

3. Macronutrient – Fat (Lipids)

The fats when inside the body are called lipids. Fats in the diet come from both plant and animal sources. The fats from animal source-meats and dairy are mostly unhealthy saturated invisible fats. The fats from the plant sources are primarily healthy unsaturated fats. The unsaturated fats from plant sources are of two types – Monounsaturated and Polyunsaturated fats. These are present in seed and vegetable oils. These have to be consumed unrefined in cold compressed form to retain their nutrient value as outlined below. Finally, there are human-made commercial fats produced by the hydrogenation of vegetable oils. Hydrogenation process prolongs the shelf life of oils, but this process makes oils significantly harmful to health.

The four types of dietary fats are :

- a) *Saturated fats (Animal fats – meat and dairy)* – The saturated fats in the diet are mostly invisible and needs to be limited to small amounts. Coconut oil is the only plant-based oil, which has 90 % fat as the saturated fat amount. However, despite the negative press, coconut oil has received in the past, it has redeemed its reputation as a healthy edible oil. The saturated fat of coconut oil is small fatty acid molecules called “Medium Chain Triglycerides,” which are easy to digest, increase body metabolism and may lower the bad LDL cholesterol while increasing good HDL cholesterol.
- b) *Monounsaturated fats (Seed and vegetable oils)*- Olive oil, Sesame oil, Flaxseed oil, Avocados, and Nut oils are rich in monounsaturated fats. Mustard and Sesame oils are a mixture of mono and polyunsaturated fats. All these help reduce the levels of bad –LDL cholesterol and raise levels of good HDL cholesterol.
- c) *Polyunsaturated fats (present in seed oils and fish)* – Fish and seed oils are rich in polyunsaturated fats. These fats contain two essential fatty acids -omega 6 and omega3. The essential fatty acid implies that the body cannot make these by itself and must get these from food. Omega 3 oils are healthy, but too much of Omega 6 oils in diet cause disease, producing inflammation in the body. The World health organization recommends that the amount of omega 6 fats should be kept low, and the ratio of omega 6 and omega 3 fatty acids in the diet should not exceed 4:1. The diets which are rich in fried foods and commercially prepared foods have this ratio at dangerous levels of 10:1 or 15:1. The high proportion of omega 6 versus omega 3 fatty acids, increases the risk of metabolic diseases such as Obesity, Type2 diabetes, heart disease, arthritis, and more.

“The simplest solution to keep omega 6 levels low in the diet, is to minimize the consumption of fried, packaged, and pre-prepared commercial foods.”

The healthy omega 3 fatty acids are present in certain fish – Mackerel, sardines, and cod. The vegetarian sources of omega 3 oils are- Chia seeds, Hemp seeds, flaxseeds, sesame (gingelly) seeds, walnuts, and perilla seeds. The educated urban population is quite familiar with the benefits of omega 3 fats for heart health. That has promoted the availability of these seeds in the health food stores. Some of the benefits of Omega 3 fatty acids are:

- i. Reduction of harmful LDL- cholesterol.
 - ii. Better blood sugar control with an improved insulin effect.
 - iii. Improvement in the bone, skin, and hair health The seeds and nuts which are rich in omega-three fatty acids are also good sources of selenium and zinc which are essential for bone, skin and hair health
 - iv. Reduction in Premenstrual symptoms and pain of arthritis – This benefit could be related to anti-inflammatory effects of omega 3 oils.
- d) Human-made unhealthy trans fats and hydrogenated vegetable oils – Vegetable and seed oils are difficult to store because they get bitter and rancid from oxidation. The process of hydrogenation changes the chemical structure of the seed oils to a more stable saturated fat, which has an extended shelf life. Unfortunately, most vegetable and seed oils available in the market are partially hydrogenated and sold under the misguided label of “Cholesterol free and Heart healthy. The process of frying or high heat cooking in partially hydrogenated oils also creates unhealthy trans fats. The refined hydrogenated oils and trans-fats increase the risk of heart disease by:
- i. Increase in the level of harmful LDL- Cholesterol
 - ii. A decrease in the level of healthy HDL-Cholesterol
 - iii. An increase in the levels of triglycerides in the blood promoting inflammation in the body, including blood vessels with blockage.

Because of the well-defined health risks outlined above, nutritional authorities in the Western countries have prohibited the use of trans-fats. In 2018, the World Health Organization set up official guidelines to eliminate trans -fats from the global food supply. Unfortunately, in India, the commercial production of trans-fats such as Dalda and margarine has continued unhindered because of the lack of governmental regulatory oversight.

How much and what kind of fats should we eat?

