Fish is quite popular with coastal population and contain good quality protein but the smell is not acceptable to all. Red meat although is excellent source of iron, has certain problems like higher amount of saturated fat and also has been associated with heart disease and cancer. Chicken has become the non-vegetarian protein source of choice because of high and good quality protein, less fat and can be used in a variety of cuisines as it is goes well with many different ingredients.

With poultry industry growing leaps and bounds in India, chicken and eggs have become quite affordable and many high quality and safe products have become available. Not just chilled and frozen poultry meat but a lot of value-added easy to cook and many heat-&-serve products have made it very easy and acceptable.

Even fast food stores have made it quite popular with burgers, pizza and fried foods are turning more people to enjoy chicken foods. Even Indian preparations like chicken tikka have become a global favourite. Going from roadside chicken store to processed chicken has certainly made it a much safer and higher quality product. This trend will certainly keep growing in future as well. With Greetings & Wishes,

Prof. Jagadish S. Pai,
Executive Director
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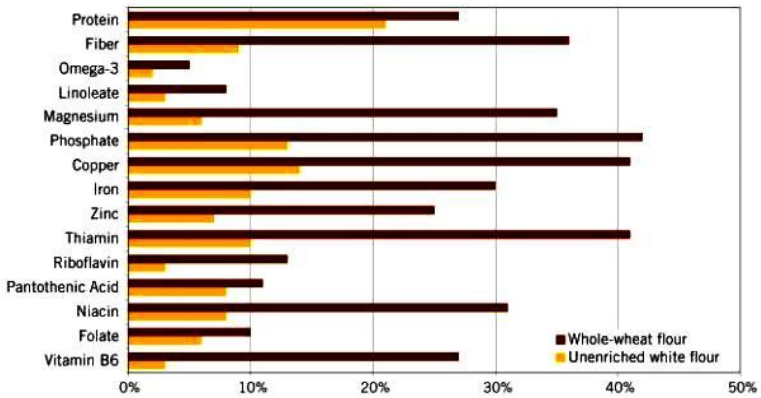
Daily Bread

by Prof. Jagadish Pai

Bread is prepared by mixing wheat flour and water to make dough and is baked or roasted sometimes after leavening. This is popular around the world being one of oldest foods. There are numerous combinations of different flours although wheat flour, refined or whole, is the most common ingredient. Different ingredients and processes have been used to make a large variety of types, shapes, sizes and textures of breads. It may be leavened by different processes although yeast being the most common agent. Over the years a wide variety of ingredients and additives may be used including fruits, nuts, various fats, chemical additives for improving flavour, texture, colour and shelf life.

According to one market analysis, global market for bread is projected to reach US$ 192.2 billion by 2018. The markets are driven by growing consumer preference for convenience food, launch of healthy bread products, improving standards of living and westernised lifestyle in developing countries. High per capita consumption in developed markets has little room for further growth, while demand is on the rise in developing markets like China and India, where per capita consumption is low. Thus growth in global markets is expected because of developing nations. The bread market worldwide is seeing a shift towards healthy bread varieties like brown bread, whole wheat bread, and multi grain bread as well as those fortified with healthy ingredients like omega-3. China, Hong Kong, India and Malaysia are lucrative markets driven by strong economic growth, rising standards of living, westernisation of lifestyles and reduced time for making elaborate home cooked meals/breakfast. The whole wheat and white flour are compared in the figure.

Fig 1: Comparison of 100g whole & white wheat flour



Consumers are now enjoying many different varieties of bread. Not only the more nutritious whole wheat bread with more fibre, iron and many vitamins is now available, there are many other grains with additional nutritional profiles are being added for greater choice. Many unleavened products like roti and chapatti are made from whole wheat and have a better nutritional profile. Even these are now being fortified with many nutrition rich ingredients.

Bread Making

Bread has been standardised over many centuries and people like the soft texture of white bread. There are many ingredients such as flour, fat, leavening, sugar and water are added along with additional ingredients and additives in order to make it taste better and last longer. Additional ingredients affect the sensory properties and so it is a challenge to prepare the bread with changes in ingredients without change in taste, flavour, texture, appearance etc. People have already accepted the brown colour of whole wheat bread.

Amount Per Serving	
Calories 247	Calories from Fat 30
	% Daily Value*
Total Fat 3g	5%
Saturated Fat 1g	4%
Trans Fat 1g	
Cholesterol 0mg	0%
Sodium 472mg	20%
Total Carbohydrate 41g	14%
Dietary Fiber 7g	27%
Sugars 6g	
Protein 13g	
Vitamin A 0% • Vitamin C	0%
Calcium 11% • Iron	13%

Amount Per Serving	
Calories 266	Calories from Fat 29
	% Daily Value*
Total Fat 3g	5%
Saturated Fat 1g	4%
Trans Fat	
Cholesterol 0mg	0%
Sodium 681mg	28%
Total Carbohydrate 51g	17%
Dietary Fiber 2g	10%
Sugars 4g	
Protein 8g	
Vitamin A 0% • Vitamin C	0%
Calcium 15% • Iron	21%

Fig 2: Whole wheat and refined flour nutrition facts (per 100g)

Refined flour to make white bread contains only endosperm portion of grain, while whole grain includes germ and bran as well, which contain fibre, oil, vitamins and minerals. Although whole grain is more nutritious, bran and germ affect the bread making quality like leavening process of yeast. Wheat has gluten which is very elastic and expands when yeast makes CO_2 and that leavens the dough making it lighter and bread fluffier. When baked, gluten coagulates giving bread the structure and strength. Rye has gluten although weaker so it can form bread. Barley also has some gluten. So when other grains are added gluten quantity and quality is affected so leavening is poorer. Hence making multigrain bread is not easy especially when consumers are demanding similar properties as white bread.

Gluten in Bread

Gluten is formed in wheat dough from wheat proteins glutenin and gliadin when flour is mixed with water and kneaded. Gluten is elastic and can stretch. Excessive kneading may weaken it. The resulting network of gluten is able to trap tiny gas bubbles formed by yeast and as more CO_2 is formed the bubbles grow like balloon inside the gluten. With strong flours having higher protein contents of about 12 or higher high-speed machines can be used for kneading or mixing for a short time. Other ingredients like seeds, raisins etc. can

be added to strong flour. Indian flours are weaker so it is difficult to accommodate other ingredients as well as whole grain flour.

Commercially baked bread usually contains fat ingredients to improve crumb softness, volume and texture. Fat is referred to as shortening because it shortens or breaks up masses of gluten weakening the structure and making final bread more tender. During mixing, fat surrounds gluten particles lubricating them so they do not stick to each other so fat acts as tenderiser. Cake formulations use shortening regularly as cakes need to be more tender or softer.

Shortening

Fat also has another function by slowing down moisture loss by coating starch granules increasing the shelf life by delaying staling. Loaf volume also increases when shortening especially higher melting point one is used. Solid fats like butter or vanaspati are thus preferred. Since vanaspati (partially hydrogenated vegetable oil) has trans fat, it is avoided. Alternatives for shortening are being searched. Oat oil has been suggested for heart healthy bread. It is also rich in phospholipids and glycolipids so oil combines with water to lubricate bread dough to help even leavening and baking a springy loaf that keeps soft for several days. A waxy durum wheat has been bred that could replace vegetable shortening without losing desired attributes of shortening. An oil, mostly composed of diglycerides and made from soy and canola oil, has similar properties but much is metabolised as energy instead of storing as fat. Still another oil has short and long chain fatty acids for bread application and has lesser calories than normal fat.

Enrichment and Fortification

The refined flour in the US is enriched by adding niacin, riboflavin, thiamine and iron and more recently folic acid. So even white bread prepared by refined flour has many vitamins and minerals, some of which were lost in milling. Besides enrichment, which is supposed to replace or enhance naturally occurring nutrients, fortification adds nutrients normally not present. Fibre is lost when refined wheat flour is prepared where bran is removed. When whole wheat flour is partially or fully replaced the fibre content is increased. However, the dough properties and leavening ability is altered. Whole grains and soy fibre can give yellow or brown colour to bread. Fibre can be soluble and insoluble and both have different health advantages. However, while insoluble fibre may not affect the fermentation process much the soluble fibre affects dough viscosity, water needed for processing, fermentation and proofing process and finished product texture. Oats have soluble fibre and so do inulin and fructooligo-saccharide (FOS). Wheat bran, soy, cellulose etc. have insoluble fibre. There have been bold attempts to incorporate flax seeds for both its fibre as well as omega-3 fatty acid alpha linolenic acid.

Improvers & Conditioners

Some additives and improvers are added to dough in order to get better loaf characteristics and shelf life. Some are added to improve performance during processing allowing dough to withstand harsh mechanical handling and baking for softer crumb and easy slicing. Potassium bromate was traditionally used but ascorbic acid can be used to give good oven spring. Being powerful oxidising agent bromated bleaches flour, enhances elasticity by strengthening gluten network providing fluffy, soft and white bread. Some countries banned bromate but others allow its use as negligible amount remains after baking. When flour contains strong gluten network high loaf volume will be difficult so reducing agents like cysteine, bisulphate etc. are used to weaken the network and get good volume in shorter time. Enzymes can be used instead of chemicals for improving dough characteristics resulting in better loaf.

Process

Bread is prepared through a series of operations including mixing of ingredients into dough, maturing the dough, dividing dough into pieces, which are then proved or leavened and finally baking. Breads can vary in weight, shape, volume, crumb texture & softness, crust thickness & crispness etc. as well as speciality breads depending on ingredients added such other grains, fruits, nuts and many others.

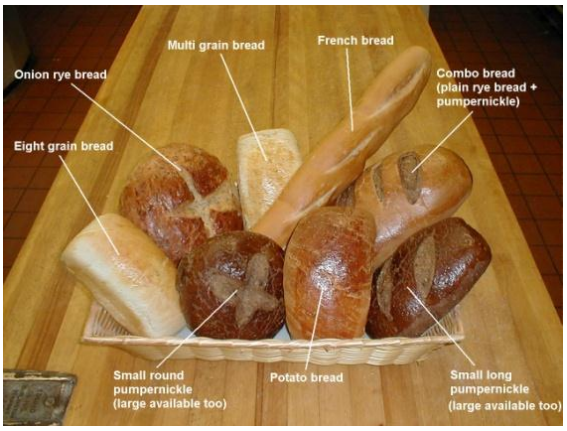
When flour, yeast, water and salt are mixed into dough it needs some time for dough development (maturing) during which gluten forms. If time is not given here, bread baked would have poor volume and with uneven, dense crumb cell structure. During maturing, gluten is formed from the proteins of wheat which due to its elastic nature, will entrap gas and expand the dough which upon baking will yield light soft bread.

The yeast added will act on sugars in dough which are formed due to amylases in wheat flour acting on wheat starch releasing sugars. If enzyme in wheat flour is not adequate then enzyme can be added. Also yeast food may be added which is used by yeast at the start so quickly produce gas. This gas (CO_2) will be entrapped in the network of gluten and will expand the dough making is soft and porous.

