

NUTRITIONAL SUPPLEMENTS THROUGH GEL SUSPENSION TECHNOLOGY

The role of nutritional supplements, and the latest technology of delivery system

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FORWARD

The inhabitants of today's world are facing with a very serious diet crisis. Although the lifespan of a human being today is much longer compared to human beings 50-100 years ago, the real question is whether their quality of life is actually any better? Obesity rates have skyrocketed in almost every nation across the globe. This increase in obesity rate is directly related to bad dietary habits and the lack of physical exercise. And even though today's people may have plenty of money and higher accessibility to obtain food, but their modern lifestyles are continuously progressing and fast-paced; hence their food too is also usually preferred in instant formats that are easy to obtain from anywhere. Fast food diet habits like these have become a trend for today's generation but these foods only provide high quantities of carbohydrates, unprocessed fats, high salt content, but is highly lacking in providing any nutrition at all. People today become fat and unhealthy because the fact is they are lacking in micronutrients that is extremely important for body's biological processes and metabolism. The quality of today's food including fruits and vegetables, have been badly tarnished due to the attitudes and reckless activities of man. Soil pollution caused by the use of chemicals and pesticides as well as preservatives and hormone injections have not only produced polluted foodstuff, but also that of much lower nutritional quality. Weight gain causes much negative strain to our bodies, which in turn increases our risk to developing diabetes, high blood pressure, heart diseases, joint pain, cancers and the possibility of dying at a young age. Environmental pollution and bad habits like smoking has exposed our bodies to a deadly cocktail of poisons, chemicals and free radicals that have been the main cause of skin, joint, eye, and heart problems, not to mention increasing the risk of cancer development too. All these factors do not only affect the physical well-being of an individual, but also the mental well-being – and this is the main reason why so many people today suffer from stress and depression. So, what is the answer to these diet crisis faced by our generation? The answer is available in this small book. Happy reading!

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CHAPTER 1

Nutrients content in food and their requirement

NUTRIENTS CONTENT IN FOOD AND THEIR REQUIREMENT

PREAMBLE



Food is an edible material consumed by man that is necessary to sustain life. From scientific point of view, the term nutrition is commonly used instead of food but what is nutrition? It is defined as the practice of consuming and utilizing food.

Nutritional science is a study on how body breakdown food and the body's reaction to this broken down food, including what happen to the elements in the food when they enter the circulation and react at a cellular level. It also includes the role of these elements on the metabolism and physiological process of a human body.

Our food intake must contain a balance of nutrients in the form of carbohydrate, protein, fat, vitamins, minerals and water. Each of these elements has a specific role in our body. Some have to be obtained from external sources whilst the body produces others. Proper food intake is important for optimum growth and for reproductive organs to function effectively. Food also serves as fuel for mind and physical activity. Some nutrients are essential for normal physiological function of our organs while others enhance our immune system to prevent common ailments such as infectious diseases, and chronic diseases like diabetes mellitus, hypertension and cancer.



NUTRIENTS IN OUR FOOD

We take food for its nutrient content. What is nutrient? Nutrient is simply a beneficial ingredient in food important for our growth and health.



Source: Internet

Two main types of nutrients are:

- a. **MACRONUTRIENT**: consist of energy producing protein, carbohydrate and fat. We usually need these in large quantity. Others like water and fiber are non-energy producing macronutrients.
- b. **MICRONUTRIENT**: these are vitamins and minerals, needed in minute quantity, but yet they are vital.

In paragraphs to follow, macronutrient and micronutrient will be described in greater detail.

MACRONUTRIENT

Macronutrient is a source of energy and also basic building blocks for muscle, skin, etc. There are three main type of macronutrient i.e Carbohydrate, Protein and Fat.

CARBOHYDRATE

Carbohydrate is a chemical compound made of three types of atoms, namely carbon, hydrogen and oxygen. Carbohydrate is divided into monosaccharide (glucose, fructose and galactose), disaccharide (lactose, maltose and sucrose) and polysaccharide (starch). Blood sugar in layperson term is actually glucose that is a type of monosaccharide. Glucose is a main source of energy in human. Galactose is derived from milk or milk products, whilst fructose comes from fruits. Disaccharides consist of two monosaccharide molecules bonded together. All



carbohydrates consumed by human will be broken into small molecules of monosaccharide before being absorbed into the circulation. Polysaccharide being long-chain molecules will take a much longer time to absorb for these molecules need to be broken down to monosaccharide, thus polysaccharide is better than monosaccharide because they do not

cause a sudden surge of blood sugar. Examples of food rich in carbohydrates are bread, pasta, rice, potato and cereals. Each gram of carbohydrate when metabolized will release about 4 kcal of energy. Most people know carbohydrates as the main fuel source in the human body but they also have roles in formation of cell structure, in fertilization, and clotting mechanism.

What is glycaemic index? It is the rate of absorption of different type of carbohydrates, the higher the glycaemic index of a particular carbohydrate the faster the absorption. Usually polysaccharides have low glycaemic index as compared to monosaccharides because of the time taken is longer to breakdown the polysaccharides. Among monosaccharide, fructose has a lower glycaemic index than glucose. Low glycaemic index carbohydrates have the following advantages, low incidence of weight gains, better diabetic control, less chances of getting diabetes, lower risk of heart disease, reduces hunger pangs and better endurance during physical activity. Examples of food with low glycaemic index are oat, barley and bran.

