PFNDAI Bulletin August 2008

Editorial

Milk has always been considered one of the best food for all and the only food for babies. In spite of such aura about milk, it has always been subjected to all kinds of problems. There are all kinds of attempts to adulterate it and to profiteer from it by unfair means in long history. We have not been able to curtail it in spite of many rules and standards prescribed. We still need to find the mythical bird that can separate the milk from added water.

There are harmless adulterations and then there are harmful and dangerous adulterations. This latter type that is becoming very alarming and the news of infant milk products being adulterated with harmful chemicals like melamine. This will falsely indicate higher content of protein than actual and so make it more profitable even after adding water.

We should now look for solutions beyond simply punishing the guilty. This certainly has some value in prevention of adulteration but will do little in changing the mindset of cheats. Our distribution system gives plenty of opportunity for them to find ingenious ways of adulteration. When one makes standards, immediately they start working on how to overcome these standards and profiteer from it. So standards are only a means of checking whether a particular food is adulterated or substandard or not. However, it does little to prevent adulteration. One of our biggest problem is water being added to milk.

Earlier, milk bottles used to have an aluminium cap of different colours to indicate different milks like standardised, toned etc. There were people who could skilfully remove them, replace milk with water and replace the cap and one would not know at all. Now we have plastic pouches that are slightly more difficult to tamper with but still have been known to be pierced with syringes to replace milk with water and reseal with candles. This operation is so simple that only a strict vigil will minimise it but may not prevent it completely.

We need to think of simple but effective solutions to prevent this from happening. We also need solutions that are not very expensive. Aseptic packs make the very difficult to adulterate but it is expensive if one compares with pasteurised milk in pouch.

Is there a plastic film that is difficult to seal under ordinary conditions and also not very expensive? Alternatively, it should change colour if non-standard conditions of sealing are used, so only when it is sealed in factory it will have the regular colour or be colourless. Only when it is opened and sealed under conditions outside processing area, it should change colour. One example can be that neutral gas like nitrogen may be used in factory sealing wherein no colour is formed, but in places where adulteration is done this will not be possible and air contact may cause colour formation that can be detected easily be consumers.

Of course, in time crooks may think of ways of overcoming this problem also, but at least for some time it may give relief from adulteration. We should think of preventing rather than punishing. We should also think out of the box solutions. Our young scientists have proved that they have world class capabilities, so let them come up with solutions that are novel.

Dr. Jagadish S. Pai
Executive Director

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White Revolution

By **Dr. J. S. Pai**

Milk is secreted by mammary glands to provide primary nutrition for newborn mammals. The early lactation, colostrums, also carries antibodies for the babies reducing disease risk in babies. Milk composition varies with species but contains good amounts of saturated fat, protein and calcium.

Milk is consumed by humans beyond infancy as food using milk of other animals like sheep, goats, water buffalo, camels etc. but most commonly cow milk. Milk from cow has been used to make cream, butter, yogurt, ice cream, cheese etc. Many food ingredients, additives and industrial products have also been prepared from milk e.g. casein, whey protein, lactose, condensed & powdered milk etc.

Indian Dairy Industry

India became the largest producer of milk a few years ago with the US and China being 2nd and 3rd largest producers. In 2006-07, Indian milk production including cow and buffalo milk, was over 100 million tonnes, roughly 15% of world milk production. It is set to become 111 million tonnes by 2010 with the growth rate of almost 4% per annum. In spite of such impressive production figures, the per capita availability (245 g per day) is lower than the world average (285 g per day). However, India is among the fastest growing markets for milk and milk products at 7.5% with a value of over Rs. 200,000 crores. The demand for value added products like cheese, yogurt (curd) and probiotic drinks is increasing at double digit rates.

Top Ten Milk Producers — 2005 (1000 tonnes)	
India	91,940
United States	80,264
China	32,179
Russia	31,144
Pakistan	29,672
Germany	28,487
France	26,133
Brazil	23,455
United Kingdom	14,577
New Zealand	14,500
World Total	**372,353**

As per one estimate consumer value of dairy products in 2005 was over Rs. 227,000 crores of which liquid milk was Rs. 83,000 crores, ghee Rs. 23,000, khoa/chhana/paneer Rs. 24,000, milk powder Rs. 4,700, table butter Rs. 770 crores, cheese/edible casein Rs. 975 crores, and other products including ethnic sweets, ice-cream etc. Rs. 9,100 crores. Of the total milk produced over 75% is sold as liquid milk of which organised industry handles only 18%. Private dudhwalas and other unorganised players sell 36% and about 46% is retained in rural areas.

India's emergence as world's leader in milk production, began around 1950's when young Dr. Kurien helped establish dairy cooperative in Gujarat now famous as Amul. Those efforts became responsible for steady growth of dairy production and Dr. Kurien is called the father of the White Revolution in India or also the Milkman of India. Today, there are tens of thousands of village cooperatives producing milk.

Today, India's largest agricultural crops rice (92 million tonnes) and wheat (75 mt) are behind milk production (over 100 mt). Although the price it fetches is more than rice and wheat and also farmers realise 60-70% of consumer price as against just 20% or so for fruits and vegetables, there are some problems of networking the procurement properly. Also the value addition will benefit the industry.

Milk Composition

Milk contains water (over 80 to 85%) in which fat globules are emulsified and kept stable by fat globule membrane made of phospholipids and proteins. Thus although milk contains significant amount of fat, it does not separate because these tiny fat globules (about 4 to 10 □ m diameter) are kept separate from each other by these emulsifiers. However, agitation or churning will disrupt the membrane allowing fat globules to merge into larger particles that can separate and collect at the surface as cream or butter.

Homogenisation is done by passing milk under pressure through a small orifice, so as it emerges out, the globules experience sudden decompression and break into even tinier globules that will be extremely stable against agitation and this milk will not easily form cream layer.

Major portion of the protein is casein that is present as micelles or spherical aggregates of large number of protein molecules with diameters of about 0.1 □ m. Colloidal calcium phosphate acts as a cement to keep the casein micelle intact. Besides Ca-phosphate, there are many interactions like hydrogen and disulphide bonds, hydrophobic and electrostatic interactions and other forces that keep the stability. The stability of the micelle will be affected by certain other factors like salt content, pH, temperature and moisture that may try to destabilise it under unfavourable conditions.

There is a minor protein fraction called whey proteins that are soluble in water. They consist of globular proteins, mostly □ -lactoglobulins and □ -lactalbumins. There are also immunoglobulins present that confirm immunity against many diseases. Whey proteins are very heat sensitive. Milk proteins are of high biological value providing all the essential amino acids.

Milk contains a unique sugar, lactose. In nature lactose is found only in milk and very few plants. This along with fat, provides major source of calories. Besides there are vitamins and minerals and certain bioactive substances including enzymes. Nutrients present in cow's milk and comparison of milk of other species is given in tables.

Colour of Milk

White colour of milk is due to both tiny fat globules and very small casein micelles scatter the light. Skimmed milk having almost no fat looks slightly bluish as casein micelles scatter shorter wavelengths. Cows (especially Jersey and Guernsey) have good amount of carotene in fat contributing to yellowish colour to butter and creamy colour to milk. Buffalo milk fat contains very little carotene so the milk looks whiter and the butter is also white.
Although cow's milk is mostly consumed world over, Indians consume buffalo milk much more than cow's. Although goat milk consumption is also significant it is quite low compared to buffalo and cow. There are inherent differences in chemical and physical properties of the two milks as seen below.

Composition of Cow & Buffalo Milk

Constituent (%)	Cow Milk	Buffalo Milk
Water	86.50	83.18
Fat	4.39	6.71
Protein	3.30	4.52
Lactose	4.44	4.45
Total solids	13.50	16.82
SNF (Solids-non-fat)	9.11	10.11
Ash	0.73	0.80
Calcium	0.12	0.18
Magnesium	0.01	0.02
Sodium	0.05	0.04
Potassium	0.15	0.11
Phosphorus	0.10	0.10
Citrate	0.18	0.18
Chloride	0.10	0.07

These are only the average values. There are many differences that will be seen within these which may be due to breed, time & stage of milking, lactation period, season, feed, nutritional level, environmental conditions, health, age, exercise, medication and hormonal treatments etc.

Milk Composition – Different Species, per 100 grams

Constituents	unit	Cow	Goat	Sheep	Water Buffalo
Water	g	87.8	88.9	83.0	81.1
Protein	g	3.2	3.1	5.4	4.5
Fat	g	3.9	3.5	6.0	8.0
Carbohydrate	g	4.8	4.4	5.1	4.9
Energy	kcal	66	60	95	110
Sugars (Lactose)	g	4.8	4.4	5.1	4.9
Fatty Acids:					
Saturated	g	2.4	2.3	3.8	4.2
Mono-unsaturated	g	1.1	0.8	1.5	1.7
Polyunsaturated	g	0.1	0.1	0.3	0.2
Cholesterol	mg	14	10	11	8
Calcium	IU	120	100	170	195

Processing of Milk

As milk is highly nutritious, most microbes can grow in it and spoil it. Within hours it starts souring and all kinds of microorganisms including bacteria, yeast and mould will spoil and putrefy it unless it is processed and preserved using different processes such as thermal processing including pasteurisation, sterilisation, UHT processing etc., chilling, drying, converting to different products with longer shelf life among other things.

