



PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

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HEALTHIER PROCESSED FOODS

Processed foods have been considered unhealthy. Some of the products are unhealthy with high fat, sugar and salt contents with lower dietary fibre and other nutrients. Because of some products, the industry is getting bad name and it is now time to regain the confidence of consumers and health professionals by trying to make most if not all processed foods healthier.

Developers do spend a lot of time and efforts to make the products more acceptable and appealing by using attractive colours and making the products taste and smell nice. Many of the ideas come from mother's cooking and such delectable foods are made on a large-scale using machines instead of hands. This makes the products different from what it is our kitchens. The reasons could be the ingredients as well as how it makes different when rolled or shaped by hand versus extruded or rolled by rollers. Then these differences are minimised by adding ingredients and/or additives that make them look like home-made. Of course, there is nothing wrong in this as long as the final product is safe to be consumed by all.

However, there is one problem. Developers many times forget that food is not just eaten for joy it provides but it should also nourish the body. So, they must ensure that whatever that may be missing from the machine-made product may be compensated by adding nutrients and ingredients. They should also try to make the product more nutritious than is normally made even at home. There are now technologies available to include such nutrients and phytochemicals

to make food products healthier, so these must be used.

Secondly, the industry should be a little more communicative. When the aseptic milk or juice can last for months, some believe that it must be containing preservatives. It is the aseptic technology which allows packaging a sterile product without letting in the spoilage microbes into the product. Once they know this, they would be more receptive to the products. Some companies have started dialogues with consumers but we still have a long way to go.

Today's societies are living far away from places where foods are grown so the fruits, vegetables, grains and animal foods are all to be transported for long distances or processed to retain their desirable characteristics so consumers will get foods that are tasty and nutritious. We cannot live in a dream where we only eat home-cooked meals which are prepared from raw agricultural produce. We have to use either processed ingredients or finished food products to prepare our final meals. So we cannot wish away the processed foods. It is industry's onus to provide nutritious and healthy food products. They should also be transparent about what and how they are doing without divulging their trade secrets, to regain the consumer confidence. This will ensure a healthy growth of the industry as well.

Prof Jagadish Pai,
Editor, PFNDAI

VITAMIN D KI TAAKAT



PREVENTION OF DIABETES



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Hon. Scientific Director, PFNDAI

Diabetes and all its preceding and succeeding health events constitute the number one burden of disease in our country. Prevention is the best strategy but how much can we achieve is a \$1,000,000 question. Three issues contribute to the development of diabetes as well as all consequences and they are genetic susceptibility, diet and lifestyle and physical activity. Until the late 70s we were a low diabetes prevalence country and therefore we cannot blame genetics. It is our diet, lifestyle and physical activity that needs to be addressed and effectively communicated to citizens as well as the government.

It is also a fact that genetically we have a propensity to conserve energy particularly so if one were to be born low birth weight. This is the first step by ensuring good maternal nutrition particularly protein, energy and micronutrients. If we have less of low-birth-weight babies being born, to some extent early onset pre diabetes and diabetes can be

prevented.

Consuming healthy diets and good physical activity from childhood through adolescence to adulthood is the second stage of prevention. Thousands of adolescents and young adults should be prevented from developing metabolic syndrome and pre diabetes. Avoiding or minimising sugar alone is not a way of prevention. The entire daily diet should be as per guidelines made up of more whole grains, fruits, vegetables and protein and less of refined carbs that include polished rice and refined flour.



Millets have had a resurgence and should replace refined cereals to the extent possible. Fat is not a major issue as long as it is from vegetable sources and balanced in MUFA, PUFA, n6 and n3 and well within the limit of both visible and invisible forms amounting to not greater than 30% of total energy intake.

Dietary interventions are all welcome if they are targeted to lower energy intakes and lower refined carbs. Daily or intermittent fasting or portion size control or using millets, non-nutritive sweeteners etc would ultimately help in lowering energy intakes. The intervention of this nature would completely fail if physical activity is not built into it. Our ancestors even with higher calorie intake than us had less risk simply because of their daily routine life was based on continuous physical activity. Despite all these persons with genetic susceptibility may still develop pre diabetes which can be reversed with above measures along with some medication.

Delayed onset of diabetes should be the goal. Every decade delayed will reduce morbidity and mortality at a younger age. Industry has a major role in making products that help consumers to maintain their glycemic profile well within the accepted limit of HbA1C being less than 6.0. Non-nutritive sweeteners alone is not sufficient to make a product better. The entire product profile should change with the dietary guidelines. We need to innovate to develop products keeping in mind the glycemic load to the consumer.

To conclude- preventing, delaying development and managing the lifestyles even after diabetes can reduce the prevalence and the morbidity associated with it. Physically active lives is possible through a daily routine not just a 30 - minute walk but a minute to minute effort to keep physically active.

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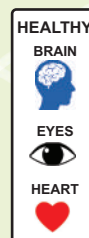
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WHO MADE THIS STANDARD?



AUTHOR

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Chairman, Regulatory Affairs,
PFNDIA

Even though FSSAI is more approachable than the previous regime, concerns are raised that regulations are not well-reasoned. The feeling is reinforced when inputs given during the notice and comment period are neither acknowledged nor responded to.

The statutory obligation u/s 18(2d), to consult “during preparation, evaluation and revision of the regulation...” apparently fails to convince stakeholders that regulations emerge from collective reasoning. Disregard for domestic realities, misalignment with global practice and ignoring grievance settlements is how disappointments are expressed. The FSSAI, however responds that based on “several representations from stakeholders”, regarding their “concern is under consideration”. So, who makes the standard if everyone is involved?

The PFA being administrative in nature merely required

enacting standards, enforcing them and prosecuting offenders. Adopting standards already set by Codex, US FDA or EU, including limits did not call for specific capabilities. And so, none were built. Internet browsing and cherry picking what’s in Codex was sufficient. Setting standards or limits based on other country realities was not a concern. Even the fact that limits between countries differed failed to evoke enquiry. Adopting the strictest limit was righteous enough for questions on ‘why this limit’.

It took a major pesticide controversy for a Joint Parliamentary Committee (JPC) to note that India did not have a scientifically established process for justifying its standards/limits. This led to passing FSSA 2006; a modern science-based Act. Essentially the JPC in asking for a scientific logic rejected the practice of borrowing standards. Another Parliamentary Standing Committee (PSC 2018) pointed out, for FSSAI to function under the new mandate it should be equipped with proper tools and capabilities. The Committee further opined that the regulatory body should be run by experts/scientists in the food sector with bureaucratic support.

More than 250 scientists are placed in 21 Scientific Panels - expanded from the original 8 - and the 27 member Scientific Committee. There is more than enough.

The PSC pointedly recommended that persons with domain knowledge and expertise in the food sector should be employed to run the organization. Contrary to the Act, functional roles initiated under its first chairmanship have been mutating towards PFA. Scientific Panels/Committee examining prepared drafts is reminiscent of PFA’s Sub-Committees/CCFS. The latter was hierarchically arranged for setting standards. SP/SC scientific capabilities, under FSSA, are intended to provide the science preceding a standard, not in drafting it. Delivery of scientific opinions in prescribed formats (Transaction of business: Sch. III) is the sole outcome expected from them. These are not forthcoming. The structure function roles laid down under the Act are yet to be fulfilled.

The PSC further suggested that Government may take a cue from similar regulatory mechanisms functioning in some of the developed countries like USA, UK, Australia etc. Delegations representing India at Codex are familiar with the approach and methodology in arriving at a standard. The approach is the same under FSSA. Yet standards are made without the scientific logic, as before. More than who made this standard, how it is made is the concern.

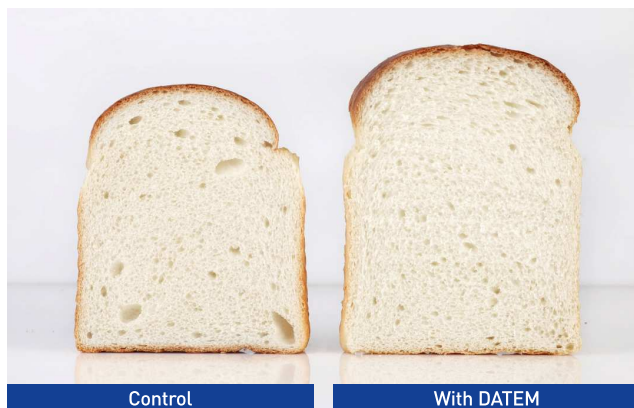
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ROLE OF DIETARY FAT IN HEART HEALTH

AUTHORS



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With increased concern about obesity and awareness about losing weight for good health, we find lot of social media posts and campaigns from many food manufacturers about low calorie foods, reduction of fats in the diet etc.

This creates a kind of fear in the mind of public about the fats. In fact, all fat is not bad. It is one of the major essential macronutrients. It gives one



Dr Ahmed Ibrahim, PhD, Scientist F, NIN

third to one fifth of the daily energy requirements. It is required to carry and help absorption of many biomolecules which are fat soluble. Often Ayurvedic preparations are recommend to be consumed with fat like ghee. Fat soluble vitamins A, D, E and K need fat as a carrier in metabolism. Many fat derivatives like phospho-lipids, play important functions of brain and nervous system. Interestingly, fat in the food has its importance in giving mouthfeel and flavour to the food. Many flavours' molecules dissolve in fats to give typical



Dr Shashank Bhalkar, Executive Director, PFNDIAI

taste and flavour. Think of products like cheese, chocolate or consuming Alu paratha in North India or Thalipeeth in Maharashtra along with dollop of home-made white butter which is always relished.

Fat comes from various sources in our food. It is either invisible fat coming from meat, milk and Milk products, fish, etc. It is also visible fat in the form of butter, ghee, or it may be fat used for cooking the food like vegetable oils. Therefore, while we calculate fat in the diet, we need to



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consider all these visible and invisible sources. Fats are classified based on their fatty acid composition and saturation/ unsaturation. Saturated fats are the ones which do not have double bonds and examples are fats which contain Palmitic, stearic or Lauric acids. Fats with one, double bonds are called Mono Unsaturated Fatty acids (MUFA) like oleic acids which come from ground nut, palm, sesame, rice bran and olive oils. Fats containing more than one double bond are called Poly Unsaturated Fatty Acids (PUFA) and are classified based on the position of their double bonds e.g., omega 6 (linoleic acid) or omega 3 like alfa linoleic Acid coming from vegetable sources or DHA, EPA coming from fish oils or even our body makes them. Trans fats are generated during hydrogenation of oils which is Vanaspati or margarine. Dairy fats also contain Trans fats and are not harmful as the ones formed during processing. The fat classification could also be based on carbon chain length: short chain (less than six carbon atoms) like butyric, propionic acid found in gut synthesized by gut bacteria. They are also medium and long chain fats. These are all saturated fats.

There are mis concepts about cholesterol, like consuming foods with higher cholesterol

will increase the blood cholesterol. Blood cholesterol is made by the enzyme in the body which makes the cholesterol as per the body's requirement and has no direct relation with dietary cholesterol. Cholesterol is present in only animal sources like dairy, eggs, meat, seafood etc. Plant sources like vegetable oils do not contain any cholesterol. Sometimes manufacturers write "Zero Cholesterol" on the labels which is naturally "Zero Cholesterol." Higher carbohydrates and higher fat consumption leads to raised cholesterol levels. Diabetics should be careful to have less intake of cholesterol in the diet because the desired LDL cholesterol levels are half of normal individuals and additionally, they have vascular problems.

Triglycerides are the transported in plasma and do not directly contribute to atherogenesis but they harden the vessels and increase the risk of heart attack. They are directly related to obesity and metabolic syndrome. Plasma triglycerides can be controlled by regular exercise, losing weight, avoiding highly refined carbohydrates and saturated fats, avoiding consumption of trans fats. Increasing omega 3 and fish consumption, avoiding/ reducing consumption of alcohol will help the reduction of triglycerides if the levels are high.

Minimum Fat intakes recommended by NIN for Indian adults should be 15% of the energy intake which works



out to be 33 g. This is higher (20%) for women in reproductive age and adults with BMI of less than 18.5. Maximum level of total fat should be 30 - 35% which is 66 - 77g. An adult man is recommended to consume visible fat of 25g (6 Teaspoons) and an adult woman 20g (5 Teaspoons). Table 1 gives data on fatty acid composition of different cooking oils and fats which are generally consumed. The recommendation is to consume one third of the saturated fat, one third MUFA and one third PUFA. Consumption of ghee is always a question mark because of its saturated fatty acids content. It is obvious from the table that it contains 70% of saturated fat.

However, one third of the fat can come from saturated. Therefore, if ghee is consumed in restricted quantity, it is not a concern. Similarly, there is controversy (especially in west) about consumption of coconut oil which contains 92% saturated fatty acids. Of the 92% saturated fat MCTs contribute 59%, which does not raise the cholesterol levels.





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Therefore, like ghee it is safe to consume if is in limit. Another tropical oil which is Palm oil also has raised concerns as it contains 44% saturated fat. But if we look at the levels of MUFA (43%) which are comparable to that of Olive oil (55 - 83%). Therefore, this is not harmful and can replace butter to give similar effect in bakery products. Gingelly oil (til oil) is commonly used in Tamil Nadu and southern India contains good amount of MUFA (43%) similar to olive oil and in addition contains PUFA (42%).

Peanut oil is actually good source because of its composition (Sat 19%, MUFA54%, PUFA 27%). Mustard oil is an excellent source which contains good amount of MUFA 67%, PUFA 15% and Omega 3 of 12%. Rice bran oil contains Sat 24%, MUFA 44% and PUFA 32%.

Safflower and Sunflower are very low in Saturated fat and good amount of PUFA. They do not have omega 3. Soyabean oil is good source of MUFA, has good amount of omega 6 and omega 3 in 10:1 ratio. Cotton seed oil is not much used for cooking in India. It is used in Vanaspati. Olive oil is very expensive oil and as explained

in the foregoing discussions we have so many oils which are as good as olive oil. Canola oil is zero erucic acid rape seed oil which is good source of MUFA, PUFA with ideal ratio of omega 6 to omega3. However, it is to be imported and is expensive. This table can be ready reckoner to find good or bad oils. We have key learnings from the above discussions. 1) Try to keep the consumption of oils to minimum. 2) Single oils do not give all the benefits and as recommended by ICMR it will be good to rotate the oils. 3) Non vegetarians should consume non fried oily fish at least once a week. 4) It is advised to consume unsalted nuts like almonds, walnuts, hazelnuts, pistachios and also omega 3 rich seeds like flax seeds, chia seed. 4) Avoid use of vanaspati and consumptions of processed foods high in trans fats.

TABLE 1

Oil/Fat	Fatty Acid composition of common cooking oils/fats (% of total)				
	Proportion of visible fat	RDA= 1/3		RDA=1/3	
	MCT- SAT	SAT	MUFA	N6 PUFA	N3 PUFA
Ghee (butter #)	5 (3)	65(66)	23(22)	2(2)	0.5(0.9)
Coconut oil	59	33	7	2	0
Palm oil	0	44	43	11	0.3
Gingelly (Til)	0	16	43	42	0.4
Peanut oil	0	19	54	27	0
Mustard	0	6	67	15	12
RBO	0	24	44	32	0.6
Safflower	0	9	14	77	0.1
Sunflower	0	11	26	63	0
Soyabean	0	16	24	54	5
Cottonseed	0	28	20	52	0.3
Olive Oil*	0	0	55-83	3-21	<1
Canola@ (Rape seed)	0	<7	60	20	10

* Hernandez et al ;Front Plant Sci 2021

#BMJopen;2016

@Barthet VJ;Encyclopedia of Food Grains,2016

Rounded off values IFCT 2017

TABLE 2 Quantities of selected foods which provide 0.1gm ALA (n-3 PUFA)

Table 2 gives information about the vegetarian sources of omega 3 fats. It shows quantity of the food which gives 0.1 g of omega 3. Unconventional seeds like flax seeds or perilla seeds, spices and nuts are rich sources. Whereas cereals like wheat or pearl millets, some pulses, vegetables and fruits also contain omega 3.

So far we have discussed the basic data about the fat. Now we will see what is the evidence about what is the risk of consumption of fat for the heart health. Paper published in 2019 show that there is no direct correlation between quantity of the fat consumed and heart attack but the type of fat matters.

Consumption of PUFA has shown protective effect, whereas increase 2% energy per day by the people who consume trans-fat the risk of CVD goes up by 16%. When it comes to dairy product, the guideline is to consume low fat milk (less than 1.5% fat) or products made of it. The studies show moderate dairy consumption up to 200 g per day has no detrimental effect on heart health. Consumption of yogurt more than 200 g or low-fat cheese (like mozzarella) up to 50 has no bad effect.

The role of saturated fat as a risk of heart disease is controversial. They may not have any role. However, if the amount of saturated fat consumed is more can increase

Sources	gm
Cereal/Millet	
Wheat & pearl millet (Bajara)	70
Pulses	
Blackgram, Rajmah & Cowpea	20
Vegetables	
Green leafy	60
Purslane (lunia)	25
Other vegetables	400
Fruits	
Raspberry	80
Avocado	90
Guava	100
Strawberry	155
Kiwi	240

the LDL cholesterol. Consumption upto 10% calories via saturated fats has no risk. Risk is more in case of saturated fats coming from meat and milk. Often a question is asked why our ancestors consuming ghee and butter had lesser heart disease? The answer is because of higher physical activity they were in normal BMI.

Association of saturated fat intake is lost if one is in the range of normal BMI. Another study indicated that there is no advantage of consumption of low-fat dairy vs full fat dairy. Even replacing small amount of saturated fat with PUFA reduces the risk. One study from Harvard says that higher consumption of lauric acid, myristic acid, palmitic acid, and stearic acid increases the relative risk of heart disease by 18%. However, this may not be true for Lauric

Sources	gm
Spices	
Fenugreek seed (Methi)	5
Mustard seed	2
Nuts	
Walnut	1.2
Unconventional oil seeds	
Flax seed (alsi)	0.5
Perilla seed (Bhanjira)	0.5

acid. The same paper has observation that replacing 1% of these fatty acids with PUFA, whole grain carbohydrates or plant proteins reduces relative coronary heart disease risk by 6 - 8%. Another recent systematic study from west about coconut oil concluded that consumption of coconut oil does not affect total cholesterol, LDL or HDL cholesterol. There is small increase in Tri glycerides. It is noteworthy that coconut oil contains 60% MCTs. Replacing palmitic acid from Palm oil, Meat and dairy fat with PUFA had strongest risk reduction.