Formerly batch fermentation for several hours was carried out but since it was a lengthy process, mechanical development partially or totally replaced fermentation for gas incorporation into dough to make it soft and expand upon baking. Many processes such Do-Maker, Chorleywood, Activated Dough, Spiral Mixing etc. were used to prepare different types of bread. Chemical leavening was also developed to produce CO_2. A number of ingredients, additives and improvers were used to help with desirable properties such as texture, colour, appearance, taste, mouthfeel etc.

Baking

This operation is very important as it finally creates bread from dough through setting of gluten network assisted by fat and starch. Here the final volume increase occurs as entrapped gas expands due to heating. Crust is formed which may be hard or soft, lightly coloured or dark and having characteristic flavour. Yeast is destroyed in the process. Earlier hearths are still used in home or retail baking but commercial bakeries use large throughput ovens including tunnel ovens, conveyor ovens, rack ovens, and others. Here the temperature could be controlled at different stages of baking and if necessary steam can be introduced to control the crust characteristics.



After baking bread needs to be cooled before it could be sliced and packed. There are many different types of breads some of which are not sliced e.g. French bread.

Future

Consumers have been used to white bread with soft fluffy texture, very fine crumb and large loaf volume. They now want all the goodness of various healthy ingredients and still expect the bread to have the same characteristics of white bread. It is a tough task but various emulsifiers, conditioners, improvers etc. are helping. However, consumers also want less or no additives. Different processes are being developed with the machinery for mixing which could give all the benefits.

There is also globalisation of many ethnic products so suddenly there is explosion of many new products in the market. As rolls and buns are becoming popular in developing countries, the rotis and chapattis and pita bread are becoming common in western markets. The influences of new ingredients are seen in both traditional and ethnic varieties. There certainly is big anticipation of growth in ingredients market that will cater to all these new ideas.

Newer application of enzymes in baking

by Dr. Malathy V., Food Technologist, PFNDAI

Traditionally baking has been associated with cooking of wheat flour using dry heat into tasty products which are part of every meal. Wheat flour and water are the major ingredients. Minor ingredients include salt sugar, yeast and improvers. Baked goods prevalent in most parts of the world include breads, biscuits and cakes. Unleavened breads also called flat bread are important as the basic meal in many parts of the world especially India. Every state in the country has its traditional flat bread. However with improved transport facility wheat flour has now become a staple food in most parts of India.

Enzymes were traditionally used as improvers to aid the baking process. The amylases excreted by yeast during fermentation improved the characteristics of the bread. Later on when technologists found that amylases could be produced by other microorganism easily, these were added as additional improvers to further improve the bread quality and reduce fermentation time for efficient production.

Flour and baking industries first began adding enzymes to their products in the 1970s and this has increased over the last 40 years. Enzymes such as fungal alpha-amylase, bacterial alpha-amylase, amyloglucosidase, glucose oxidase, xylanase and protease are used in bread making to improve dough quality and lengthen the shelf life of the final product.

Bread:

In recent years, increased health awareness has led to a shift to consumption of whole grain substitute to refined flour especially in case of baked products such as bread and biscuits. This has resulted in problems for the processor for delivery of a similar product as one obtained using refined flour. High bran content interferes with volume, texture and even machinability. Fibre degrading enzymes which were hitherto useful in animal feed were found to give good products when used as improvers. Hemicellulases consisting of cellulose, xylanases, betaglucanase gave improved volume, crumb texture and crust colour in whole wheat and fiber enriched bread. Phytase addition shortened the fermented period, without affecting bread dough characteristics. When used for whole wheat bread, a considerable increase of the specific bread volume, an improvement of the crumb texture, and the width/height ratio of the bread slice were obtained. An in vitro assay revealed that the improving effect of phytase on bread making might be associated with activation of α-amylase, due to the release of calcium ions from calcium-phytate complexes promoted by the enzyme action. Phytase offers excellent possibilities as a bread making improver, with two main advantages; first nutritional improvement due to release of cations such as Fe and Mn and second activation of amylase to give increased activity and faster results.

As bread making has moved from small bakeries to huge commercial production facilities, shelf life has become important. Many of these have a central production facility from where bread is transported even across states. This created the need for functional food additives such as emulsifiers and antistaling agents in bread to maintain desired quality. Though amylases help ameliorate staling, overdosing causes stickiness of baked goods. It was suggested that these problems could be solved using an exoamylase since they do not produce the branched maltooligosaccharides of DP20-100. Such enzymes called maltogenic amylases produce linear oligosaccharides of 2–6 glucose residues. Maltogenic amylases producing maltose, maltotriose and maltotetraose. The enzymes phospholipases have efficiently replaced emulsifiers in bread.

Formation of the large quaternary structure of wheat protein called gluten is extremely complex and depends on many factors primarily wheat variety. Stability of gluten structure is dependent on links between amino acids in the protein. This bond can be strengthened by cross linking between amino acids. Transglutaminase enzyme catalyses the cross linking of gluten thus giving stability to gluten, Stability of gluten results in improved volume of the baked product. Transglutaminase catalyzes acyl-transfer reactions introducing covalent cross links between lysine residues and glutamine residues without affecting the nutritional value of the lysine residue. Addition of transglutaminase to croissant dough has specific effects such as improved volume and increase in crispiness of the crust.

The application of isolated transglutaminase enzymes from microbiological sources has allowed for simplification of extraction and improved availability of the enzyme. Due to media cost, product is still expensive. However the effect on baked product in combination with small dosage has made this enzyme feasible for bakery use. Laccase (p-diphenol oxygen oxidoreductase) is another oxidative enzyme which recently has attracted a considerable interest in breadmaking. Laccase catalyses oxidation of low molecular weight phenolic model compounds of flour such as ferulic acid resulting in cross linking of gluten proteins. The enzyme was found to soften the bread crumb and increase the volume of breads; best results were achieved when used in combination with xylanases.

Flat bread

Flat breads are made in most parts of the world. Examples are tortilla, chapati, pita, parotta, yufka, tandoori roti, sangak, balady, barbari, taftoon, lavas, ciabatta, baati, bafla, phulka, kulcha, gyro bread. Flat bread has different characteristics rather than high volume pan bread. Some of these are:

- They have lower specific volumes but high crust and crumb ratio than pan bread
- The leavened flat breads have shorter fermentation period in comparison to pan bread
-They have different production conditions coming from higher baking temperature and shorter baking time.

Freshly baked flat breads are soft and elastic. When kept at room temperature they stale within few hours and become hard and tough. For example; chapattis are generally prepared twice a day for lunch and dinner, and unless eaten immediately after preparation, they stale rapidly and become difficult to chew. In commercial establishments, the firmer chapattis are either sold at a reduced price or given to employees. Since whole wheat flour is generally used for flat bread such as chapatti, the fiber content is higher but nutritional bioavailability is poor. The bioavailability of zinc in cereal depends on the presence or absence of certain dietary factors such as fiber and phytate. Flat breads such as chapati, phulka, lavas, taftoon, barbari and sangak are generally produced from soft white wheat flours of higher extraction levels. Many types of flat bread are made of leavened dough with fermentation. Dough is fermented by bakers' yeast or sourdough.

Chapati dough treated with fungal α-amylase, bacterial α-amylase, xylanases and combination of bacterial α-amylase and xylanases were examined for making quality. The microstructures of chapatis prepared from dough treated with enzymes were uniform with distorted starch granules surrounded with protein matrix, while in control, the starch granules were spherical with protein matrix overlapping on one another to form aggregation. Chapatis prepared from dough treated with enzymes had softer texture, better pliability and higher overall quality scores compared to control. Although arabinoxylans they form a small portion of whole wheat flour (2-3% of dry weight) they interfere with the formation of gluten network, thus affecting some properties of the baked product. Xylanases can break glycosidic linkages in arabinoxylans in an endo- or exo- fashion, creating smaller fragments which results in water soluble pentosans. The water soluble pentosans can hold upto 10 times their weight of water and is positively correlated with bread properties. Xylanases addition to wheat flour improved handling properties, sheeting and volume of flat bread.

Many enzymes such as protease, amylase, lipase, oxidative enzymes like glucose oxidase, hexose oxidase, polyphenol oxidase, peroxidase etc., are reported to improve the quality of flat bread dough. Wheat also contains a few endogenous oxidative enzymes like peroxidase, polyphenol oxidase, and super oxide dismutase etc. Glucose oxidase and peroxidase catalyse cross linking of arabinoxylans to side chains of amino acids in gluten. The result is improved volume of the baked product with bleaching of the crumb.

The microstructure of parotta dough with different enzymes revealed that the use of proteinase improved the continuous gluten formation thus improving sheeting and machinability.

Biscuits:

The recent trend in biscuit manufacture is to increase the fibre content to overcome health problems such as hypertension, diabetes, and colon cancer, among others. For the processor resistance to extension values as well as extensibility of the dough decreased with increase in the bran level. Some countries have banned use of sodium metabisulfite in

biscuit processing adding to the difficulties of processing. Sodium metabisulfite can be efficiently replaced by proteases which reduce the viscosity of flour, relax gluten to improve sheeting and prevent checking. Hemicellulases are useful in bran containing biscuit dough to partially hydrolyse the fibre improving machinability and in addition providing nutrition in the form of oligosaccharides to the consumer.

Cake:

Traditional cakes containing eggs and large quantities of fat are being replaced by eggless and low fat cakes partly due to vegetarian choice and partly due to increasing cost, consistent quality and in some case consistent availability of eggs. Also paucity of artisans has resulted in growth of premix industry where cakes manufacture can be mechanized. When the amount of egg is reduced in cake, the quality of the product in general will deteriorate. This can be countered by addition of Phospholipase A1 or A2. In addition amylases improve the gel formation ability of starch resulting in improved quality with increased shelf life. Amylomaltase or α 1-4 glycosyl transferase is known to degrade potato starch into a thermo reversible gel in water which is able to form domains in complex food such as cake to behave as fat globules.

Acrylamide formation in baked food: High levels of acrylamide have been found in high temperature processed food with high carbohydrate content such as baked food. The mechanism is reaction between the amino acid asparagine with reducing sugars. Reduction of pH in semi sweet biscuits was found to reduce acrylamide content by 30%. However ammonium bicarbonate is commonly used as the leavening agent in biscuits and this is strongly alkaline and also supportive of acrylamide formation. Asparaginase enzyme catalyses conversion of asparagine to aspartic acid therefore not permitting formation of acrylamide. About 95% reduction in acrylamide formation in baked products has been observed by addition of asparaginase in the process.

Speedy processing of food products has become necessary due to large volumes involved while maintaining consistent and high quality of products. Enzyme technology has rapidly made a niche in food processing due to the benefits obtained. Shift from chemicals to natural products is another factor for increasing research and immediate application of research of enzyme applications in baking industry. Newer enzyme applications will not only make the manufacturing process cost effective but also give additional advantage of health benefit to the consumer.

Report on Wellness Foods Conference

by Ms. Ummeayman, Nutritionist, PFNDAI

Wellness Foods Conference was organised in Bangalore, Hotel Royal Orchid on November 25, 2013 by PFNDAI along with IBM (Integrated Business Media).