Thermal processing involves heating milk at a temperature where spoilage bacteria are killed. Although milk in cow's udders is sterile but as it is drawn, it gets immediately mixed with many bacteria commonly present in barn surroundings, especially the lactic acid bacteria. These grow extremely well in milk and produce lactic acid from lactose and cause the pH to drop. At pH less than 4.6, casein precipitates and milk curdles. When the process is done using desirable bacteria, curd or yogurt is formed, but when uncontrolled then undesirable bacteria and other microbes may grow causing spoilage along with acid production.

When milk is heated these bacteria are destroyed. When heating is done to kill all the bacteria rendering the milk sterile, the process is called sterilisation. This involves very severe heating. Commonly milk is pasteurised to specifically kill pathogens or disease causing microorganisms along with a large proportion of lactic acid bacteria as well. Since this process does not kill all the spoilage organisms, milk can spoil after cooling and keeping for some time when the surviving bacteria start multiplying and grow to a large number. Hence pasteurised milk is chilled and kept at refrigerated temperature as colder condition slows down their growth.

Pasteurisation process is named after its discoverer Louis Pasteur and may be carried out by heating milk at 71.7°C for 15 seconds using high temperature short time (HTST) process compared to earlier low temperature holding at lower temperature using longer heating time. As temperature is increased, the process time gets exponentially lower that not only saves time and cost but also there is less destruction of heat sensitive nutrients.

Sterilisation requires severe heating and mostly carried out in bottles or cans after the product is sealed. Once all microbes are killed, as long as no new bacteria are introduced, the product remains unspoiled for a long time although some chemical change may take place. A new process of sterilisation uses aseptic technology. Here the product is sterilised at ultra high-temperature (UHT) treatment generally about 130°C for a second or less, immediately cooled and without allowing microbes getting into the product, milk is packed aseptically into sterile containers and sealed, so the product remains sterile and long lasting. UHT process has even greater benefit of preventing the losses of nutrients and the product can be stored without refrigeration.

Fermented Milks

Original function of fermenting milk was to extend its shelf life. With this came many other advantages like improved taste and digestibility as well as producing a variety of products. Earlier fermentations occurred spontaneously due to indigenous microflora of milk namely lactic acid bacteria that produced lactic acid from lactose and typically suppressed spoilage and pathogenic organisms effectively.

Today the fermentations are controlled using specific starter cultures and controlled temperature. Examples of fermented milk products are acidophilus milk, kefir, koumiss, buttermilk, sour cream etc.

Common Milk Products

There are a large number of products that are made in many parts of the world. Initial efforts were to preserve the milk in different forms but then innovative variations were made to make different products with different consistencies, texture, colours and flavours using many ingredients and to be consumed at different temperatures. There are many milks including whole, skimmed (with different fat%), condensed, dried, evaporated, flavoured and milk shakes. There are many yoghurts like plain, fruit, low fat, flavoured, drinking etc. There are many cheeses including cheddar, swiss, cottage, cream, reduced fat, stilton, Cheshire, soft (brie), blue, mozzarella, whey cheese etc. There are different types of creams and butters and a large number of dairy desserts and sweets like ice creams, custard, pudding and a long list of Indian sweets including shrikhand, rasso golla, pedha, burfi, kulfi, etc.

Butter & Buttermilk

Butter is prepared by souring the cream that is separated from milk by cream separators. After souring the separation becomes easier and also there is flavour production especially the formation of diacetyl that gives characteristic buttery aroma. When the soured cream is churned, butter separates from the buttermilk which is a very nutritious beverage. It has very little fat as most is removed as butter, but it still has most of the other nutrients including protein, vitamins, minerals etc. Buttermilk can also be prepared directly from whole or partially or fully skimmed milk after fermentation. The resultant yoghurt can then be churned and one gets buttermilk with higher fat. Indian traditional lassi is prepared by adding sugar or salt along with spices to this.

Yogurt

Yoghurt is prepared by fermenting milk by bacterial cultures that convert some of lactose to lactic acid. This lowers pH giving it tart flavour and a semi-solid texture due to precipitation of proteins at the lowered pH. This product has been produced in many Asian countries including India for centuries using mixed cultures. In India it is called curd or dahi and usually uses cultures present in previous batch of curd. These cultures were natural flora that have been used over a long periods.

Industrially produced yoghurt uses pure cultures specially developed to produce lactic acid and good flavour quite rapidly and with consistency so production processes could be standardised. Most commonly *Lactobacillus bulgaricus* strains but others are also used. The fruit and other ingredients including flavour and colour may be used to enhance the appeal. Manufacturers have started using other probiotic cultures including *Bifidobacterium* to add health benefits.

Cheese & Paneer

Difference between cheese and paneer is that while milk is fermented and enzyme rennet is added to curdle it for cheese making while lemon juice is added to heated milk and curdled it to make paneer. Also most cheeses are then ripened while paneer is simply pressed and cut into pieces. Cheeses use fermentation with lactic acid bactaria and also use rennet to hasten coagulation. The curd is then cut to drain the whey. Pressing is also used to hasten draining of whey. The drained curd is then milled to form smaller pieces.

Soft cheeses like cottage or cream cheeses are consumed without ripening. Other cheeses are ripened to make hard cheeses like Cheddar, Edam, Swiss etc. or soft cheeses like Camembert, Limburger etc. The ripening may be done by microbes and/or enzymes that will hydrolyse protein and fat. During ripening microbes grow and produce flavour substances. In Swiss cheese *Propionibacterium* grows and produces CO_2 what forms holes or eyes in the cheese along with the bittersweet flavour, while in Blue cheese, mould *Penicillium roquefortii* along with the characteristic blue-green colour it produces sharp flavour.

Ice Cream

This is a frozen dessert prepared using milk and cream along with flavourings and sweeteners. The mixture is stirred while cooling so ice crystals remain very small resulting in smooth texture. In most ice creams a lot of air is whipped giving 'overrun' making the product lighter and softer. There are many variants with flavours as well as with ingredients like fruits, nuts, other confectionery pieces like chocolate, candies, jellies, as well as coated and multiple variants. Some frozen desserts are made with vegetable fats instead of milk fat. One variation is ice cream with cone in which waffle cone is baked and in this ice cream scoops are put to conveniently eat with no other accessories like plate or spoon. This idea is further extended to ice cream sandwich. Now with all types of variants, there are hundreds of different types of ice creams available including Indian variant Kulfi. This product is not aerated so is much denser and harder.

Indian milk based sweets

Indians use mostly cow and buffalo milk for most sweets and these milks are more suited for certain applications than others. For example, qualities such as high total solids and fat content, superior whiteness and viscosity render buffalo milk suitable for making khoa, dahi, paneer, kheer, payasam, malai, kulfi, ghee and other traditional products. Cow milk yields a soft coagulum, making it suitable for preparation of chhana and its products such as sandesh, rasogolla, chumchum and rasmalai.

Buffalo milk also has more protein and fat. The coagulable proteins, caseins are much more in buffalo milk, so when milk is coagulated by heat and/acid, there is firmer and denser coagulum produced which is suitable for products like paneer, peda, burfi etc. Cow's milk produces softer coagulum and gives a springy texture, which is more suitable for products like rasogolla, sandesh and rasmalai.

Indian milk sweets have been developed to preserve the nutritional goodness of milk and to extend its shelf life under high ambient temperature. Sweets are mainly prepared from three intermediate product bases: khoa (partially heat-desiccated milk), chhana (coagulated milk after draining of whey) and chakka (concentrated curd).

Khoa is a major intermediate product base for a variety of sweets. It is obtained by rapidly evaporating milk in shallow pans to a total solids content of about 70%. The product could be preserved for several days and is also used as a base for different kinds of sweets like peda, burfi, gulab jamun, etc. Another important base is chhana. It is obtained by acid coagulation of hot milk and draining out the whey. This product is used as an ingredient in different kinds of sweets, especially in the eastern region of India. Chhana based sweets are popularly called Bengali sweets e.g. rasogolla, rasomalai, rajbhog, khirmohan, sandesh, pantua etc. The third major intermediate base is chakka, popular in western India. It is a fermented product obtained from dahi (curd) and is used in a variety of Gujarati and Maharashtrian desserts. Whey is drained using cloth which removes most of the unfermented lactose. Sweets like shrikhand, mishti doi etc. are prepared by adding sweeteners like sugar and jaggery along with flavourants and colours.