W. C. Willet, an authority on the subject mentioned in his paper that ratio of N6 to N3 is not important and can be misleading as both are essential and reduce the risk of heart attack. In practice, reduction consumption of milk and meat and increasing intakes of nuts, fish, soy oils products and non-hydrogenated will improve mix of fatty acids benefitting the heart health.

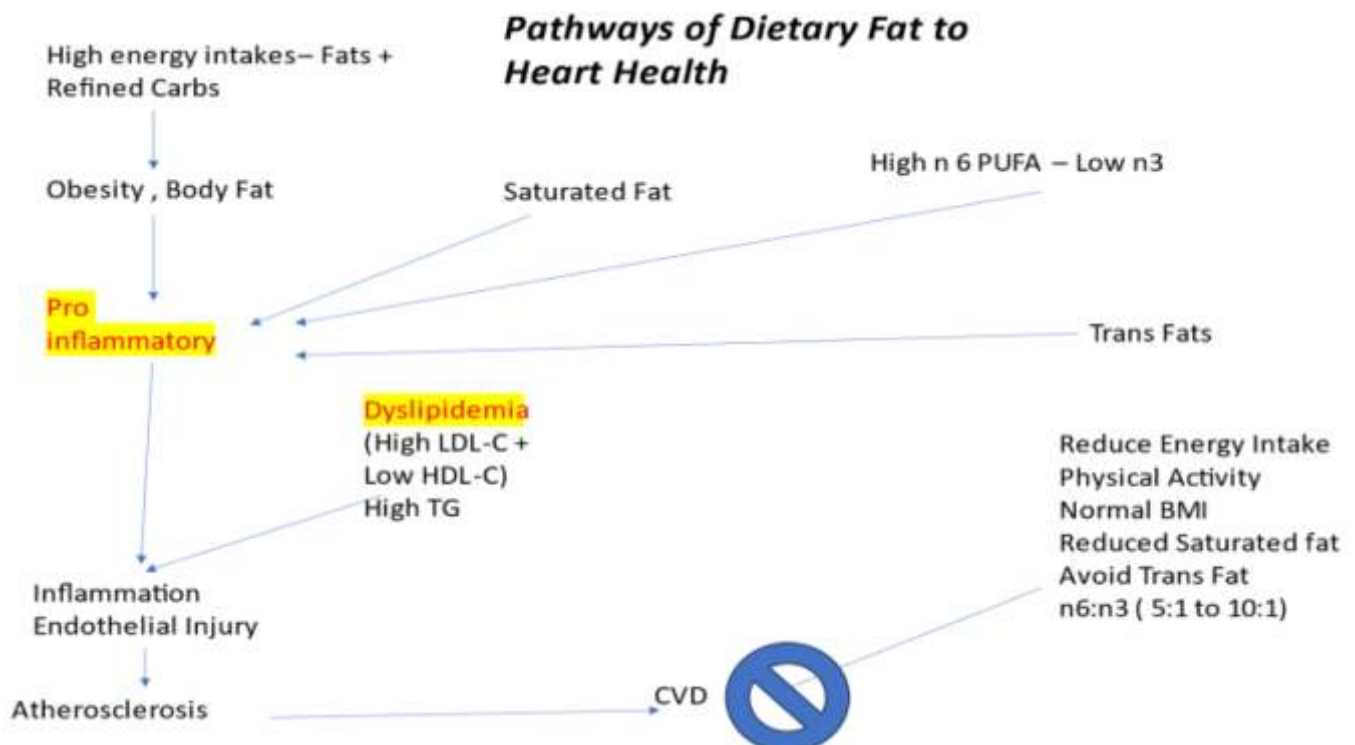
Willet's statement about the ratio may not be applicable to India. Because, one Indian paper shows that the saturated fats consumed in high income countries are more than recommended RDA. Whereas, in India it is lower than RDA. Similarly, omega 6 consumption in case of western countries as well as in India are at acceptable levels. Whereas, when it comes to omega 3, western countries consume more than RDA levels which is deficient in Indians because of the dietary habit differences. Therefore, the statement of Willet about ratio of N6 to N3 may not hold good for Indians. Indian diets are low in saturated fats, which mainly come from ghee, dairy, and vegetable oils. Therefore, replacing saturated fats only with omega 6 will lead to higher amount of inflammation in the body. When we look at Indian diets, ratio of omega 6 is more and unfavourable towards omega 3, because of

increased consumption of oils such as sunflower, safflower which are zero in omega 3 at the expense of traditional coconut, ground nut or sesame oils. Therefore, saturated fat is not a big issue in India. We are taking more of omega 6 PUFA. Another data based on animal study shows the ratios are very important. Low fat diets high in omega 6 has a bad effect. It increases pro-inflammatory condition resulting in increased deposition in adipose tissue which is further damaging. Studies indicate increased intake of omega 6 during pregnancy results in obesity in newborn. Studies have shown that low omega 3 in diet results in increased adiposity. Hence, higher ratio of omega 6 to omega 3 is a risk factor for obesity. Trans fats are pro-inflammatory and hence it is advisable to avoid industrial Trans-fat in the diet. Of late, the hydrogenated fat

manufacturers have developed processes which produce minimum Trans fats. In the study by Joshi et al in 2014 across the country showed 80% of the population had dyslipidemia only 20% are having normal lipid levels. The commonest dyslipidemia is high LDL cholesterol. Hypercholesterolemia is only 12%. Therefore, high cholesterol is not the issue. The ratio of bad and good cholesterol goes in favour of bad cholesterol. Our problem of dyslipidemia is different than of the west. The problem of dyslipidemia is because of risk factors such as diabetes, obesity and dysglycemia. These are to be addressed by lifestyle intervention strategies and not higher intake of saturated fats.

Different pathways of dietary fat to heart health are depicted in the figure 1.

FIGURE 1





As we can see high energy intakes in the form fats and refined carbohydrates lead to increase in body weight and fat which has a proinflammatory effect causing endothelial injury which further leads to atherosclerosis causing CVD. Similarly diets in high saturated fat or with high omega 6 to omega 3 ratio or high in trans-fat or dyslipidemia led to inflammation causing heart health problems. There is post covid increase in heart attacks in younger people because Covid has increased the pro inflammation. This can be corrected by reducing energy intake, having sufficient physical activity, maintaining normal BMI, reducing saturated fat, and avoiding trans-fat, maintaining Omega 6 to Omega 3 ratio.

Many diagnostic tests for the heart include pro inflammatory markers. For example, IL6 pro coagulant cytokine promotes coagulation. CRP is routinely measured. IL 8 links obesity with CVD. Increased apo B to apo A1 ratios are unfavourable for people with metabolic syndrome. Inflammatory markers TNF alpha, IL 1 B come down with consumption of cruciferous vegetables. While in ICU when one has heart attack Procalcitonin and high sensitivity CRP markers are now been studied to assess the

risk of death by heart attack.

To sum up, fat is an essential macronutrient and in addition to giving energy has many functions in body. When it comes to maintaining good heart health, consuming limited amount of fat with right fatty acid composition, eating less refined carbohydrates high in fibre, keeping healthy lifestyle are beneficial.

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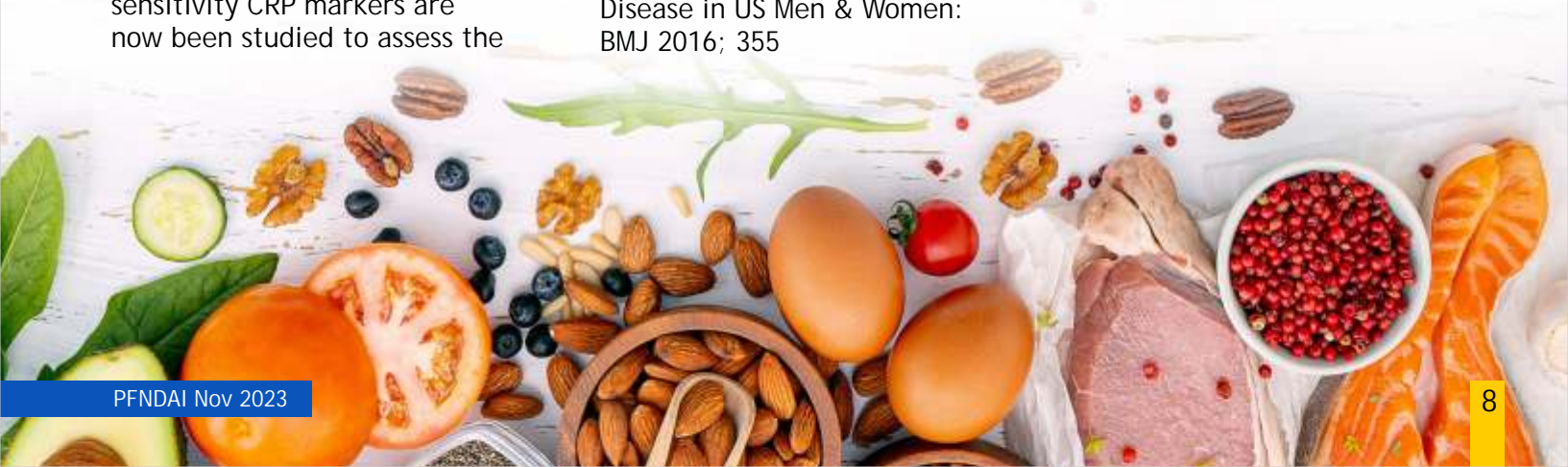
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ADVANTAGES AND BENEFITS OF INCORPORATING FOS IN NUTRIBARS



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structure of bar, crunchiness with enhance shelf life.

- In cold process, dry ingredients are mixed with syrup binder and moulded to produce Nutribar. This cold process is suitable for whole food bars where ingredients are generally raw (such as nuts, dried fruit chunks etc.) unprocessed or are processed minimally.

be used in reducing sugar content and calorie load of the products.

Incorporating FOS into Nutribars

Prebiotic fibres like short chain fructo-oligosaccharides (FOS) have added advantage as ingredient when incorporated in nutrition bars as it brings many technological benefits in product formation. FOS can act as humectant to provide texture support to a nutrition bar and can also act as a good binder to hold the ingredients in bar format. FOS is highly soluble and this prebiotic fibre is also suitable to use in different bar making process like hot/baking/cold process. Versatility of function make FOS an ingredient of choice in nutrition bar segment. Further, FOS is sweet in taste and has lower calories per gram than sugar (2 vs 4 kcal/g), these can

Nutribar Manufacturing Process with FOS

Nutribars are majorly prepared by two ways i.e. cold process or hot process.

- Hot press process is more common, where wet ingredients syrup is prepared using heating method followed by mixing of the dry ingredients in hot condition. This hot mixture is now placed in the moulds and cooled which results in the final product, the nutribar(s). Sometimes after moulding nutribars, they are baked for certain category of products where multigrain flakes or cereals (high fibre bar or energy bar) or protein crispies used (meal replacement bar or protein bar). Baking of nutribar provide better

FOS as an ingredient is suitable for both these processes. FOS is added during the preparation of wet ingredient syrup process. FOS can be used along with other ingredients like jaggery, sugar syrup, liquid glucose, honey, and glycerine etc. that are added in optimal proportions to maintain a crunchiness or chewiness of the nutribar.

Advantages for Manufacturers Using FOS in Nutribars

FOS provides functional advantages in terms of product quality.

In a syrup format FOS is stable, does not crystallize easily like sugar. FOS acts as binder in nutribar to hold the ingredients efficiently.



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Manufacturers are looking for ingredient which can replace regular sugar along with its function with any other ingredient that can provide an edge over sugar, and FOS fits perfectly well for the purpose. As FOS is sweet in taste (40% of sugar), it can replace sugar in the nutribar, providing a dual function of sweetness as well as functionality, i.e., giving bulk like sugar along with its binding ability.

Functional Role of FOS in Nutribars

FOS has many functional attributes which are beneficial for nutribar manufacturing process and product quality. Some are as mentioned below:

- FOS helps to bind the ingredients of the nutribar; it can give chewy texture over long period in shelf, as it can stay in metastable rubbery state in multicomponent binder matrix. FOS does not crystallize easily and does not form glass-like structure easily (unless moisture reduces drastically). When FOS is used along with existing binders (Sugar/Glucose syrup/ Glycerol), it can provide good synergy and also improve texture of nutrition bar.
- FOS can also improve texture of nutribar by giving a glossy appearance to nutrition bar

and imparts some color after baking. FOS can keep the same texture for longer period of time when it is used alone or along with other binding materials.

- FOS is sweet in taste and as it is a mixture of oligosaccharide, it can easily coat over ingredients like natural extracts or high intensity sweetener like sucralose, stevia and mask the off-note associated ingredient.

Health and Nutrition Benefits of FOS

Health and Nutrition benefits of FOS are many. These include:

- **FOS helps to increase of Dietary Fibre content of the product:** Fructo-oligosaccharides have been classified as dietary fibre by various jurisdictions. FOS is soluble dietary fibre and its inclusion in nutribar help to increase its fibre content. Further, dietary fibres have been associated with benefits as improvement in bowel movements.
- **Digestive Health:** Fructo-oligosaccharides (FOS) have been classified as prebiotic fibres as substrates that are selectively utilized by host microorganisms conferring a health benefit. Various studies have reported an increase in the intestinal flora, in particular the relative abundance of beneficial bacteria as Bifidobacterium and/or Lactobacillus.
- **Low Glycaemic Index:** Being an indigestible carbohydrate (dietary fibres are indigestible/ unavailable

carbohydrates), the dietary fibre has no glycemic index. Fructo-oligosaccharides are also unavailable carbohydrates. And thus, have low or no glycaemic index.

- **Sugar Reduction:** Fructo-oligosaccharides, particularly short chain types, are sweet to taste (30 - 40%of sucrose sweetness) may thus be used to replace regular sugar in any food and beverage application. This helps the reduction in consumer's sugar intake per serve.
- **Lower Calorie:** Fructo-oligosaccharides are fermentable fibres and have an energy /a calorie density of 2 kcal/g as compared to regular sugar/carbohydrate (4 kcal/g). Incorporation of FOS in any food and beverage application thus helps to reduce the comparative energy /calorie density of the product.

Comparing FOS with Alternative Ingredients in Nutribars

As FOS have dual function of sweetness as well as binding ability in nutribar apart from its health benefits, not many ingredients can be exactly same as FOS.



Prebiotic ingredient Oligofructose syrup derived from chicory root or Isomalto-oligosaccharides (IMO) can function similar way as FOS; however, there may be differences in the sweetening ability. Soluble corn fibre (SCF) can also act as prebiotic syrup for a Nutribar application (similar to FOS), however, use of SCF may not provide the sweetening effect (as FOS). Polyol syrup like maltitol or sorbitol may fulfil of function of binder/texturizer along with sweetening ability, but may lack the prebiotic effect. Thus, use of FOS in the Nutribar application can be advantageous compared to other alternatives that may not have the dual benefits (nutritional and functional).

What positioning option for a manufacturer make while using FOS in their nutribars?

Fructo-oligosaccharides are prebiotic soluble dietary fibres which help in gut bacteria modulation. Fructo-oligosaccharide intake (2.5 - 10.0 g/day) increased the

relative abundance of Bifidobacterium and/or Lactobacillus. Prebiotic fibre may have many other health benefits -

- Prebiotic fibre helps to boost immunity by proliferating good bacteria in the gut. 70-80% immune cells are present in the gut and thus a healthy gut may support immune health.
- Prebiotic fibre intake supports a healthy gut. It is known that nearly 90% of serotonin - the hormone that stabilizes our mood, feeling of well-being, and happiness is synthesized in the gut. A healthy gut may thus support a healthy mood.
- Prebiotic fibre may help in absorbing nutrients.

Nutribar manufacturers may position there products as "no added sugars", "reduced sugar", "lower sugar", "rich in fibre", "high fibre", "contains prebiotic fibre", "good for gut" etc, dependent on the quality of FOS used, minimum incorporation level of FOS and on local regulations.



Other food and beverage applications of FOS

Fructo-oligosaccharides are a versatile fibre that finds its place in most of the Food & Beverage applications. These include categories (products) like bakery (cookies, biscuits, cake, bread, rusk etc.), dairy (ice cream, flavoured milk, yoghurt etc.), confectionary (chocolate, gummies, candy etc.), cereal products (muesli, coated breakfast cereal, granola etc.), Indian sweets (ladoo, milk cake, peda, barfi etc.) and many more.



FRONT-OF-PACK LABELLING FOR **FOOD** AND **BEVERAGES:** CHALLENGES AND IMPLICATIONS (PART 1)

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Introduction:

Dietary guidelines and recommendations continue to evolve as understanding of nutrition and health has advanced. However, the general principle of a healthy and balanced diet remains consistent. It's important to consume a variety of foods in recommended proportions to meet your nutritional needs and promote good health.

More than a decade, food pyramid has been a visual representation of the suggested dietary guidelines to help individuals make informed choices about their food intake. World Health

Organization (WHO) adopted the "Global Strategy on Diet, Physical Activity and Health" in 2004 with emphasis on balanced diet and physical activity. The strategy highlighted importance of consumption of fruits, vegetable, whole grains and limiting energy intake from total fats, shifting fat consumption away from saturated fats to unsaturated fats, elimination of trans-fatty acids, limiting intake of free sugars and salt (sodium) consumption from all sources of intake. It called for actions to empower consumers to make informed choices by effectively spreading

concerns about lifestyle diseases. The nutrient profile modelling was drafted to include front of pack labelling and marketing restrictions, with an assumption that these policies will help consumers in making healthier choices with the information provided through front of pack(FOP) labelling.

WHO's Global NCDs Action Plan 2013-2020 represented a significant paradigm shift in terms of advising consumers to make informed choices. The approach as per this plan, is however majorly directed toward food industry to reformulate their products and

awareness to understand the impact of diet & physical activity to lead healthy life. Further in 2009, WHO initiated guiding principles for development and adoption of nutrient profile models with the intent to address rising

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nutrient profiling of the products or promoting reduction of sugar, salt, and fat in product manufactured and marketed by food companies.

packaged foods. It can include symbols/ graphics, text or a combination thereof that provide information on the overall nutritional value of the food and/or on nutrients included in the FOPNL.

The goal of front of pack nutrition labelling is to assist consumers in making informed choices by providing at-a-glance information about the nutritional content of the product in form of colour codes or symbols or icons. However, there is an ongoing debate about the front of pack labelling with respect to its scientific rigour and projected efficacy to achieve public health goals. It is known that several FOPL systems simplify complex nutritional information into a few symbols, colour codes, or ratings.