Wellness has always been a human quest. Although wellness was considered to be physical health depending on medicines, however with changing times, mental, spiritual, social, environmental aspects are being accepted and food has been recognised as an important factor. With a brief introduction to the conference by Dr. V. M. Adhikari, Conference Convener, followed by welcome address by Mr. Bhupinder Singh, Vice Chairman-PFNDAI & CEO-Vista Processed Foods, the conference was set on note.

Inaugural Address by Dr. Ram Rajasekharan, Director, CFTRI gave an insight into innovative projects like the Green Milk concept. Such innovative projects can help to overcome malnutrition and osteoporosis and additional fortification with omega3-fatty acids further increases the nutritional properties of such nutritional products. As many Indians were lactose-intolerant, there were efforts to prepare the green milk from leaves and other vegetarian ingredients. This would be an excellent replacement of buffalo or cow milk and could also be used in tea or coffee.

Dr. B. Sesikeran, Ex-Director, NIN, Hyderabad, in his Keynote Address on "Efficacy and Safety of Bio Active Substances", presented some of the health benefits of the bioactive molecules and their sources, what are their role and their functionality in reducing the risk of some of the diseases. Although many of these food products that are source of the bioactive molecules have been consumed for years , however there are studies done and more research is to be done to know the safety limits of their consumption. In conclusion he emphasised the need to translate new knowledge into products and ensure safety and quality.

Special Address was delivered by Ms. Geetu Verma, Executive Director, Hindustan Unilever on industry efforts on developing healthy food products. She gave several examples of new healthy products which kept in mind the changing lifestyle and the requirements of consumers who not only were facing problems of weight as well as less time for food. Industry gave foods which were not only easy to prepare, consume and also had healthy ingredients including vitamins, minerals and many herbal products designed to be healthful.

Technical Session on Health & Maintenance was chaired by Dr. B. Sesikeran. The session opened with presentation on 'Sports & Fitness Nutrition: Products & Benefits' by Dr. Vijay Tijare, Gen. Manager, Venky's India is becoming a potential market for some of the sports nutrition products as there has been an increasing demand from weekend sports enthusiasts. Also with growing urbanisation it has impacted the lifestyle and people are more concerned for their growing needs. Dr. Tijare gave and insight into the different diet needs of the athletes of different age groups and into various different sports.

Mr. Vijay Uttarwar, CEO, Naturell India presented 'Nutrition on the run: Energy Bars'.India's rapid economic expansion has boosted corporate profits and employee

incomes, but has also sparked a surge in workplace stress and lifestyle diseases. Thus one needs to be concerned of what he eats. One should always go for a diet with high fibre, appropriate amount of amino acids,omega-3, prebiotics and no cholesterol. Mr. Uttarwar gave an insight into some of the products available in market that could help manage the concerns of our rapid lifestyle.

'Spices as Functional Foods for deriving Health and Wellness' was presented by Dr. K. Srinivasan, Chief Scientist, Biochemistry & Nutrition, CFTRI. Spices have been consumed in India since years and it could be well regarded as the first 'Functional Foods' and medicinal properties of spices have been recognised for a long time. Dr. Srinivasan gave an insight into the multiple health benefits of spices such as anti-inflammatory, anti-lithogenic, anti-diabetic, digestive stimulant, anti-cancer and hypocholesterolemic and antioxidant properties of spices.

Mr. Deepak Gunvante, VP, Nutritionals R&D, GSK presented 'Functional Food Products for Health'. Functional foods are the answer to fight the double burden of malnutrition. There is a global prevalence of problems such as obesity, CVD, diabetes and all these needs to be addressed on priority. He presented the global scenario of cases of anaemia and malnutrition.

Technical Session 2 on Health at Different Stages of Life was chaired by Dr. Vilas Adhikari. Very apt to the session, Dr. Vongsvat Kosulwat, Director-Nutrition Science R&D, Mead Johnson Nutrition (Asia Pacific) started with the presentation on 'Development of Infants & Requirements'. Every stage of foetal development and later stages requires special dietary attention. Calcium is most important during the early developmental stages but there is equal importance of various minerals during the developmental stages. Dr. Kosulwat explained what the globally recognised recommendations are during pregnancy and for infants.

Role of Nutrients in Growth & Development of Children by Dr. Sheela Krishnaswamy, Nutritionist &Dietician. There is a continuous development of critical bone mass, muscle mass, fat and body water during the early growth period of a child. India being a developing country not only faces the burden of malnutrition but in some of the urban regions there is a major health concern towards weight, body composition, hypertension, and type 2 diabetes in children. A study from northern India reported a childhood obesity prevalence of 5.5%in higher socio-economic strata. She stated that we need to address these concerns by education the young and parents towards healthy eating habits and exercise.

Dr. Jayant Deshpande, Chief Technical Officer, Omniactive Health Technologies presented some of the 'Age-related Problems'. As adults age, they become more forgetful.

Forgetfulness is the first sign of Alzheimer's Disease (AD). Memory loss and confusion are accepted as just part of growing older. Also there are problems of bone and joints. The weight-bearing bones and the movable joints take much wear and tear as the body ages. The most common age-related conditions are arthritis and osteoporosis. Ageing also affects eyes and vision. After the age of 40, vision blurs, cataracts develop.He stated that some of these problems could be addressed by consumption of antioxidant rich vegetables and fruits, but poor bioavailability is a concern and isolated purified natural antioxidants are poorly soluble in water and less bioavailable even at higher doses. Lutein from marigold flowers and curcumin from turmeric, among others, hold promise in scavenging the free radicals and delay age related damage to the eyes.

The conference concluded with panel discussion on Commercial & Regulatory Aspects chaired by Dr. G.M. Tewari. The panellists present were Dr. J. I. Lewis, Chairman, Regulatory Affairs, PFNDAI, Ms. Anuradha Narasimhan, Britannia, Mr. Vijay Bhaskar Reddy, Dabur and Mr. Pichet Itkor. Views on the food regulations of Indian and globally were discussed. Members also presented their views on Indian markets and the scope of development and innovations.

Research in Health & Nutrition

Lack of Dietary Protein May Cause Overeating, Obesity

November 8, 2013 Food Product Design

The overriding drive for dietary protein could be a key factor in the global obesity epidemic, with individuals' total calorie intake increasing as the percentage of protein in their diets decreases, according to a new study published online in *Obesity Reviews*.

Researchers at the University of Sydney found that regardless of weight, age or the time frame of a diet, reducing the percentage of dietary protein will result in increased total energy intake, contributing to overweight and obesity. The research collated the results of 38 published experimental trials measuring the unrestricted energy intake of people on different diets, also taking into account a broad spectrum of age ranges, Body Mass Indexes (BMIs) and diet durations.

"We found that regardless of your age or BMI, your appetite for protein is so strong that you will keep eating until you get enough protein, which could mean you're eating much more than you should," said Dr. Alison Gosby, lead author of the research and a Postdoctoral Fellow at the University of Sydney's Charles Perkins Centre.

As diets shift toward an increased proportion of foods that are higher in carbohydrate or fat, available protein is reduced and calorie intake necessarily increases. "For example, when you consume things like soft drinks, which are fairly low in proportion of protein but high in calories, your energy intake will increase because you'll need to keep eating to get the protein you need. If you add a soft drink to your lunch then you've added a lot of calories, but you'll still have to eat the same amount of food," Gosby said.

The increased understanding of appetite provided by the research could have profound impacts on the design of effective and healthy weight-loss diets, food-labeling policies, food production systems and regulatory frameworks. "We have shown that when people are trying to lose weight they need to look at macronutrient composition, not just calories. If you cut out calories but don't consider protein intake, you're going to be hungry and your diet won't be successful," she said.

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Cow's milk peptide may help treat gastric cancer

A study published in the *Journal of Dairy Science* shows that a peptide fragment derived from cow's milk, known as lactoferricin B25 (LFcinB25), may be a potential therapeutic agent for gastric cancer. The researchers evaluated the effects of three peptide fragments derived from lactoferricin B, a peptide in milk that has antimicrobial properties. Only one

of the fragments, LFcinB25 reduced the survival of human AGS (Gastric Adenocarcinoma) cells in a dose-dependent and time-dependent manner.

Under a microscope the investigators could see that after an hour of exposure to the gastric cancer cells, LFcinB25 migrated to the cell membrane of the AGS cells, and within 24 hrs the cancer cells had shrunken in size and lost their ability to adhere to surfaces. In the early stages of exposure, LFcinB25 reduced cell viability through both apoptosis (programmed cell death) and autophagy (degradation and recycling of obsolete or damaged cell parts). At later stages, apoptosis appeared to dominate, possibly through caspase-dependent mechanisms, and autophagy waned.

The research also suggested a target, Beclin-1, which may enhance LFcinB25's cytotoxic action. Beclin-1 is a protein in humans that plays a central role in autophagy, tumor growth, and degeneration of neurons. In this study, the investigators found that cleaved beclin-1 increased in a time-dependent manner after LFcinB25-exposure, suggesting to the researchers a new approach in drug development that may boost the anticancer effects of LFcinB25.

IFT Weekly November 13, 2013

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Poor diet may increase inflammation-related health problems

A study presented at the American Institute for Cancer Research (AICR) Annual Research Conference shows that eating a diet high in sugar, saturated fats, and others foods that promote inflammation may increase the risk of premature death from any cause, including cancers of the gastrointestinal tract.

Study researchers used an inflammatory index of foods and nutrients developed by University of South Carolina (USC) researchers. "Studies have shown that diet can modify inflammation, and inflammation can drive the growth of many cancers, such as colorectal cancer," said Susan E. Steck, USC Associate Professor and co-author of the study. "In previous studies, we found that dietary inflammatory index scores were associated with levels of C-reactive protein, a marker of inflammation. This new study extends the research to examine disease outcomes, and suggests that consuming fewer pro-inflammatory dietary factors and more anti-inflammatory dietary factors may reduce risk of gastrointestinal tract cancer death."

The study followed 10,525 men and women in the Aerobics Center Longitudinal Study from 1987 through 2003. Participants had completed three-day food records when the study began. At the end of the study, 259 people had died; 30 from gastrointestinal tract cancers. Gastrointestinal tract cancers include cancers of the esophagus, stomach, colon, and rectum.

Compared to those consuming the most anti-inflammatory diet, participants consuming the most pro-inflammatory diet had a 53% higher risk of mortality during the course of the study. (The risk slightly decreased after adjusting for cardiorespiratory fitness.) For gastrointestinal tract cancers, there was a four-fold increase among the group consuming the most pro-inflammatory diet compared to the most anti-inflammatory.

"This study adds support to the recommendations to consume a more anti-inflammatory diet, rich in plant-based foods that contain numerous anti-inflammatory nutrients and phytochemicals," said Fred Tabung, a doctoral candidate in epidemiology at the University of South Carolina and the study's lead author. "Due to the small number of gastrointestinal tract cancers in our study, our finding needs to be confirmed in larger longitudinal studies."