Nutritional & Health Benefits

Milk is an excellent source of calcium and high quality protein along with many other nutrients including biotin, pantothenic acid, thiamine, folate, iodine, potassium, magnesium, selenium, among others. Calcium from milk is more bioavailable compared to certain vegetables like spinach that have calcium chelating agents.

Some studies have shown that consumption of low-fat milk reduces risk of hypertension, coronary heart disease, colorectal cancer and obesity. Overweight individuals consuming milk may have reduced risk of insulin resistance and diabetes type 2. Milk is a source of conjugated linoleic acid that has been shown beneficial against cancer and also lower cholesterol.

Lactose intolerance

This problem is more common in certain countries and ethnic groups where milk is not traditionally consumed in adult diet. In South America, Africa and Asia, over 50% people are intolerant to lactose whereas in Northern Europe and America, about 5% have this condition. In these people, lactase the enzyme needed to digest lactose is absent or present very little. Lactose intolerance causes symptoms like bloating and diarrhoea when a glass or two of milk or equivalent amount of milk products are consumed.

The lactose in milk goes through intestine without getting hydrolysed to glucose and galactose. Body can absorb these sugars but not lactose so the undigested lactose goes to large intestine where bacteria immediately start growing on them producing large amount of gas that causes the symptoms.

These individuals can have smaller amounts of milk without reacting. They can also consume cheese, buttermilk, fermented milks and yoghurt without any problems. Cheese contains much less lactose but yoghurt and other fermented products contain smaller but similar amounts of lactose as milk but still it is easier to digest for lactose intolerants. A small amount of lactose is converted to lactic acid but still yogurt contains about 4.7% lactose whereas milk contains about 5%. Possibly lactic acid bacteria help digest lactose. In the US and some European countries, milk treated with lactase is available. Such milk contains very little lactose and is safe for lactose intolerants.

Milk protein allergy

Unlike lactose intolerance, milk allergy can cause mild to severe reactions. It may cause skin rashes, itching, diarrhoea, vomiting, stomach cramps, wheezing, rhinitis, asthma and difficulty in breathing. In very few cases allergy can cause anaphylaxis which can be life-threatening. Allergy is commonly caused by certain proteins or allergens trigger formation of immunoglobulin antibodies that start the allergic reactions in the body. Unlike intolerances, extremely small amounts of allergens can cause allergic symptoms so sensitive individuals must totally avoid allergenic substances.

Cow's milk allergy is common in infancy and is often outgrown by the age 3 to 5 years. In several countries, the prevalence of cow's milk allergy among young infants is about 2%. There are also some hypoallergenic milk based formulas available for sensitive infants. Here the proteins are hydrolysed to very small peptides. As the allergens need to have certain size in order to be recognised by body's immune system, very small peptides do not cause formation of antibodies responsible for triggering these symptoms.

Conclusions

India is the largest producer of milk and Indian food industry is showing rapid growth of many value added food products. Milk is a unique material that is both healthy and has many applications as ingredients in many different food products. Its industrial products like casein, whey protein isolate, caseinates etc. have further enhanced the possibility and usefulness. Indian consumers are showing keen interest in new products not just western food products like hamburger, pizza etc. that uses cheese and other dairy products, but also variants of traditional products. The future is quite promising for milk and products in India.

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Creating Value to Food Ingredients through Sustainable Innovation

By **Marie-Hélène Saniez & Rajeev K. Thakur**

Present pace of development in the area of food-processing put forward a great question: how to anticipate success for tomorrow through sustainable innovation in nutrition and health?
Sustainable way of life needs the innovation and the investments through ethical policies under well defined responsibilities of any Industry. This defines sustainable innovation in nutrition and health for food-process industries which open opportunities of production of healthier and safer chemical products and functional food ingredients **(Fig 1)**. Such innovations must consider environment, socio-economical and ethical issues and that is possible through a good equilibrium among them. In true sense sustainable innovation in nutrition and health needs intense research which can be viable only through the association of government and consortium of industrial allies in accordance with the expert recommendations.

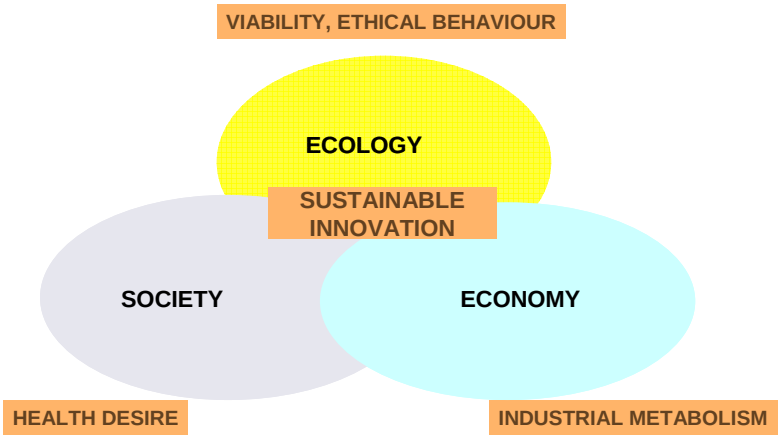

Fig. 1 : Sustainable innovation

As far as conceiving and developing functional food-ingredients are concerned one should take into account sustainable contextual components e.g. raw materials, energy, emissions, biodegradability etc. One of the objectives will be to put agriculture to serve agro-food industry which is leading not only the well-being of people but also food quality and safety. To achieve one should target the trends and needs a country, available raw materials and the bioactive products to be produced. The ultimate aim is to achieve consumers expectations which could be specific population having diseases or population willing to avoid diseases.

Research on innovative functional products is designed for preventing and reducing the risks of chronic illnesses linked to ageing and/or diets, but also for improving wellness and reducing suffering of ill people or nutritional deficient people. Sourcing of functional ingredients is mainly either from agriculture or from horticulture field. For Instance, leguminous plants such as peas, beans, lentils are cultivated for food and animal feed from long time. Those plants do not require much fertilizers and water for irrigation. Even they are useful for nitrogen fixation for soil fertility. Among them pulses are exploited primarily for their rich protein content and distinctive starch content.
Recent industrial exploitation from pea for proteins, starch and micro-constituents has shown the way of their extraction without the use of any chemical solvent. The products from pea source are at low risk of contamination (e.g. mycotoxines, pesticides) and not identified as major allergens. Moreover, pea contains functional constituents such as fibers, high biological value protein functional oligosaccharides and high amylose starch. Furthermore at the time being the biodiversity of leguminous plants is not really exploited in agro-food industry, if this could be done, probably it could be a source of innovation.

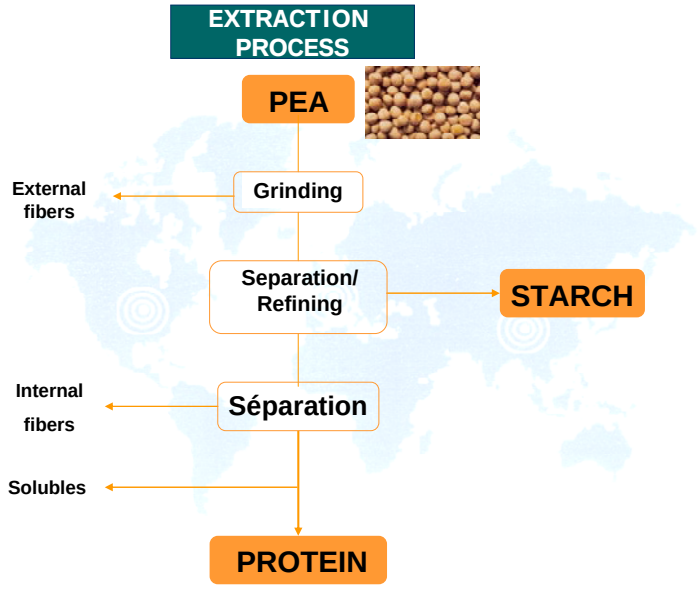

Fig. 2 : Pea extraction separation process

Presently peas as such are consumed in spite of having some drawbacks such as strong taste, anti-nutritional factors in some variety and problems in gut intolerance due to non digestible oligosaccharides and amylase inhibitors. These facts must be extracted from the pea components for their higher value for nutrition.

The leguminous industry through extraction process without use of solvent as it is the case in soy extraction industry, is able to manage concentration of micronutrients, to extract starch with new specificities such high amylose starch, to extract and design high pure fiber, to extract and produce functional pea protein, this last showing a very high biological value **(Fig 2 and Fig 3)**.