While simplification is necessary for understandability or usability; an overly simplistic system would fail to capture the full nutritional context of the food product. For example, focusing solely on calories or a single

nutrient may not provide a comprehensive picture of a food's healthfulness in the diet. Consumers may misinterpret FOPL symbols or ratings, thinking that a product is not healthier than it actually is or vice versa. For instance, a "high-fat" depiction in FOPL does not necessarily mean a product is low in other desired nutrients.

provide additional labelling declarations on food packages. Focus on the need of industry to reformulate products reflects a specific aspect of public health policy that has garnered increased attention in recent years. While product reformulation does offer a scope for improvement of the nutritional content of food products, important consideration would be to empower consumers with nutritional literacy and information to make right dietary choices rather than directives through label warnings or cautionaries. Education and awareness campaigns remain important cornerstones to achieve the goals of public health initiatives.

A few governments have implemented nutrient profile modelling and sugar taxes with the objectives of reducing the consumption of certain food products and using these tax revenues to fund public health initiatives. However, no evidence is available if the revenues so collected were indeed allocated toward improving public health or any initiatives supporting it. Few others have chosen to pursue alternative strategies, such as voluntary industry commitments to improve the

What is Front of Pack Labelling?

Front of Pack Labelling (or Front of Pack Nutrition Labelling) on processed or prepackaged food products is promoted as a policy tool to address lifestyle diseases, introduced in a section of countries. Its application is largely voluntary and in select cases, it is mandatory for packaged food and beverage products in respective markets. It refers to the information displayed on front of the food packaging, that is expected to provide consumers with key nutritional data-points or directives in some cases, about the product.

Front of Pack Labelling (FOPL / FOPNL) is defined in accordance with the Codex Guidelines on Nutrition Labelling (CXS 2 - 2021)¹ as:

Front-of-pack nutrition labelling (FOPNL) is a form of supplementary nutrition information that presents simplified, nutrition information on the front-of-pack of pre-



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*Refers to outcome of a clinical study published in Ind. J. Nutr. Dietet; (2008). Refer pack for more details. Growth and cognitive development are influenced by genetic, nutrition and environmental factors. Complan to be taken as a part of daily balanced diet.

Current Trends in FOPL

FOPL, is relatively a new phenomenon which offers limited experience from the last decade. Yet it is being proposed for a centre-stage intervention for food labelling regulations in packaged foods. FOPL vary from country to country. To be precise, the specific format and information provided on these labels vary region wise, depending on local regulations or industry adopted self-regulation. An overview of mandatory and voluntary FOPL systems is shown in Figure 1. Different types of FOPL formats that are prevalent, vary from Reductive, Hybrid and Evaluative FOP Labelling as shown in Figure 2. (Source: Hamlin, R.P.; McNeill, L.S.; Moore, V. The impact of front-of-pack nutrition labels on consumer product evaluation and choice)

refers to FOP label on the food product that provides factual information about some of the nutrients in the product without expressing any direction or opinion. These FOP labels are designed to provide essential nutritional information about the product to assist consumers make an informed choices about the foods in their diets. Guideline Dietary Allowances (GDA) Monochrome is an example of reductive FOP label. GDA Monochrome Labels provide reference values for each of the nutrients (such as Sugar, Salt, Sodium, Total Fat, Saturated Fat), based on dietary guidelines and recommendations for a typical adult's daily intake of calories and nutrients. It often includes a percentage of the daily recommended intake that the serving represents. For example, if a serving contains 30% of the recommended daily intake of saturated fat, it

would be listed as such.

Hybrid FOP Labelling

introduced in some countries is another set of labelling systems such as Traffic Light Labels in UK, Nutri-Score in France or other colour-coded front of pack labelling. In Hybrid FOP Labelling, the colour coded symbols are used in addition to factual information. It typically employs colour coding, each with a specific meaning in relation with how healthy a product is. E.g., green indicates that a certain criterion or performance level has been met or exceeded. It supposed to mean that the product is 'healthy' or specific nutrient of concern is within limits. Yellow or amber colour code signifies a cautionary or intermediate state, meaning consumers need to be careful in selecting the product while it is not necessarily a critical issue.

Reductive FOP label typically

Figure 1

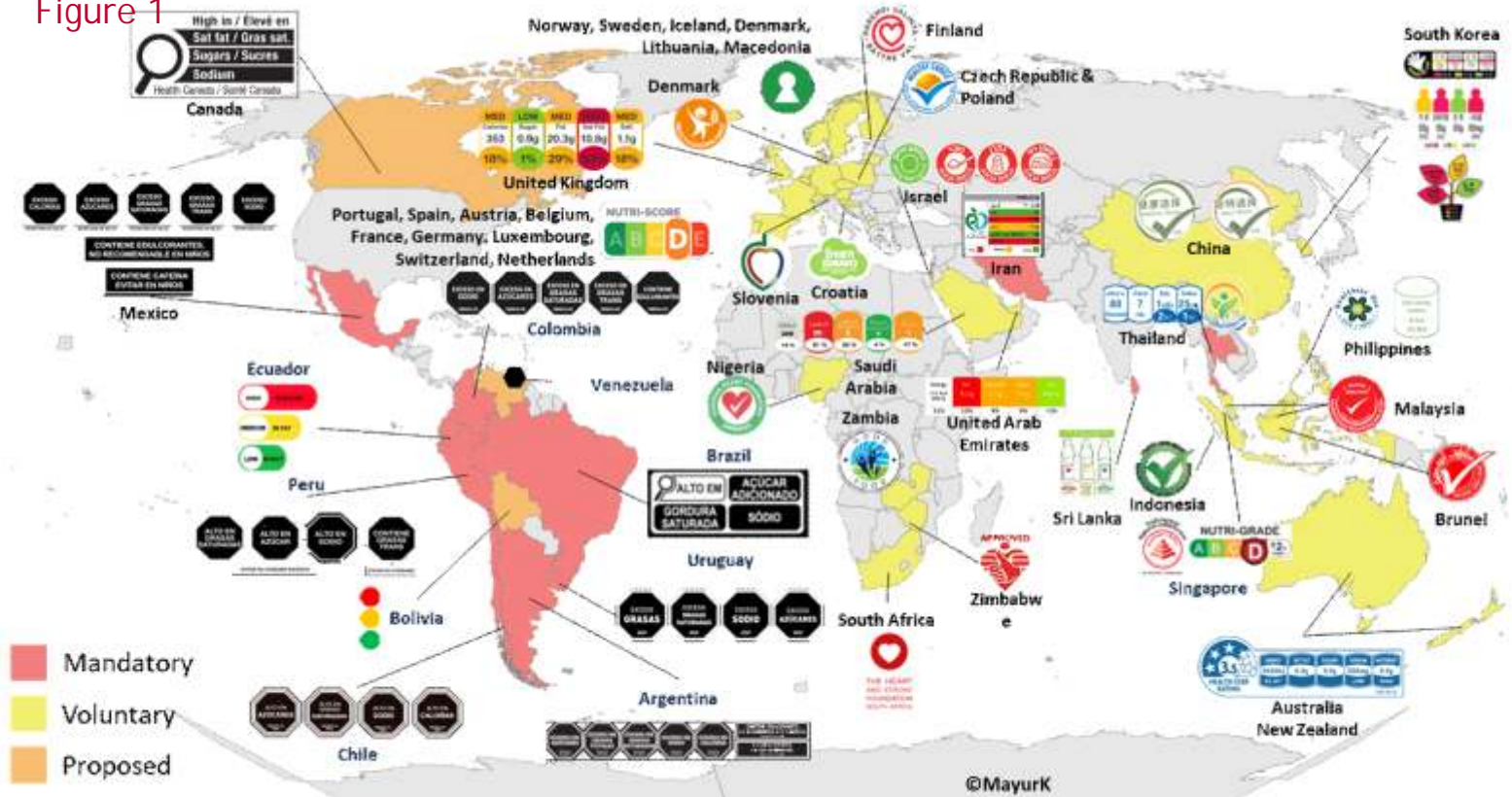
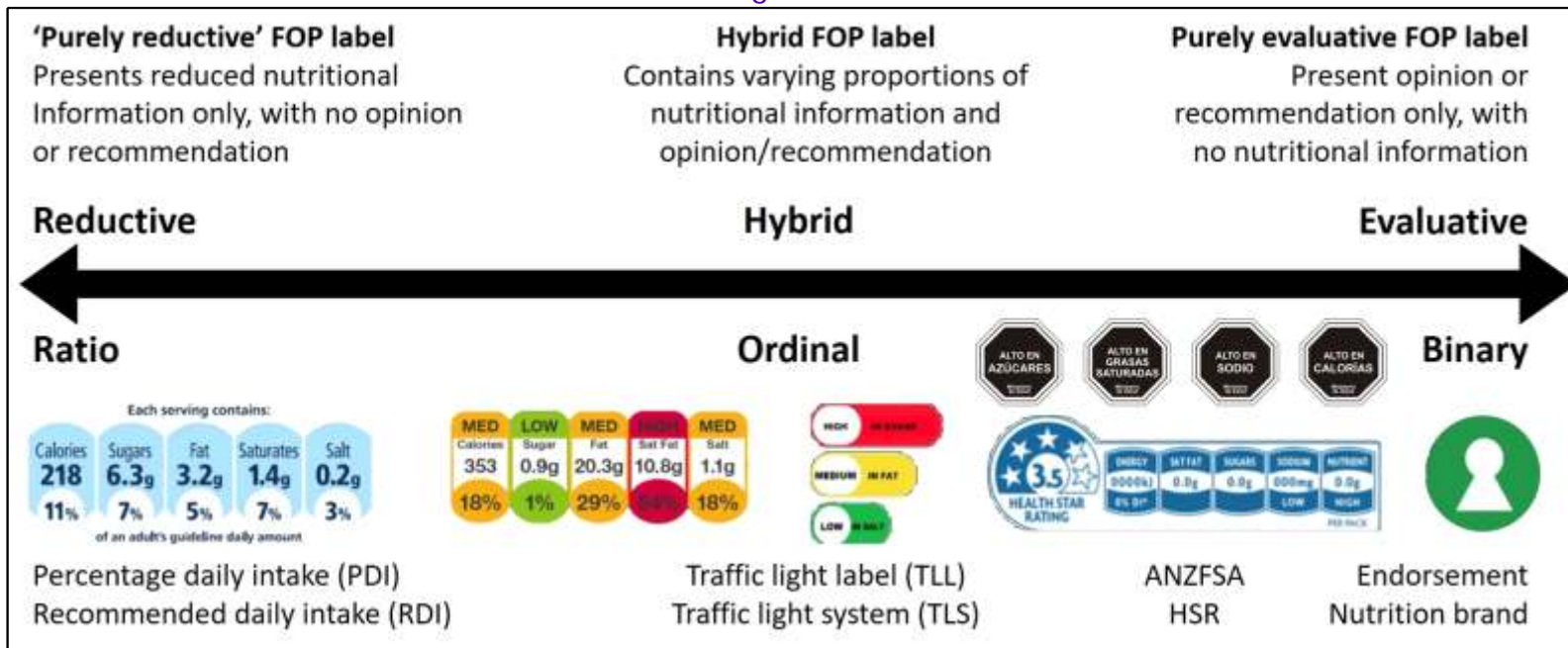


Figure 2⁷



From industry point of view, the product with amber needs to be reformulated. Red indicates that either significant change/ modification/reformulation is required, or threshold as directed by FOPL designer is not met. A product therefore gets termed as 'unhealthy' even when just one of nutrient indicators is marked Red. Nutri-Score introduced in France assigns a colour to each food product based on its overall nutritional quality. There are five colours in the scheme, ranging from dark green (A) to dark red (E), with shades of yellow and orange in between. Nutri-Score uses specific algorithm to calculate point score based on energy, saturated fat, sugars, sodium, fruits & vegetables, nuts, fibres

and proteins in the product. Nutri-Score approach leans towards evaluative (or directive) FOP labelling, in the sense that it is opaque to consumers who would want to know specific nutrient details in packaged food products they may be purchasing. Australia New Zealand's Health Star Rating (HSR) considers nutrients of concern as well as desirable nutritional components to calculate the final HSR score. It uses a star rating scale from 0.5 stars (least healthy) to 5 stars (most healthy), in half-star increments for display on front of pack.

Evaluative FOP label typically presents an opinion or directive assessment of product without providing

detailed factual information to the consumers. These labels are designed to convey subjective judgments or endorsements rather than objective nutritional data. The Warning STOP signs used in Latin America; Healthier Choice Symbol in Singapore are few instances of Evaluative FOP Labelling. Swedish Keyhole Symbol have been used in Norway, Denmark, Sweden also falls under this category but with a difference. Products that meet criteria set by Keyhole, are allowed to display the symbol prominently on their packaging. Products that display the Keyhole symbol are considered to be better choices within their respective product categories.



MAKE THE **RIGHT SHIFT** FOR A **BETTER** **GUT HEALTH** **POST 40:** NAVIGATE HEALTHY AGING



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A central hallmark of the aging process resides in the gradual deterioration of organ function. A quintessential illustration of this phenomenon is evident in the digestive system, where age-related changes can lead to decreased gastric motility, diminished secretion of digestive enzymes, and compromised absorption of essential nutrients, thereby affecting overall nutritional status and health in the elderly. As Hippocrates said: "All diseases begin in the gut".

These changes in gut have significant health implications, especially observed as gastrointestinal symptoms and nutritional deficiencies in older adults.

A large-scale multinational study based on internet surveys has shown that >40% of people worldwide suffer from gastrointestinal complications, and aging is linked to an increase in gastrointestinal problems in both men and women (1). Longitudinal Aging Study in India (LASI), a

population-based national survey, conducted during 2017-2018 with a representative sample of 72,250 individuals also stated that the overall prevalence of self-reported gastrointestinal problems was 18%, with significant variations among regions, concerns increased with increasing age. Adults from the age group 45-64 years had the higher prevalence of gastrointestinal problems compared with the <44 y age group. Middle age is often regarded as the tipping point as it represents a critical point after which the body starts showing tangible signs of dysregulation leading to the pathophysiology of aging.



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1.1: Human gut and the impact of aging

Human being is described as a superorganism, a complex interconnected system where a trillion of cells, along with an array of microbes, coexists in remarkable harmony. This intricate web of life within us forms a synergistic partnership, wherein gut microbes contribute to digestion, nutrient absorption, metabolism and even immunity. The balance and diversity of these gut microbes are critical factors in our overall health, underscoring the profound impact of the gut in sustaining overall health and wellness.

The complex community of microbes in our gastrointestinal tract stays in a dynamic state of continuous evolution. It continues to develop along with the body from birth, throughout our lifetime till we age. At birth, our gut is relatively sterile, however, it gets colonized with various microorganisms, influenced by factors like mode of delivery and early exposures including breast milk or formula feeding, exposure to antibiotics etc. During infancy and childhood, this microbial community matures and diversifies, influenced by diet, environment and genetics. The composition of gut microflora

plays a crucial role in shaping physical growth and development of an immune system to protect against harmful pathogens. Gut microflora interacts with human systems via range of metabolites that it produces like vitamins polyamines and short chain fatty acids (SCFA). SCFAs like butyrate and acetate are involved in a variety of processes, such as providing energy for microbes and colonocytes, controlling nutrient uptake, combating pathogens, development of immunity and regulating metabolism.

As we age, the gut microflora also undergoes a change. Overall gut microbiota richness decreases, with emergence of microbial taxa associated with unhealthy aging. These changes are driven by age related alterations in gut physiology as well as factors like diet, medication etc. The aging gut exhibit decreased resilience, making it susceptible to disruption by factors like antibiotics or dietary changes.

plays a crucial role in shaping physical growth and development of an immune system to protect against harmful pathogens. Gut microflora interacts with



Lifestyle has also been shown to strongly influence the structure and function of gut microbiota.

1.2: The critical link to overall wellness

A few cohort studies have been conducted by scientist to understand the role of gut microbiota in aging. ELDERMET study on a cohort of 500 people in Ireland has uncovered frailty-microbiome association. Other workers have demonstrated association of microbiome alterations with reduced physical activity, cardio-metabolic disorders, cognitive decline, reduced bone mass density, obesity and metabolic syndrome, disorders associated with an unhealthy aging trajectory.

This link is primarily attributed to a shift in bacterial balance, that involves loss of commensals (like *Akkermansia* and *Bifidobacteria*) and a gain of pathobionts (such as *Eggerthella* and *Clostridium* species). A shift in microbial community structure is associated with broad range of health consequences driven by a low grade of systemic inflammation (termed "inflammaging").



Decline in species like *A.muciniphila*, is associated with a decrease in the production of SCFAs, triggering a chain of inflammatory events, such as impairment of intestinal barrier integrity and increased gut leakiness, and subsequent inflammaging leading to aging-associated dysfunction.

The intestinal barrier forms a physical barrier against harmful substances entering the body while ensuring nutrient absorption. Thus, the malfunctioning intestinal epithelial barrier (leaky gut) contributes to pathogenesis by increasing pathogen penetration.

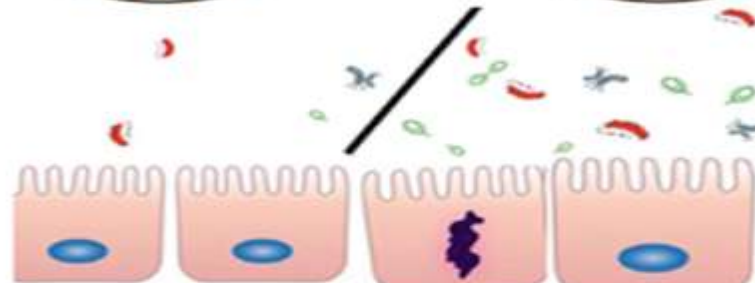
This further leads to gastrointestinal disturbances, allergic responses and compromising host nutrition; eventually causing malnutrition. In addition to this compromised barrier has been associated with changes like systemic inflammation, metabolic defects and behavioural decline. Age related dysbiosis is attributed as one of the major causes for compromised barrier.

Other exogenous factors such as unhealthy diet, chronic stress and certain medications also have detrimental effect on gut barrier function. Factors such as physical or psychological stresses are proven to impact intestinal barrier function via brain-gut axis. Stress-mediated release of peripheral corticotropic-releasing factor plays a key role in the regulation of gastrointestinal permeability by regulating mast cell

Fig. 1: Age-related changes in the intestinal tract lead to low-grade chronic inflammation, with increased gut permeability



Age related dysbiosis



Compromised gut barrier

Low grade systemic inflammation

function and tight junction proteins.