IFT Weekly November 13, 2013

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Asian Vegetable May Fight Head, Neck Cancer

November 18, 2013 Food Product Design

Extract taken from an Asian vegetable may have therapeutic qualities to treat head and neck cancer, according to a new study published in the journal *PLOS ONE*. Researchers at Saint Louis University studied extract from the bitter melon, a vegetable commonly used in Indian (*karela*) and Chinese diets, to determine its effects on head and neck cancer cell growth in an animal model.

In a controlled lab setting, Ratna Ray, Ph.D., associate professor, pathology, Saint Louis University, found that bitter melon extract regulated several pathways that helped reduce the head and neck cancer cell growth in the animal model. After a period of four weeks, Ray found that the growth and volume of the tumour had reduced.

"We wanted to see the effect of the bitter melon extract treatment on different types of cancer using different model systems," said Ray, who first tested the extract in breast and prostate cancer cells. "In this study, the bitter melon extract treatment suppressed the head and neck cancer cell growth in the mouse model, reducing the growth of the tumour."

Although more research is needed, Ray believes the bitter melon extract may enhance the current treatment option. "It's difficult to measure the exact impact of bitter melon extract treatment on the cell growth, but a combination of things—existing drug therapy along with bitter melon—may help the efficacy of the overall cancer treatment," Ray said.

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Protein-Rich Breakfast Curbs Appetite, Overeating

November 14, 2013 Food Product Design

Eating high-protein breakfasts curbed hunger throughout the morning, compared with a low-protein breakfast or skipping breakfast, in women ages 18 to 55 years, according to new research presented at Obesity Society's Obesity Week, Nov. 11-16.

Researchers with Biofortis Clinical Research and the University of Missouri gave participants either high-protein or low-protein breakfast meals containing approximately 300 calories and similar quantities of fat and fiber. The protein-rich breakfast—sausage- and egg-based breakfast bowls—contained 30 to 39 grams of protein. The participants completed questionnaires to rate aspects of appetite—such as hunger, fullness, and desire to eat—before breakfast and at 30-minute intervals between breakfast and lunch.

Study participants had improved appetite ratings—lower hunger, more fullness, less desire to eat—throughout the morning after eating each protein-rich breakfast, and also ate fewer calories at lunch, compared with the low-protein breakfast and breakfast skipping.

"Eating a breakfast rich in protein significantly improves appetite control and may help women to avoid overeating later in the day," said Kevin C. Maki, principal investigator of the study and research scientist, Biofortis Clinical Research.

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Diabetes numbers soar worldwide

According to *Reuters*, the number of people estimated to be living with diabetes globally has soared to a new record of 382 million this year. The vast majority have type 2 diabetes—the kind linked to obesity and lack of exercise—and the epidemic is spreading as more people in the developing world adopt Western, urban lifestyles.

The latest estimate from the International Diabetes Federation is equivalent to a global prevalence rate of 8.4% of the adult population and compares to 371 million cases in 2012. By 2035, the organization predicts the number of cases will have soared by 55% to 592 million.

The federation believes a strategy involving all parts of society is needed to improve diets and promote healthier lifestyles. It calculates diabetes already accounts for annual healthcare spending of $548 billion and this is likely to rise to $627 billion by 2035.

The country with the most diabetics overall is China, where the case load is expected to rise to 142.7 million in 2035 from 98.4 million at present. But the highest prevalence rates are to be found in the Western Pacific, where more than a third of adults in Tokelau, Micronesia, and the Marshall Islands are already living with the disease.

IFT Weekly November 20, 2014
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High Fruit Intake Yields Healthy Pregnancy

November 22, 2013 Food Product Design

A healthy diet, with a high intake of fruit—at least three pieces a day—both before and during pregnancy, may increase the chance of an uncomplicated pregnancy, according to a new study published in the journal *BMJ.*

Researchers monitored more than 5,000 first-time mothers in New Zealand, Australia, the United Kingdom and Ireland to investigate factors leading to a normal pregnancy rather than factors which could have an adverse effect.

A comprehensive set of data—including details about medical histories and dietary information—was collected by interviewing and examining participants, and conducting questionnaires. Participants underwent an ultrasound scan between 19 and 21 weeks and had maternal measurements monitored. The outcome of pregnancies and infant measurements were collected after birth by research midwives.

Researchers concluded a healthy diet, which includes at least three servings of fruit per day, can increase the chance of an uncomplicated pregnancy, with decreased risk of complications such as pre-eclampsia or premature birth. Other important factors include maintaining a healthy body mass index (BMI) and blood pressure levels.

"These findings suggest that by leading a healthy lifestyle both before and during pregnancy—including eating lots of fruit and maintaining a healthy BMI—it could be possible for women to increase the likelihood of experiencing an uncomplicated pregnancy," said Lucy Chappell, Ph.D., lead author from the Division of Women's Health, King's College London.

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Introducing solid foods while continuing to breast feed could prevent child allergies

November 20, 2013 Science Daily

Introducing solid food with breast milk after the 17th week of birth could reduce food allergies in babies, according to research. The research suggests that giving the baby solid food besides breast feeding helps it develop a better, stronger immune system to fight food allergies. Introducing solid food with breast milk after the 17th week of birth could reduce food allergies in babies, according to University of Southampton research.

The research, led by Dr Kate Grimshaw, dietitian and senior research fellow at the University, say that giving the baby solid food beside breast feeding helps it develop a better, stronger immune system to fight food allergies. "Introducing solid foods alongside breastfeeding can benefit the immune system," Dr Grimshaw explains. "It appears the

immune system becomes educated when there is an overlap of solids and breast milk because the milk promotes tolerogenic mechanisms against the solids.

"Additionally, our findings suggest 17 weeks is a crucial time point, with solid food introduction before this time appearing to promote allergic disease whereas solid food introduction after that time point seems to promote tolerance." Infants are largely intolerant of solid food before four to six months of age. This is thought to be due to the infant gut being relatively immature, which may cause symptoms of food allergy.

The study, funded by the UK Food Standards Agency and published in Paediatrics, recruited 1140 infants at birth from the Hampshire area in a study known as 'PIFA'. 41 of these children went onto to develop a food allergy by the time they were two years of age. The diet of these infants was compared with the diet of 82 infants who did not develop food allergy by the time they were two.

The team found that children who had developed allergies began eating solid food earlier than children with no allergies -- roughly, at age 16 weeks or earlier. Children with allergies were also more likely to not be being breastfed when the mother introduced cow's milk protein, from any source. Women who are not breastfeeding are encouraged to introduce solids after 17 weeks of age, Dr Grimshaw says.

This unique research supports the recommendations of the American Academy of Paediatrics and the European Society of Paediatric Gastroenterology, Hepatology and Nutrition who urge mothers not to introduce solid foods before four to six months of age. Furthermore the findings also support the American Academy of Paediatrics' breastfeeding recommendations that breastfeeding should continue while solid foods are introduced into the diet.

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Cows chomping on fresh grass, red clover produce omega milk

November 20, 2013 Science Daily

Fat is an important ingredient that has a material impact on the nutritional value, texture, taste, shelf-life and producer price of milk. However, milk products are a significant source of saturated fatty acids in the Western diet. How should dairy cattle be fed for their milk to contain more unsaturated fatty acids?

Fat is an important ingredient that has a material impact on the nutritional value, texture, taste, shelf-life and producer price of milk. However, milk products are a significant source of saturated fatty acids in the Western diet. How should dairy cattle be fed for their milk to contain more unsaturated fatty acids?

Only scant research data are available on the effects on the lipid metabolism of ruminants of the forage conventionally used to feed dairy cows. Anni Halmemies-Beauchet-Filleau, who has worked as a researcher at MTT and at the University of Helsinki, studied in her

doctoral thesis the role of forage species and conservation method in ruminal lipid metabolism and milk fatty acid composition.

The practical aim was to develop a feeding strategy that decreases the share of saturated fatty acids and increases the share of unsaturated fatty acids, particularly oleic acid (Omega-9) and alpha-linolenic acid (Omega-3), in milk fat composition.

Fresh grass increases the share of oleic acid

Approximately one half of milk fat is generated in the mammary glands of cows, the other half coming from the fats in forage. Most of the unsaturated fatty acids in forage go through biohydrogenation, i.e. become saturated in the rumen. In addition, as a result of feed fermentation, fat precursors are formed in the rumen, which develop into saturated fatty acids in the mammary glands. "Feeding can be used to affect the lipid metabolism of the rumen and the mammary glands, and thereby the fat composition of milk," Halmemies-Beauchet-Filleau explains.

The effect of the forage conservation method was examined in two tests, using fresh grass, hay or silage prepared with or without acid-based additive. The most advantageous effect on lipid metabolism is produced by forage from pasture or fresh cut grass. Cows fed on fresh grass use more fatty acids originating in adipose tissue to form milk fat than do other cows.

"Fresh grass decreases the share of saturated palmitic acid and increases the share of unsaturated oleic acid in milk fat, compared to hay feed," says Halmemies-Beauchet-Filleau. As for hay feeding, this accentuates the share of saturated fatty acids originating in the mammary glands. The differences in milk fat composition between hay and silage feedings were minor.

Changing to red clover is worth it

Milk fatty-acid composition was also investigated by replacing grass silage with red clover silage, and using a compatible vegetable oil supplement (rape, sunflower and camelina). The changes in ruminal lipid metabolism are based on the differences between plant species in terms of digestion kinetics and microbial flora in the rumen.

"Replacing grass silage with red clover accomplished a distinct decrease in the saturation of fatty acids in the rumen, and increased the concentration of alpha-linolenic acid in milk fat," Halmemies-Beauchet-Filleau notes.

A moderate vegetable oil supplement also further changed the composition of milk fat to become more favourable as human nutrition. The vegetable oil supplement did not decrease forage intake and made little change to the share of trans fatty acids in milk fat, except when given as camelina press cake.

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Obesity, nutrition keys to avoiding metabolic syndrome

November 19, 2013 Science Daily

Data reinforce the positive influence of lifestyle factors in mitigating risks that potentially increase the likelihood of heart disease and other health problems. Findings based on 1,059 people underscore the importance of obesity prevention and nutrition, specifically eating more fruits and vegetables, in addressing metabolic syndrome, a common precursor to cardiovascular disease.

Data reported by the Hearts Beat Back: The Heart of New Ulm Project reinforce the positive influence of lifestyle factors in mitigating risks that potentially increase the likelihood of heart disease and other health problems. Findings based on 1,059 residents of New Ulm, Minn, underscore the importance of obesity prevention and nutrition, specifically eating more fruits and vegetables, in addressing metabolic syndrome (MS), a common precursor to cardiovascular disease (CVD).

This study used an easily calculated Optimal Lifestyle Score (OLS), which is a composite summary of smoking, fruit and vegetable consumption, alcohol use, physical activity, and body mass index. The results were presented by Jackie Boucher, MS, RD, LD, CDE, Vice President for Education, Minneapolis Heart Institute Foundation on November 19 at the American Heart Association Scientific Sessions in Dallas, TX.

Hearts Beat Back: The Heart of New Ulm Project is a research and demonstration project with a goal of reducing heart attacks in New Ulm, Minn. over a ten year period. The project involves worksite, clinical and community programs, and environmental changes and is being led by the Minneapolis Heart Institute Foundation in close partnership with Allina Health and the community of New Ulm.