PROTEIN

Protein is a group of amino acids, consists of nitrogen, carbon, hydrogen and oxygen atoms. Amino acid is the smallest base unit of protein molecules and there are 20 types of amino acids known today. The arrangement of these amino acids determines the type and function of each protein. Although protein is also a source of energy (1 gram protein = 4 kcal of energy), more importantly protein function as a basic building block for hormones, muscles and support tissue. Protein also plays a

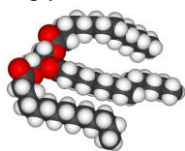


role in many biochemical processes in the body. Of all available amino acids, our body produces only 10 of them (non essential amino acids), and the rest has to be outsourced externally from food we consumed. The lack of even one amino acid may be detrimental to the body to

function, to the extent that body's own muscle tissue can be broken down to fill the shortage gap. Unlike carbohydrates or fats, human body is not designed to store excess protein. The 10 amino acids produced in the body are alanine, asparagine, aspartic acid, cysteine, glutamic acid, glutamine, glycine, proline, serine, and tyrosine.

FAT

Similar to carbohydrate, fat consists of carbon, hydrogen and oxygen atoms. Fatty acid like amino acid (in protein) is the base unit for fat. The combination of fatty acid and glycerol will form more complex triglycerides. It is a common fact that fat is associated with diseases, but



do we know that without fat, life cease to exist. Among its many functions, fat produces the highest amount of energy i.e. 9 kcal for each gram. There are 4 types of fat i.e saturated fat, monounsaturated fat, polyunsaturated fat and trans fatty acid.

Saturated fat: This fat will solidify when kept below 0°C. Saturated means it is saturated with hydrogen atoms thus its name, saturated. Excessive intake can harm the body and cause the rise in cholesterol level. The high level of cholesterol if left untreated will block the arteries, especially the coronary artery leading to coronary artery disease (acute coronary syndrome). Saturated fat mainly derived from meat, meat products, internal organs, milk products and



processed food such as cakes, pastries and coconut oil.

Monounsaturated fat: This type of fat will remain liquid even below freezing temperature. Monounsaturated has only one space for hydrogen atom. According to nutritional expert, monounsaturated fat has the advantage to moderately reduce the risk of coronary artery disease. Examples are olive oil and avocado oil that are widely used among people in the Mediterranean.



Polyunsaturated fat: Unlike saturated fat, polyunsaturated fat has more spaces for hydrogen atoms. Nutritional experts agree that this type of fat is good for health, especially to the heart. The fat derived is known as omega-3 polyunsaturated fatty acid. It is said to protect the heart from coronary artery disease by reducing the cholesterol level, and many believe it is useful for arthritis and some skin diseases. Its main sources are sardine, trout, herring and mackerel, sunflower seed oil, corn oil, etc.



Trans fat: This is a synthetically- produced fat. Adding hydrogen in vegetable oil in order to solidify it produces trans fat. Trans fat can either be monounsaturated fat or polyunsaturated fat, but never a saturated fat. It is neither required by the body nor does it provide any health benefit. Excess in intake of trans fat can increase the bad cholesterol (LDL) whilst reducing the good one (HDL), hence causing higher risk of coronary heart disease and stroke. Regrettably, trans fat is popular amongst food manufacturers because it is cheap, improve food flavour, and prolonged shelf life of food. It also being used widely in a fast-food restaurant, for cooking French fries, donut, pizza, cookies, crackers, to name a few; and is also contained in stick margarine. A statement from American Heart Association warned about consumption of trans fat must not be more than 1% of total caloric intake.



Cholesterol: Cholesterol despite its bad reputation for health is actually important for certain bodily function provided that the level is kept within a safe range. It occurs naturally in the body and plays a role in cell membrane, digestion of food, hormone and vitamin D formation. It can also be consumed through food intake. There are 2 main types of

cholesterol; the good cholesterol HDL and LDL the bad one. High level of LDL has been linked to circulatory diseases, coronary heart disease and stroke. LDL cholesterol gets deposited on the vessel wall forming plaque, eventually reduces the blood flow or even blocks the blood supply totally. The normal level for total cholesterol is below 5.2 mmol/l, HDL > 1.02 mmol/l in man, 1.3 mmol/l in woman, and LDL < 2.6 mmol/l. It is important for us to keep the level of our HDL high and LDL low by consuming food low in saturated fat, performing a regular exercise, and consuming a lot of food with high fiber such as fruits and vegetables.



CARBOHYDRATE, PROTEIN, AND FAT – HOW MUCH SHOULD WE CONSUMED?

In order to maintain health, carbohydrate, protein and fat must be consumed in appropriate proportion. The recommended proportion is based on their contribution for the energy requirements of a day. We know that each gram of carbohydrate and protein will each produce 4 kcal of energy, while 1 gram of fat produces 9 kcal of energy. According to Dr Barry Sears who invented “Diet Zone”, our daily intake should consist of 30% fat, 30% protein and 40% carbohydrate. Fat that contains omega-3 and vegetable oil is highly recommended. For someone who eats a balance of these 3 components of macronutrient, carbohydrate will be first



to be broken down for energy followed by protein and fat. But if more carbohydrates are consumed, any excess will be converted into fat and get deposited in the body. The amount of calories needed varies according to age, physical activity, lifestyle, and disease. On average, an adult male needs 1800 calories daily while a woman needs an average 1200 calories. Although we are advised to eat meals low in calories, it must not be too low as recommended in some weight reduction program where less than 800 calories are consumed.