This in turn leads to immune dysfunction leading to inflammaging. In various studies, researchers have documented the role of intestinal barrier dysfunction in driving age related

pathologies across multiple species like flies, nematodes, vertebrates and primates like humans.

Hence, intestinal barrier dysfunction is considered one of the evolutionarily conserved hallmarks of aging.



1.3 Gender specific needs

It is often observed that though women have longer lifespans than men, they experience a higher prevalence of late-life morbidities.

More precisely, it is the climacteric period when most women seek interventions for gastrointestinal symptoms including abdominal pain/discomfort, intestinal gas, and alternations in bowel function such as diarrhoea and constipation. An interplay between age and sex hormones contributes to dysbiosis and gastrointestinal symptomology in mid-age women. These changes are attributed to IBS (irritable bowel syndrome) symptoms because of intestinal dysmotility, visceral hypersensitivity, intestinal barrier dysfunction and mucosal immune activation. A longitudinal Study of Women's Health Across the Nation (SWAN) demonstrated that there is an increase in gut permeability as women progress from premenopause to postmenopause. This might play a crucial role in driving systematic inflammation and pathologies associated with age.

Hence, it becomes essential to approach menopause-related dysbiosis at the right stage using tailor-made interventions designed for women.

1.4: Relevance of the tipping point:

Middle age is considered as a critical tipping point when there is a drastic change in

gastrointestinal health mostly attributed to a shift in dietary and lifestyle habits. It is observed that beyond middle age gastrointestinal microbiota diversity and compositions starts changing more drastically. Essentially, when the stability is lost and age-related dysbiosis begins, there is a change in physiology in terms of loss of functions, often implied as biological age (i.e., physiological age). Reduction in counts of Bifidobacterium is identified as one of the features of midlife microbiota, which results in a reduction in saccharolytic capacity leading to a significant decline of SCFA (acetate) production which seems to be associated with the diseases prevalent in midlife (2). This shift is also sometimes referred to as mid-life microbiota crises. Various course correction interventions, in terms of diets tested at this stage, in different animal models demonstrated positive outcomes compared to intervention at later stage of life. For instance, when inulin-containing diet was tested in middle-aged

and old mice for the ability to restore microbiome, SCFA production, and the subsequent metabolic response, middle-aged mice demonstrated greater improvement as compared to older mice.

Therefore, attempts are being made to attenuate age related physiological changes and improving quality of life in later life by targeting the gut microbiome in middle age, emphasizing the need for early intervention and preventive measures.

1.5: Interventions being explored

Microbiota is considered as a critical controller of age-related functional alterations, hence multiple approaches are being explored to re-establish microbial balance in the gut. Two critical variable factors are being targeted to achieve the desired shift: diet and lifestyle factors

Dietary factors: Directly targeting gut microbiota via probiotics, prebiotic or synbiotic interventions is one of the most evaluated approaches to combat age-related dysbiosis. Multiple meta-analysis of intervention studies suggests that probiotics and prebiotics can bring a positive change in microbiota, along with improvement of symptoms like constipation(10-40 % improvement) and improvement of cellular immune function in subjects(3).





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In addition, natural ingredients like polyphenols are also emerging as novel candidates to modify microbial structure and metabolism. Polyphenols are a large and diverse group of natural compounds occurring in plants that are associated with anti-oxidant properties. Intervention with polyphenol rich diet has been associated with an increased level of serum indole 3-propionic acid (IPA) in older adults. IPA is a well-known anti-inflammatory and antioxidant compound which has also been proposed as a marker of increased biodiversity of the intestinal microbiota.



Specialised diets such as the Mediterranean diet are also linked to diet-modulated microbiome change, associated with an increase in short/branch chained fatty acid production and negatively associated with inflammatory markers including C-reactive protein. Many cohort studies

have suggested that the Mediterranean Diet (MD) characterized by a high intake of fruits, vegetables, whole grains, olive oil, potatoes, beans, nuts, is associated with a range of health benefits, including a reduction in risk of chronic age-related diseases and increased longevity.

Indian thali diet has also been proposed as one of the approaches to promote a healthy and diverse gut microbiota, reduce intestinal and systemic inflammation, and decrease the risk of chronic diseases. A Thali (Indian diet) comprising diverse phytonutrients from vegetables and spices, along with probiotics, and prebiotics from fermented foods, dals, might promote diversity in the gut by providing anti-inflammatory/ antioxidant activities.

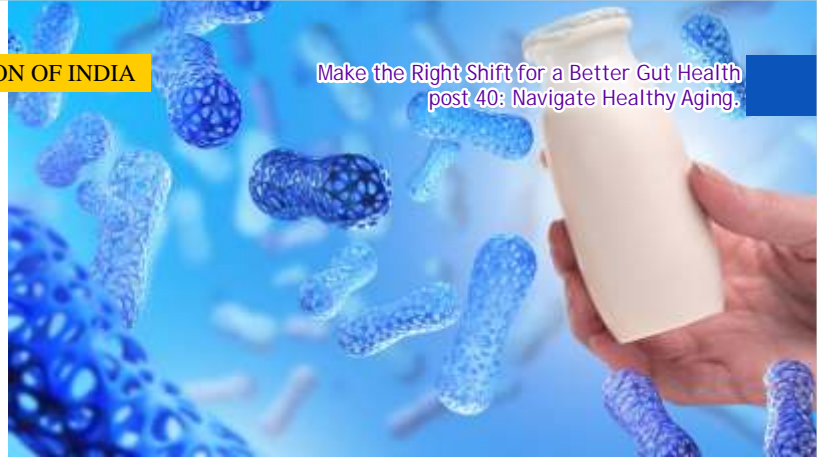
Millets have been traditionally used in China for treating gastrointestinal ailments. In addition to being nutritionally wholesome, millets have also been shown to increase levels of *Bifidobacterium* and *Lactobacillus* and decrease levels of *Escherichia coli*, *Enterococcus*, and *Bacteroides* in gut. This was also associated with an improvement in intestinal motility making them an excellent option for the seniors.

Lifestyle: In addition to diet, lifestyle factors such as infections, level of physical activity, stress

and sleep patterns can significantly influence the composition and function of gut microbiome. Regular exercise and quality sleep promote healthier gut microbiota. Lifestyle, which includes physical activity and social engagement has been shown to play an important role in maintaining overall health. Conversely, chronic stress and inadequate sleep can disrupt the gut-brain axis, potentially exacerbating age-related gut issues. Therefore, adopting a proactive approach to lifestyle choices along with diet can help maintain gut health as we age by mechanism like management of dysbiosis and preserving the intestinal tract's epithelial integrity.

Advancement of science and technology has undeniably improved life expectancy by enabling better healthcare, however has also led to new challenges including the burden of chronic ailments. As people live longer, they are more susceptible to age-related and lifestyle-related diseases. As per an estimate, in 2020, for the first time in history, people aged 60 years or over outnumbered children under 5 years. By 2050, there will be more than twice as many people above 60 as children under 5.





Hence, global scientific efforts are being undertaken to improve the quality of life and health of aging population. UN Decade of Healthy Ageing program represents significant global initiatives aiming at addressing unique challenges and opportunities associated with the growing elderly population. Plan of action comprehends harnessing wisdom and experience to ensure not only longer but also healthier lives.

Leveraging the wealth of knowledge about gut microbiota and its functional capabilities can be instrumental in promoting healthy aging in multiple ways. It can either be via probiotic or prebiotic prophylactic intervention, through specially designed diets, or via developing personalised interventions to manage age related dysbiosis in gut. Early detection of signatures of microbiome can enable proactive interventions and by promoting health we might be able to add a few more years to the life. In short, as our understanding of gut microbiome continues to expand, researchers and professionals are actively

engaged in understanding underlying mechanisms and designing innovative approaches to diagnose, monitor and promote various aspects of healthy aging. This burgeoning field explores the intricate relationship between gut bacteria and age-related health outcomes.

Hence, the importance of maintaining gut health in the aging population cannot be overstated. By making dietary modifications, fermented foods, probiotics, fibers, prebiotics, and leading healthy lifestyles, regular exercise, good night sleep and reduced stress, older adults can improve their overall health and well-being and reduce the risk of gastrointestinal complications. Having a healthy and strong gut allows for proper nutrient absorption, enhanced immunity, and reduced likelihood of digestive disorders.

Let health begin with the gut!!

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THE CHALLENGE OF MAKING A LABEL CLAIM



AUTHORS

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PFNDAI

All manufacturers of packaged foods have opportunities to make a claim on the specific benefits of their product. These could be based on the nature of the ingredients in the product, or a unique way of processing or based on scientific evidence already available, some of them being a part of traditional knowledge or based on a research study done using the product itself. Label claims are the only way a manufacturer directly communicates with the consumer. Since the consumer is the ultimate beneficiary of the product, claims need to be truthful, scientifically valid and verifiable and simple to be understood easily. Claims also need to comply with regulations to avoid any legal problems. It is evident that a claim should be sound enough to withstand several challenges not only from

consumers and regulators but also from competitors.

There are several ways in which label claims could be made.

- Ingredient/s the product may contain- e.g., Immune nutrients
- An ingredient quantity-based claim- Rich in or Good Source
- Substance disease relationship- Diabetes friendly
- A Novel Process based claim- Nano particulate curcumin.
- A traditional evidence-based claim- Chyavanprash Improves immunity
- A product claim- X reduces cognitive decline.

If it were to be an Ingredient/s the product may contain-

- Mention clearly that product X has Y benefits due to scientifically proven Z ingredients it contains.
- Provide access to the published scientific literature or give reference.
- The level or quantities at which the ingredients were

proven to give the said benefit should be present in the product in a serve or a total of daily recommended serves.

While making a quantitative claim e.g., Rich or Good Source of a particular nutrient it would be good to follow the FSSAI guidelines.

A substance disease relationship in a claim is usually a risk reduction claim. In this case the following should be available for substantiation

- Could be based on proven ingredients/ product claim. E.g., Oryzanol known to lower cholesterol and reduce risk of heart disease.
- FSSAI regulations on risk reduction claims
- If product claim - substantiation through product based human intervention studies.

If it is a Novel Process based claim- e.g., Nano particulate curcumin

- Generally, an ingredient process - substantiate with published evidence.

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substance/disease relationship can be drawn

- Rate the remaining studies for methodological quality and evaluate the strength of the totality of

the selection of claim statement may be useful.

Regulators permit structure/function claims for nutrient or ingredient such as “supports joint function” for which no clinical trial may be needed. However, a more specific claim like “reduces discomfort within few days” or “increases stamina by 20%” for a product may require a study, which will give an advantage to the product.

- If product is made with a unique or novel process, then product-based evidence is required through established patents or research studies. A traditional evidence-based claim- e.g., Chyavanaprash Improves immunity
- Method of preparation and composition should be according to acceptable traditional publications.
- If different or a product specific claim - substantiate with data from respective research studies.

scientific evidence

- Considering study types, methodological quality, quantity of evidence for and against the claim (taking into account the numbers of various types of studies and study sample sizes)
- Relevance to the population or target subgroup
- Replication of study results supporting the proposed claim, and overall consistency of the evidence.

FSSAI may soon be providing similar guidelines for Indian Food Business Operators

The research partner, such as a practicing doctor, an academic institution or a professional contract research organisation will affect costs, timeline as well as results, so a careful selection is essential. If the researcher understands regulatory provisions, then planning the study and choosing proper claim statements is easier. There are advantages of each of these considering their experience and expertise as well as standing in the field. While designing the study, inclusion and exclusion criteria such as age, gender, medical conditions etc., are important in selecting subjects.

Product claim

What needs to be done to establish or defend such a claim?

The claimant or the advertiser should have sufficient evidence of the product having the said benefit. **USFDA** has the following requirements or processes for approval

- A systematic science-based evaluation of the strength of the evidence to support a statement
 - Evaluates the strength of the scientific evidence to support a proposed claim about a substance/disease relationship
- With the following steps
- Steps to assess scientific studies and other data
 - Eliminate those from which no conclusions about the

The figure below shows the different levels of evidence as used in pharmacological evidence generation but also applies to product claims to a great extent.

Usefulness of Clinical Trials

Many companies prefer to conduct clinical trials through contract research organisations not just because of regulatory requirements but also since consumers nowadays like to see on label what the product can do for them. The strongest proof comes from studies conducted on human. For this a proper research partner as well as proper study subjects and place along with

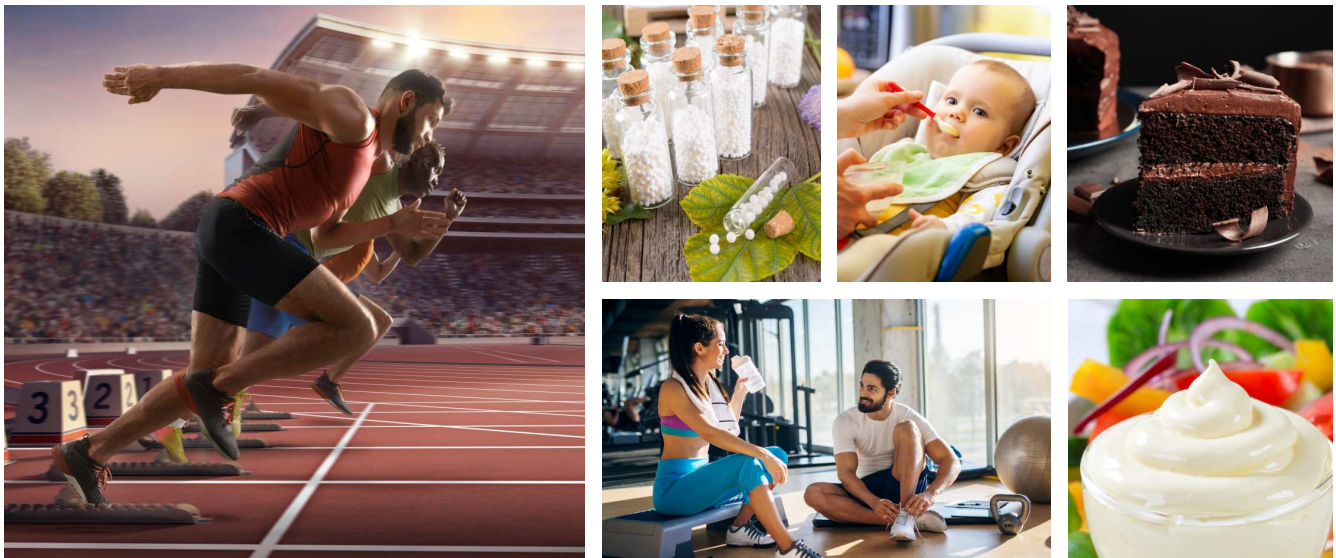


Location also becomes an important consideration as different populations not just have genetic variations but also there are other factors like diet and lifestyle that may affect the overall health.



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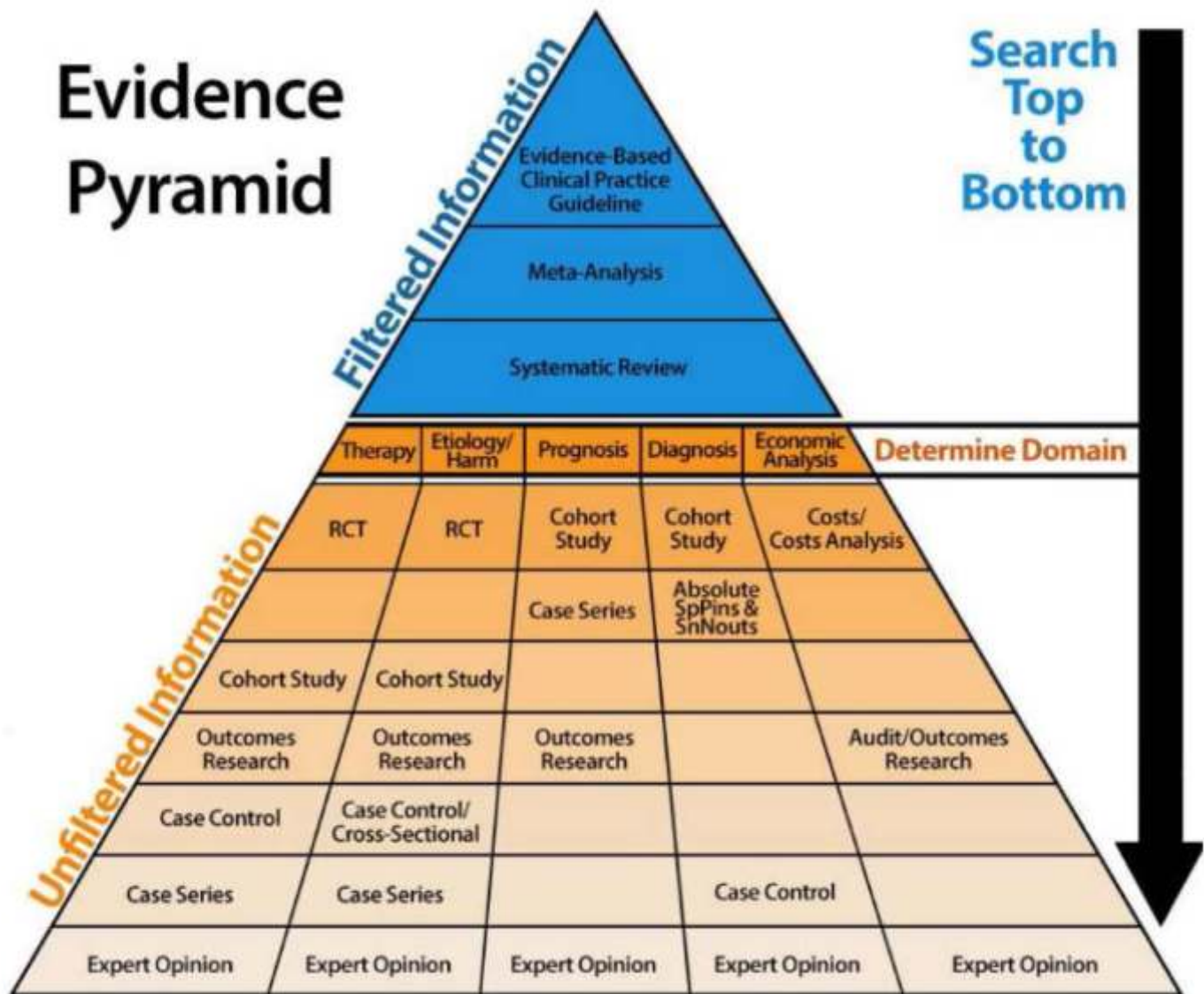
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Evidence Pyramid

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Guiding principles for a sustainable claim.