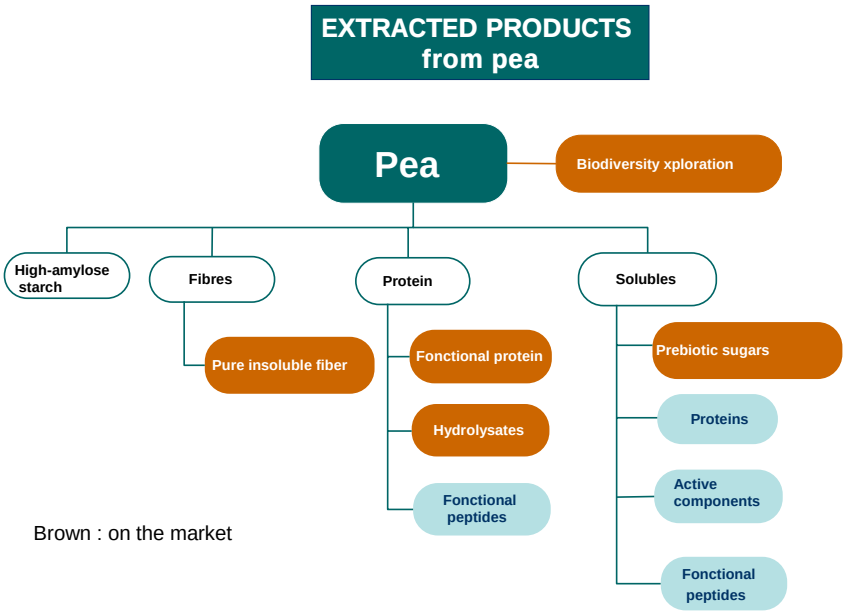

Fig. 3 : Extracted produced from pea

The amino acid profile of pea protein is interesting for its nutritional aspects. The essential amino acid profile (Fig. 4) shows that, contrary to proteins from vegetable origin generally unbalanced on this amino acid criteria, pea protein shows interesting lysine content (7.2 %), branch-chain amino acids content (17.9 %), arginin content (8.7 %)*.

In g per 100 g protein	NUTRALYS® Pea Protein	FAO 1985 Adult Reference	FAO 1985 2-5 years children
Cystine + Méthionine	2.1	> 1.7	< 2.5
Histidine	2.5	> 1.6	> 1.9
Isoleucine	4.5	> 1.3	> 2.8
Leucine	8.4	> 1.9	> 6.6
Lysine	7.2	> 1.6	> 5.8
Phenylalanine + Tyrosine	9.3	> 1.9	> 6.3
Threonine	3.9	> 0.9	> 3.4
Tryptophan	1.0	> 0.5	< 1.1
Valine	5.0	> 1.3	> 3.5

Fig. 4 : Essential amino acid profile*

Combining cereals and pea protein shows that it is possible to reach a high balanced nutritional quality. Cereals such as wheat are deficient in lysine and rich in sulphur amino acids, whereas peas are the reverse: rich lysine and low sulphur amino acids. It opens the way to launch foodstuffs well-balanced in proteins, respecting nutritional recommendations of experts and meeting consumer's safety, quality demand and taste expectations. It is possible starting from high quality extracted pea protein to proceed to hydrolysis to obtain proteolysates, the best could be to obtain functional peptides. It is known that some peptides could be active as anti-hypertensive or antipathogen. This could be a great field of investigation for these types of products. Before reaching this ultimate goal, pea hydrolysates and pea protein can be useful for enriched protein recipes **(Fig. 5)**. On the other hand purified insoluble fibers issued from pea can be introduced in many recipes to decrease the lipid level and to enrich the final product in fiber, thus the final product will present a low caloric level. Other fractions such as solubles obtained through the separation process **(Fig. 3)** presents very interesting micro-constituants such as bifidogenic oligosaccharides, vitamins and peptides. Extraction applied to leguminous through clean process allows to consider that the nutritional value of pea can be enhanced compared to raw unprocessed pea.

Dehydrated Soup
"MUSHROOMS CREAM SOUP"

For 100g	Actual	Proposal
Nutritional value (g)		
Proteins	**2,3**	**4,1**
Carbohydrates	**11,8**	**11,5**
Lipids	**8,3**	**8,1**
Caloric value (kcal)		
Proteins	**9,2**	**16,5**
Carbohydrates	**47,2**	**46,2**
Lipids	**74,7**	**73,1**
Total	**131,1**	**135,8**
% of global caloric value		
Proteins	**7,0**	**12,1**
Carbohydrates	**36,0**	**34,0**
P/L	**0,28**	**0,51**

Adding 2.2 g of Pea protein NUTRALYS would allow to claim « source of proteins »

Fig. 5: Recipe with pea protein

Conclusions

The ultimate goal for nutrition and health in a sustainable way is favoring decreasing risks of chronic diseases related to food (deficiencies and excess) and aging, helping specific populations to better support disease treatment and improve well-being while decreasing pain. Thus sustainable products and functionalities require food industry's innovations and investments to be in adequation with ethical policies, environmental protection, nutritional expert recommendations, specific needs of populations and individuals, economical and safe food processes. The example of extraction leguminous industry illustrates a way of sustainable innovation in nutrition and health.

*** NUTRALYS® pea protein available on the market.**

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Some health claims in jeopardy

US FDA is re-evaluating some of the health claims it permitted earlier for soy, antioxidant vitamins and fat-cancer. It recently made an announcement declaring its intention to re-evaluate these authorised health claims as some new scientific evidence has either supported or questions some of these health claims. This is the first time for FDA to reassess the evidence in support of health claims since the time health claim related regulatory guidelines were announced. Health claims are made when there is a relationship between a substance in food and a disease or health-related condition and these are normally written as "the diet rich in substance X may reduce the risk of disease Y." These health claims need to be okayed by the FDA before used for promotion of food or a dietary supplement to the consumers. There are several ways of getting FDA approval for authorisation of a health claim.

First may be by a petition indicating that there is significant scientific agreement about a particular health claim in literature. This must satisfy the conditions of Nutrition Labelling & Education Act and then FDA may give approval for traditional, unqualified health claim. Secondly, there might be cases where FDA may believe that the above standard is not met, then it may allow a qualified health claim. Thirdly, a manufacturer may inform FDA that he intends to make a health claim based on an authoritative statement from a federal scientific agency as per the provisions of Food & Drug Administration Modernisation Act. FDA has no intentions of making any changes in the basic regulatory framework but it intends to re-examine certain specific claims.

Soy Protein & A Reduced Risk of Coronary Heart Disease

Agency for Healthcare & Research Quality (AHRQ) published a report in July 2005 on Soy, Effects on Health Outcomes. FDA noted that the conclusions from the report being that soy products appear to exert a small benefit on low-density lipoprotein cholesterol. However, both to FDA and to the authors of the report it did not seem clear

whether soy protein or other soy components were responsible for any of these benefits. As per FDA, the AHRQ report has raised questions regarding the strength of significant scientific agreement supporting this health claim.

Dietary fat & Cancer

Institute of Medicine (IOM) issued a report in 2005 titled Dietary Reference Intakes for Energy, Carbohydrate, Fibre, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids, wherein it has suggested that the association between high fat diets and increased cancer risk has been weakened by some new epidemiological studies. IOM has concluded that the evidence linking fat intake with higher risk of cancer was not sufficient to consider cancer as a disease outcome in setting an acceptable macronutrient distribution range for total fat.

Antioxidant Vitamins E & C and Selenium, and Certain Cancers

Another report by AHRQ has been the basis of re-evaluation of this claim. The report was published in May 2006 titled Multivitamin/Mineral Supplements, Chronic Disease Prevention. There was no study identified by the report on the efficacy of vitamin C supplement and cancer risk but it concluded that the overall strength of the evidence is low for vitamin E and selenium. FDA wants to review the current scientific literature to determine if evidence still supports the qualified health claims or whether the language of the claim needs to be modified to reflect a stronger or weaker relationship.

Cancer Health Claims by Cancer Site

FDA also is re-evaluating its position on whether cancer-related health claims for dietary fat (authorized) and antioxidants and selenium (qualified), which currently must refer to "certain forms of cancer," may specifically identify sites affected by cancers. FDA has already considered separate qualified health claims for each type of cancer for some other substances, e.g., tomatoes and prostate, ovarian, gastric and pancreatic cancers; green tea and prostate and breast cancer; and calcium and colon/rectal, breast and prostate cancers and recurrent polyps. FDA notes that the most current scientific evidence indicates the etiology, risk factors, diagnosis and treatments are unique for each type of cancer.

FDA's desire to re-evaluate these claims is sensible and comes at a time when health claims and particularly qualified health claims are often attacked as misleading by consumer advocates. Scientific knowledge regarding diet and health is constantly evolving. This obviously creates both challenges and opportunities for the food industry, as manufacturers scramble to keep up with the latest information and then hope it remains current long enough to realize a return on investments in new formulations and claims.