This can cause detrimental effect on our health. Prolonged low caloric intake will result in i) protein breakdown to produce energy, hence muscle atrophy (shrinking of muscle) ii) lower basal metabolic rate, iii) lethargy, poorly nourished, emotional disturbance, iv) lack of water, and v) more ketones are produced.

MICRONUTRIENT

Micronutrient is another type of nutrient needed by our body, and its supply comes from food source. Although taken in small quantities, it is doubtless that micronutrients are important for physiological function. Micronutrient to our body is like electrical energy produced by a car battery. A car is useless without a functioning battery, despite having state of the art gadgets. Vitamins and minerals are examples of micronutrient. They are important in formation of various enzymes, hormones and other elements for growth and development. Micronutrient is also important for the conversion of food to energy, and the absence of just one micronutrient can render a negative impact on our health. According to a World Health Organization (WHO) report, the lack of iodine, vitamin A and iron are common amongst pregnant mother in many parts of the world.



There are two types of micronutrient:

1. MINERALS
2. VITAMINS

MINERALS



Dietary minerals also known as mineral nutrients are the chemical elements required by living organism, other than the four elements of carbon, hydrogen, nitrogen and oxygen present in common organic molecules. They are at least 16 types of minerals according to experts needed by our body.

Potassium : its presence in every part of the body responsible for the regulation of ATP in every cell for energy utilization and formation of RNA. Lack of potassium affects the nervous system, cardiovascular system and physically lethargic. In high amount, potassium will disturb the conduction system of the heart causing rhythmic, and heart muscle contractility problems. Bananas, cherries, onion, apple and garlic are the best source of potassium.



Chloride: apart from being part of hydrochloric acid in the stomach for digestion, chloride plays a role as a pump in transporting in and out of a cell.

Sodium: it exists everywhere in the body, like potassium, sodium too, is essential in regulation of ATP.

Calcium: it is the most abundant of all minerals found in our body. Apart from bone, calcium is important for the wellbeing of muscle, heart, and digestive system. Bone development, blood components, clotting system, information relay of nervous system, and hormonal secretion. Low in calcium may result in muscular spasm, stomach cramp, osteoporosis, tooth decay, tiredness and others. On the contrary, excess calcium may cause muscle weakness, constipation, rhythmic heart problem, kidney stone, and failure in iron absorption leading to anaemia. Calcium is abundant in water, milk and milk products, tofu, broccoli and cabbage.



Phosphorus: an important mineral in bone and energy production. It is the second largest mineral exist in the body. Phosphorus is important for strength and development of normal bone and teeth. Deficiency of phosphorus causes rickets, tooth decay and tiredness. Among sources of phosphorus are meat, beans, cereal, milk and milk products.

Magnesium: it is important in processing of ATP, and bone health. Magnesium is needed for normal functioning such as muscle contraction, clotting system, regulation of blood pressure, food metabolism, and immune system. Lack in magnesium causes disturbance of nervous system, cramps, uncontrollable muscle contraction, and difficulty in swallowing and laryngeal spasm. High level of magnesium can result in nausea and vomiting, respiratory disturbance, and low blood pressure. Food rich in magnesium are beans, wheat, green vegetable, chocolate, and seafood.



Zinc: some enzymes require zinc for their normal function. Zinc also helps in converting food to energy. Together with calcium and magnesium, they have a role in bone health. Lack of zinc may impede normal growth of the body, anaemia, skin discolouration, enlargement of liver and spleen, testicular dysfunction, impair wound healing



and defect in the immune system. Protein rich food like meat, seafood, and cereal contain high zinc content.

Iron: apart from its main function in formation of haemoglobin, iron helps in production of protein and enzymes function. Its low level may lead to iron deficiency anaemia but in excess, it affects pancreas and heart causing organ failure. Red meat, eggs, oatmeal and broccoli are all good sources of iron.



Manganese: act as co factor in enzymatic function and helps in food conversion to energy. It is stored in bone, liver and kidney. Manganese deficiency causes fainting attacks, hearing problems, weak tendon reflex, etc., it may impair iron absorption if taken in excess. Foods rich in manganese are beans, wheat and vegetables.



Copper: an important component to a number of enzymes. It helps in conversion of food to energy. Anaemia, low white blood cells and platelets as well as disorder of nervous system may occur if copper level is lower than normal. Among food rich in copper are wheat, seafood and water.

Iodine: its sole function is in formation of thyroxine hormone. Thyroxine plays an important role in regulating body metabolism, regulation of temperature, growth, nervous system development and muscle function. Lack of iodine hence thyroxine (hypothyroidism) has a dreaded effect in well-being of newborn causing mental retardation if untreated. It may cause goitre (enlargement of thyroid gland) in adult and series of medical problems. Iodine is abundant in iodide salt, seafood and seaweeds.

Selenium: has a role as co-factor in antioxidants. Deficiency in selenium may lead to lethargy, heart problem, and cartilage damage. It is also important in normal function of thyroid glands. Together with vitamin E, it functions as an effective anti-oxidant. Foods high in selenium are fruits, vegetables, meat and also seafood.

Molybdenum: is important for the normal functioning of 3 types of enzymes namely xanthine oxidase, aldehyde oxydase, and sulfite oxydase. It helps in converting food to energy. It has a role in the formation of uric acid, and utilization of iron and carbohydrate metabolism. Deficiency in molybdenum impairs metabolism and reduces red cell counts. Green vegetables, milk and milk products, green pea and wheat are foods rich in this mineral.