- Be Truthful, Ethical and Non-Misleading
- Do not claim ingredient evidence of benefit as product substantiation
- Follow all regulations to the word, not by interpretation of convenience
- Data interpretation based on good statistics.
- Study to be based on a clear

hypothesis and primary objective

- Minor secondary objectives may not be used for claims since sample size was powered based on primary objectives.
- Adequate sample size, and appropriate controls
- Randomize/ blinding to remove bias

Finally, a word of caution

- Do not claim superiority over natural food or claim

equivalence based on one or two ingredients.

- E.g., More calcium than a glass of milk
- Natural foods have many more bio active substances.
- However, it is still possible if a well-designed human study shows an advantage.

In conclusion it may be summarised that claims with sufficient substantive evidence will stand the test of time



CIRCADIAN RHYTHM



AUTHOR

Ms. Simran Vichare,
Nutritionist, PFNDAI



Nature is a rhythmic place. Life on Earth evolved by adapting to daily fluctuations in light - day and night. Organisms evolved to thrive in their niche environment, using resources that were available. The universe as a whole maintains harmony and balance through a rhythm that encompasses everything in it, including us. As there are specific cycles for seasons, earth's and other planet's motions, moon phases, etc. similarly our body is dependent on our internal clock known as the 'Circadian rhythm'.

What Is Circadian Rhythm?

Circadian is derived from the Latin phrase "circa diem," which means "around a day."

Similar to animals, humans must adhere to a biorhythm known as the 'Circadian rhythm.' The most important biorhythm in all living things, the circadian rhythm sets the pace for biological activities to occur at regular intervals. It refers to changes in the body, brain, and behaviour that occur on a 24-hour cycle.

Your body has many circadian rhythms that are all synchronized with an internal clock in the brain because various bodily systems follow various circadian rhythms. To be specific, the suprachiasmatic nucleus (SCN), a brain region in the hypothalamus, maintains an internal clock that regulates circadian rhythms throughout the body.

Out of all the factors light has a significant impact on the SCN, other elements such as

temperature, colours, meals consumed, social interaction, and exercise can also have an impact on the SCN, which in turn impacts the circadian rhythms.

The cycle between sleep and awake is one of the most well-known circadian patterns. The fluctuations in your body temperature during a 24-hour cycle are another pattern.

Additionally, circadian rhythms help our body produce specific hormones, control our metabolism, and ensure that some biological processes run smoothly. They also allow the brain to receive signals based on the surroundings.

For instance, circadian rhythm makes sure that your body creates digestive juices at the same time each day while you eat your meals.



What Causes Disruption of Circadian Rhythm?

Multiple factors can cause circadian rhythm disruption, ranging from internal alterations at the molecular, cellular, tissue, or system level to misalignment between various organizational levels and/or behavioural and environmental cycles. Circadian rhythms can be persistently disturbed by a single or a series of events.

The following are some of the common causes of disturbance: -

- Age: Most people find that as they age, falling asleep becomes more difficult. They awaken early in the morning and more frequently during the night. Because of this, the sleep-wake-up cycle gets disturbed.
- Stress: Short-term and long-term stress are both detrimental to our health. Research shows that most individuals irrespective of the age group, undergo stressful situations on a daily basis. People today experience stress in every part of their lives pertaining to education, career, finance, social relationships, etc. All of this leads to rising stress levels and

an erratic lifestyle, which causes the early onset of diseases like CVD and Type 2 Diabetes.

- Excessive caffeine consumption: The most extensively used psychoactive substance in the world is caffeine,

which is the principal ingredient in beverages including coffee, tea, energy drinks, chocolate, etc. Consuming excessive caffeine on a daily basis can reduce the quality of sleep and also affect the sleeping hours of an individual. Additionally, it can also lead to less deep, slow-wave sleep, which is essential for waking up feeling refreshed.

- Excessive use of drugs, alcohol, nicotine, and other harmful substances.
- Eating patterns are haywire, with no specific timings.
- Inadequate exposure to natural light during the day.
- Unhealthy lifestyle choices, like routinely exposing oneself to artificial light especially blue light at night, and staying up late will cause disruption of the cycle.
- Night shifts or frequent changes in shift timings lead to no specific sleeping schedule.
- Frequent air traveling which causes Jet Lag
- Other medical conditions like blindness or brain damage due to stroke, dementia, head injuries, and intellectual disabilities.

Effects When the Circadian Rhythm Is Disrupted:

When the Circadian Rhythm is disturbed, the body's ideal functioning is also disturbed. This can hamper the normal functioning of various systems in the body. For example: An irregular sleep-wake pattern can lead to poor sleep quality and disrupt the sleep schedule making it difficult to sleep and wake on time which directly leads to low energy levels and daytime sluggishness during the day.

Continuous repetitive patterns can even lead to Obstructive sleep apnoea (OSA) which is a sleep disorder and may lead to other chronic health conditions like obesity, diabetes, mental health disorders, etc.

Symptoms When the Circadian Rhythm Is Disrupted:

- Sleep-related disorders like Parasomnias, Insomnia, etc
- Excessive daytime sluggishness and sleepiness
- Reduced quantity and quality of sleep
- Mental health issues like anxiety, and depression can set in.
- Stress in maintaining relationships and inability to meet social obligations



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- Poor concentration leads to low-performance outcomes ultimately hampering one's productivity.
- Memory retention is reduced and decision-making capacity is decreased.
- It can also affect the gut by impairing digestion.
- Hormonal imbalance leading to another set of health conditions.

How To Maintain a Proper Circadian Rhythm to Promote Health?

Nutrition and Circadian Rhythm:

Our circadian rhythm and biological processes like metabolism are tightly related. Our metabolism changes throughout the day because of our circadian rhythm. We feel alert and energized in the morning because insulin sensitivity rises and melatonin falls in reaction to food and daylight. The body gets ready for sleep and cell repair in the evening as melatonin levels rise and insulin sensitivity falls.

Findings of various studies have shown a wide range of effects of food composition on circadian rhythms, including behavioural and gene expression patterns. High-fat diets (HFDs) have a particularly

negative impact on the organization of the circadian clock. For instance, the daily physiology of the human being consists of an active phase, which begins at 10 a.m., and a

resting phase, which starts at 10 p.m. So having an HFD towards the end of an active phase has more possibility to cause adiposity, and increase insulin and leptin as compared to having an HFD at the start of the active phase. Additionally, some dietary nutrients like Palmitate, the most common saturated fatty acid in animals, and docosahexaenoic acid (DHA), a polyunsaturated fatty acid present in fish and algae, significantly impact core clock genes of the hypothalamus cell line. Basically, higher protein and lower carbohydrate diets enhance the rhythmic expression of several clock genes.

A number of emerging tactics based on the modification of the gut microbiome might partially strengthen host circadian rhythms since nutrients and bioactive substances in food can alter the composition and functions of the gut microbiome.

Specifically, plant-food-based fibre and polyphenols can produce bioactive SCFAs, vitamins, and amines, which in turn may help resynchronize circadian cycles, alleviating some of the metabolic changes linked to modern living.

Several non-essential food substances have also been repeatedly demonstrated to have an impact on the circadian rhythm. The biochemical, endocrine, and behavioural circadian rhythms of humans appear to be notably disturbed by alcohol consumption in many societies. Coming to caffeine is the most often used psychoactive substance in the world, which affects circadian rhythm especially if taken in the evening/night.

How To Do Time-Restricted Eating?

Talking about the timing of our meals, it should be coordinated with our circadian cycle, in order to maximize weight reduction, increase endurance, lower blood pressure, lessen your risk of type 2 diabetes, and other benefits. Feeding, at inappropriate times, disturbs circadian system organization and consequently contributes to negative metabolic effects and the development of chronic disease. For instance, eating late can cause circadian clocks to become out of sync and affect hormone secretion since food is the primary synchronizer of the peripheral clocks in the liver, pancreas, and gastrointestinal system, which cannot perceive light as a synchronization stimulus.



To overcome this: Try to consume your meals consistently throughout the day, especially breakfast. Our body considers the time we eat breakfast as a cue to start our digestive system for the day and ensures smooth digestion throughout the day. Make sure you are having 3 main meals and 2 snacks throughout the day at regular times. Each meal should contain high-quality protein (chicken, meat, fish, eggs, dairy products, nuts), complex carbohydrates, healthy fats, fibre in the form of cooked or raw vegetables, and essential micronutrients. Incorporating probiotics like curd, yogurt, and buttermilk can also be beneficial. According to some studies, the essential amino acid tryptophan, which is present in milk and other foods high in protein, may have a soothing and calming effect. Therefore, drinking a glass of warm milk as you prepare for bed may improve your sleep thus improving your circadian rhythm.

Other useful considerations to do: By developing a daily schedule that includes a set of activities for the day and a different set for the night one can try to regulate the cycle. The signs of circadian rhythm problems may be controlled in this way:

- **Maintaining sleep schedule:** Many people are able to remain awake until late and

then sleep till late as a result. You'll sleep better if you wake up and go to bed at the same time every day to maintain a scheduled pattern. Plus, your body receives all the rest and recovery that is needed.

- **Body movement:** Avoid being sedentary for extended periods of time. Establishing a regular exercise schedule, avoiding strenuous activity an hour or more before bedtime



- **Exposure to natural light:** Upon waking up, especially in the first hour, make sure you receive some sunlight. Your circadian cycle is paced by this, which increases alertness while also assisting in fine-tuning your internal clock. Reduce indoor lighting and stay away from bright TVs, computers, laptops, and mobile screens in the evening and at night to further reduce your exposure to artificial light.

- **Medications:** There are certain sleep-promoting and



wake-promoting medicines available in the market that help align your cycle. However, these medications have side effects and complications and therefore can be taken only after a proper diagnosis and recommendation from a physician.

To sum it up in line, your Circadian rhythm can be maintained by leading a healthy, active lifestyle and following regular habits, which will improve your overall health

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REPORT ON WEBINAR ON UNDERSTANDING HEART HEALTH



AUTHOR
Ms Anuja Padte,
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Protein Foods & Nutrition Development Association of India organized a webinar in collaboration with Marico to promote understanding of heart health as part of Marico's Heart Health Campaign for World Heart Day on September 29th, 2023.

Dr Shashank Bhalkar, Executive Director, PFNDAI gave a welcome address emphasizing that the heart is a vital organ that circulates blood to all parts of the body, thereby supplying oxygen and nutrients to our organs. Therefore, maintaining a healthy heart is of utmost importance. Urbanization and



industrialization led to lifestyle changes that caused a shift from physically demanding activities to less demanding ones, causing people to consume more unhealthy snacks. As a result, lifestyle ailments such as cardiovascular diseases, diabetes, and strokes increased. Cardiovascular disease is the leading cause of death globally, claiming over 20 million lives each year. Modifying sedentary lifestyles is essential to prevent it. Engaging in physical activities such as brisk walking, running, or cycling is vital. Mental stress and long working hours increase the risk of heart attack. Maintaining good heart health is primarily dependent on following a healthy diet. This can be achieved by consuming more fruits and vegetables that are rich in soluble fibre and micronutrients, while also reducing the intake of high-

calorie dense foods such as meat, cheese, or snack foods. Choosing foods that are rich in healthy fats, including MUFA, PUFA, and Omega 3 fatty acids, is also essential. Today's webinar will cover all these aspects of maintaining heart health. He mentioned that We are celebrating "World Heart Day" with this informative webinar, which is graced by several eminent speakers and panelists from the fields of Medicine, Science, Nutrition, and Dietetics and we are confident that will gain valuable information and knowledge on this vital subject during the webinar.

Ms Dolly Soni, Manager Marketing & Projects welcomed all the Speakers and Panelist for the session and gave a brief introduction.



To Yolk or Not to Yolk ?

The American Heart Association recommends aiming for a dietary pattern that achieves 5% to 6% of calories from saturated fat.

PCMR guidelines for type 2 diabetes mellitus 2019
Saturated fat (SFA) \leq 10% energy and 7% in those with raised blood lipid levels.

ISSM clinical practice recommendations for the management of type 2 diabetes mellitus 2019
Saturated fat (SFA) 27% energy
Cholesterol: 300 mg

According to ICMR 2017
1 Egg (70g weight) = 212 mg cholesterol
1.5g saturated fat

For example,
If you are consuming 1500 kcal per day, 6-7 % of 1500 kcal = 90-105 kcal = 10-11.6 g of saturated fat.
So saturated fat intake should be \leq 10-11.6 g per day if calories consumed is 1500 kcal.

Sheryl Salis, RD, CDE, NDMA, CPT, CDESS
Nurture Health Solutions

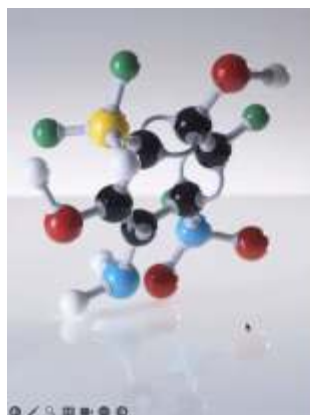
Ms Sheryl Salis

Ms Sheryl Salis, Founder & Director, Nurture Health Solutions gave a talk on “Mindful Eating for a Healthy Heart”. In her presentation she spoke about cardiovascular diseases that are the leading cause of death globally, affecting Indians a decade earlier than the Western population. The diet plays a crucial role in cardiovascular diseases, with a higher consumption of fruits, vegetables, nuts, legumes, and low-fat dairy associated with lower risk, while high consumption of processed meat, red meat, and sugary drinks increases the risk. In India, the consumption of cereals is high, while pulses and protein intake are low. It is recommended to have a balanced diet with proper nutrient balance, including fats, proteins, and carbohydrates. Carbohydrates also play a significant role in heart health, and it is recommended to consume more fibre for the prevention of diseases like diabetes and heart disease. Barley and oats are beneficial for heart health due to their fibre content. Protein, especially from soybeans, has cardio-protective effects. Fats are essential for the body, and replacing

saturated fats with monounsaturated and polyunsaturated fats is beneficial for heart health. A Mediterranean-style eating pattern is recommended, which includes primarily plant-based foods, fish, and moderate red wine consumption. Nuts and seeds, rich in nutrients and antioxidants, also have positive effects on cardiac health. Phytochemicals found in fruits, vegetables, and whole grains act as antioxidants and reduce the risk of cardiovascular diseases. Folic acid and B vitamins help break down homocysteine, which is related to a higher risk of heart disease. Mindful eating is encouraged to promote healthy eating habits.

Dr Sesikeran B., Chairman of the Scientific Advisory Committee, Honorary Scientific Director of PFNDAI, and former Director of NIN (ICMR), spoke about the role of dietary fat in heart health. He highlighted the importance of

fat in our diets, the different types of fat and their sources, and the impact of cholesterol and triglycerides on heart health. The talk emphasized the need for fat as an essential macronutrient and its various functions in the body. It also provided information on food sources of fat, including visible and invisible fats, and the qualitative differences based on fatty acids. The relationship between dietary cholesterol intake and blood cholesterol levels, as well as the impact of triglycerides on heart health, were discussed. The presentation also included the current recommendations for fat intake in different age groups and physical activity levels. It explored the evidence on the relationship between dietary fat and cardiovascular disease, including the effect of total fat consumption, dairy foods, saturated fat, and medium-chain saturated fatty acids. Additionally, it addressed the importance of maintaining a balanced ratio of omega-6 to omega-3 fatty acids in Indian diets and the need to reduce trans fats. Finally, Dr Sesikeran discussed the pathways of dietary fat to heart health, including the role of inflammation and dyslipidemia in the development of cardiovascular disease.



Need for Fat

- Essential Macronutrient
- Contributes 1/5 to 1/3 of energy intake
- Required for absorption of fat-soluble molecules and micronutrients
- Building blocks of brain and nervous system
- Second messengers

Dr Sesikeran B.



Dr. Agatha Betsy, Manager-Nutrition Marico Limited spoke on the Marico's Campaign on Heart Health. She spoke on Marico's Campaign on Heart Health, which is an initiative aimed at inspiring young Indians to prioritize their health and make positive lifestyle changes. Dr. Agatha highlighted the growing prevalence of non-communicable diseases (NCDs) in India, such as obesity, heart disease, and diabetes, due to unhealthy habits and sedentary lifestyles. The campaign involves 40 young achievers taking daily healthy steps for 8 weeks to improve their lifestyle scores and

create awareness about the cumulative effects of unhealthy habits. During her presentation, she shared the results of a survey on lifestyle habits in India. The survey revealed that many people have low consumption of whole grains and fruits, lack of exercise, job-related stress, sleep issues, high blood pressure, and high blood sugar. These lifestyle habits contribute to the worsening health situation in India and highlight the need for individuals to adopt healthier alternatives and make positive lifestyle changes. The World Heart Day 2023 campaign by Saffola and TOI focuses on creating awareness about the

importance of a healthy lifestyle and making small, positive changes to improve overall health. After all the presentations there were few questions from the audience which were answered by the respective speakers.



There was a panel discussion which was Moderated by Dr Shashank Bhalkar, Executive Director, PFNDAI. The Panelists for the session included Dr. Zubeda Tumbi, Clinical Dietitian, Founder at Health Watch Nutrition Clinic, Mrs. Varsha Gorey, Senior Clinical Dietician, Apollo Hospitals, Ms. Sheela Krishnaswamy, Nutrition & Wellness Consultant, Ms. Sheryl Salis, Founder & Director, Nurture Health Solutions.

Panel Discussion





During the panel discussion, the moderator asked each panellist a few questions about Heart Health. The questions were related to the relationship between stress, mental health, and heart health, and whether there are specific nutrients or dietary patterns that can support

overall emotional well-being. They also discussed the potential benefits and drawbacks of popular diets such as the ketogenic diet or the plant-based diet for heart health, and what individuals should consider when choosing a diet plan.

The panellists also discussed how healthcare providers and dietitians can collaborate to educate and support patients in making sustainable dietary changes for heart health. Finally, they compared the Mediterranean diet to other

dietary patterns in terms of its impact on heart health and discussed the key components of this diet.



The webinar ended with Ms. Dolly Soni, Manager of Marketing & Projects at PFNDAI, thanking the speakers, panelists, and attendees.

Panel Discussion



REGULATORY ROUND UP



AUTHOR
Dr Shashank Bhalkar,
 Executive Director, PFNDAI
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Dear Readers,

The advisory about inclusion of QR codes on Food products to provide accessibility to visibly impaired persons is the welcome step. Order for food exporters will help ease of doing business to encourage exports.