From: Article by David Joy in FoodProcessing.com

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Nutrition & Health Research

Eat Oily Fish at Least Once a Week to Protect Your Eyesight in Old Age

Two 3oz servings a week of oily fish, such as salmon, tuna or mackerel, provides about 500 mg of DHA and EPA per day.

Eating oily fish once a week, may reduce age-related macular degeneration (AMD) which is the major cause of blindness and poor vision in adults in western countries and the third cause of global blindness, according to a study published in the American Journal of Clinical Nutrition.

There are two types of AMD, wet and dry. Of the two, wet AMD is the main cause of vision loss. A team of researchers across seven European countries and co-ordinated by the London School of Hygiene & Tropical Medicine sought to investigate the association between fish intake and omega 3 fatty acids with wet AMD,

comparing people with wet AMD with controls. Participants were interviewed about their dietary habits including how much fish they ate and what type. Information on the main omega 3 fatty acids (docosahexaenoicacid (DHA) and eicosapentaenoic acid (EPA) was obtained by linking dietary data with food composition tables.

The findings show that people who habitually consume oily fish at least once a week compared with less than once a week are 50% less likely to have wet AMD. There was no benefit from consumption of non oily white fish. There was a strong inverse association between levels of DHA and EPA and wet AMD. People in the top 25% of DHA and EPA levels (300 mg per day and above) were 70% less likely to have wet AMD.

Astrid Fletcher, Professor of Epidemiology at the London School of Hygiene & Tropical Medicine, who led the study, commented: "This is the first study in Europeans to show a beneficial association on wet AMD from the consumption of oily fish and is consistent with results from studies in the USA and Australia. Two 3oz servings a week of oily fish, such as salmon, tuna or mackerel, provides about 500 mg of DHA and EPA per day".

The research team is not, however, recommending omega 3 supplements as the study did not investigate whether supplements would have the same benefit as dietary sources.
http://www.nutritionhorizon.com/home/viewhealthnutrition.rails?Id=&pageNo=1

Broccoli may undo diabetes damage

Eating broccoli could reverse the damage caused by diabetes to heart blood vessels, research suggests. A University of Warwick team believes the key is a compound found in the vegetable, called sulforaphane. It encourages production of enzymes which protect the blood vessels, and a reduction in high levels of molecules which cause significant cell damage. Brassica vegetables such as broccoli have previously been linked to a lower risk of heart attacks and strokes.

People with diabetes are up to five times more likely to develop cardiovascular diseases such as heart attacks and strokes; both are linked to damaged blood vessels. The Warwick team, whose work is reported in the journal Diabetes, tested the effects of sulforaphane on blood vessel cells damaged by high glucose levels (hyperglycaemia), which are associated with diabetes. They recorded a 73% reduction of molecules in the body called Reactive Oxygen Species (ROS). Hyperglycaemia can cause levels of ROS to increase three-fold and such high levels can damage human cells. The researchers also found that sulforaphane activated a protein in the body called nrf2, which protects cells and tissues from damage by activating protective antioxidant and detoxifying enzymes.

Countering vascular disease Lead researcher Professor Paul Thornalley said: "Our study suggests that compounds such as sulforaphane from broccoli may help counter processes linked to the development of vascular disease in diabetes. "In future, it will be important to test if eating a diet rich in brassica vegetables has health benefits for diabetic patients. We expect that it will."

Dr Iain Frame, director of research at the charity Diabetes UK, stressed that research carried out on cells in the lab was a long way from the real life situation. However, he said: "It is encouraging to see that Professor Thornalley and his team have identified a potentially important substance that may protect and repair blood vessels from the damaging effects of diabetes. It also may help add some scientific weight to the argument that eating broccoli is good for you."

Story from BBC NEWS: http://news.bbc.co.uk/go/pr/fr/-/2/hi/health/7541639.stm

Herbs and spices combat high blood sugar

Herbs and spices are rich in antioxidants, and a new University of Georgia study suggests they are also potent inhibitors of tissue damage and inflammation caused by high levels of blood sugar.

Researchers, whose results appear in the current issue of the Journal of Medicinal Food, tested extracts from 24 common herbs and spices. In addition to finding high levels of antioxidant-rich compounds known as phenols, they revealed a direct correlation between phenol content and the ability of the extracts to block the formation of compounds that contribute to damage caused by diabetes and ageing.

"Because herbs and spices have a very low calorie content and are relatively inexpensive, they're a great way to get a lot of antioxidant and anti-inflammatory power into your diet," said study co-author James Hargrove, associate professor of foods and nutrition in the UGA College of Family and Consumer Sciences.

Hargrove explained that when blood sugar levels are high, a process known as protein glycation occurs in which the sugar bonds with proteins to eventually form what are known as advanced glycation end products, also known as AGE compounds. The acronym is fitting because these compounds activate the immune system, resulting in the inflammation and tissue damage associated with ageing and diabetes.

The researchers found a strong and direct correlation between the phenol content of common herbs and spices and their ability to inhibit the formation of AGE compounds. Spices such as cloves and cinnamon had phenol levels that were 30 percent and 18 percent of dry weight, respectively, while herbs such as oregano and sage were eight and six percent phenol by dry weight, respectively. For comparison, blueberries - which are widely touted for their antioxidant capabilities - contain roughly five percent phenol by dry weight.

Study co-author Diane Hartle, associate professor in the UGA College of Pharmacy, said various phenols are absorbed differently by the body and have different mechanisms of action, so it's likely that a variety of spices will provide maximum benefit.

"If you set up a good herb and spice cabinet and season your food liberally, you could double or even triple the medicinal value of your meal without increasing the caloric content," she said.

She added that controlling blood sugar and the formation of AGE compounds can also decrease the risk of cardiovascular damage associated with diabetes and ageing. She explained that high blood sugar accelerates heart disease partly because AGE compounds form in the blood and in the walls of blood vessels. The AGE compounds aggravate atherosclerosis, which produces cholesterol plaques.

The UGA researchers tested for the ability to block AGE compounds in a test tube, but animal studies conducted on the health benefits of spices lend support to their argument. Cinnamon and cinnamon extracts, for example, have been shown to lower blood sugar in mice. Interestingly, cinnamon lowers blood sugar by acting on several different levels, Hargrove said. It slows the emptying of the stomach to reduce sharp rises in blood sugar following meals and improves the effectiveness, or sensitivity, of insulin. It also enhances antioxidant defences.

Hargrove said their findings suggest it's likely that the herbs and spices they studied will provide similar benefits in animal tests. He points out that because humans have been consuming herbs and spices for thousands of years, they come without the risk of possible side effects that accompany medications.

"Culinary herbs and spices are all generally recognised as safe and have been time-tested in the diet," he said. "Indeed, some of spices and herbals are now sold as food supplements because of their recognised health benefits."

Study co-author Phillip Greenspan, associate professor in the College of Pharmacy, noted that most people don't get their recommended five to nine servings of fruits and vegetables a day. Rather than seasoning their food with salt - which provides no beneficial phenols and has been linked to high blood pressure - he recommends that people use a variety of herbs and spices to help boost the nutritional quality of their meals.

"When you add herbs and spices to food, you definitely provide yourself with additional benefits besides taste," Greenspan said.

From: Efood Ingredients from Scientist Live 06/08/2008

Sesame Seed Extract and Konjac Gum May Help Ward Off Salmonella & E. Coli

A new study in SCI's Journal of the Science of Food and Agriculture shows that konjac gum and sesame seed extract may offer protection against different strains of E. coli and Salmonella bacteria.

The study by Dr Petra Becker et al from Wageningen University and Research Centre, the Netherlands, shows that these foodstuffs act as binders for E. coli and Salmonella bacteria. The bacteria attach themselves to the fibrous foods instead of the gut cells of the host.

Dr Becker says that eating a diet full of these foodstuffs may offer protection from gastro-intestinal infections or reduce the severity of symptoms caused by E. coli or Salmonella.

Other foods that were shown to have a beneficial effect included yeast, tomato, and pumpkin.

In the lab study which also included negative controls, the scientists looked at 18 food-related products including coffee beans, carrot, mango, fermented soya, and food stabilizers such as locust bean gum and konjac gum. All were subjected to in-vitro exposure to various bacteria which were allowed to attach themselves to the test products. The levels of bound bacteria were determined in a microplate-based method specifically developed for this purpose.

The results showed that sesame seed extract and konjac gum had the greatest number of adhered bacteria, leading to the conclusion that they may have a part to play in preventing certain E. coli and Salmonella from latching onto the host.

Dr Becker said: 'The importance of fibre, particularly from certain foodstuffs, in maintaining a healthy gut and digestion cannot be underestimated. The study shows that these foods bind certain bacteria and may be a means of stopping bacteria from entering host cells thereby preventing disease.'