Vanadium: vanadium maintains the normal blood sugar level, it also strengthened the bones and teeth. Wheat, mushrooms, and seafood are rich in vanadium.

Chromium: carbohydrate metabolism needs chromium. It helps transporting glucose into cells. It also helps in converting carbohydrate into fat and energy. Chromium can be obtained from meat, beans and vegetable oils.

VITAMINS



Vitamins are another important micronutrient for our health. They are organic elements that are essential physiologically, albeit in a minute amount. Of 13 vitamins only 2 **are produced by our body**, vitamin K and D. Each has its own unique function, any deficiency will result in a specific condition peculiar to that deficiency. Rickets is a result lack of vitamin D, while lack of vitamin A will affect the eyesight, especially at night. There are 2 types of vitamins, the fat-soluble vitamin, consist of A, D, E, K and water-soluble vitamins, Vitamin B and C. Due to its nature of absorption in the intestines together with fat, fat-soluble vitamins are retained longer in the body, whilst they are not easily excreted. Therefore, deficiencies in fat-soluble vitamins are rare as compared to water-soluble vitamins as the later are excreted through kidneys and has to be taken more frequently.

Vitamin A : known as retinoids, retinols or carotenoids. Vegetables like broccoli, spinach, carrots, pumpkins, and mangoes are some examples of vitamin A rich food. Its deficiency can results in night blindness, anaemia, joint pain, and tooth



decay. Taken in excess may lead to keratomalacia, a degenerative disease of a cornea.

Vitamin B1 : known as thiamine. Foods rich in thiamine are wheat, beans, meat, and green vegetables. They are easily destroyed during heating and storage. Lack of vitamin B1 can cause muscular weakness, depression, confusion, and nervous system disorder. Long standing lack of vitamin B1 can lead to Beriberi.



Vitamin B2 : known as riboflavin, its rich sources are asparagus, broccoli, spinach, meat, fish, mushrooms and milk products. Deficiency in vitamin B2 may leads to slow wound healing, oily skin and inflammation of eye, lips and tongue.



Vitamin B3 : known as niacin, its main sources are milk products, meat, beans, and wheat. Vitamin B3 deficiency can lead to lethargy (tiredness), loss of appetite, diarrhoea, pruritus (itchiness) and confusion.

Vitamin B5 : it is also known as pantothenic acid. Eggs, meat, mushrooms, broccoli and wheat are examples of food rich in vitamin B5. Lack of vitamin B5 may cause lethargy, vomiting, abdominal pain, difficult to sleep, depression and easily irritable.



Vitamin B6 : known as pyridoxine, and easily obtained from food such as banana, potato, soy bean, chicken, fish, cereals, and meat. Among symptoms and signs of vitamin B6 deficiency, are anaemia, depression, confusion, lethargy, headache, nervous system disorder and pruritus.

Vitamin B7 : or biotin can be obtained from soybean, egg yolk, and fish. Lack of Biotin can lead to dermatitis, lethargy, numbness of feet and arms. It can also cause hair loss and inflammation of the intestines.

Vitamin B12 : known as cobalamin or cyanocobalamin. Its best-known sources are milk products and meat. Its deficiency is rare due to the body's ability to store and re-use it again. Lack of vitamin B12 can cause lethargy, sensitive skin, anaemia, sore tongue and degenerative disorder of a nervous system.

Folate : an extremely important element for DNA and in early stages of development. It is important for expecting mother, and folate deficiency

can cause a neural tube defect to the baby. Some of the folate rich foods are asparagus, green vegetables, wheat, nuts, orange and avocados. Low in body's folate will lead to lethargy, headache, confusion, anaemia and bowel disorder. Folate deficiency commonly occurs among those with high cells turn-over such as pregnancy, cancer patient, burn, measles and blood loss.



Vitamin C : known as ascorbic acid, a powerful antioxidant. Fruits such as orange, berries, and vegetables, especially green vegetables, tomatoes, and potatoes are rich in this element. Lack of vitamin C will cause poor wound healing, joints pain, bone pain, blood vessels fragility, and malocclusion of teeth. It is also helpful in preventing colds and infection.