The fats consumed daily should make up to 20-30% of total calories based on physical activity level, weight, and age. The lower amount for those with sedentary (minimal physical work)

occupation. Children and growing adults require a higher amount of fat calories. The fats in the diet are:

- The visible or added fats which one can see.
- The invisible or hidden fats- These are inherently present in the foods.

The visible fats are fats such as oils, ghee, or butter used in the cooking process. Hidden fats are the fats present in seeds, nuts, grains, milk, egg yolks, and meats. Meat and whole milk dairy products can be a substantial source of invisible fats. The worst culprits amongst the hidden fats are the sweets (especially milk-based sweets), and pre-prepared fried foods, baked goods, and fast foods. Invariably, it is these invisible unhealthy fats in the commercially -prepared foods which create a significant burden of unhealthy fats, causing obesity, Type2 diabetes, and heart disease. Fruits and vegetables do not have fats, the exception being the avocado and coconut, which is rich in healthy saturated fats.

A holistic, healthy meal plan requires minimizing the proportion of invisible unhealthy fats. That includes – meats, dairy, pre-prepared fast foods, and baked foods. It also includes eating healthy fats in the right amount as follows:

1. Cold compressed oils such as Mustard, Sesame oil and Coconut oil (4-6 teaspoons or 20-30gm)
2. Seeds and nuts such as Sesame, flaxseeds, chia, sunflower, pumpkin, melon, almonds, walnuts, peanuts (20-30 gm or a fistful or an ounce)
3. Saturated fats in small amounts- Butter and Ghee (2-3 teaspoon or 10-15gm)

Some healthy tips on frying the food

The fried foods are the staple of fast food chains and restaurants and are rich in calories and unhealthy trans fats. Fried preprepared fast foods are significant contributors to the modern epidemics of food and lifestyle diseases. Even at home, a quick way to put together tasty food is by frying.

It is essential to know that during frying, the water content of the fried vegetable gets replaced with fat, and that is what gives it taste, the crunch and the calories. Since urban humans cannot abandon frying altogether, we must learn what makes fried food unhealthy and how to minimize those limitations:

1. *Frying increases the caloric content of food (each gm of fat adds nine calories)* – To reduce the fat content of the fried item, do not coat the food with the additives which will *soak* more oil. A good example besan fritters (pakoras) without baking soda or frying cutlets and kabobs with no bread crumbs coating. Stir-frying, steaming, and

baking of the vegetables is a better option as these make food tasty without risking excess fat calories.

2. *Do not fry in the refined oils* – Unfortunately, all the vegetable and seed oils available on the store shelves are partially hydrogenated refined oils. Heating the refined oils to frying temperatures converts these to unhealthy trans fats. In contrast, the natural cold compressed oils like mustard oils and coconut oil which have a high smoking point can withstand high temperatures of frying without turning to trans fats. The refined partially hydrogenated oils include – Sunflower oil, Canola oil, corn oil, and many other brands of refined grocery shelf oils. All these unhealthy seed oils get sold under the meaningless labels of “Cholesterol Free.” Oils.
3. *Natural healthy oils which have a high smoke point and are ideal for frying include* – Coconut oil, Mustard oil, Ghee, a mixture of Sesame oil and coconut oil (sesame oil by itself has a low smoking point and adding coconut oil enhances its smoke point).
4. *Do not keep refrying in the same oil* – By the second or third round of refrying, the oil becomes thicker, and that is an indication for discarding it.

Culprits in heart attacks: Sugars versus Fats!!

- i. *Demosi M, Lustig RN et al. The Cholesterol and caloric hypothesis are both dead-it is time to focus on the real culprit- Insulin Resistance: Clinical Pharmacist, 2017.*
- ii. *Willet Dc: Dietary fats and Coronary Heart disease; Review. Journal of Internal Medicine, 2012.*
- iii. *Siri Tarino PW et al. Saturated fats, Carbohydrates and cardiovascular disease. American Journal Clinical Nutrition, 2010.*

Fats from both the animal and plant origin have been an integral part of human diets since the dawn of civilization. Up until the 1960s, humans consumed the dietary fats in their cultural traditions – the saturated (Meat and Dairy) and the unsaturated fats (from plant seeds). The safety net which kept populations from getting obesity, Type2 diabetes, heart disease, and host of all other lifestyle diseases was:

- There were no human-made trans fats and refined oils.
- The commercial refined synthetic carbohydrates and sugary beverages were not available.
- Lifestyles were active.

All this changed with the commercialization of foods, affluence, and automation. Until recently, this momentous change in the diet and lifestyle of the population got overlooked as being a

significant contributor to heart disease. The focus instead went on fats because blood testing in the heart patients shows high lipid (fat) levels in the blood. That observation is what gave birth to the “Lipid- Heart theory” or “Cholesterol – Heart theory “of the 1970s.