From: Science Daily Aug. 6, 2008

Adults who eat eggs for breakfast lose 65 percent more weight

New research confirms that eating eggs boosts a healthy weight loss plan

Park Ridge, Ill. (August 5, 2008) – A study published online today in the International Journal of Obesity shows that eating two eggs for breakfast, as part of a reduced-calorie diet, helps overweight adults lose more weight and feel more energetic than those who eat a bagel breakfast of equal calories. This study supports previous research, published in the Journal of the American College of Nutrition, which showed that people who ate eggs for breakfast felt more satisfied and ate fewer calories at the following meal.

"People have a hard time adhering to diets and our research shows that choosing eggs for breakfast can dramatically improve the success of a weight loss plan," said Nikhil V. Dhurandhar, Ph.D., lead researcher and associate professor in the laboratory of infection and obesity at Pennington Biomedical Research Center, a campus of the Louisiana State University system. "Apparently, the increased satiety and energy due to eggs helps people better comply with a reduced-calorie diet."

Significant Weight Loss Related to Egg Breakfast

Compared to the subjects who ate a bagel breakfast, men and women who consumed two eggs for breakfast as part of a reduced-calorie diet:

- lost 65 percent more weight
- exhibited a 61 percent greater reduction in BMI
- reported higher energy levels than their dieting counterparts who consumed a bagel breakfast

The egg and bagel breakfasts provided the same number of calories and had identical weights (energy density), which is an important control factor in satiety and weight loss studies.

The researchers also found that blood lipids were not impacted during the two month study. They found that blood levels of HDL and LDL cholesterol, as well as triglycerides, did not vary compared to baseline cholesterol blood

levels in subjects who ate either the bagel or egg breakfasts. These findings add to more than 30 years of research that conclude that healthy adults can enjoy eggs without significantly impacting their risk of heart disease.

New Emphasis on the Importance of High-Quality Protein

This study adds to the growing body of research which supports the importance of high-quality protein in the diet. The American Journal of Clinical Nutrition (AJCN) published a special issue in May 2008, which contains nine articles that focus on the value of high-quality protein in the American diet. A major finding was that not getting enough high-quality protein may contribute to obesity, muscle wasting (loss) and increased risk of chronic disease.

Jump Start the Morning with Eggs

Jackie Newgent, registered dietitian and chef, stresses the importance of obtaining adequate high-quality protein when advising consumers about weight loss. "Eggs are a good source of all-natural, high-quality protein, so they can help keep you satisfied longer, making it easier to resist tempting snacks," said Newgent. "Nearly half of an egg's protein, and many of the other nutrients, are found in the yolk, so make sure to eat the whole egg for maximum benefits."

Newgent suggests these nutrition tips for a successful weight loss plan:

- Manic Monday: Make a batch of hard-cooked eggs on Sunday, so you'll have all-natural, high-quality protein meals for your on-the-go schedule during the week. Plus, eggs are incredibly affordable. At an average of $1.93 per dozen (or $0.16 per egg), eggs are one of the most affordable high-quality protein foods in the marketplace.
- In-a-Minute Morning Meal: In less than 60 seconds, you can prepare an egg breakfast to help jump start your day. Simply beat one whole egg in a microwave-safe mug then cook in the microwave oven on high for 60 seconds. Slide the egg onto a whole grain English muffin. Add flavor with a sprinkling of fresh herbs, salsa, or cheese. Serve fresh seasonal fruit slices, like peaches in the summer, on the side for a balanced meal.

From: Eureka Alert August 5, 2008

New Study Finds Cranberry Works as Well as Probiotics in Reducing Ulcer Causing Bacteria

New York University School of Medicine, "Using cranberry juice and probiotics to possibly suppress growth of H. pylori is great news for physicians and patients who are seeking natural alternatives to antibiotics."

New research suggests that cranberry juice can be as effective as probiotics in maintaining good digestive health. The double-blind trial at the University of Chile found a regular 6.8 oz. serving of 25% cranberry juice was as effective as the probiotic studied in suppressing growth of H. pylori among asymptomatic children. The study also showed the potential for an increased benefit when cranberry and probiotics are combined.

"This research is exciting as antibiotics are currently the only effective treatment for H. pylori, the most common cause of stomach ulcers worldwide and a risk factor for gastric cancers," says Dr. Fritz Francois, Assistant Professor of Medicine at New York University School of Medicine. "Using cranberry juice and probiotics to possibly suppress growth of H. pylori is great news for physicians and patients who are seeking natural alternatives to antibiotics."

Recent research has shown that eradicating all bacteria in the gut, which is the case with many current antibiotic therapies, may create additional health woes. Probiotics and cranberry inhibit H. pylori due to natural mechanisms that work differently than antibiotic drugs, offering a way to avoid side effects and support a healthy balance of bacteria. The cranberry PACs work by providing a unique "anti-adhesion" activity against certain harmful bacteria including those that cause urinary tract infections, gum disease, as well as the H. pylori that causes stomach ulcers.
http://www.nutritionhorizon.com/home/viewhealthnutrition.rails?Id=&pageNo=7

Lowering Cholesterol Early in Life Could Save Lives

UC San Diego Researchers Advocate Intervention Beginning in Childhood

With heart disease maintaining top billing as the leading cause of death in the United States, a team of University of California, San Diego School of Medicine physician-researchers is proposing that aggressive intervention to lower cholesterol levels as early as childhood is the best approach available today to reducing the incidence of coronary heart disease.

In a review article published in the August 5, 2008 issue of the American Heart Association journal *Circulation,* pioneering lipid researcher Daniel Steinberg, M.D., Ph.D., professor emeritus of medicine at UC San Diego, and colleagues Christopher Glass, M.D., Ph.D. and Joseph Witztum, M.D., both UC San Diego professors of medicine, call current approaches to lowering cholesterol to prevent heart disease "too little, too late."

They state that with a large body of evidence proving that low cholesterol levels equate with low rates of heart disease, "...our long-term goal should be to alter our lifestyle accordingly, beginning in infancy or early childhood" and that "…instituting a low-saturated fat, low-cholesterol diet in infancy (7 months) is perfectly safe, without adverse effects…"

According to Steinberg, progress has been made in the treatment of coronary heart disease in adults with cholesterol lowering drugs like statins. However, while studies show a 30% decrease in death and disability from heart disease in patients treated with statins, 70% of patients have cardiac events while on statin therapy. Promising new therapies are under development, but with an alarming rate of coronary heart disease in the U.S. today, action to curtail the epidemic is needed today.

In fact, they propose that lowering low-density lipoproteins (the so-called "bad cholesterol") to less than 50 mg./dl. even in children and young adults is a safe and potentially life-saving standard, through lifestyle (diet and exercise) changes if possible. Drug treatment may also be necessary in those at very high risk.

"Our review of the literature convinces us that more aggressive and earlier intervention will probably prevent considerably more than 30% of coronary heart disease," said Steinberg. "Studies show that fatty streak lesions in the arteries that are a precursor to atherosclerosis and heart disease begin in childhood, and advanced lesions are not uncommon by age 30. Why not nip things in the bud?" Such early signs of heart disease should be taken as seriously as early signs of cancer or diabetes, he said.

Physicians have been slow to measure cholesterol, much less prescribe cholesterol lowering regimens in children and young adults who are otherwise healthy. However, the UC San Diego team notes that studies of Japanese men in the 1950s showed that consuming a low-fat diet from infancy resulted in lifelong low cholesterol levels, and their death rate from heart disease was only 10% of the rate of cardiac-related death in the U.S. Even with risk factors such as cigarette smoking and diabetes, heart disease deaths remained significantly lower in Japanese men with lifetime levels of low cholesterol. This protective effect was lost in Japanese who migrated to the United States and adopted a Western diet leading to higher blood cholesterol levels.

Interventions today typically begin in adults diagnosed with high cholesterol levels or other risk factors or symptoms of coronary artery disease. However, initiating cholesterol-lowering interventions in 50-year-old adults, even if successful, is unlikely to reverse established arterial disease and will therefore have limited impact on the occurrence of adverse events related to coronary heart disease.

Citing the success of lowering cholesterol levels in children diagnosed with familial hypercholesterolemia, the UC San Diego team suggests that programs to lower cholesterol in the population at large from childhood on, with the ideal LDL level set at 50 mg./dl. or less (in those at highest risk), will have a long-term beneficial effect and lower the nationwide rates of coronary artery disease. They do not advocate using drug therapy to reach these levels, especially in children with no other risk factors, but to achieve these low levels through "TLC," or "therapeutic lifestyle changes," such as diet and exercise.

The National Institutes of Health (NIH) has declared "war" against the parallel epidemics of obesity and diabetes. The researchers conclude that "The weapons for those wars—education and behavior modification—are the same as those needed for a 'war' on coronary heart disease."