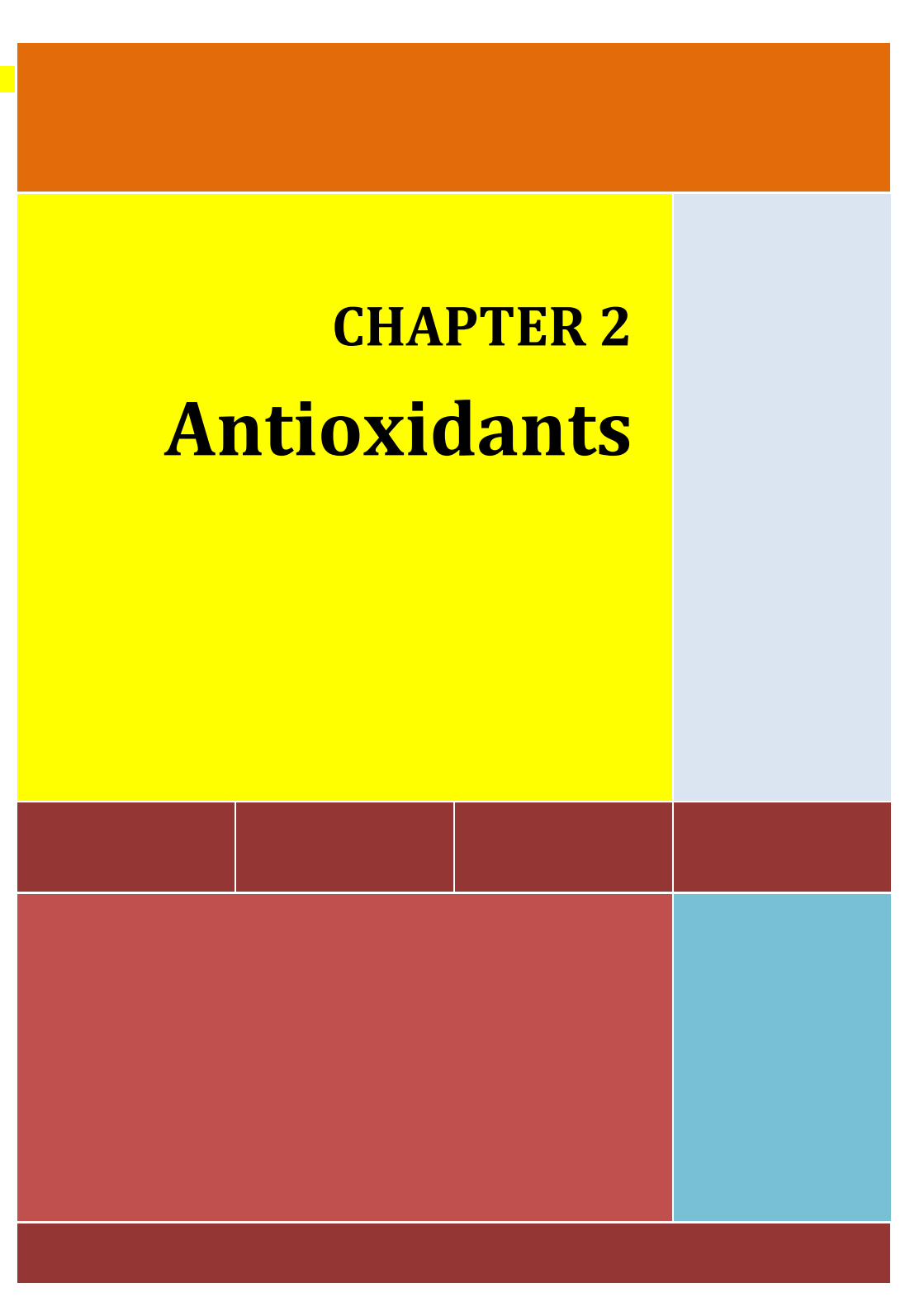


Vitamin D : known as calciferol. Our body produces vitamin D with the help of sunlight. Together with vitamins A, C and K, they are important micronutrients for bone health. Apart from body's own production with exposure to sun's UV light, vitamin D can also be consumed from food such as milk, margarine and cheese. Lack of vitamin D can lead to rickets and osteoporosis.



Vitamin E : also known as tocopherol. An anti oxidant which can be obtained from vegetable oils, olive oil, green vegetable, wheat, and cereals. Low in intake may cause lethargy, muscle cramps, poor vision, nausea, anaemia, and speech disorder.

Vitamin K : known as phyloquinone and menaquinone. Phylloquinone is obtained from food while menaquinone is produced from bacterial activity in the intestines. Vitamin K is essential in formation of protein that regulates the clotting mechanism in human and bone health. Because vitamin K deficiency is a common occurrence among newborn, it is administered to all newborn infants. Failure to form clots and brittle bone are among signs of lacking in vitamin K. Excessive intake of mineral oils, antibiotics and anti epileptic drugs can interfere with the absorption of vitamin K.

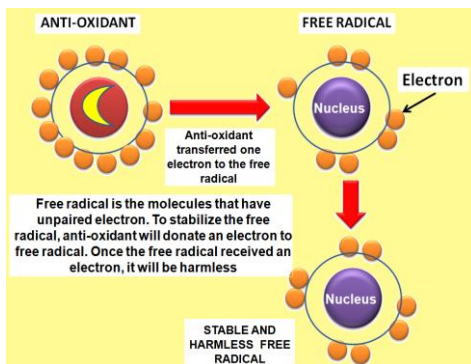


CHAPTER 2
Antioxidants

ANTIOXIDANTS

What is antioxidant?

Antioxidant is a substance that is capable in prevention and slowing down cell damage as a result of oxidation. To understand what oxidation is, let us see what happen if we leave an apple in open air for a few days. It starts with few brown patches gradually turn dark and eventually become soft and begin to rot. This darkening process is a result of oxidation. It is due to the release of free radicals more than the naturally existing antioxidants. To understand more about antioxidants we have to know what free radicals are. They are active atoms or a molecule that has at least one unpaired electron and is therefore unstable and highly reactive. Free radicals are very unstable and react quickly with other compounds, trying to capture the needed electron to gain stability. Generally, free radicals attack the nearest stable molecule, "stealing" its electron. When the "attacked" molecule loses its electron, it becomes a free radical itself, beginning a chain reaction. Once the process is started, it can cascade, finally resulting in the disruption of a living cell. The disruptions of cells involve cellular proteins and even DNA. The effects are seen as accelerated ageing process and cell death manifested by degenerative diseases such as arthritis, hardening of blood vessels, heart disease, stroke, hypertension and cancer. Free radicals are also said to cause psychological problem including stress and depression. There may be millions of free radicals either in the body or in the environment. Some examples of free radicals are superoxide anions, hydroxyl radical, nitric acid and ozone. Of all free radicals, the most active and plays an important role in our body is the one with oxygen atom. They are known as oxygen free radicals or reactive oxygen species (some well known are radical superoxide, radical hydroxyl, and hydrogen peroxide). In our body free radicals are produced during aerobic respiration, metabolism and inflammation, whereas in the environment free radicals are product of pollution, sunlight, radiation, cigarette smoke and alcohol.