[Inclusion of QR Codes on Food Products for Accessibility by Visually Impaired Individuals](#) To enhance the accessibility of visually impaired persons, this order encourages FBOs to incorporate QR codes on the labels. These QR codes to encompass details about the product, including details of ingredients, nutritional information, allergens, manufacturing date, best before/ expiry/use by date, allergen warning and contact information. This is excellent step by Food authorities to facilitate visually impaired persons to access information on the labels and make an informed choice independently.

[Import of food consignment for 100 % Export/Re-export purpose](#)
 The purpose of

the order is to avoid the delays in clearance of the food consignments which are meant for making value added products for 100 % Export or re-export.



In such cases, custom authorities will not refer the consignments of articles of food, to Food authorities for clearance. The importer to give declaration in Form 8 that imported articles of food are for 100% export. This is good step in line with the objective to lighten the load of regulatory compliances and encourage export of Food.

[List of Labs capable of testing Fortified Rice \(FR\), Fortified Rice Kernel \(FRK\) and Premix for FRK](#) This order (dated 13th

October) gives the list of laboratories which can analyse Fortified Rice, Fortified Rice Kernel and Premix of Premix of Fortified rice kernel.

[Revised List of Labs capable of testing Fortified Rice \(FR\), Fortified Rice Kernel \(FRK\) and Premix for FRK](#) This order (19th October) gives the list of laboratories capable of testing fortificants (Iron, Vitamin B12 and Vitamin B9). The laboratories should have valid accreditation status.

[List of Referral Food Laboratories for testing of fortificants in FR, FRK and Vitamin-Mineral Premix for FRK](#) The order (dated 26 October) gives the list of Referral Food Laboratories for testing fortificants in FR, FRK and Vitamin-Mineral Premix for FRK.





[Mandatory uploading of the test reports of FRK and Vitamin-Mineral Premix for](#)

[FRK on the Infolnet portal by FSSAI notified laboratories](#)

According to the order (dated 31 Oct) FSSAI approved laboratories for testing of FRK and Vitamin-Mineral Premix of FRK should immediately upload the results of analysis on Infolnet portal. They should submit monthly reports of such analyses before 5th of every month in the given format. They are directed to submit details of manufacturer of non-compliant samples and store such samples under refrigeration (5 to 100C) for three months.

[Direction regarding source of iron salts prescribed for vitamin and mineral premix and Fortified Rice Kernel \(FRK\)](#)

This order (dated 30 Oct) is about the specifying source of iron on the labels. In case of both retail and no-retail containers of fortified food products, the FBOs should specify the exact ingredient in the list of ingredients. For example, when ferric Pyrophosphate or Sodium Ferredetate is added, they just "Iron" cannot be declared in the list of ingredients.

[Re-operationalisation of FSS \(L and D\) regulations 2022, related to labelling](#)

[requirements of various articles](#) The order re-operationalises FSS(L and D) regulations 2022 for labelling requirements related to: non retail container, minimally processed food, tolerance limit and warning statement for pan masala etc. The provisions are re-operationalised from 01.07.2023.

[Products with the ingredient S-Adenosyl-L-Methionine \(SAME\) under FSSAI license](#) FSSAI vide this order has banned the sale of S - Adenosyl - L - Methionine (SAME) as a food or food ingredient as it is not listed in the regulations. The order directs the FBOs to withdraw such products containing SAME and modify the license accordingly. Enforcement authority is directed to ensure that products containing SAME are not sold including E Commerce platform.

[Validity Order of FSSAI notified Food Testing Laboratories dated 26th Oct, 2023](#) The order gives the list of FSSAI notified laboratories along with the validity of their NABL accreditation as on 26th October 2023. Such list is routinely published by Food Authorities and will be useful to FBOs who wish to get the samples analysed.

[Re-operationalisation of Food Safety and Standards \(Licensing and Registration of Food Business\) Amendment Regulations 2021](#) FSS (Licensing and Registration of



Food Business) Regulations have several amendments in various sections. The draft regulations were notified 17.11.2022 and comments were invited from the stakeholders. These are re-operationalised from 11.05.2023 as the notification of the final amendment is taking time.

[Clarification with regard to declaration of address of the brand owner on food labels](#)

The order clarifies that the FBOs can declare their address either through text or Barcode/GTIN on the label. The order further states that if the Brand owner's address is given through Text or Barcode/ GTIN on the label, the same need not be again declared through text on the label.

[Status of NSF & FI applications](#)

This is the status of products/ ingredients which are applied for approval under Non-Specified Foods/ Ingredients Regulations, as on 3rd October 23. This will be very useful information as it gives status: approved, rejected or under process.

[Updated FAQs on FSS \(Labelling and Display\) Regulations 2020](#)

This is excellent source of information uploaded on 1st November 23. This will be useful for FBOs who have questions on this regulation.



RESEARCH IN HEALTH & NUTRITION

A mother's diet can protect her grandchildren's brains:
 Science Daily August 3, 2023

Mothers who eat apples and herbs in early pregnancy could be protecting the brain health of their children and grandchildren, a Monash University study using genetic models has found.

The discovery is part of a project that found a mother's diet can affect not just her child's brain but also those of her grandchildren. Published in Nature Cell Biology, the Monash Biomedicine Discovery Institute study found that certain foods could help protect against the deterioration of brain function.

More specifically, the study used roundworms (*Caenorhabditis elegans*) as the genetic model because many of their genes are also found conserved in humans, allowing insights into human cells. The researchers found that a molecule present

in apples and herbs (basil, rosemary, thyme, oregano, and sage) helped reduce the breakdown of communication cables needed for the brain to work properly.

Senior author Professor Roger Pocock and his team were investigating nerve cells in the brain that connect and communicate with each other through about 850,000 kilometres of cables called axons. For axons to function and survive, essential materials need to be transported along an internal structure that contains microtubules. Professor Pocock explained that a malfunction that caused the axons to become fragile led to brain dysfunction and neurodegeneration.

He said his team used a genetic model with fragile axons that break as animals age. "We asked whether natural products found in the diet can stabilise these axons and prevent breakage," he

explained. We identified a molecule found in apples and herbs (ursolic acid) that reduces axon fragility. How? We found that ursolic acid causes a gene to turn on that makes a specific type of fat. This particular fat also prevented axon fragility as animals age by improving axon transport and therefore its overall health."

Professor Pocock said this type of fat, known as a sphingolipid, had to travel from the mother's intestine, where food is digested, to eggs in the uterus for it to protect axons in the next generation. He said while the results were promising, they still need to be confirmed in humans.

"This is the first time that a lipid/fat has been shown to be inherited," he said. "Further, feeding the mother the sphingolipid protects the axons of two subsequent generations. This means a mother's diet can affect not just their offspring's brain but potentially subsequent generations. Our work supports a healthy diet during pregnancy for optimal brain development and health."





Microgreens and mature veggies differ in nutrients, but both might limit weight gain
 Science Daily August 16, 2023

Young vegetables known as microgreens are reputed to be particularly good for health. Now, researchers are trying to find out if microgreens -- which can easily be grown at home -- are the superfood they're claimed to be, and how they compare to mature veggies. Results to date show their nutritional profiles differ, as do their effects on gut bacteria. Yet, tests in mice suggest that both microgreen and mature vegetables can limit weight gain.

The researchers will present their results today at the fall meeting of the American Chemical Society (ACS). ACS Fall 2023 is a hybrid meeting being held virtually and in-person Aug. 13-17, and features about 12,000 presentations on a wide range of science topics.

"The scientific literature suggests that cruciferous vegetables, like kale and broccoli, are good for you," notes Thomas T. Y. Wang, Ph.D., the project's principal investigator. The microgreen versions of these foods are particularly touted for their health benefits.



Older than sprouts but younger than baby greens, microgreens are typically harvested within a couple of weeks after they start growing. And they can easily be grown in a container on a windowsill.

The team began their studies with another cruciferous plant -- red cabbage. The researchers found that both young and fully grown cabbage limited weight gain in mice fed a high-fat diet. Yet the cabbage's nutrient profile changed over time, and the microgreen was significantly richer in substances such as glucosinolates -- nitrogen- and sulphur-containing compounds that may offer protection from cancer, Wang says.

In their latest work, Wang and his colleagues are comparing the biological effects of microgreen and fully grown kale. They have discovered that both the young plant and mature kale are effective in limiting weight gain in mice fed a high-fat diet. Additional experiments will be needed to see if humans would experience these same benefits.

Molecules in vegetables can help to ease lung infection

Science Daily August 16, 2023

Researchers at the Francis Crick Institute have found that molecules in vegetables like broccoli or cauliflower help to maintain a healthy barrier in the lung and ease infection.

The AHR -- aryl hydrocarbon



receptor -- is a protein found at barrier sites like the gut and the lung. Natural molecules in cruciferous vegetables -- for example, kale, cauliflower, broccoli, or cabbage -- are dietary 'ligands' for AHR, which means, once eaten, they activate AHR to target a number of genes. Some of the genes targeted switch off the AHR system, allowing it to self-regulate. The effect of AHR on immune cells is well understood, but this research, published today in Nature, now shows that AHR is also highly active in endothelial cells lining blood vessels in the lung.

The lung barrier between the body and the air outside is only made up of two layers, one of endothelial cells and one of epithelial cells, because it needs to allow oxygen to enter. But the barrier also has to be kept strong against pollution or viruses and bacteria.

The researchers conducted a series of experiments in mice to show how AHR impacts lung barriers. When mice were infected with the flu virus, blood was found in the airspaces in the lungs, as it had leaked across the damaged barrier. The researchers then showed that AHR was able to prevent the barrier from becoming leaky: when AHR was overactivated they observed less blood in the lung spaces.



They also found that mice with enhanced AHR activity didn't lose as much weight when infected with flu, and were able to better fight off a bacterial infection on top of the original virus.

When AHR was prevented from being expressed in the lung endothelial cells of infected mice, more blood and immune cells were seen in the air spaces, showing greater damage to the barrier.

The researchers also showed that flu infection causes a decrease in protective lung AHR activity, but only in mice fed AHR ligands in their diet before the illness.

These findings link food consumption to AHR activity and outcome in viral infection: infected mice didn't eat as much food when ill, so their intake of AHR ligands was reduced and the AHR system was less active, leading to more lung damage.

Despite the infection-driven reduction of AHR activity, it was beneficial for mice to be on an AHR ligand-rich diet: these mice had better barrier integrity and less lung damage during infection than mice on the control diet.

These results indicate that AHR has a protective effect on the lung barrier which is impacted by infection, but can be improved by the right diet.

A healthy diet, reading, and doing sports promote reasoning skills in children

Science Daily August 17, 2023

Reasoning skills are crucial skills in learning, academic performance, and everyday problem-solving. According to a recent study conducted at the University of Eastern Finland, improved overall diet quality and reduced consumption of red meat, as well as increased time spent in reading and organised sports enhanced reasoning skills among children over the first two school years.

"Children with healthier eating habits showed greater cognitive development than other children. Specifically, better overall diet quality, lower red meat consumption, and higher low-fat dairy product intake were linked to better reasoning skills," says Doctoral Researcher Sehrish Naveed of the University of Eastern Finland.

Children who spent more time in reading and organised sports showed better reasoning skills than their peers. On the other hand, excessive time spent on a computer and unsupervised leisure-time physical activity were associated with poorer reasoning skills. Screen time, active school transportation, recess physical activity, and physical activity intensity were not associated with reasoning skills.

Over half of the children participated in a two-year family-based and individualised diet and physical activity intervention.



However, the intervention did not impact reasoning skills, with the children in the intervention and control groups exhibiting similar cognitive development.

"In the lives of growing children, diet and physical activity intervention is just one factor influencing lifestyle and reasoning skills. Based on our study, investing in a healthy diet and encouraging children to read are beneficial for the development of reasoning skills among children. Additionally, engaging in organised sports appears to support reasoning skills," Dr Eero Haapala points out.

Published in the Scandinavian Journal of Medicine & Science in Sports, the results of this study are based on data from the Physical Activity and Nutrition in Children (PANIC) study. This sub-study examined the effects of a two-year diet and physical activity intervention on cognition among 397 Finnish elementary school children. The associations of dietary factors, physical activity, and sedentary behaviour with cognition over two years were also studied. The analyses considered parental education and income as well as children's body fat percentage and maturity level.





Extreme dietary habits for carbohydrates and fats affect life expectancy

Science Daily August 30, 2023

A new study, published in *The Journal of Nutrition*, suggests that extreme dietary habits involving carbohydrates and fats affect life expectancy.

Researchers from Nagoya University Graduate School of Medicine in Japan led by Dr. Takashi Tamura found that a low carbohydrate intake in men and a high carbohydrate intake in women are associated with a higher risk of all-cause and cancer-related mortality and that women with higher fat intake may have a lower risk of all-cause mortality. Their findings suggest that people should pursue a balanced diet rather than heavily restricting their carbohydrate or fat intake. While low-carbohydrate and low-fat diets are becoming popular as a way to promote weight loss and improve blood glucose levels, their long-term effects on life expectancy are less clear. Interestingly, recent studies conducted in Western countries suggest that extreme dietary habits for carbohydrates and fats are associated with a higher risk of mortality. However, few studies have explored these associations in East Asian populations, including Japanese individuals who typically have relatively low fat and high-carbohydrate

dietary intakes.

The authors conducted a follow-up survey over a period of 9 years with 81,333 Japanese people (34,893 men and 46,440 women) to evaluate the association between carbohydrate and fat intakes and the risk of mortality. Daily dietary intakes of carbohydrates, fats, and total energy were estimated using a food frequency questionnaire and calculated as a percentage of total energy intake for carbohydrates and fats. Carbohydrate intake quality (i.e., refined compared with minimally processed carbohydrate intake) and fat intake quality (i.e., saturated compared with unsaturated fat intake) were also assessed to examine the impact of food quality on the association with mortality.

They found that men who consumed less than 40% of their total energy from carbohydrates experienced significantly higher risks of all-cause and cancer-related mortality. The trend was observed regardless of whether refined or minimally processed carbohydrate were considered. On the other hand, among women with 5 years or longer of follow-up, those with a high carbohydrate intake of more than 65% had a higher risk of all-cause mortality. No clear association was observed between refined or minimally processed carbohydrate intake and the risk of mortality in women. For fats, men with a high fat intake of more than 35% of their total energy from fats had a higher risk of cancer-

related mortality. They also found that a low intake of unsaturated fat in men was associated with a higher risk of all-cause and cancer-related mortality. In contrast, total fat intake and saturated fat intake in women showed an inverse association with the risk of all-cause and cancer-related mortality. They concluded that this finding does not support the idea that high fat intake is detrimental to longevity in women. "The finding that saturated fat intake was inversely associated with the risk of mortality only in women might partially explain the differences in the associations between the sexes," Dr. Tamura stated. "Alternatively, components other than fat in the food sources of fat may be responsible for the observed inverse association between fat intake and mortality in women."

Legumes may provide as much amino acids and proteins as red meat, says study

21 Aug 2023 Nutrition Insight

Fava bean and pea-based products are a safe alternative to red meat in providing sufficient amino acids and protein intake without compromising bone health, according to a study by researchers at the University of Helsinki, Finland.





“Decreasing the consumption of red and processed meat in the diet to the upper limit of the Planetary Health Diet while increasing the consumption of legumes cultivated in Finland, such as peas and fava beans, is safe from the perspective of protein nutrition. Similarly, bone health is not compromised by such a dietary change either,” says Suvi Itkonen, a docent at the faculty of Agriculture and Forestry, University of Helsinki.

The study, published in the British Journal of Nutrition, included 102 men between 20 and 65. The experiment lasted for six weeks and divided the participants into two groups. Corresponding to the average protein consumption of Finish men, one group consumed 25% of their protein intake - 760 g of red and processed meat - weekly. The other group consumed 5% of their weekly protein levels of red and processed meats and 20% of foods based on legumes, fava beans and peas. Apart from changes in protein intake, the participants carried on with their usual diet but stuck with the protein intake provided by the study. There was no difference in bone formation or resorption when comparing the groups. There was also no difference in levels of vitamin D and calcium. Additionally, the intake of amino acids and protein intake was sufficient in

both groups.

“Increasing the proportion of non-soya legumes by reducing the amount of red processed meats in the diet for six weeks did not compromise bone turnover and provided on average adequate amounts of amino acids in healthy men, indicating that this ecologically sustainable dietary change is safe and relatively easy to implement,” reads the study.

Edited by Beatrice Wihlander

Smart therapeutics: Bioengineers create non-invasive biosensor to detect gut disease

18 Aug 2023 Nutrition Insight
Bioengineers from Rice University, US, have created a platform that allows engineered biosensor bacteria safe passage through the gastrointestinal (GI) tract.

Probiotics such as these - engineered to sense and report signs of bowel inflammation - could be the future of non-invasive gut disease detection. The bioengineers combined synthetic biology with biomaterial design to create a platform that could eventually monitor disease progression, assess treatment response and provide customized care for the individual gut microbiome. “For our proof-of-concept study, we chose inflammatory bowel disease (IBD), an autoimmune disorder that causes painful and recurrent inflammation flares. But gut health plays many important roles in the human body,

affecting metabolism, immunity, brain function and other systems,” says Elena Musteata, a graduate student in systems, synthetic and physical biology, Tabor lab, Rice University. “As we discover more biomarkers for different diseases, we can use this platform to diagnose and monitor many health conditions.”

The engineered bacterial strain produces a fluorescent green protein in response to thiosulfate, a compound associated with gut inflammation. It makes it possible to assess colon inflammation by measuring bacterial fluorescence after passage through the animal GI tract. Once clinically proven, the method could provide firsthand information about the inner workings of the intestines, provided they are not killed or dispersed in the process. The platform could replace the prolonged and complex diagnostic process for IBD, which involves invasive, time-consuming procedures like colonoscopies and biopsies.

The “good” bacteria, designed to produce a fluorescent protein in response to physiological signs of disease, fared well inside the gut of the test rat, protected inside alginate particles. The platform appears viable to improve patient outcomes because of its ability to tailor treatments to individual patient’s physiology.

By Inga de Jong



“Powerful” fermented vegetable postbiotic relieves constipation and improves skin health

17 Aug 2023 Nutrition Insight

Japan Bio Science Laboratories (JBSL) has created Biozyme, a highly effective postbiotic from an extract containing at least 40 fermented vegetables and herbs. It is rich in physiologically active substances produced by a fermentation process with *Bacillus* sp. Biozyme and then followed by a maturation process to break down the active components into low molecular compounds for better absorption in the body.