They propose that “A concerted national effort might dramatically reduce morbidity and mortality due to three major chronic diseases…It would take generations to achieve and it would require an all-out commitment of money and manpower to reeducate and modify the behavior of a nation. Is that impossible? No. We have already shown that even a frankly addictive behavior like cigarette smoking can be overcome (eventually).”

From: University of California San Diego News Centre August 5, 2008

Eating Fish May Prevent Memory Loss and Stroke in Old Age

Eating tuna and other types of fish may help lower the risk of cognitive decline and stroke in healthy older adults, according to a new study.

For the study, 3,660 people age 65 and older underwent brain scans to detect silent brain infarcts, or small lesions in the brain that can cause loss of thinking skills, stroke or dementia. Scans were performed again five years later on 2,313 of the participants. The people involved in the study were also given questionnaires about fish in their diets.

The study found that people who ate broiled or baked tuna and other fish high in omega-3 fatty acids (called DHA and EPA) three times or more per week had a nearly 26 percent lower risk of having the silent brain lesions that can cause dementia and stroke compared to people who did not eat fish regularly. Eating just one serving of this type of fish per week led to a 13 percent lower risk. The study also found people who regularly ate these types of fish had fewer changes in the white matter in their brains.

"While eating tuna and other types of fish seems to help protect against memory loss and stroke, these results were not found in people who regularly ate fried fish," said Jyrki Virtanen, PhD, RD, with the University of Kuopio in Finland. "More research is needed as to why these types of fish may have protective effects, but the omega-3 fatty acids EPA and DHA would seem to have a major role."

Types of fish that contain high levels of DHA and EPA nutrients include salmon, mackerel, herring, sardines, and anchovies.

"Previous findings have shown that fish and fish oil can help prevent stroke, but this is one of the only studies that looks at fish's effect on silent brain infarcts in healthy, older people," said Virtanen. Research shows that silent brain infarcts, which are only detected by brain scans, are found in about 20 percent of otherwise healthy elderly people.

The study was supported by the National Heart, Lung and Blood Institute, the National Institute of Neurological Disorders and Stroke, the Finnish Cultural Foundation, Helsingin Sanomat Centennial Foundation, the Finnish Foundation for Cardiovascular Research, the Yrjö Jahnsson Foundation and the University of Kuopio.

From: Science Daily Aug. 5, 2008

2 years old -- a childhood obesity tipping point?

Over the last decade, childhood obesity has grown into an epidemic, reflected in soaring rates of type 2 diabetes and recommendations that pediatricians check toddlers for elevated cholesterol. What hasn't been as clear is how early to intervene.

A study presented at a pediatric research program on Friday suggested obesity prevention efforts should begin as early as age two, when children reach a "tipping point" in a progression that leads to obesity later in life.

"This study suggests that doctors may want to start reviewing the diet of children during early well-child visits," said John W. Harrington, M.D., a pediatrician at Virginia's Children's Hospital of The King's Daughters (CHKD). "By the time they reach eight years old, they're already far into the overweight category, making treatment more difficult."

The study examined records of 111 overweight children from a suburban pediatric practice. All of the children had their height and weight measured at least five times during pediatric visits. The average age was 12.

Children whose body mass index exceeded that of 85 percent of the general population were classified as overweight. Researchers charted the recorded body mass index of the children from infancy. through They found that the obese children had started gaining weight in infancy at an average rate of .08 excess BMI units per month. On average, they began this progression at three months of age.

Over half the children could be classified as overweight at two years old, 90 percent before reaching their fifth birthday.

Vu Nguyen, a second year student at Eastern Virginia Medical School, CHKD's academic partner, said the results surprised him.

"I didn't think that that obesity would start that early," said Nguyen, who presented the results Friday at a pediatric research scholars program.

Nguyen conducted the study with Harrington and Lawrence Pasquinelli, M.D., a pediatrician with Tidewater Children's Associates in Virginia Beach, Va.

More research is needed to determine the causes of early obesity including "information on family history and the dietary and exercise habits in infancy," said Harrington, an EVMS associate professor. "We may then have to look prospectively to see what interventions work in reversing this trend."

From: Bio-Medicine 8/1/2008

Alcohol Binges Early In Pregnancy Increase Risk of Infant Oral Clefts

A new study by researchers at the National Institute of Environmental Health Sciences (NIEHS), part of the National Institutes of Health, shows that pregnant women who binge drink early in their pregnancy increase the likelihood that their babies will be born with oral clefts.

The researchers found that women who consumed an average of five or more drinks per sitting were more than twice as likely than non-drinkers to have an infant with either of the two major infant oral clefts: cleft lip with or without cleft palate, or cleft palate alone. Women who drank at this level on three or more occasions during the first trimester were three times as likely to have infants born with oral clefts.

"These findings reinforce the fact that women should not drink alcohol during pregnancy," said Lisa A. DeRoo, Ph.D., an epidemiologist at NIEHS and author on the study. "Prenatal exposure to alcohol, especially excessive amounts at one time, can adversely affect the fetus and may increase the risk of infant clefts." The causes of clefts are largely unknown, but both genetic predisposition and environmental factors are believed to play a role in their development. The paper appears online today as an advance access publication in the American Journal of Epidemiology.

The population-based study was conducted in Norway, which has one of the highest rates of oral clefts in Europe. The investigators contacted all families of newborn infants born with clefts between 1996 and 2002. The study included 573 mothers who had babies born with cleft lip with or without cleft palate and cleft palate only; as well as 763 mothers randomly selected from all live births in Norway. The average age of the mostly married mothers was 29 years.

Mothers completed a self-administered mailed questionnaire focused heavily on the mother's lifestyle and environmental exposures during her first three months of pregnancy when a baby's facial development takes place.

The researchers found increased risks of orofacial clefts among infants whose mothers reported binge-level drinking of an average of five or more drinks per occasion during the first-trimester compared to non-drinkers. Risk was further increased among women who drank at this level most frequently.

Both animal and human data suggest that it is the dose of alcohol consumed at one time during pregnancy rather than the frequency or total amount over time that matters most. "The greater the blood alcohol concentration, the longer the fetus is exposed. A single binge during a critical period of an infant's development can be harmful," said

DeRoo.

"Fortunately, heavy maternal drinking is uncommon in many populations, but the fact that it is happening at all tells us we need to do a better job of letting mothers know about the effects that alcohol can have on their baby's development," said Allen J. Wilcox, M.D., Ph.D., NIEHS researcher and co-author on the paper. In Norway, a separate study found that 25 percent of Norwegian women reported at least one binge drinking episode early during pregnancy.

Alcohol is a recognized teratogen, or an environmental agent that can cause malformations of an embryo or fetus. One of the most severe outcomes of heavy maternal drinking is fetal alcohol syndrome, a lifelong condition that causes physical and mental disabilities, including craniofacial malformations. There has been little research to determine if alcohol consumption is related to oral cleft risk.

From: Medical New Today August 1, 2008

New Research Study Links Dark Chocolate to Vascular Health Benefits

Dark chocolate has come to be recognized for its flavanol antioxidant benefits, but a new study, conducted by the Yale-Griffin Prevention Research Center, has uncovered an important link to its vascular health benefits. The study, which used Hershey's Extra Dark Chocolate, reported that dark chocolate has a positive impact on blood pressure and blood vessel function. The study's release comes on the heels of Hershey's Extra Dark Chocolate, a rich dark chocolate featuring 60 percent cacao, earning renowned health and fitness expert Bob Greene's Best Life seal of approval - the first chocolate bar to earn that distinction.

"The Hershey Company is continuously looking for opportunities to offer products that support the balanced lifestyles of today's health-conscious consumers," said Debra Miller, Ph.D., Director of Nutrition, The Hershey Company. "This one-two punch of the Yale-Griffin research confirming chocolate's vascular health benefits, combined with Bob Greene's Best Life seal, makes Hershey's Extra Dark Chocolate a sensible option for people looking for small indulgences."

The Yale-Griffin Prevention Research Center study is the largest study of its kind to research the short-term benefits of solid dark chocolate and cocoa containing beverages on blood pressure and endothelial function (blood vessel function). The results of the study, recently published in the American Journal of Clinical Nutrition, found that consuming Hershey's Extra Dark Chocolate (75g) as well as Hershey's Natural Cocoa (22g) lowered blood pressure and improved endothelial function in 45 participants 2 hours after consumption.

"Our study demonstrated impressive enhancement of endothelial function following the acute consumption of dark chocolate and cocoa," said David L. Katz, MD, MPH, principal investigator of the study and director of the Prevention Research Center. "The results are exciting because they show that dark chocolate, a highly-popular treat long associated with pleasure, has health promoting properties as well."