"These findings clearly support national recommendations encouraging individuals to achieve energy balance and to increase fruit and vegetable consumption," stated Boucher. "Our data suggests that there is a clear connection between increased body weight or the decrease in the consumption of fruits and vegetables, and the development of metabolic syndrome, a clustering of CVD risk factors."

In 2009, 1,059 of screened residents did not have MS, with 123 (12%) going on to develop MS by 2011. A decline in the OLS was associated with a nearly 3-fold increased risk of incident MS (aOR = 2.9, CI: 1.69, 5.04). Changes in BMI and fruit/vegetable consumption were the OLS components most strongly associated with MS. People who became obese during the two-year time period were more than eight times more likely to develop MS and people who reduced their intake of fruits and vegetables to less than 5 or more servings per day were four times more likely to develop MS.

The Hearts Beat Back: The Heart of New Ulm Project is in year five of the Project. Overall, data demonstrates significant increases in the consumption of fruits and vegetables, levels

of physical activity and the daily use of aspirin. Data also suggests that significantly fewer people have high blood cholesterol and high blood pressure, reinforcing the importance of modifying nutrition and physical activity behaviours to improve health and prevent disease.

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Texting your way to weight loss

November 18, 2013 Science Daily

Tracking information on diet and exercise habits through text messages could save time and improve the likelihood of people sticking with their get-healthy routine, say researchers.

If the idea of keeping a food and exercise diary keeps you from joining a weight-loss program, there may be a better way: texting.

Research shows that when people keep track of their diet and exercise habits, they do better at losing weight. But sticking with detailed monitoring of what you eat and your exercise habits electronically or via traditional pen and paper can prove cumbersome. If people stop doing it, they may stop losing weight.

Tracking this information through text messages could save time and improve the likelihood of people sticking with their get-healthy routine, say researchers at Duke University.

Their study, published in the online edition of the Journal of Medical Internet Research, found that after six months, 26 obese women who used daily texting as part of the Shape Plan weight-loss intervention lost nearly 3 pounds, while another 24 who followed traditional methods gained 2 1/2 pounds. The average age of participants was 38.

The daily text messages focused on tracking tailored behavioural goals (i.e., no sugary drinks, 10,000 steps per day) along with brief feedback and tips.

Every morning, participants got a text from an automated system that said, "Please text yesterday's # of steps you walked, # of sugary drinks, and if you ate fast food." Based on how they responded to the text, the automated system sent another text with personalized feedback and a tip.

"Text messaging has become ubiquitous and may be an effective method to simplify tracking of diet and exercise behaviours," said lead author Dori Steinberg, a post-doctoral obesity researcher in the Duke Obesity Prevention Program.

Text messaging offers several advantages compared to other self-monitoring methods, she said:

-- Unlike Web-based diet and exercise diaries, data in a text message can be entered quickly on nearly all mobile phone platforms. This provides more portability, nearly real-time tracking and more accessibility for receiving tailored feedback.

-- Previous studies show that long-term adherence to traditional monitoring is poor, possibly because they are time- and labour-intensive, require extensive numeracy and literacy skills, and can be perceived as burdensome.

-- Text messaging has been conventionally limited to about 15-20 words per message, thus reducing the detail and cognitive load that is required for documenting diet and exercise behaviours.

The study primarily focused on helping obese black women lose weight (82 percent of participants were black). Researchers said that's because 59 percent of black women are obese, and many use cell phones. This combination makes text messaging a good way to reach this high-risk population.

About half of participants texted every day throughout the six-month program, with 85 percent texting at least two days per week. Most participants reported that that texting was easy, and helped them meet their goals.

The key challenge in weight loss is helping people keep weight off for the long-term. So the next step is to see if texting can help people maintain their weight loss.

"Given the increasing utilization of mobile devices, text messaging may be a useful tool for weight loss, particularly among populations most in need of weight-loss treatment," Steinberg said.

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Lowering salt intake improves heart, kidney health of chronic kidney disease patients

November 7, 2013 Science Daily

In patients with chronic kidney disease who lowered their salt intake for two weeks, excess extracellular fluid volume, blood pressure, and protein excretion in the urine all dropped considerably. If maintained long-term, the effects could reduce a patient's risk of progressing to kidney failure by 30%.

Reducing salt intake provides clear benefits for the heart

and kidney health of patients with chronic kidney disease, according to a study appearing in an upcoming issue of the *Journal of the American Society of Nephrology* (JASN). The findings point to the power of salt restriction in potentially prolonging kidney disease patients' lives.

Excessive salt intake is consistently linked to increased risk of heart disease and worsening kidney function. People with chronic kidney disease (CKD) may be particularly susceptible to salt's detrimental effects due to the kidney's important role in controlling salt balance and their increased risk of dying from heart disease. Until now, though, the effect of salt restriction in these patients has not been well explored.

The LowSALT CKD study represents the first blinded randomized controlled trial comparing a high vs low salt intake in people with CKD. During the study, Emma McMahon (PhD candidate, University of Queensland, in Australia) and her colleagues, led by principal investigator Katrina Campbell, PhD (Princess Alexandra Hospital, in Australia) compared the effects of a high salt diet (180 to 200 mmol/day) vs a low salt diet (60 to 80 mmol/day) maintained for two weeks each in a random order in 20 patients with CKD. (Dietary guidelines recommend limiting sodium to less than 100 mmol -- which is 2300 mg or one teaspoon -- per day.) The team measured various parameters related to heart and kidney health, including change in extracellular fluid volume, blood pressure, and protein in the urine.

The researchers found that on average, low salt intake reduced excess extracellular fluid volume by 1 liter, lowered blood pressure by 10 /4 mm Hg, and halved protein excretion in the urine, without causing significant side effects.

"These are clinically significant findings, with this magnitude of blood pressure reduction being comparable to that expected with the addition of an anti-hypertensive medication and larger than effects usually seen with sodium restriction in people without CKD," said McMahon. She was particularly impressed with the 50% reduction in protein excretion in the urine. "If maintained long-term, this could reduce risk of progression to end-stage kidney disease -- where dialysis or transplant is required to survive -- by 30%."

The findings suggest that salt restriction is an inexpensive, low-risk and effective intervention for reducing cardiovascular risk and risk of worsening kidney function in people with CKD. "If these findings are transferable to the larger CKD population and shown to be sustainable long-term, this could translate to markedly reduced risk of cardiovascular events and progression to end-stage kidney disease, and it could generate considerable health-care savings," said Dr. Campbell.

In an accompanying editorial, Cheryl Anderson, PhD, and Jochim Ix, MD (University of California San Diego School of Medicine) commended the researchers for providing important clinical trial data in support of current clinical practice consensus guidelines, noting that "this study makes us cautiously optimistic." They added that larger studies with

longer follow-up specifically designed and carried out in CKD populations are needed to help inform recommendations to both individual patients and policymakers.

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Lower education levels linked to unhealthy diets

November 6, 2013 Science Daily

People with lower levels of education may eat larger amounts of unhealthy, calorically dense food than those with a higher education level, possibly because they are more physically active. People with lower levels of education may eat larger amounts of unhealthy, calorically dense food than those with a higher education level, possibly because they are more physically active, according to new research published November 6th in the open-access journal *PLOS ONE*, by Jonas Finger and colleagues at the Robert Koch Institute in Berlin, Germany.

Studies consistently show that unhealthy diets are seen more often in people of lower socioeconomic status, a term based on factors such as education level, income level, and occupation. Overall physical activity, however, may also be related to socioeconomic status and dietary habits.

In this study, the authors used a large-scale survey approach to investigate the relationship between education level, food consumption, and physical activity. They analyzed a large database from a representative German adult population and found that German adults with a low level of education consumed more sugar- and fat-rich foods than adults with a high education level. They also consumed fewer fruits and vegetables than those with higher education levels.

They next analyzed how physically active each group was, which is related to how much energy they used. They found that adults of lower socioeconomic status were more physically active and expended more energy than those of higher socioeconomic status. These results suggest that the higher energy expenditure in this group may explain their higher consumption of sugar- and fat-rich foods.

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Teens who eat lots of chocolate tend to be slimmer

1 November 2013 Medical News Today

Another study appears to find benefits from eating chocolate: researchers from the University of Granada in Spain analzying data on European teenagers found a strong link between high chocolate consumption and low levels of body fat.

Dr. Magdalena Cuenca-García, of the Department of Medical Physiology in Granada University's School of Medicine, and colleagues report their findings in a recent online issue of the journal *Nutrition*. The researchers are part of the HELENA study group, which is collecting and analyzing data about the diets, fitness and various health measures among European adolescents.

Previous studies have already found that regular chocolate consumption is linked to leanness in adults. There is also evidence that eating chocolate may reduce cardiovascular disease risk. They analyzed records on 1,458 adolescents from nine European countries who were aged from 12 to 17 and who had completed computer-based questionnaires asking them to recall what they had eaten in the previous 24 hours on 2 non-consecutive days.

The records also contained information from which they could assess participants' BMI, waist circumference, body fat measures and activity levels.

The results showed that higher chocolate intake among the teenagers was linked with lower levels of total fat and fat around the middle, regardless of other factors (including exercise).

The researchers in this study did not examine why chocolate appears to help the youngsters stay slim, but some previous studies have suggested it could be something to do with the flavonoids it contains.

Flavonoids are a group of polyphenolic compounds known to have numerous beneficial biochemical and antioxidant effects. For example, they appear to protect against cardiovascular disease through antioxidant, anti-clotting and anti-inflammatory properties.

"It's also possible that flavonoids in chocolate may decrease blood concentrations of bad cholesterol and reduce blood pressure," says Dr. Susanna C. Larsson, of Sweden's Karolinska Institute, where she and her team conducted a study of Swedish men that found chocolate consumption may also lower stroke risk.

Many researchers say it is dark chocolate that is good for the heart, but Dr. Larsson says, surprisingly, that 90% of the chocolate eaten in Sweden - as they also found in their study - is milk chocolate.

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Product improves decision making skills in older adults

8 November 2013 Medical News Today

A human clinical study of older adults has demonstrated that participants who took NutraStem Cardio®, a natural dietary supplement created by Natura Therapeutics, Inc., showed a significant increase in cognition when compared to age-matched individuals

taking a placebo. Cognition includes processes such as attention, decision making, and memory.

The company's study, Nutraceutical Intervention Improves Older Adults' Cognitive Functioning, has been published online ahead of print in the journal *Rejuvenation Research.*

Natura Therapeutics, a University of South Florida startup and incubator company, conducted the two-month, double-blind placebo study of 105 people. The average age of participants was 73, with 52 people taking NutraStem Cardio® and 53 people taking a placebo. The results indicated that the subjects taking NutraStem Cardio® improved significantly on two measures of decision making speed across the two month test period.