“Biozyme is more effective than conventional enzyme extracts because through the production process of Biozyme, the enzymes are cut into amino acids and peptides that contain the active group still intact so they can easily be recombined within the body,” Vincent Hackel, president and CEO of JBSL tells Nutrition Insight.

“In conventional enzyme extracts, enzymes will be altered and inactivated if made into liquid form through

hydrolysis, and the same will happen during any sterilization process. Enzymes are also large molecules that are presumed to hardly be absorbed into the small intestine. With Biozyme, you do not have the concern of absorption because of the lower molecular size.”

The postbiotic has been validated as a proven effective postbiotic in a human clinical trial of 20 female participants between 20-39 years of age. The postbiotic aims to improve irregularity and skin health. The active substances include amino acids and peptides from broken-down enzymes, polysaccharides and oligosaccharides, organic acids, vitamins and minerals. Because Biozyme is a low-molecular fermented extract, it promotes the formation of enzymes in the body more efficiently than average enzyme extracts, states JBSL.

Ashitaba is one of the main ingredients used in Biozyme which is a plant native to Japan that is highly nutritious, more so than kale or spinach, and has a high Oxygen Radical Absorbance Capacity (ORAC) value. It also features burdock, a root commonly eaten in Asia and has been used for centuries in traditional medicine, for



treating cold and cough symptoms. “Burdock is rich in many antioxidants and is a fibre called inulin that aids in digestion. Another ingredient is ginger, which is known for its benefits for nausea and upset stomach,” Hackel explains.

“Enzymes are the essential workers in our body for making millions of chemical reactions happen on a daily basis. However, because of aging and unbalanced diets, our bodies’ productive ability to create and maintain enzymes deteriorates.”

Consuming foods that are abundant in enzymes, such as fermented foods is, therefore, important. “Biozyme allows for individuals to consume broken down enzymes in a way that allows for proper absorption and renaturation of the enzyme inside the body,” he says. Biozyme also contains a highly concentrated extract of various vitamins, minerals, organic acids, and polysaccharides.

By Inga de Jong



& FOOD SCIENCE INDUSTRY NEWS

Making plant-based meat alternatives more palatable

Science Daily August 14, 2023

One of the biggest obstacles to the uptake of plant-based alternatives to meat is their very dry and astringent feel when they are eaten.

Scientists, led by Professor Anwasha Sarkar at the University of Leeds, are revolutionising the sensation of plant proteins, transforming them from a substance that can be experienced as gloopy and dry to one that is juicy and fat like. And the only substance they are adding to the plant proteins is water. To bring about this change, the scientists created plant protein microgels, through a process called micro-gelation.

Plant proteins -- which start off as dry with a rough texture -- are placed in water and subjected to heating. This alters the structure of the protein molecules which come together to form an interconnected network or gel which traps water around the plant proteins.

The gel is then homogenised, which breaks the protein network into a microgel made up of tiny particles that cannot be seen with the naked eye. Under pressure, as they would be when they are being eaten,

the microgels ooze water, creating a lubricity akin to that of single cream.

Professor Sarkar said: "What we have done is converted the dry plant protein into a hydrated one, using the plant protein to form a spider-like web that holds the water around the plant protein. This gives the much-needed hydration and juicy feel in the mouth. Plant-based protein microgels can be created without having to use any added chemicals or agents using a technique that is widely available and currently used in the food industry. The key ingredient is water."

The right combo: Getting the most health benefits from fruit smoothies

Researchers find adding a banana decreased the level of flavanols in smoothies

Science Daily August 24, 2023

Smoothies can be a tasty and convenient way to get the important fruits and vegetables you need for a healthy diet. But is a banana and blueberry smoothie the best combo? Researchers at the University of California, Davis, suggest that blending certain ingredients in smoothies can influence whether your body is getting a

nutritional boost.

The study, published today in the Royal Society of Chemistry's journal Food and Function, used smoothies to test how various levels of polyphenol oxidase, an enzyme in many fruits and vegetables, affects the levels of flavanols in food to be absorbed by the body. Flavanols are a group of bioactive compounds that are good for your heart and cognitive health and are naturally found in apples, pears, blueberries, blackberries, grapes and cocoa -- common smoothie ingredients.



"We sought to understand, on a very practical level, how a common food and food preparation like a banana-based smoothie could affect the availability of flavanols to be absorbed after intake," said lead author Javier Ottaviani, director of the Core Laboratory of Mars Edge, which is part of Mars, Inc., and an adjunct researcher with the UC Davis Department of Nutrition.



Slice an apple or peel a banana and the fruit will quickly turn brown. That happens because of polyphenol oxidase, or PPO, an enzyme naturally present in those foods. The browning occurs when the food containing that enzyme is exposed to air, cut or bruised. The researchers wanted to know whether consuming freshly prepared smoothies made with different PPO-containing fruits impacted the amount of flavanols available to the body.

Bananas versus berries

The researchers had participants drink a smoothie made with banana, which has naturally high PPO activity, and a smoothie made with mixed berries, which have naturally low PPO activity. Participants also took a flavanol capsule as a control. Blood and urine samples were analysed to measure how much flavanols were present in the body after ingesting the smoothie samples and capsule. The researchers found that those who drank the banana smoothie had 84% lower levels of flavanols in their body compared to the control.

"We were really surprised to see how quickly adding a single banana decreased the level of flavanols in the smoothie and the levels of flavanol absorbed in the body," Ottaviani said. "This highlights how food preparation and combinations can affect the

absorption of dietary compounds in foods."

Starch discovery reaps benefits for brewing, baking and milling industries

Science Daily August 25, 2023

Research has brought clarity to the longstanding question of how starch granules form in the seeds of Triticeae crops -- wheat, barley, and rye -- unlocking diverse potential benefits for numerous industries and for human health.

Starch in wheat, maize, rice and potatoes is a vital energy-giving part of our diet and a key ingredient in many industrial applications from brewing and baking to the production of paper, glue, textiles, and construction materials.

Starch granules of different crops vary greatly in size and shape. Wheat starch (and those of other Triticeae) uniquely have two distinct types of granules: large A-type granules and smaller B-type granules.

The ratio of A- and B-type granules can affect the quality of wheat-based foods, such as bread and pasta. The two types of granules also present a problem for starch manufacturing industry because many of the smaller B-type granules are lost and therefore wasted during the milling process. Further, too many B-type starch granules in barley can cause a hazy or cloudy appearance in beer because they do not get



digested and filtered out during the brewing process.

New research published in the journal *The Plant Cell* by the group of Dr. David Seung at the John Innes Centre have made a breakthrough in solving this problem. The team used genomic and experimental techniques to show that A- and B-type granules are formed by two distinct mechanisms.

By identifying an enzyme involved in B-type granule initiation and by then using conventional plant breeding techniques to remove this protein, they were able to produce wheat with low or no B-granules -- with no penalties on plant development and without reducing the overall starch content.

Added to previous studies by this group which have shed light on the shape and formation of A-type granules, the discovery has major implications says first author of the study Dr. Nitin Uttam Kamble:

"We discovered that the ubiquitous enzyme, (PHS1) is crucial for the formation of B-type granules in wheat. This is a scientific breakthrough because decades of research on this enzyme have failed to find a clear role for PHS1 in plants, and it shows that the A- and B-type granules of wheat form via different biochemical mechanisms.



researchers has figured out how to remove some saturated fat, sugar and salt from popular American foods while maintaining their tastiness. The trick?



We can now use this knowledge to create variations in starch for different food and industrial applications."

Dr. David Seung, a group leader at the John Innes Centre added: "Industry does not generally like heterogeneity; it wants something nice and even to process smoothly and having these different types of starch granules in wheat has always represented a challenge.

"So, for us to discover the enzyme responsible for making the smaller granule population and to be able to use our breeding platform to reduce the number of B-type granules will hopefully be of great interest to many industry users.

Replacing saturated fat and salt with herbs/spices is both tasty and healthy

Science Daily August 29, 2023

In response to the low-fat craze of the 1990s, many food companies removed saturated fats from their products, only to replace them with sugars to maintain their palatability.

Unfortunately, the resulting products were no healthier than the originals, and the average person today consumes too much saturated fat. Now, a team of Penn State

Replacing these overconsumed nutrients with a dose of healthy herbs and spices.

"Cardiovascular disease is the leading cause of death globally, and limiting saturated fat and sodium intake are key recommendations for reducing the risk of developing this disease," said Kristina Petersen, associate professor of nutritional sciences, Penn State. "Yet, we know that one of the key barriers to reducing intake of these ingredients is the flavour of the food. If you want people to eat healthy food, it has to taste good. That's why our finding that participants actually preferred some of the recipes in which much of the saturated fat and salt was replaced with herbs and spices is so important."

The team used a nationally representative database from the Centers for Disease Control and Prevention, called the National Health and Nutrition Examination Survey, to identify 10 of the most popular foods that are typically high in sodium, added sugars and saturated fat. These included meatloaf, chicken pot pie, macaroni and cheese, and brownies.

Next, they worked with culinary experts to develop

three versions of these recipes. The first contained typical amounts of saturated fat, sugar and salt used in these recipes. The second version was nutritionally improved by removing the excess saturated fat, sugar and salt. The third version had the same nutrient profile as the second version, but also contained added herbs and spices, such as garlic powder, ground mustard seed, cayenne, cumin, rosemary, thyme, cinnamon and vanilla extract.

For example, the typical macaroni and cheese recipe included salted butter, 2% milk, American cheese and salt. For the nutritionally improved version, the researchers swapped the salted butter for unsalted butter and reduced the amount in the recipe by 75%. They swapped the 2% milk for skim milk, replaced some of the American cheese with reduced fat cheese, and eliminated the extra salt. For the nutritionally improved, plus herbs and spices, version, the researchers added onion powder, garlic powder, ground mustard seed, paprika and cayenne.





"Our goal was to see how much we could lower these overconsumed ingredients without affecting the overall properties of the food in terms of mouthfeel and structure, and then add in herbs and spices to improve the flavour," said Petersen.

Next, the researchers conducted blind taste tests featuring each of the 10 recipes. Participants evaluated all three versions of a dish, one at a time, in a single session. Between 85 and 107 consumers completed each test. Participants rated several aspects of acceptability for each recipe, including overall liking and attribute liking, such as the food's appearance, flavour and texture. Participants then ranked the dishes in order of preference.

We found that adding herbs and spices restored the overall liking to the level of the original food in seven of the ten recipes," said Petersen. "In fact, participants actually liked some of the recipes better than the originals."

Specifically, participants liked the healthier, flavour-enhanced versions of the brownies and chicken in cream sauce significantly more than the original recipes. For five of the dishes -meatloaf, chili, apple pie, pasta with meat sauce and taco meat -- participants liked the healthier, flavour-enhanced

versions about the same as the original versions. They liked the healthier, flavour-enhanced cheese pizza, mac and cheese, and chicken pot pie recipes less than the original versions.

Finally, the team modelled the potential impact of 25 to 100% of U.S. adult consumers eating these recipes instead of the original recipes. For both saturated fat and salt, they found that the estimated daily reduction would be about 3% if 25% of consumers adopted the healthier recipes versus about 11.5% if 100% of consumers adopted the healthier recipes. Smaller estimated reductions in added sugars were observed across the modelled range of consumer adoption.

Spotlight on skin care nutrients: Boosting dermal health with vitamins, collagen, peptides and botanicals

31 Aug 2023 Nutrition Insight

Skin care is closely tied to nutrition via diet or topical applications. Nutrition Insight speaks to experts at Gelita, International Flavors & Fragrances (IFF), Monteloeder and PhytoGaia about outstanding nutrients for boosting skin health while revealing how their nutrition and skin care products share synergies. We also show how these

companies demonstrate the efficacy of their products for skin care customer trust.

The skin is multilayered with different cell types. Keratinocyte cells are majorly found in the top layers, requiring hydration to keep the skin barrier intact, explains Heli Anglenius, senior scientist II at IFF Global Health and Nutrition Science. The lower dermis contains fibroblasts, structural components like collagen and elastin, immune cells for defence mechanisms, with other cell types like melanocytes and hair follicles. "Nutrients and supplements supporting these different cell types can benefit skin health. For instance, vitamin C, probiotic support collagen synthesis and phosphatidylserine benefits both the epidermis and dermis, being a component of cell membranes and lipid lamellae, which contributes to the barrier of the epidermis," she continues. "Keratin promotes stronger hair follicles and healthy nail growth. The deeper layers have a longer turnover than the surface layers, with a turnover of approximately one month. For this reason, deeper layers benefit from more sustained supplementation with nutrients that affect skin structure maintenance."





Primary nutrients and supplements for skin

Dr. Ariati Aris, scientific affairs specialist and Bryan See, VP at PhytoGaia, says: "The skin's external visibility allows us to observe any issues, changes, or illnesses occurring within the body." Their top three nutrients for skin health include: "Cutting-edge potent antioxidants or vitamins with proven science such as vitamin E tocotrienols. These are potent fat-soluble antioxidants for healthy skin, protecting skin from free radicals that could damage skin cells and accelerate aging, preferentially accumulation in the stratum corneum and it is the skin's first line of defence against free radicals as well as anti-inflammatory properties." The other two nutrients are squalene - an essential component in sebum - and collagen - a protein that gives skin its structure and firmness. According to Oliver Wolf, Marketing EMEA at Gelita, a balanced diet rich in vitamins and minerals is vital for skin health that can be further enriched with smart supplements such as bioactive collagen peptides. "When taken orally, they stimulate fibroblast cells in the dermal layer of the skin to increase extracellular matrix formation, thus positively influencing the skin's collagen metabolism from within," he adds.

Similarly, Nuria Caturla, PhD, chief R&D officer at Monteloeder, says that a

proper diet can help prevent premature skin aging and promote clear and luminous skin. "In particular, vitamins like C and E, as well as beta-carotene, are known for their ability to enhance skin quality. Collagen, a crucial protein for skin firmness and youthfulness, thrives with the support of amino acids such as proline and glycine, which are found in certain foods," she says. "The recent emergence of botanicals, exemplified by products like a formula of botanical extracts such as rosemary, olive leaves, Sophora japonica and Lippia citriodora and a natural combination of extracts from rosemary and grapefruit, showcases the potential to enhance the skin's natural radiance."

By Venya Patel



Ingredient synergies: Blending individual compounds for nutritional absorption and optimal health

10 Aug 2023 Nutrition Insight

Combining ingredients holds the power to enhance nutritional value and benefit health.

In this, we discuss ingredient synergies for gut health, immunity, active nutrition and botanicals, highlighting

vitamin and mineral blends. Nutrition Insight sits down with experts from IFF, Gnosis by Lesaffre, ADM, Kerry, Lubrizol Life Science and Euromed, for a dive deep into how the companies combine ingredients to achieve nutritious and healthy products.

Claire Piddington, product marketing lead at IFF, says combining cellulosic and antioxidants in fried foods may improve the overall nutritional quality of such foods. "Cellulosics create a coating barrier to moisture and oil, which can reduce fat and calories by up to 30%, depending on the application. At the same time, antioxidants can increase frying oil efficiency resulting in at least 30% less oil needed."

On a larger scale, she notes combining multiple ingredients can support the customization and uniqueness of products, encourage new ground-breaking concepts, increase the functionality of end products and, in some cases, increase speed-to-market. "Ingredient synergies also have sustainability benefits, as optimization can result in less waste and potentially more environmentally friendly production processes. The end recipe will need fewer ingredients when ingredients work together to create additional benefits. While an average coffee creamer, for example, could need around 20 different ingredients, creating a system blend could narrow the overall recipe to about eight."



Andrea Salvador, technical marketing specialist of Nutraceutical Ingredients at Lubrizol Life Science, says that ingredient synergies have an evident impact on potentiating health benefits and combating nutritional deficiency. Immunity, infection and malnutrition have always been interlinked, being the areas of nutrition in which food synergy plays a vital role in preventing a healthy state. "Problems with some minerals exist in terms of off-taste, reactivity, interaction with other ingredients and unwanted colour changes, among others, that must be solved to obtain stable, bioavailable and good-tasting products that also prevent consumers from possible side effects such as tract irritation caused by the intake of mineral-fortified supplements," adds Salvador.

Piddington also details ingredient synergies in the digestive health and active nutrition market. "Products designed for gut health by combining beneficial ingredients can support a balanced gut microbiome through prebiotic fibres, probiotics and digestive enzymes." As for fitness, she details that athletes often seek products that combine ingredients to optimize performance, enhance endurance and support recovery. "One great example is the research by IFF that shows the value of soy-dairy protein blends in promoting muscle growth and maintenance. Findings show that while soy, whey and casein protein sources can all stimulate muscle protein synthesis, blending them

would take advantage of their subtle differences, such as amino acid content, delivery time and health benefits."

Vaughn DuBow, global director of marketing for microbiome solutions at ADM, tells us that consumers across North America and the EMEA try to maximize their protein intake. Recent research found that plant-based consumers remain conscious of the nutritional value in foods, including products supporting the immune system and the digestive tract. "With these two increasing areas of consumer interest, brands have the prime opportunity to combine gut microbiome-supporting solutions with plant proteins," he says.

Clarisse Geraci, product manager with Gnosis by Lesaffre, says that the primary trends are combining minerals and vitamins into complex formulas to ensure optimal benefits from the individual ingredients. "There has been considerable press around the dangers of excess vitamin D and calcium supplementation. To reduce these concerns, formulators must consider adding vitamin K2 as MK-7," Dr. Niamh Hunt, senior marketing manager for immune health at Kerry, stresses that immune health remains the primary goal for consumers of healthy lifestyle products, and they are increasingly aware of the intimate links between immune health and mental well-being - in particular, the adverse effects of stress and poor

sleep on immunity.

Andrea Zangara, head of scientific communication and medical affairs at Euromed, tells us that many traditional medicine systems, such as Ayurveda and Traditional Chinese Medicine, have long recognized the importance of synergistic effects in herbal formulations. He further notes these systems often combine multiple herbs to enhance therapeutic efficacy through synergistic interactions observed and improved through centuries. "Traditional dietary styles, such as the Mediterranean diet, provide many examples of synergisms between foods and spices. Lemon juice, a good source of vitamin C (ascorbic acid), enhances the absorption of non-heme iron found in plant-based foods and supplements."

By Beatrice Wihlander

Pre- and postbiotics evolve into syn- and psychobiotics while sports and personalization proliferate

03 Aug 2023

The demand for fibre and protein is at its highest, with food formulators being inventive in incorporating this type of carbohydrate into products.