The current knowledge supports that the sugar, the human-made trans-fats, and refined hydrogenated oils are the big culprits in causing high levels of harmful fats (lipid levels) in the body and the heart disease. Unfortunately, the “Cholesterol – Heart theory,” has dominated the medical profession and public psyche for 50 years and is not easy to shed. The pharmaceutical industries in the meantime have been making billions on fat-lowering drugs statins. A simple and cheap alternative solution will be to educate the population to eliminate sugars, refined oils, and trans fats for a permanent drug-free solution to heart disease as well as Type2 diabetes.

The truth about “Cholesterol- Heart Theory of the 1970s

Over the past 50 years, the recommendation handed down by the “Cholesterol – Heart Theory” of the 1970s has been “All fats are bad” That concept got incorporated into dietary recommendations and the public health policies. The replacement of fats ended up shifting the food choices of the population to the other two remaining macronutrients – carbohydrates and proteins. The diets of the most western people by default, became rich in carbohydrates, simply because the dietary proteins cost much more. The global community followed this nutritional philosophy leading to the worldwide epidemics of obesity and Type2 diabetes. These epidemics are an unforeseen consequence of Cholesterol- Heart theory of the 1970s.

Interestingly, the American heart association has led the way declaring in their heart-healthy dietary guidelines that one should eat six or more servings of bread, cereal, pasta and starchy vegetables that are low in fat and cholesterol. The global populations fixated on cholesterol theory promoted by the West adopted these dietary guidelines written for the Americans. The commercial food markets took the lead, got focused on lowering fat and cholesterol, replacing these with cheaper carbohydrates and sugars. The diet culture of the world changed with commercial food and pharmaceutical industry leading the way. The American epidemics of obesity, Type 2 diabetes, heart disease, and other lifestyle diseases, have become the global epidemics over the past four decades. Recently, however, the dietary guidelines for Americans were changed to more sensible guidelines of 4-5 servings of fruits and vegetables instead of refined grains like bread and pasta. Hopefully, the global population will reverse the trend on the dietary guidelines promoted by 1970s theory of “ All fats are bad.”

All Fat is not bad !!

Overcoming “all fats are bad “sentiment, will require reeducation of the population regards to three issues:

a) What is cholesterol? What does it do?

b) The truth about “Cholesterol – Heart connection.”

c) What are healthy and unhealthy dietary fats?

Contrary to the negative publicity it has carried; the current research suggests that cholesterol is an essential lipid (fat) for the body. There are trillions of cells in the body. Each of these cells has a protective membrane made of lipid and protein. If there is no cholesterol coming from food, the body must make it's own. So, if there is less cholesterol in the food, the balance will be made up by the liver making more of it. It is good to know few facts on cholesterol:

- Several vital hormones in the body – Cortisol, estrogen, Progesterone, testosterone require cholesterol molecule for the synthesis.
- About 80% of the cholesterol in the body is made internally by the liver. Only the 20% fraction comes from the diet. If one eats the foods deficient in cholesterol, the body will make its own from the sugar. It is ironic that all refined synthetic oils sold in the market which are unhealthy; always carry the label of “No Cholesterol-Heart healthy.” Given the current knowledge, such catchy advertising labels are meaningless.
- When one eats foods rich in refined sugars, it increases the level of unhealthy lipids, which includes – LDL cholesterol, total cholesterol, and Triglycerides. Simultaneously, the level of good cholesterol HDL will decrease.
- Many recent studies suggest that heart disease is an inflammatory disease caused by a high carbohydrate diet of refined sugar and refined wheat flour food products and trans fat consumption. High consumption of refined carbohydrates leads to a vicious cycle of high blood glucose and high insulin levels. Insulin is the glucose utilization hormone, and when there is an excess of it, the body stops responding to it in a usual way. That is called Insulin Resistance. When the body cells are resistant to insulin, most glucose in the body gets converted to fat. The phenomenon of Insulin Resistance is at the root of food and lifestyle diseases such as:
 - Obesity
 - Type2 Diabetes
 - High blood pressure and Heart disease
 - Arthritis
 - Cancer
 - Stroke and more

The culprits in the new epidemic of the above diseases are refined carbohydrates such as cane sugar, high fructose corn sugar used in soda and sports drinks, high fructose fruit juices, milled wheat flours, trans-fats, and processed hydrogenated oils. All these cause insulin resistance with an ongoing inflammatory reaction in the body. The condition which shows up first is Metabolic syndrome with the following features:

a) Abdominal obesity (a large waistline with a prominent belly)

- b) High Blood pressure
- c) High fasting blood glucose
- d) Fatty liver
- e) High Triglycerides (unhealthy lipid)
- f) Low HDL (the good cholesterol)

A food and lifestyle change will completely reverse the insulin resistance, the metabolic syndrome, and save an individual from more severe conditions outline above.