"The results of this study are promising and suggest the potential for interventions like these to improve the cognitive health of older adults," said Paula C. Bickford, Ph.D., co-founder of Natura Therapeutics and co-author of the study. "We are honoured to have the NutraStem Cardio® study published in an internationally respected, peer-reviewed journal like *Rejuvenation Research."*

"The patented formulation behind the company's line of products consist of four specific ingredients - blueberry extract, green tea extract, L-Carnosine, and Vitamin D3 - that, when combined, have a natural synergy and help adult stem cells replenish," said Bickford. "Adult stem cells can help repair damaged cells, restore tissues and organs, and support the immune system."

Natura Therapeutics has an exclusive license to the technology behind NutraStem Cardio®. The study was conducted at the Byrd Alzheimer's Institute at the University of South Florida. USF is also an owner of the technology. Brent J. Small, USF professor of Aging Studies, was first author of the study.

"Our company's philosophy is 'Nature's Care for Self Repair'," said Cyndy D. Sanberg, Ph.D., president of Natura Therapeutics and co-author of the study. "We believe that everyone has the ability to repair their body the way Mother Nature intended, naturally."

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Aerobic exercise may trump resistance training in health benefits for obese teen girls

11 November 2013 Medical News Today

Obesity has more than doubled in children and tripled in adolescents in the United States in the past 30 years, according to the Centres for Disease Control and Prevention. The growing rate of childhood obesity is a major health concern since overweight and obese youth are at increased risk of developing several diseases once considered reserved for adults. These new paediatric diseases include type-2 diabetes, metabolic syndrome, and non-alcoholic fatty liver disease, a condition in which fat builds up in the liver, potentially

impairing its function over time. Although both diet and exercise have been considered as first lines to treat childhood obesity, SoJung Lee of the Children's Hospital of Pittsburgh, University of Pittsburgh School of Medicine and her colleagues recently showed that when obese adolescent boys increased physical activity alone, they improved several markers of health. These include reducing total fat, fat packed around organs in the abdomen (known as visceral fat, a risk factor for diabetes), and liver fat, and improving fitness of their heart and lungs.

To see if physical activity might work in the same way for obese adolescent girls, Lee and her colleagues performed a new study that compared the health effects of two different types of exercise - aerobic exercise and weight lifting - over three months to remaining sedentary. Although their results show beneficial effects for both types of exercise, the researchers found that girls who performed aerobic exercise, but not weight lifting, had significant reductions in visceral fat and liver fat, as well as improvements in insulin sensitivity, another risk factor for diabetes that's linked with obesity.

The article is entitled "Aerobic Exercise But Not Resistance Exercise Reduces Intrahepatic Lipid Content and Visceral Fat and Improves Insulin Sensitivity in Obese Adolescent Girls". It appears in the online edition of the *American Journal of Physiology-Endocrinology and Metabolism*, published by the American Physiological Society.

Methodology

The researchers recruited 44 obese girls between 12 and 18 years old. They separated these volunteers into three groups. One group was assigned to perform 60 minutes of aerobic exercise three days a week for three months, either running on a treadmill or using an elliptical trainer. A second group was assigned to perform the same amount of resistance exercise, but instead participated in aerobic exercise program, doing 10 whole body resistance exercises using weight machines over the course of each hour-long session. A third group was asked not to participate in any structured physical activity program over the course of the study. Before the exercise programs began, all the study participants had a detailed physical exam, which included measuring their total fat, visceral fat, liver fat, and fat embedded in their muscles through various noninvasive means. The researchers also measured the volunteers' insulin sensitivity, a risk factor for diabetes, as well as basic health measures including weight and physical fitness.

Results

The researchers found that those in both exercise groups had less total fat and intramuscular fat by the end of the three-month study period compared to the sedentary group. However, the two exercise groups differed significantly in other measures. Overall, those in the aerobic exercise group lost visceral and liver fat and improved their insulin sensitivity, but those in the other groups didn't.

Importance of the Findings

These findings suggest that for teen girls, aerobic exercise might be superior to resistance exercise for cutting health risks associated with obesity. They also note that, anecdotally, girls in the aerobic exercise group seemed to enjoy their workouts more than those in the resistance exercise group, an opposite sentiment from the obese boys in their previous study.

"Therefore, given the superior improvements in metabolic health with aerobic exercise and the enjoyment factor, we propose that aerobic exercise may be a better mode of exercise for adolescent girls of this age group," they write.

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Betaine supplements may support muscle growth & improve body composition

Nutra-Ingredients 11-Nov-2013

Daily supplements of betaine may improve body composition, performance and power of strength-trained men, according to the first human clinical trial to show such benefits.

Six weeks of supplementation with BetaPower Natural Betaine from DuPont Nutrition & Health were associated with improvements in bench press training volume and body composition, compared to placebo.

"This new betaine research signals benefits for more mainstream consumers looking to improve body composition, as well as core sports nutrition consumers seeking improved performance and power," said Greg Paul, PhD, marketing director at DuPont Nutrition & Health.

Betaine is a nutrient found in foods such as shellfish, spinach, beets and whole grains. Previous studies have linked it to numerous performance-enhancing benefits, including less fatigue, greater general strength and greater endurance during recovery. DuPont's ingredient is extracted from sugar beet.

Betaine is currently approved for use in foods, beverages and supplements in North America and in supplements in Europe.

Training benefits

Stuart Craig, PhD, DuPont Nutrition & Health and co-author of the study, said the new results, which were published in the *Journal of the International Society of Sports Nutrition* , *"confirm that the addition of betaine to sports performance foods, beverages and dietary supplements can provide differentiating benefits when training*.

"This is supported by several previous performance studies as well as two papers published earlier this year highlighting the role betaine plays in building muscle."

The first of these papers, by researchers at the University of Connecticut, reported that betaine supplementation before exercise enhanced the body's hormonal responses and signalling pathway activity associated with an increase in skeletal muscle protein synthesis (Apicella et al., *Eur J Appl Physiol*, 2013. Vol. 113, pp. 793-802).

The second paper, conducted at San Raffaele Scientific Institute, indicated that in a cell culture system, betaine promoted muscle fiber development and growth through a pathway involving IGF-1 activation (Senesi et al., *J Transl Med*, 2013. Vol. 11, pp. 174).

Study details

The new study, conducted at the Springfield College Human Performance Laboratory in Massachusetts, involved 23 men aged between 18 and 35. The men were randomly assigned to consume 2.5 grams per day of betaine or placebo for six weeks. During the intervention period, the men were required to follow a strict training program, comprising of exercises commonly performed by weight lifters.
Results showed that men in the betaine group had significant improvements in body composition, compared to placebo, with increases in lean muscle mass and reductions in body fat percentage.
In addition, arm size and bench press work capacity had increased, and a trend toward improved power was observed.
"The increase in arm cross sectional area in the betaine group compared to placebo was accompanied by an improvement in bench press work capacity," wrote the researchers. *"The greatest improvements in volume over placebo occurred during the first and third training micro-cycles, where subjects were instructed to perform 3 sets of 12–15 repetitions with 90 sec rest periods and 3 sets of 8–10 repetitions with 120 sec rest periods, respectively.*
"Given the relationship between training volume and hypertrophy, betaine may have positively impacted muscle growth by promoting a greater training load over a series of subsequent workouts."
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Mediterranean diet may protect against cognitive decline, depression and stroke: Meta-analysis

29-Oct-2013 Food Navigator
Adherence to a Mediterranean diet may contribute to the prevention of a variety of conditions linked to the aging brain, including cognitive decline, depression and stroke, say researchers.

The meta-analysis, published in Annals of Neurology, shows that high adherence to a healthy dietary pattern, such as Mediterranean diet, may be beneficial along many central nervous system-related axes - and is inversely associated with stroke, cognitive impairment, and depression.
To a lesser extent, moderate adherence to Mediterranean diet seemed also to confer protection in terms of depression, as well as cognitive impairment risk, whereas its protective effects regarding stroke remained only marginal; the pattern of results may be indicative of a dose–response relationship. Interestingly, the protective effects of Mediterranean diet in stroke prevention seemed more sizeable among males, whereas the favourable actions of moderate adherence concerning depression seemed to fade away with advancing age.
Led by Professor Theodora Psaltopoulou from the University of Athens School of Medicine, Greece, the research team revealed that the Mediterranean diet was found to be protective for both subgroups of cognitive decline (mild and advanced), and the finding was reproduced for Alzheimer's disease (AD), which was the predominant condition among studies addressing advanced cognitive decline.
"Adherence to Mediterranean diet was found protective for depression in all types of studies (longitudinal

cohort, case–control, and cross-sectional) both in Mediterranean and in non-Mediterranean countries," revealed the researchers.

"Interestingly, depression is a risk factor for AD; thus, the protective role mediated by Mediterranean diet in terms of both depression and AD seems to point to the internal consistency of results," they added.

"Given the limited availability of pharmaceutical agents to treat cognitive impairment, cognitive decline, and stroke, one could argue for the importance of preventive measures, such as a healthy dietary regime, to diminish the risk of mild and advanced cognitive decline, Alzheimer's disease, depression, and stroke," wrote Psaltopoulou and colleagues.

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Association News

Hexagon CMD Mr. Kelkar donating cheque to initiate Hexagon-PFNDAI Student Scholarship

Mr. T. Vijay Bhaskar Reddy, Head – R&D Foods, Dabur receiving J S Pruthi Life-time Achievement Award from Mr. Tarique Anwar, Union Minister of State – Food & Agri

Food Science & Industry News

New Protease Reduces Bitterness In Enzyme-Modified Cheese

November 5, 2013 Food Product Design

A non-animal protease with a de-bittering action when added to enzyme-modified cheese processes was launched. It is an exopeptidase preparation with low levels of endopeptidase activity. In enzyme-modified cheese applications, the hydrolysis of cheese proteins by endopeptidases, such as animal and bacterial proteases, can create bitter flavors due to the accumulation of small hydrophobic peptides. Exopeptidases can be used to control bitterness by removing these bitter-tasting peptides. Due to its fungal origins, the enzyme is available kosher, halal and vegetarian.

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Innovative Flavors Keep Consumers Coming Back

November 7, 2013 Food Product Design

Innovative flavors are boding well with consumers, as 73% say that trying and enjoying a menu item with an innovative flavor would make them highly likely to return to the restaurant for the same menu item, according to a new report from Technomic, Inc.

Technomic's "Flavor Consumer Trend Report" shows consumers are leaning toward more exciting and innovative flavors, as many are swayed by innovative menu options and restaurants that offer them. In fact, 37% of consumers say they are increasingly driven to try new flavors, and that new flavors can influence them to visit a restaurant (41%).

The report shows an increased demand for spicy flavors, as 54% of consumers prefer hot or spicy sauces, dips or condiments compared to 48% in 2011. Sweet flavors pair well with the greatest number of other flavors, including savory, sour, smoky or spicy profiles.

"In a competitive foodservice climate, flavor differentiation is a must-have for operators," said Darren Tristano, executive vice president, Technomic. "Because today's foodservice consumers have such a strong expectation for innovative flavors, operators and suppliers have to help the menu stand out by staying ahead of the flavor curve." A medley of flavors are predicted to appear in 2014 food trends, including innovations with flavors derived from lemon, tea leaves, egg yolk, nut milks and a variety of other ingredients.