In addition, The Hershey Company announced that Hershey's Extra Dark Chocolate is the first chocolate bar to earn the respected Best Life seal of approval. Designed by Bob Greene, respected exercise physiologist and famed trainer, the Best Life seal appears on select grocery products and is intended to help consumers make healthier food and lifestyle decisions. Hershey's Extra Dark Chocolate's naturally occurring antioxidants and proven vascular health benefits helped the product to earn this distinction. Bob Greene will utilize Hershey's Extra Dark Chocolate and Hershey's Natural Cocoa as he helps consumers to develop balanced, healthy lifestyles through his book, The Best Life Diet, the companion website TheBestLife.com, appearances on The Oprah Winfrey Show and other national television and radio shows, and national tours.

From: Find Articles – Business Wire July 30, 2008

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News from Nutrition & Health

What are the world's healthiest foods?

Let's face it. These days, shoppers are overloaded with information every time they hit the supermarket. Products labelled 'Smart Choice', 'Low Fat', 'Low Carb' and 'Sugar Free' line every aisle, meant to cater to the latest gimmick diet *de jour*.

Take breakfast cereals for instance: in larger stores, there are often two dozen or more options, each claiming to be better for your body than all the rest!

Of course, the bottom line is that people want to eat the healthiest foods. But how can one cut through all the marketing fluff to make a quick, nutritious purchase?

Enter Dr David L Katz, director of the Yale-Griffin Prevention Research Centre in Connecticut, USA. Katz, as head of an all-star line-up of medical specialists and researchers, has unveiled a food rating system called the Overall Nutritional Quality Index, or ONQI for short (It is likely to be marketed under the name NuVal). His system evaluates all foods in a grocery store on a 1-to-100 scale, with 100 being the healthiest and 1 being the least healthy.

Before generating a score, the algorithm takes into account the following factors: fiber, folate, vitamins A, C, D, E, B12, B6, potassium, calcium, zinc, omega 3 fatty acids, bioflavanoids, carotenoids, magnesium, iron, saturated fat, trans fat, sodium, sugar, cholesterol, fat quality, protein quality, energy density and glycemic load.

Katz, who aspires to have the rating used in supermarkets, restaurants, food packaging and other avenues, says ONQI "rates foods based on their overall quality and the more wholesome, more natural foods come out on top."

At the top of the list -- vindicating mothers the globe over -- are fresh veggies and fruits: mustard greens (*sarson ka saag*) score a perfect 100, as do fresh strawberries, raw spinach, raw broccoli and oranges. Other high scores are apples (96), bananas (91), plain oatmeal (88) and atlantic salmon (87). On the other end of the spectrum are candies like taffy and popsicles, each scoring a pitiful 1. Other poor performers are pepperoni (9) and diet soda (15).

The immediate fun with ONQI is that it allows you to easily evaluate different types of foods. So, you can put bacon to the test against dark chocolate, or finally compare apples to oranges. But its lasting contribution may be the ability to judge similar foods. For example, next time you have 20 different loaves of bread staring you in the face, wouldn't it be nice to find the highest number and be done with it?

Of course, there are some clear methodological flaws with Katz's system, particularly when put into the Indian context. Most clearly: we don't eat foods individually, we eat meals. While it's nice to know the rating for the boneless chicken breast (39) that goes into our *methi murgh*, how about the dish as a whole? Isn't it a pain to look up the rating for each individual ingredient? And can you imagine the local *subzi wallah* dutifully reporting the ONQI scores of his various wares? Not likely.

So, while the system is interesting and promising, it's not without its limitations. Perhaps a variation can be invented that takes evaluation to the next logical step: rating recipes based on the ingredients and recommended portion size.

As it stands, however, the system will be introduced this September in a select number of US grocery stores. The ONQI rating will be found on pricetags, so that consumers can weigh both monetary cost and nutritional value when making a purchase. No plans have been announced to introduce the system in stores world wide.

Mustard Greens (sarson ka saag) 100
Fresh Strawberries 100
Raw Spinach 100
Raw Broccoli 100
Orange 100
Apple 96
Banana 91
Plain Oatmeal 88
Atlantic Salmon 87
Tilapia (fish) 82
Almonds, dry roasted 82

1% Milk 81
Barley, cooked 63
Scallops 51
Sunflower Seeds, dry roasted, salted 40
Orange Juice 39
Ground Beef, cooked at home 31
Canola Oil 24
Diet Soda 15
Pretzel Sticks 11
Pepperoni 9
Cheese Calzone 8
Regular Soda 1
Taffy 1

From: Rediff News August 27, 2008

Menu for a Brainy Breakfast

High-protein breakfast foods do help a child's behavior. Throughout your child's brain, biochemical messengers called neurotransmitters help the brain make the right connections. Certain foods and combinations of food, influence how these neurotransmitters operate -- for better or worse.

Two types of proteins in breakfast foods can have a major impact on neurotransmitters. First, tyrosine, an amino acid, stimulates dopamine and norepinephrine, the transmitters responsible for alertness. Second, the calming protein tryptophan relaxes the brain. A breakfast that balances both types of proteins will start the child off better primed to learn and behave. Protein-rich foods, especially breakfast favorites such as milk, yogurt, eggs and whole grains, all contain tyrosine and tryptophan.

Carbohydrates can also act to calm the brain. But, watch out -- some carbs may excite the child too much and lead to upsetting behavior. Since carbohydrates are the main energy source for the brain, the brain can be a real sugar hog. When the brain receives a steady supply of sugars, it functions more steadily. When the body's blood sugar fluctuates up and down, the sugar entering the brain is unsteady. These peaks and valleys in sugar level can result in a child's behavior also becoming "unsteady."

To avoid this behavioral roller coaster, fill your child's diet with calming carbohydrates. Basically, a calming carb is a complex carb -- one that is packed with fiber, protein, and fat. These other nutrients slow the absorption of sugars into the child's bloodstream and provide a steady supply of fuel. Avoid simple sugars such as corn syrup or just plain sugar. These carbs enter the bloodstream too fast, worsening behavior rather than steadying it.

As you have noticed, proteins don't have this roller-coaster effect on blood sugar. So, the best breakfasts are those that contain complex carbohydrates along with proteins. Compare this to junk-carb breakfasts -- pastries and cereals, for instance -- that are low in fiber, low in protein, and contain a lot of artificial sweeteners. The brainy breakfast menu looks something like this:

- Scrambled eggs, whole wheat toast, and orange juice
- Yogurt, whole grain cereal, and apple slices
- Whole grain pancakes or waffles, berries, and a glass of milk
- A fruit and yogurt smoothie
- Veggie omelet, bran muffin, and yogurt

Finally, there is yet another protein perk to explain why your child is happier after a balanced breakfast. Junk carbs are rapidly absorbed in the stomach, leaving the child hungry sooner, but proteins satisfy a child's appetite longer so that the child is not hungry as frequently. Since proteins create a "full and satisfied" feeling quicker than carbs,

children are unlikely to overeat high-protein foods the way they do high-sugar stuff. A child who is not hungry is usually a happier child.

From: Ask Dr. Sears, Parenting

Small, Sweet and Healthful: A Square of Dark Chocolate a Day Offers Benefits

ROCHESTER, Minn. — Chocolate as health food? Not exactly, but eating a small amount of dark chocolate every day offers some health benefits.

The benefits are thought to come from flavonoids in dark chocolate, according to the August issue of Mayo Clinic Women's HealthSource. Flavonoids are a naturally occurring antioxidant that also are found in teas, red wine and some fruits and vegetables.

The flavonoids in dark chocolate have been associated with a beneficial effect on the cardiovascular system. One recent study showed that 6 grams of dark chocolate a day, about one square, lowered systolic and diastolic blood pressure by 2 points each.

Dark chocolate also may lower low-density lipoprotein (LDL) cholesterol levels by about 5 points. While not a huge affect, it's sending that "bad" cholesterol in the right direction. Also, flavonoids have a beneficial effect on how the lining of the blood vessels function.

"We think a lot of bad things that happen to the cardiovascular system are because the lining of the vessels cracks and becomes inflamed, setting the stage for plaques to form and rupture," says Robert Sheeler, M.D., a family physician at Mayo Clinic.

To gain the health benefits, there's no need to eat a whole chocolate bar. After all, chocolate still contains calories and fat. Dr. Sheeler says just one square a day, about 30 calories worth, will provide the health benefits.

Generally, to gain health benefits, Dr. Sheeler recommends chocolate that contains at least 60 percent cocoa. Milk chocolate typically has 15 percent to 25 percent cocoa. Dark chocolate tends to have 50 percent to 80-plus percent cocoa. And no need to buy the priciest brands. Some high-quality dark chocolate bars are available for $2 to $4 each.

http://www.mayoclinic.org/news2008-mchi/4927.html