Role of antioxidant

Antioxidant prevents oxidizing process by neutralizing free radicals. When that happens the antioxidant itself will be oxidized and thus neutralized and renders inactive. For this reason, our body needs a constant supply of antioxidants since free radicals are always produced inside the body and outside in the environment. There are two ways how antioxidant works:

- **Impedes the cascade of free radicals:** when attack by free radicals, it either 'steals' or 'donates' an electron to a stable molecule converting it to free radicals and thus starting the cascade by 'infecting' other molecules. Antioxidant stops this chain reaction, and the damage caused by free radicals is either lessened or halted. The damages may not be restored but at least stopped.
- **Preventing the formation of free radicals at an early stage:** antioxidant can also act by preventing the discharge of electron, thereby inhibit the effect of free radical from beginning. Among antioxidant capable of preventing the formation of free radicals are superoxide dismutase, catalase, and glutathione peroxidase.

The actual action of antioxidant is highly complex and difficult to comprehend. Its effectiveness in defending the body from deleterious action of free radicals depends upon various factors namely; type of free radicals, how and when it is produced, the extent of damage incurred and so on. Theoretically, the ability of our body to defend against free radicals onslaught depends on numbers of antioxidant available in the body and in food taken.

Types of antioxidants

They are available within and outside our body. Since we may not produce enough antioxidants, we have to outsource from food we eat. In order to minimize the effect of free radicals, we have to consume food rich in antioxidant. There are three types antioxidants,

1. **Antioxidant nutrient:** these are actually nutrient with antioxidant properties. They are distinctive either structurally or functionally. Some examples are, vitamins E & C, beta-carotene, selenium, manganese and zinc.

2. **Antioxidant enzymes:** these are superoxidase dismutase, catalase and glutathione peroxidase.
3. **Other antioxidants:** apart from vitamins, minerals and enzymes, there are other compounds which act as antioxidants, such as, co enzyme Q 10 (CoQ10), uric acid, fucoidan, and phytochemicals (plant in origin, like, carotenoids from carrot and tomato, curcumin (turmeric), flavonoids (apple and grapes), isoflavones (soybean, peas), lignan and phenols (berries and tea).

Does antioxidant restore health?

It is a known fact that free radicals if left uncontrolled will be detrimental to health, thus the unquestionable importance of antioxidants in our body if taken in a right amount. There are a number of studies on the effect of beta- carotenes, vitamins E and C. Majority of these studies show benefits of antioxidant, although some however show otherwise. Some well-known studies are ATBC (the alpha-tocopherol beta carotene cancer prevention study), CARET (carotenoid and retinol efficacy trial), PHS (physician health study), and AREDS (age-related related eye disease study). The different in results shown in these studies may be explained as follows,

- The different in dose and quantity of antioxidants, some in an excessive amount may have caused negative effects.
- Simultaneous consumption of antioxidants in the form of fruits and vegetables.
- The cohort of patients in some studies may be of the elderly group, render antioxidant ineffective.

Nevertheless, hundreds of observational studies on eating habits and diseases showed individuals with high intake of antioxidant have lower risk of contracting diseases such as cancer, heart disease, stroke, cataract, Alzheimer disease and joints disease. Most scientists agree that antioxidants are beneficial for health. The American Heart Association in a statement recommends a balanced diet with food rich in antioxidants. The statement also agrees on the importance of antioxidants to be taken as health supplements.

Oxygen Radical Absorbance Capacity (ORAC)

ORAC is a method of quantifying the capacity of the antioxidant in the biological samples outside the human body. The assay measures the oxidative degradation of the molecules tagged with the fluorescent (e.g fluorescein). The free radical will be generated by the free-radical generators such as azo-initiator compounds. This artificially free radical will act on the fluorescein and removed the fluorescence from the molecules. By adding the antioxidants, it is possible to measure their capacity by measuring their ability to prevent the fluorescent molecule from losing their fluorescence. The intensity of fluorescence (the more fluorescent molecule, the higher intensity of the reading) can be measured by fluorometer which indirectly quantifying the degree of protection by the added antioxidants. In other words, the presence of antioxidant will slow the fluorescence decay. The decay curves (fluorescence intensity versus time) are recorded and the area between the two decay curves (with or without antioxidant) is calculated. Subsequently, the degree of anti-oxidant-mediated protection is quantified using the so called antioxidant trolox (a vitamin E analogue) as a standard. Different concentrations of trolox are used to make a standard curve, and test samples are compared to this. The results for test samples (foods and substances) are published as “trolox equivalents” or TE. The ORAC score or scale of different foods/substances are identified based on this comparison.