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FAO Predicts Balanced Food Markets, Less Price Volatility

November 7, 2013 Food Product Design

Food commodity markets are becoming more balanced and less price volatile than in recent years thanks to improved supplies and a recovery in global inventories of cereals, according to a new report by the United Nation's Food and Agriculture Organization (FAO).

FAO's "Food Outlook" report attributes the increase in 2013 cereal production to a recovery of maize crops in the United States and record wheat harvests in CIS countries. World rice production in 2013 is expected to grow only modestly.

"The prices for most basic food commodities have declined over the past few months. This relates to production increases and the expectation that in the current season, we will have more abundant supplies, more export availabilities and higher stocks," said David Hallam, director, trade and markets division, FAO.

Global cereal stocks, ending in 2014, are anticipated to increase by 13% to 564 million tons, with coarse grains alone up 30%. The increase is anticipated to occur mostly in the United States. Wheat and rice stocks are also projected to rise, by 7% and 3% respectively.

The world food import bill is set to decline 3% to $1.15 trillion in 2013, with import costs of cereals, sugar, vegetable oils and tropical beverages falling, but dairy, meat and fish remaining firm, according to the report.

The FAO Food Price Index, which measures monthly changes in international prices of five major food commodity groups, rose slightly in October, averaging 205.8 points. This was 2.7 points, or 1.3% above September, but still 11 points, or 5.3% below its October 2012 value. The slight increase was largely driven by a surge in sugar prices, although prices of the other commodity groups were also up.

Forecasts for other commodities include:

- Cassava—world cassava output is expected to increase for the 5th consecutive year to reach 256 million tons in 2013, fueled by rising demand for food in the African continent and increasing industrial applications of cassava in East and Southeast Asia, especially for ethanol and starch.
- Sugar—world sugar production is forecast to increase only slightly in 2013-14, while sugar consumption is set to grow approximately 2%.
- Oilseeds—world oilcrop production could climb to an all-time high in 2013-14, supported by record soybean crops in South America. Global output of oilseed products is projected to match world utilization for the 2nd consecutive year, although a sizeable surplus is possible in the case of meals/cakes.
- Meat—world meat production is anticipated to grow 1.4% in 2013, with no sign of overall price decreases, despite reduced feed costs.
- Dairy—world milk production in 2013 is forecast to grow 1.9%. Asia, Latin America and the Caribbean are expected to account for most of the increase, with only limited growth elsewhere. International dairy products prices have declined, but still remain at historically high levels.
- Fisheries—aquaculture continues to boost overall fish supply, pushing quotations down from earlier levels. Fish consumption per capita keeps growing, with aquaculture in the process of overtaking capture fisheries as the main source of supply for direct human consumption.❁❁❁

Technomic predicts foodservice trends for 2014

Technomic, a foodservice research and consulting firm, has identified trends that may significantly impact the restaurant industry in 2014. These expert insights are based on site visits evaluating the restaurant scene in cities across the country as well as interviews and surveys of operators, chefs, and consumers, backed up by qualitative data from its Digital Resource Library and quantitative data from its MenuMonitor database. Some of these developments reflect larger societal trends while others point to specific, emerging food preferences that may or may not take hold in restaurants across the U.S.

1. **Convince me it's real:** Consumers want assurances that what they're eating is real—in every sense of the word. Today's menus describe items far more thoroughly, listing not only the ingredients but also where they came from and how they were prepared.
2. **Pushing the parameters of proteins:** Rising commodity costs for beef mean that chicken will be big again in 2014. However, the latest protein star is pork—appearing in regional barbecue items, in Hispanic and other ethnic fare, in charcuterie, and as pulled-pork sandwiches.
3. **Return of the carbs:** Starches are staging a comeback—from ramen to buckwheat noodles to pasta made with unusual ingredients. Rice bowls (and jasmine rice, basmati rice, brown rice) will be big, in part because of continued fascination with Asian fare and in part because of an association with healthfulness.
    4. **Creamy, cheesy, high-fat goodness:** The demand for healthier eating is real, but so is the backlash. We'll see even more cheese melts, pasta with creamy sauces, fried appetizers and sides, and oddities like doughnut-based sandwiches.
    5. **Pucker up:** Forays into less-familiar ethnic cuisines, from Korean to Scandinavian, are partly responsible for growing interest in pickled, fermented, and sour foods.
    6. **Day for night:** Consumers are less likely to eat according to a three-square-meals schedule; they nosh, skip meals, eat breakfast for dinner, and vice versa.
7. **Every daypart is a snack daypart:** As the snacking lifestyle goes mainstream, diners are paradoxically less interested in snack menus per se. Millennials see dollar and dollar-plus menus as the snack menu. Limited-service restaurants are paying more attention to snack-size handhelds and car-friendly packaging; they're also stepping up their game with grab-and-go or market-style offerings. As full-service restaurant customers move away from meat-and-potatoes meals, operators are catering to the snacking-and-sharing ethos with pairings, trios, and flights from all parts of the menu—from soup trios to beer samplers to retro popsicle-flight desserts.
8. **On tap:** Tap technology is revolutionizing the beverage world: barrel-stored cold-brewed coffee that can be sent through repurposed beer taps, facilitating a new kind of coffee bar; soda-water taps that allow chefs to create their own fruity soft drinks; wine-on-tap tasting stations in high-end supermarkets; keg-wine bar concepts and retrofits; RFID-card-controlled self-serve beer-tap walls at high-tech pubs.

9. **For fast service, bring your own device:** Operators in every segment are finding new ways to use technology for faster, more accurate ordering. iPad orders placed tableside will be a point of differentiation for a few tech leaders, but we'll primarily see a bring-your-own-device system of advance and inside-the-restaurant ordering.
10. **Everything is political:** Consumers are increasingly aware that the personal is political—that their choices and those of the restaurants they patronize regarding food, treatment of employees and suppliers, sustainability, and the environment have real consequences. Consciously or unconsciously, they will gravitate to concepts that share their worldview, and some restaurants will promote this cultural identification.

IFT Weekly November 20, 2014

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Texture Trick Reduces Salt In Bread, Maintains Flavor

November 20, 2013 Food Product Design

Changing the texture of bread to make the pores, or holes, larger can make people perceive bread as having saltier taste, providing a new approach to salt-reduction strategies, according to a new study in the *Journal of Agricultural and Food Chemistry*.

Researchers at the Hans-Dieter-Belitz-Institute for Cereal Grain Research baked bread using different proofing times to alter the texture of the bread to examine interactions between sodium and wheat bread ingredients and their impact on salt perception in bread crumb.

Results concluded using longer proofing times lead to softer breads with larger pores, which were rated by subjects as noticeably more salty, even though each bite actually contained less salt. "Appropriate modification of crumb texture thus leads to enhanced saltiness, suggesting a new strategy for salt reduction in bread," researchers said.

Cutting dietary salt would reduce people's risk for developing high blood pressure, which has been diagnosed in 40% of adults ages 25 and older worldwide, and heart disease, which was the cause of 30% of all deaths in 2008.

Despite food industry pledges to reduce sodium in products, sodium-reduction efforts have been inconsistent and slow. In fact, the average sodium content in 402 packaged foods tracked between 2005 and 2011 declined by just 3.5%.

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Tomato therapy: Engineered veggies target intestinal lipids, improve cholesterol

November 13, 2013 Science Daily

Researchers report that tiny amounts of a specific type of lipid in the small intestine may play a greater role than previously thought in generating the high cholesterol levels and inflammation that lead to clogged arteries. The team also found they could reduce the negative effects of these lipids in mice by feeding the animals a new genetically engineered tomato that is designed to mimic HDL (“good”) cholesterol.

UCLA researchers report that tiny amounts of a specific type of lipid in the small intestine may play a greater role than previously thought in generating the high cholesterol levels and inflammation that lead to clogged arteries.

The team also found they could reduce the negative effects of these lipids in mice by feeding the animals a new genetically engineered tomato being developed at UCLA that is designed to mimic HDL ("good") cholesterol.

The study, published in the December issue of the *Journal of Lipid Research* with an accompanying editorial, focused on a group of lipids found in the small intestine called unsaturated lysophosphatidic acids (LPAs).

"These lipids may be a new culprit that we can target in the small intestine in fighting atherosclerosis," said senior author Dr. Alan Fogelman, executive chair of the department of medicine and director of the atherosclerosis research unit at the David Geffen School of Medicine at UCLA.

Big effect of small amount of LPA

Previously, it was thought that the role of the small intestine in response to a high-fat, high-cholesterol diet was simply to package the fat and cholesterol for transport to the liver. Once delivered to the liver, the large load of fat was thought to cause increased blood levels of LDL ("bad") cholesterol, decreased levels of "good" cholesterol and the rise of systemic inflammation.

But that may not be the complete story. The UCLA researchers revealed that LPAs, previously considered very minor because they are found in far smaller amounts in the small intestine than other lipids, like cholesterol, may play a more direct role in contributing to the factors that cause atherosclerosis.

Scientists found that mice fed a high-fat, high-cholesterol diet (21 percent fat) showed a two-fold increase in the amount of LPAs in the small intestine over mice fed normal low-fat mouse chow (4 percent fat).

When researchers added LPAs at only one part per million (by weight) to the normal low-fat, low-cholesterol mouse chow, they observed the same increase in LPAs in the small intestine as when the mice were fed the high-cholesterol, high-fat diet.

Surprisingly, with the addition of LPAs to the low-fat diet, the UCLA team also found alterations in the patterns of gene expression in the small intestine, changes in cholesterol

levels (increases in LDL and decreases in HDL) and increases in blood markers of inflammation typically seen when the mice consumed a high-fat, high-cholesterol diet.

The findings suggest that some of the factors leading to atherosclerosis occur in the small intestine and not just the liver. Targeting LPAs in the small intestine may be a way to help stop changes in blood cholesterol and inflammation before the load of packaged fat even reaches the liver, the researchers said.

"Recognizing the importance of these minor lipids in the small intestine may lead to ways to reduce their levels and prevent abnormalities in blood levels of 'good' and 'bad' cholesterol that contribute to heart attack and stroke," Fogelman said.

Testing the tomatoes

The next step was to test the impact of the genetically engineered tomatoes on reducing the effects of these lipids in the small intestine. The tomatoes, created at UCLA, produce a small peptide called 6F that mimics the action of apoA-1, the chief protein in HDL.

Researchers added 2.2 percent (by weight) of freeze-dried tomato powder from the peptide-enhanced tomatoes to low-fat, low-cholesterol mouse chow that was supplemented with LPAs. They also added the same dose of the peptide-enhanced tomatoes to the high-fat high- cholesterol diet.

They found that this addition to both diets prevented an increase in the level of LPAs in the small intestine and also stopped increases in "bad" cholesterol, decreases in "good" cholesterol and systemic inflammation. Tomatoes that did not contain the peptide had no effect.

According to Fogelman, the peptide-enhanced tomatoes may work in large part by reducing the amount of the LPAs in the small intestine.

Future research will focus on identifying the genes in the small intestine that are altered by the LPAs in order to find signaling pathways that may be targets for treatment.