Another significant development in the biotics space is the evolution into synbiotics, postbiotics and psychobiotics, while sports nutrition and personalized nutrition are poised for upgrades. ADM, Lonza, Kerry and Univar Solutions give Nutrition Insight a taste of what suppliers prioritize and a peek into their R&D strategies. "Prebiotic fibre also continues to be an important piece of the microbiome puzzle. Today's consumers have shown an increased interest in adding more fibre to their diet to support wellness factors such as digestion and satiety," says Vaughn DuBow, global director of marketing, microbiome solutions at ADM.

Intelligence, innovation and R&D in the world of biotics have evolved into more detailed fields such as synbiotics, a combination of pre- and probiotics and even

deeper into the emerging specializations of postbiotics and psychobiotics. "When it comes to understanding the role of biotics, there is an

immeasurable amount of research to unlock in this space. Both postbiotics and psychobiotics are emerging fields attracting attention," notes Sarah Gonçalves, technical business development manager, nutraceuticals, Univar Solutions.

Postbiotics, defined by the International Scientific Association for Probiotics and Prebiotics (ISAPP) as the preparation of inanimate microorganisms and their components that confers a health benefit on the host, such as short-chain fatty acids offer health benefits but without the need for live bacteria as with probiotics. Psychobiotics formulations, on the other hand, aim to positively influence mental health and cognitive function through the gut microbiota. These biotics are sought after for stress reduction, anxiety

management and potential support for depression.

Probiotics featuring multi-ingredient formulations have become "powerful differentiators" in the industry, catering to the holistic health needs of consumers. "Synbiotics (combination of pre-and

probiotics) have the potential to surpass expectations by incorporating complementary ingredients that enhance overall gut health," says Gonçalves.



A good example is the integration of probiotics, prebiotics, antioxidants and minerals, supporting a targeted health demand. "As consumers become more knowledgeable about gut health, they comprehend that achieving a robust microbiome requires a holistic approach, focusing not just on two ingredients, but a multitude of factors," she says. This includes musculoskeletal, gut, immune-enhancing and cognitive health demands.

By Inga de Jong



REGULATORY NEWS

India food authority orders upgrades for all state labs to boost exports

By Pearly Neo 27-Sep-2023 - Food Navigator Asia

The Food Safety and Standards Authority India (FSSAI) is attempting to balance plans for boost organic food exports with ongoing food safety concerns by mandating all state-authorized laboratories to adopt organic testing capabilities.

FSSAI had initiated strategies to improve organic standards and governance in India in June this year, but reinforced this order in the third quarter amidst continuing public concern over adulterated organic products in the market. This was also driven by increased government emphasis on growing organic exports earlier in September, which was announced by India's Commerce Secretary Sunil Barthwal. "The global market for organic foods is around US\$135bn, of which India is only taking a US\$700mn share," he said via in a formal address. "There is a lot of potential for growth here in organic foods, and this is a very important area [to India] so we are focusing on growing this sector. Right now, more awareness must be generated

regarding India's organic food standards, and [to comply] with the standards of importing markets - one important thing to do is to promote our India organic logo to help improve the credibility of our organic products in the international market."

India already has a wide range of organic food items from fruits such as avocado and passionfruit to grains such as rice and millets. All organic foods need to carry the local logo with the wording Jaivik Bharat in order to be legally recognised as organic. This organic logo was established in India back in December 2017 and was widely publicised by the government, but food safety concerns have continued to run rife over potential adulteration despite its use.



Earlier this year, an FSSAI crackdown revealed over 170 cases of adulteration amongst products being sold in India within just six months, covering multiple areas usually requiring certification such as health supplements and

organic foods. In light of increased government focus and consumer fears surrounding the organic sector, FSSAI has responded by mandating that more organic testing and analysis be made available in all state-authorized laboratories.

"The Government has decided to promote organic products in India and the success of this depends on reliable testing, to ensure the authenticity of organic products," FSSAI Quality Assurance Advisor Dr. Satyen Kumar Panda stated via a formal statement. "Therefore, all food testing laboratories will need to optimise their facilities and procedures [to prepare to] handle organic testing efficiently and accurately. All FSSAI Notified laboratories are hereby directed to review current capabilities in this area and take the necessary steps to enhance organic product testing, as well as to apply to the Agricultural & Processed Food Products Export Development Authority (APEDA) as a recognised laboratory for organic testing. Labs must also apply to the APEDA National Referral Laboratory to take part in proficiency testing, as a pre-requisite to qualify as a laboratory that can conduct pre-export testing for organic product exports."



Font size can 'nudge' customers toward healthier food choices

Science Daily August 10, 2023

Restaurants can persuade patrons to choose healthier foods by adjusting the font size of numbers attached to nutritional information on menus, according to a study headed by a Washington State University researcher.

Lead researcher Ruiying Cai, an assistant professor in the WSU School of Hospitality Business Management, said U.S. restaurants with more than 20 locations are already required to show the calorie content of food on their menus. By representing these values incongruously -- using physically larger numbers on the page when they're attached to lower-calorie options, and smaller numbers for high-calorie foods -- Cai said businesses can successfully "nudge" customers toward healthier choices. "When restaurants use a larger font size for the calorie content of healthy foods, even though the number itself has a smaller value, it will increase consumers' preference to order the healthier item," Cai said.

For the study, recently published in the International Journal of Hospitality Management, participants were asked to choose between

a less healthy item like a smoked beef burger and a healthier option like a grilled chicken sandwich. They were then randomly assigned to two groups. In the first group, number values and font size rose and fell together. In the second group, the relationship between the numbers' magnitude and their size was incongruent, meaning the font size became smaller as the number values rose and vice versa.

Researchers also posed questions to gauge how health-conscious participants were and gave varying time limits to some to measure the effect time constraints have on their decisions. Cai said the study results showed that participants in second group, who saw low calorie counts printed in large fonts, were more likely to lean toward the healthier option. Respondents who indicated they were less health-conscious were also the most affected, particularly when there was a tight timeframe to make the choice. People who had a high level of health awareness were less likely to be swayed, Cai said, but this is likely because they already favoured healthy food.

Child-friendly packaging? Action on Sugar urges ban on "pester power" designs amid UK obesity crisis

15 Aug 2023 Nutrition Insight

Action on Sugar is calling for a ban on packaging that appeals to children for food

products that contain high or medium amounts of sugar.

The charity argues that designs that attract young consumers should only be used for healthier alternatives. New research by Action on Sugar, based at Queen Mary University of London, has revealed that breakfast cereals and yogurts with packaging that appeals to children contain excessive amounts of sugar despite both categories registering sugar reductions between 2015-2020. Furthermore, just nine cereals and six yogurts were considered low in sugar.

Packaging that appeals to children includes cartoon characters, animations, vibrant colours and familiar characters. Known as "pester power," the marketing approach was designed to attract children's attention and influence caregivers' purchasing decisions. "Pester power is the power children hold to pressure their parents into buying something that has caught their attention, usually through marketing techniques. Companies can create that situation in-store through child-appealing packaging," Zoe Davies, nutritionist at Action on Sugar, tells Packaging Insights.

Nutritionist Dr. Kawther Hashem, campaign lead at Action on Sugar, adds: "Given the soaring numbers of



under 18s suffering weight-related health problems and tooth decay being the leading cause of child hospitalization, now is the time for companies to be forced to remove child-appealing packaging from products that are misleading parents and making our children unhealthy and sick." The researchers found that breakfast cereals and yogurts with packaging that appeals to children have "unnecessary" amounts of sugars - with some products containing the equivalent of up to four teaspoons of sugar (per suggested serving). But breakfast cereals and yogurts have reportedly recorded significant sugar reductions between 2015 and 2020 (14.9% and 13.5%, respectively) as part of the UK government's Sugar Reduction Programme - which is still short of the original 20% target.

By Natalie Schwertheim



Food safety and transparency: UK opens consultation into improving nutrition labelling

11 Aug 2023 Nutrition Insight

The UK government has launched a consultation on improving the enforcement and regulation of nutrition and health claims on food and drink products. The aim is to ensure that consumers can trust information found on

labels and make informed choices about their diet and health. The consultation sets out two proposals for changes in relation to nutrition labelling, composition and standards (NLCS).

The first proposal is to introduce an improvement in the notice's regime, providing an additional early step for enforcement authorities to specify measures for companies to take to ensure compliance with requirements. "By means of the introduction of improvement notices, enforcement authorities would be able to act more quickly to deal with non-compliance and businesses would be able to respond faster to ensure compliance, while potentially avoiding costly and burdensome court proceedings for both parties," say the authorities.

The second proposal is to revoke redundant legislation that "does not serve any current legal purpose." Legislation will come into force in England three months after the legislation has been made - although that timeframe is also under consultation. The authorities explain that using unauthorized health and nutrition claims is a criminal offense.

"However, the current enforcement procedure does not align with other food labelling enforcement, which is less bureaucratic, more proportionate and largely welcomed by businesses and enforcement agencies alike. An improvement notice regime enables a consistent and low-



resource enforcement approach to labelling offenses." Moreover, the second proposal would allow to "tidy up" the statute book, "making it simpler to navigate." If passed, 60 of the current 72 commission regulations would be revoked. The new enforcement system is less "threatening" as it encourages dialogue, is low resource and provides clarity. Bringing a case to court is costly and time-consuming for local authorities and business. The new system is faster, cheaper and more proportionate, the proposal highlights. Businesses will be able to appeal an improvement notice under the new legislation; however, non-compliance will still ensure court action.

By Marc Cervera

"High in" nutrition symbol may improve consumer diet and reduce diet-related diseases, study flags

07 Aug 2023

Substituting foods with lower "high in" indications on front-of-pack labelling (FOPL) has shown significant reductions in dietary intake and diet-related non-communicable disease (NCD).





The results were found during the evaluation of dietary impact research done by researchers from the universities of Toronto, Wageningen, São Paulo and Harvard.

According to the study published in *Frontiers in Nutrition*, consumer surveys show that after implementing mandatory “high in” FOPL symbols, 30-70% of consumers chose or were willing to choose products with fewer “high in” indications.

The researchers calculated reductions of 73-259 mg a day in sodium, up to 6.9 g of total sugars, 0.5 g a day of saturated fats and between 14-46 kcal of energy in Canadians, the study’s target group.

They estimate that 2,148 to 7,047 diet-related deaths, mainly cardiovascular diseases, could be averted if consumers choose products with fewer “high in” indications. Excessive intake of sodium and sugar increases the risk for many NCDs such as hypertension, diabetes and renal disease.

The estimated health gains highlighted in the study were more meaningful for men than women, specifically for ischemic heart disease, where the number of deaths that could be averted were double that estimated for women. This was validated by the

differences in nutrient intake and diet-related NCD mortality burden between Canadian men and women.

FOPL has been identified as a cost-effective policy to help consumers make healthier food choices. In 2022, Health Canada published new FOPL guidelines which require a nutrition symbol on most prepackaged foods with a Nutrition Facts table, specifically, those that exceed the thresholds for saturated fat, sugars or sodium. The thresholds correspond to a percentage of the daily value (DV) per reference amount or serving size for saturated fat, sugars or sodium, whichever is greater.

The intake of sodium, total sugar, saturated fat and energy were evaluated in 11,992 Canadians using data from the 2015 Canadian Community Health Survey-Nutrition. Foods selected by a food composition database were substituted in up to 70% of the adult participants and the health impacts estimated. The study’s findings suggest that substitution with a healthier food alternative, based on the display of fewer “high in” FOPL symbols, could improve dietary intake of sodium and sugar.

By Inga de Jong

Consumers are willing to buy ‘healthier’ ultra-processed foods

By Ryan Daily 17-Oct-2023 - Food Navigator USA

Food and beverage industry stakeholders are debating the role and importance of ultra-

processed foods (UPFs) as consumers signal a willingness to try healthier versions of these products.

“Ultra-processed foods have been demonized for a long time ... but ultra-processed foods are a necessary evil ... largely because the reality is most people can’t afford to eat fresh food. That was true before COVID, and it’s even more so after COVID when basic staple prices for fresh foods increased,” Ayana Bio CEO Frank Jaksch told FoodNavigator-USA.

Ayana Bio conducted a survey of more than 2,000 US consumers “to get an idea of what people thought of, what they perceived as ultra-processed foods, and how would they perceive potential fixes for ultra processed foods,” he said. The survey also defined UPFs as “foods that have gone through multiple levels of processing and contain additives such as preservatives, sweeteners, sensory enhancers, colorants, flavours, and processing aids,” the company shared in a press release.

In the survey, most consumers (57%) said they believe UPFs are bad for their health, and 64% classified “healthier” foods as having more nutritional value and less fats, sugars, and salts.



However, most (74%) consumers were open to trying healthier UPFs if they could improve brain or immunity health, sleep quality, or boost energy levels, the survey added.

In Mintel's 2024 Global Food & Drinks Trends report, the research group found consumers are increasingly concerned about UPFs, with 34% of the 2,000 US consumers surveyed saying said that it's a top concern aside from price and taste. Consumers are inspecting labels more carefully for ingredients, a trend influenced by the clean-label movement, and becoming more critical of what they put in their body, Jenny Zegler, director of food and drink and global consumer for Mintel, told FoodNavigator-USA.

"The discussion around highly processed connects a little bit to the debate about junk food, and is this food ... a 'sometimes food,' is it something I know I shouldn't have all the time, but I really enjoy it, or it makes me feel good, so I'm going to make that exception," she said.

Similarly, Jaksch noted, "post-COVID, more people are paying attention to reading the labels than they were before... that trend has been increasing pretty consistently over the past 10years."

The debate about UPFs role in the US diet also comes at a time when more research is being done on the impact of UPFs on human health and how the food and beverage industry can create healthier foods, Robert Lustig, professor emeritus of pediatrics, division of endocrinology at UCSF, told FoodNavigator-USA. "If I had to basically sum up what's wrong with ultra-processed food, it's that sugar has been added for palatability, and the fibres have been taken out for shelf life, and it turns out that both of those are enormously bad for food, and therefore, bad for us," Lustig said. The added sugar in UPFs has been associated with impacted metabolic health, Lustig said.

While sugar and protein have the same number of calories (four calories per gram), the problem is the fructose molecule in sugar "inhibits mitochondrial function and if you inhibit mitochondrial function that means you're not burning calories," he said. "It turns out glucose helps stimulate mitochondria to burn. Glucose, for lack of a better word, we can call it good. Fructose, on the other hand, the sweet molecule in sugar, the molecule that ...we seek, the molecule that is addictive, turns out that molecule is a mitochondrial inhibitor. It inhibits three separate enzymes that are necessary for mitochondria to function."

The other problem with UPFs is that many lack the fibre content, and too little fibre in

a diet can lead to leaky gut, which opens up consumers to a host of diseases, he added. "Fiber turns out to be the food for your bacteria in your intestine. Fiber is absolutely essential. It's necessary, but we don't understand that. We think that the fibre is just junk, garbage. We think that the fibre is what doesn't taste good. Turns out the bacteria in your intestine utilizes fibre as its food, and if you don't feed your intestinal bacteria, your intestinal bacteria will feed on you."

CPG companies like Coca-Cola, PepsiCo, and others have reduced the sugar and fat content of their products. However, these companies need to focus on the other side of improving UPFs by adding back in the nutrition these products lack, Jaksch noted.

"The reductionist side is actually easier than adding actual nutrition back in. So, they all embraced the idea of sugar reduction and salt reduction and getting rid of calories and potentially even finding better ways of ... eliminating or reducing fat or changing fat sources," he said. "You've done the easy part. Now, let's talk about the elephant in the room, which is the big part, which is how you're going to actually put nutritive value in these products."





Japanese expert questions credibility of FFC system and urges revisions to 'old and complex' regulations

By Hui Ling Dang 02-Aug-2023 - NutraIngredients Asia

Japan's Food With Function Claims (FFC) system has boosted the nutra market, but it can be 'confusing' and risks letting down consumers, claims a leading expert in the country.

Currently the Representative Director of the International Society of Sports Nutrition (ISSN), Dr Seiji Aoyagi has more than three decades of experience in research and commercial applications of sports nutrition. His portfolio includes major firms like Kyowa Hakko Kogyo, Abbott, GSK, and Danone.

Speaking at the ISSN Sports Nutrition Conference 2023 in Shanghai, as part of Hi & Fi Asia-China, Dr Aoyagi made candid observations about food regulations in Japan.

"The law that differentiates food and drugs has been in effect from 1971 till now. Although Japanese companies have asked for revisions to the law, only foreign firms have been able to produce some

results so far. There are some ingredients and compounds that cannot be used in food and supplements, as well as product formats that are still listed under the drug category. For example, taurine, L-alanyl-L-glutamine, and products delivered via sublingual (under the tongue) or oral spray format," said Dr Aoyagi.

Specifically, the compounds that were successfully re-categorised are L-carnitine by the efforts of Lonza in 2002, beta-hydroxy beta methyl butyrate (HMB) by Abbott in 2009, and beta-alanine by NAI in 2019. Dr Aoyagi suggested that pressure from overseas firms, including Chinese nutrition giants, could help to fuel changes.

Health foods, or Foods with Health Claims (FHC), are further subdivided into four categories: Food for Special Dietary Uses (FOSDU), Foods for Specified Health Uses (FOSHU), Foods with Nutrient Function Claims (FNFC), and Foods with Function Claims (FFC). FOSDU and FOSHU require regulatory approval, FNFC is subject to a self-certification system, while the FFC system enables businesses to label functions on foods by notification – the category that Dr Aoyagi finds most questionable.

"The FFC system introduced in 2015 opened up the market, but it is confusing and sometimes not right. It seems more of a marketing stunt to

boost the industry. More than 5,000 products have been notified within eight years – it is not possible for all products to do what they claim, but the public is not aware and not getting the benefits on the labels," Dr Aoyagi told NutraIngredients-Asia after his presentation.

The FFC system had come under scrutiny for the way the products are scientifically evaluated. The Consumer Affairs Agency (CAA) has since announced that companies should adhere to PRISMA 2020 when selecting the types of systematic reviews to back up their product claims.

The active and wellness market in Japan is valued at USD3.6bn, of which sports-related food and beverage products make up about 17% (approximately USD600m). "Sports nutrition is not a big market, but it is growing, especially for protein. Among protein products, 72% have sports functions. Furthermore, the pandemic did not affect the segment's annual growth rate of around 20%," Dr Aoyagi shared. Other segments that are gaining traction include amino acids for sport consumers, and soy for female consumers. Notably, research has shown that anabolic response to a combination of essential amino acids (EAAs) and whey protein is greater than whey protein alone in young healthy adults.