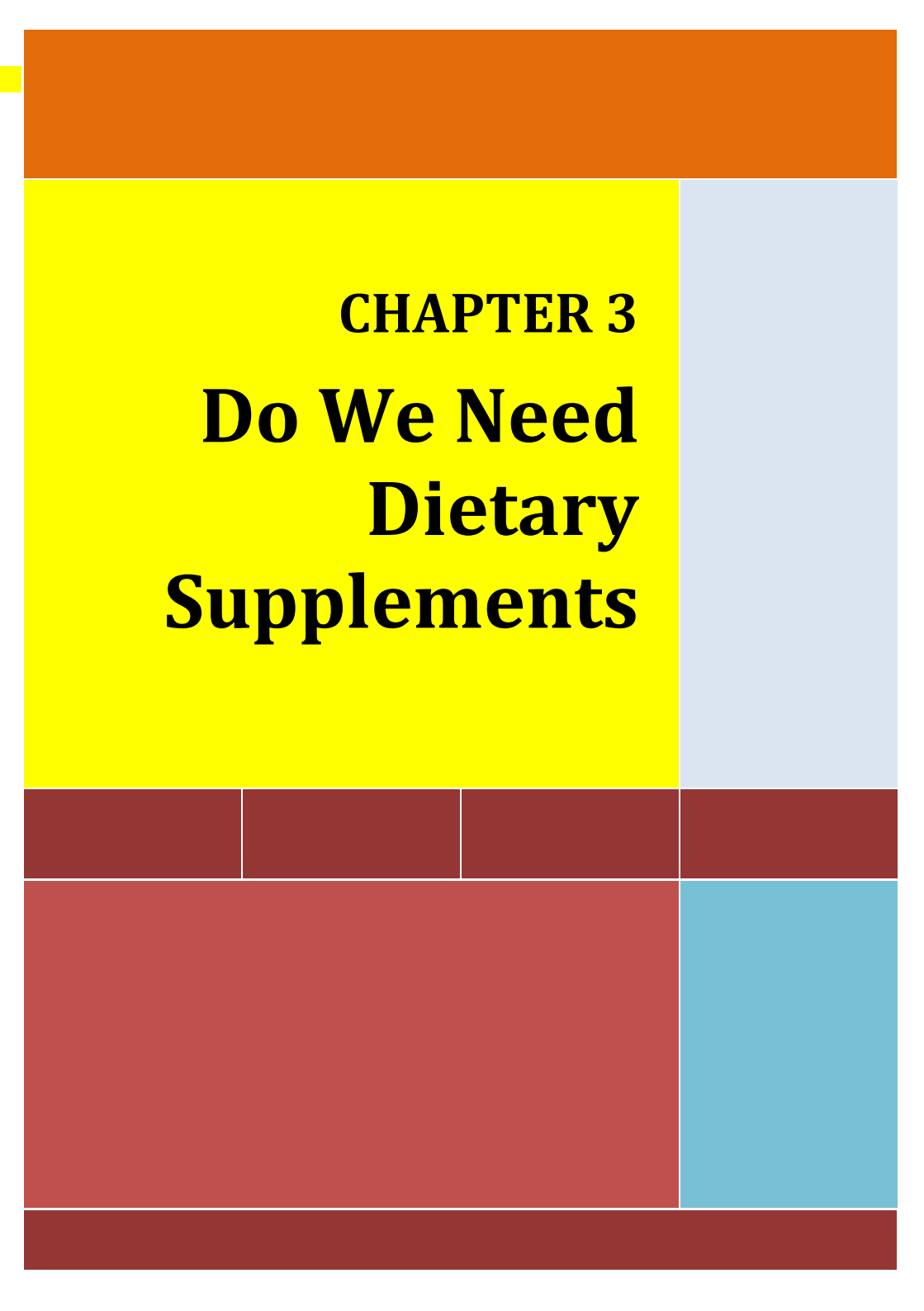
The value of ORAC scale/score for some foods/fruits was published by USDA, for instance, 1 cup of wild blueberry has an ORAC scale of 13,427 unit while 1 cup of raspberry has ORAC scale of 6,058 unit. Interestingly, study had shown that with nearly all vegetables, conventional boiling can reduce the ORAC scale by up to 90%, while steaming retains more of the antioxidants. Some of the ORAC scale published by USDA (US Department of Agriculture), BHNRC, etc is shown in the table below. The drawback of ORAC scale is that, this is based on in-vitro (outside human body) analysis, the relationship between ORAC values and a health benefit has not been established.

ORAC Scale of Selected Foods – 2007,2010 (USDA)

Food/fruits	Mean Total ORAC scale (umol TE /100gm)
Apple with skin	2589
Apple juice	414
Acai, fruit pulp,skin	102700
Acai, juice blends	1767
Apricots, dried to 40% moisture	3234
Apricot raw	1115
Avocados, raw	1933
Bananas, raw	879
Blackberries, raw	5347
Blueberries, raw	6552
Bread,oatnut	1318
Broccoli , raw	3083
Broccoli, cooked	1552
Chokeberry, raw	16062
Corn, sweet, raw	728
Cranberries,raw	9584
Dayes,deglet noor	3895
Elderberries, raw	14697
Garlic, raw	5346
Ginger root,raw	14840
Grapes, raw,red	1548
Grapes, black	1746
Guava, white fleshed, raw	2550
Lemon balm, leaves,raw	5997
Limes,raw	82
Mangosteen, raw	2510
Noni,raw	800
Nut Almond	4454
Onion, red,raw	1521
Pears,raw	2941
Plum raw	6259
Pomegranates, raw	4479
Raspberries, raw	4882

Raspberries,black	19220
Soybeans, mature seeds,raw	5764
Spinach, raw	1515
Strawberries, raw	3577
Watermelon, raw	142

Source : Oxygen Radical Absorbance Capacity (ORAC) of Selected Foods – 2007,2010 (Release 2) prepared by Nutrient Data Laboratory, BHNRC,ARS and US Department of Agriculture (USDA) in collaboration with Arkansas Children’s Nutrition Centre.
<http://www.ars.usda.gov/nutrientdata>.