"Identifying the role of these specific lipids in the small intestine and new ways to target them will hopefully provide new insights and lead to new treatments," said Judith Gasson, a professor of medicine and biological chemistry, director of UCLA's Jonsson Comprehensive Cancer Center, and senior associate dean for research at the Geffen School of Medicine.

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Scientists create 'tearless' onions that may help in the fight against cardiovascular disease, weight gain

8 November 2013 Medical News Today

Onions, a key ingredient in recipes around the globe, come in a tearless version that scientists are now reporting could pack health benefits like its close relative, garlic, which is renowned for protecting against heart disease. They published their laboratory analysis, which suggests a similar heart-friendly role for the tearless onions, as well as a possible role in managing weight gain, in ACS' Journal of Agricultural and Food Chemistry.

Colin C. Eady and colleagues note that the onion has a unique chemistry that leads to its tear-inducing effects when cut. Its pungency has driven cooks to don goggles, clench wooden spoons in their mouths and try other usually futile techniques to prevent crying at the cutting board. An answer could arrive in the form of a new type of onion that makes less of the protein blamed for making eyes burn and tear up. Eady's team has developed such a version, which instead makes a sulfur compound similar to one found in cut garlic that may be the key to its cardiovascular benefits. Many people eat garlic cloves or take it as a nutritional supplement in pill form to reduce the clumping of platelets in the blood, which can lead to blood clots and clogged arteries. Garlic also has been shown to reduce weight gain. They wanted to know whether the new onion might also have similar positive effects on health.

The scientists found that in lab tests, extract from the tearless onion significantly reduced platelet clumping, compared to regular onions or even garlic. Other results showed that the new onion had about the same anti-inflammatory properties as the original. Also, preliminary testing in rats showed that the tearless onion could help control weight gain - more so than regular onions or garlic.

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Curcumin Extracts win EU patents

08-Nov-2013 Nutra Ingredients

Indiana-based Verdure Sciences has won a patent in 8 European countries for its Longvida curcumin extracts.

The European Patent Office authorisations (EP 1993365) are valid in Austria, France, Germany, Great Britain, Italy, Poland, Spain and Switzerland and relate the turmeric extracts' ability to move freely in the blood stream. Verdure Sciences says Longvida uses to Solid-Lipid Particle Technology to produce non-metabolised, bioavailable curcumin forms.

"This new patent marks a milestone for the Longvida brand," said VP of marketing Sonya Cropper, in a statement. *"The Longvida brand continues to set industry standards for curcumin research, which we believe will support its success in Europe and worldwide."* Technical director Blake Ebersole added: *"Thus far, more than a dozen scientific studies have proven this technology can fulfill the promise of curcumin for the brain and body."*

Curcumin, the natural pigment that gives the spice turmeric its yellow color, has increasingly come under the scientific spotlight in recent years, with studies investigating its potential health benefits. Curcumin exists naturally with two analogs

demethoxycurcumin and bis demethoxy curcumin. Studies suggest curcumin can benefit skin diseases, Alzheimer's disease, colitis, stomach ulcers, high cholesterol, scabies and viral infections.

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Food Safety & Regulatory News

Improved Ways of Testing Meat in the Food Chain

November 12, 2013 **Food & Beverage News**

The horsemeat scandal has shown there is a need to improve, increase and expand current authenticity testing regimes.

The BBSRC-funded Institute of Food Research has teamed up with Oxford Instruments to develop improved ways of testing meat in the food chain. New approaches for carrying out such tests are being developed at the IFR that use molecular spectroscopic techniques, principally nuclear magnetic resonance (NMR), to analyse the fatty acid composition of food samples.

The fatty acid profiles of meat from different animals are readily distinguishable using NMR, but until recently the equipment to carry out these tests has been too expensive and technically complicated to allow deployment in industrial settings. Earlier this year, Oxford Instruments launched a new benchtop NMR instrument, Pulsar™, which makes NMR spectroscopy available for routine testing. In parallel, IFR is developing the analysis software to provide new weapons in the battle against food fraud.

The methods being developed will be rapid and low cost. Dozens of samples could be analysed per day, taking 10-15 minutes per test, at a typical cost of less than £20 per sample. This makes the system ideal and affordable for high-throughput screening, or for pre-screening ahead of more time-consuming and expensive DNA testing.

The aim is to keep the techniques affordable for local authority funded as well as privately owned analyst laboratories, and potentially also to suppliers further up the food chain – i.e., beyond farm gate testing – one of the key recommendations from the NAO report.

At the moment, the research has reached a point where we are able to differentiate between whole cuts or chunks of beef, lamb, pork and horse. Further development work will be carried out over the coming months, to extend the methodology to the detection of small amounts of minced meat in the presence of another, mimicking many of the adulteration events that came to light earlier this year.

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NIR Spectroscopy Can Ensure the Safety and Purity of Dairy Products

October 30, 2013 **Food & Beverage News**

NIR spectroscopy has been used for quality assurance purposes by the dairy industry for over 40 years.

Dairy products provide an important source of nutrition globally and have a very high economic value in the food sector. Consumers expect milk and other dairy products to be pure, unadulterated and free from both accidental and deliberate contamination. Fast, reliable and cost effective analyses are essential to ensure that products are pure and safe when they are sold. JNIRS—Journal of Near Infrared Spectroscopy has published a Special Issue on Milk and Milk Products, containing papers reporting new developments and uses of NIR spectroscopy as a valuable tool along the full dairy chain.

This issue updates researchers and the dairy industry on the rapid and reliable analysis of liquid milk and the products derived from it, while also exploring some new applications, and presenting practical experiences and outcomes from an industrial perspective.

NIR Spectroscopy has been used to predict the chemical composition of milk and dairy products, to monitor the cutting-point during cheese manufacturing and even predict sensory characteristics such as hardness and tenderness.

Several papers in this issue will help readers understand how light interacts with complex matrices such as milk. The issue includes papers which explain how the contribution to apparent absorption due to scattering can be separated from that due to true absorption by the sample. The benefits which this offers include being able to obtain important information on the chemical composition and micro-structural properties which are not available with the traditional techniques used in dairy production.

Modern dairies measure the output from each quarter of the udder and a paper in this issue reveals the potential of real time *in vivo* spectroscopy for diagnosing mammary gland inflammation in dairy cow udders before milking.

The issue also includes papers on assessing the degree of homogenisation of milk and the monitoring of milk powder in a production line where the challenges to accurate analyses include variations in the operating temperature.

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The impact and consequences of banning *trans* fatty acids

On Nov. 7, the U.S. Food and Drug Administration (FDA) announced its preliminary determination that partially hydrogenated oils (PHOs), the primary dietary source of artificial *trans* fat in processed foods, are not "generally recognized as safe" for use in food. In a new *ePerspective* post, Eric Decker, Professor and Dept. Head, Dept. of Food Science at the University of Massachusetts, explains that this proposed rule is not without consequences to many individuals so it is critical that this decision is made carefully. Firstly, Decker questions the scientific data that the FDA is using to back up this proposed rule.

Secondly, he questions what will be used in place of *trans* fatty acids if they are taken off the GRAS list. Certain foods require solid fats for function (e.g., baked goods) so partially hydrogenated oil will have to be replaced with another solid fat such as palm oil. However, the health consequences of replacing partially hydrogenated oil with tropical oils in diets that already have low levels of *trans* fatty acids is unknown. Additionally, other potential solid fats could be used but they are more expensive and would increase food costs.

Decker also raises some questions for consideration and discussion. For example, some partial hydrogenation technologies, such as electrochemical hydrogenation, can produce low levels of *trans* fatty acids. Could these products be used in foods if the proposed rule is passed? If so, what criteria would be used to determine if they are GRAS? Read Decker's blog post for his expert opinion on the FDA's proposed rule and then comment with your thoughts.

IFT Weekly November 13, 2013

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Poultry Probiotic to Battle Foodborne Pathogen

November 18, 2013 Food Product Design

The coat of potential poultry probiotic *Lactobacillus johnsonii* has been recently characterized, giving the first clues of how it may be used to exclude pathogenic bacteria from chickens, according to a new study published in the *Journal of Biological Chemistry*.

Researchers at the Institute of Food Research (IFR) characterized the coat of the poultry probiotic *Lactobacillus johnsonii,* to develop a better idea of its role and how it may help in combatting foodborne pathogen *Clostridium perfringens.* The probiotic has previously been shown to exclude *C. perfringens* from the guts of poultry, opening the door to it being developed as a way of reducing necrotic enteritis in poultry and food poisoning in humans.

Using NMR spectroscopy, the researchers discovered the coat is made up of two types of exopolysaccharides (EPS), which are long sugar-containing molecules that many bacteria use to encapsulate themselves. This capsule may help the bacteria to cope with environmental stress, or aid colonization and adhesion. "Characterizing the EPS structures in the *L. johnsonii* strain is the first step to explaining how it might outcompete *C. perfringens*," said Arjan Narbad, Ph.D., Gut Health and Food Safety Program, IFR.

Previous studies had identified potential genes in *L. johnsonii* for producing EPS, giving the researchers tools to probe how the bacteria synthesize these molecules. Knocking out the whole cluster of EPS genes meant the bacteria produced no capsule. Further analysis of the genes by IFR Ph.D. student Enes Dertli uncovered their potential roles in the capsule biosynthesis process. However, more research is needed to fully understand the system and how it is regulated.

This strain of *Lactobacillus johnsonii* is now being taken through farm-scale trials to assess its potential use to combat pathogenic infections of poultry by bacteria such as *C. perfringens*. Prior research conducted in 2012 determined the probiotic may be capable of minimizing the risk of *Listeria* infection when combined with the *Listeria* protein. The probiotic helps block the same paths the bacteria uses to pass through intestinal cells and into bloodstreams.

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Garlic Compounds Reduce Infant Formula Contamination

November 26, 2013 Food Product Design

Certain garlic-derived compounds have been shown to significantly reduce the contamination risk of foodborne pathogen *Cronobacter sakazakii* in production of dry infant formula powder, according to a new study published in the journal *Applied and Environmental Microbiology*.

Researchers at the University of British Columbia used high-throughput RNA sequencing and confocal-microscopic lasers to systematically determine the antimicrobial mechanism of garlic compounds on the pathogen. *C. sakazakii* is sometimes present in dry infant formula powder and other fortified foods.

While rare, *C. sakazakii* can poison a baby's bloodstream and lead to meningitis, often fatal for infants. Researchers identified two compounds derived from garlic—diallyl sulfide and ajoene—that significantly reduce the contamination risk of *C. sakazakii* in the production of infant formula.

"A trace dose of these two compounds is extremely effective in killing *C. sakazakii* in the food manufacturing process," said Xiaonan Lu, corresponding author and assistant professor of food safety engineering in the Faculty of Land and Food Systems, University of British Colombia. "They have the potential to eliminate the pathogen before it ever reaches the consumer."

According to Lu, the garlic compounds could be used to prevent *C. sakazakii* contamination on food contact surfaces and in every step of food production—processing, packaging and delivery. "Pipes used in the manufacturing of milk products are typically cleaned with chemicals like chlorine, but these garlic compounds are a natural alternative," Lu said. "We believe these compounds are more beneficial in protecting babies against this pathogen."

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