The natural healthy fats: Cold Compressed Oils –Sesame, Mustard, coconut, and Ghee

Reclaiming health requires that the Indian population go back in time 50 year, to their cultural roots of eating healthy fats. For centuries the following natural oils were used for cooking in India:

- Mustard oil (High smoke point, used for high heat cooking)
- Sesame Oil (Low smoke, not for high heat cooking but combined with coconut oil, raises the smoke point for high heat cooking. Sesame oil has health benefits similar to olive oil as it carries 60% of healthy monounsaturated fatty acids.
- Coconut Oil (High smoke point, can be used for high heat cooking)
- Flaxseed Oil (Low smoke point, not for high heat cooking)
- Unrefined filtered peanut oil (High Smoke point, can be used for high heat cooking)- The peanut oil has the limitation of a high level of Omega 6 fats, so amount needs to be limited.
- Olive oil – A new craze in oil not native to India. Most olive oil available in India is not the healthy natural first-press virgin olive oil available in Italy or Greece. The supply of extra virgin olive oil worldwide remains limited. The olive oil available in India is third or fourth press variety, heavily contaminated with refined seed oils. The virgin olive oil has a low smoke point and is unsuitable for high heat Indian cooking. In India, it is better to stay with the indigenous oil such as sesame oil, which comes close to the olive oil in taste, character, and health benefits of having high content(60%) of monounsaturated fatty acids.
- Ghee – Indians have used ghee for thousands of years. Ayurveda has promoted ghee as a health food, which improves digestion and minimizes inflammation. Ghee is currently well known globally, as a healthy saturated fat. The organic food store shelves in the USA are lined up with Ghee. Hopefully, the Indian population will take the lead. Ghee has a high

smoke point and is suitable both for high heat Indian cooking and frying. Since ghee is saturated fat, its intake should be restricted to 2-3 spoons (10-15gm) daily.

Benefits of eating Healthy Fats

The healthy natural fats listed above are rich sources of essential fatty acids called omega 6 and omega 3 fatty acids (Linoleic and Linolenic acids). The essential means the body needs these fatty acids as it cannot make these by itself. The healthy fats are necessary for preserving good health for the following reasons:

- Fats are a good source of energy in the body during fasting periods. Each gm of fat produces 9 calories of energy, twice as much as an equal amount of protein and carbohydrate. Dietary fats are high in caloric value, and therefore, need to be limited to – 20 to 30% of total calories, that amounts to 30-50 gm day. Overweight and obese individuals must minimize their fat consumption as they already have stored fat in their body.
- Fats add flavor to the food making it more palatable and also add to the satiation.
- Fats slow stomach emptying time and postpone the onset of hunger, thereby, minimizing overeating. Low or no-fat boiled diets are not very successful in long term weight loss because these diets neither curb appetite nor provide any satiation.
- Cellular health – A protective lipid-protein membrane surrounds every cell in the body. The lipids, therefore, play an integral role in maintaining the health of body tissues.
- Anti-inflammatory effect – Essential omega 3 fatty acids reduce inflammation in the body. In contrast, commercially produced trans-fats, and hydrogenated oils cause inflammation in the body. Omega 3 fatty acids reduce joint pain in Rheumatoid arthritis, other forms of arthritis, and minimize menstrual cramps. For keeping good health, the ratio of omega 6 Omega to 3 fats should be 4:1.

Omega 3 fats (Alpha-linoleic acid) include – Certain fish, cod liver oil, Flaxseeds (abundant source of omega3 fats) and flaxseed oil, Walnuts, Almonds, Chia seeds, Mustard seeds/oil, Sesame seeds/oil, and unrefined soybean and canola oil (unfortunately, both these oils are available in the market only as refined, hydrogenated form).

Omega 6 fats include – Sunflower oil, corn oil, soybean oil, Peanut oil, cottonseed oil, and Rice-bran oil. Processing or refining of the vegetable oils increases omega 6 fatty acids levels. A significant problem facing the population is that the vast majority of these oils are sold as partially hydrogenated refined products to prolong the shelf life.

- Brain function-About 80% of brain tissue is fat. Most lipids in the brain are essential Omega 3 fatty acid. Diets rich in omega 3 fats promote good memory and protect against anxiety, depression, memory loss, and cognitive decline.