CHAPTER 3

**Do We Need
Dietary
Supplements**

DO WE NEED DIETARY SUPPLEMENTS ?

What is a dietary supplement?

Dietary supplements are vitamins, minerals, herbs and other ingredients consumed as supplements to our daily food intake to improve on any lack of nutritional value of food. Dietary supplement has actually been practiced for many years and has become a huge industry in various countries, including Malaysia. It is a multibillion dollars industry, and in United States alone it is projected to generate USD 6 billion in 2011. Studies have shown that almost 56% of American adults consumed some form of a dietary supplement.



Do we need them?

Yes. We need a dietary supplement if our dietary habit is improper and if food taken is unable to supply enough vitamins, minerals and other necessary elements.

Do you have a perfect eating habit or is food taken nutritionally adequate? The answer to this question will be revealed at the end of the chapter.

Nevertheless, at this point of time, the answer to the above question is that you probably have difficulty in maintaining the proper eating habit, coupled with the fact that foodstuff available today may have lost most of the nutrients.

This is an indisputable fact. First, food value and eating habit these days are unhealthy and secondly, environmental pollution could have deteriorated the state of affair and our bodies need more strength to keep healthy.

What causes a low nutritional value in our food?

There are many factors contributing to low nutritional food value. Soil and water today are heavily polluted. Our seas and rivers as the main source of food are contaminated as well as a result of human greed and chemical pollution. The polluted food source in fish and other marine life will eventually reach us in the form of toxins and heavy metals such as

mercury and copper. None of our sea or ocean is spared from pollution, including sea around our country, as a result of our lack of awareness of the importance of safeguarding our environment. The water has become murky as a result of numerous contaminants such as toxic material, bacteria and chemical compounds capable of causing various types of diseases in human. The thought of drinking polluted water worries us all, amid food consumed already low in nutritional value. It is without doubt that we are to be blamed for soil contamination, especially in the dumping sites where waste produced contains chemicals, poisons, bacteria, heavy metals capable turning fertile grounds into deadly grounds. As a result, today's soil is incomparable to soil condition decades ago hence what could be expected to grow from this contaminated soil? The use of pesticides and additives to soil has also been identified among other factors causing soil deterioration. Among



well known pesticides, organophosphates has been blamed to cause the reduction in calcium as shown by a research in broccoli calcium content, where its calcium content has reduced to a mere 15% as compared to 50 years ago. A study by Consumer Association of Penang on 1500 samples of vegetables grown in Malaysia and those imported showed between 15-38% contained high amounts of pesticides. Do you know that these pesticides can be deleterious to health causing cancers, affecting our reproductive systems and has negative effects on our brain and nervous systems?

Even the air that we breathe is not free from pollution; factories have been shown to spew gases with various types of toxins known to spread very fast and covering large areas. These gases are not only toxin-laden, but also contain free radicals that are continuously released into the environment. They can damage our body organs, cause genetic anomalies and mutation leading to abnormal babies, cancers and other chronic illnesses. Another significant contributor to the release of green house gases is from cars run on fossil



fuel, which can choke cities with smog and haze. High toxin content in cigarettes is well known to cause gradual health damage to the smoker but also those around him as passive smokers. Other sources of air pollutants are from open burning and forest fires.

Human beings are also exposed to radiation that can lead to cancer. Radiation leaks can occur in places such as laboratories, health centres and nuclear reactors. Radiation can also occur naturally from radon gas release as a result of uranium fission. This radioactive material can be anywhere from subterranean rock layers of earth in forests, caves, mountains, and even beneath our own homes! W.H.O has stated that radon is one of the causes of lung cancer. The worst nuclear reactor disaster ever recorded in human history in Chernobyl, Ukraine revealed its deadly effect in causing birth defects, leukemia and cancers in generations to come. Pollution has also resulted in thinning of the ozone layer thus exposes human being to UV light causing a high incidence of skin cancers.



Quality of our food today

Is the quality of food taken today better than that taken by our ancestors? How many of us consumed self-produced food, far from being polluted, grown from soil free from pesticides and chemicals, uncontaminated water source, low in fat and carbohydrate but rich in fibre?

Fruits and vegetables contain a high amount of anti oxidants, fibres, vitamins and minerals, but can we really depend on these two sources?



In reality, they have undergone many processes before reaching our kitchens, from the time of harvesting, packing and finally being kept refrigerated for a long duration. Are we aware that these fresh looking fruits and vegetables are actually preservatives added and should be our cause of concern? This is especially true

for imported fruits and vegetables where time taken to reach us can be quite long thus affecting the quality of nutrients content. The situation is quite alarming not just for their reduced nutrients content but also

microorganisms such as bacteria and fungus can grow easily, which eventually affects our health.

It is a fact that most of us prefer a flavor to quality of food taken. Overcooking can deplete the nutrients' content and to make it even worse, the food prepared contain high amount of oil, fat and high in calories. Other aspects that may contribute to reduce nutritional quality of food and food-borne diseases are attitude of food handlers who have little or no knowledge in hygienic preparation of food, and working in dirty food outlets.

Food preservations initially intended to store excess food has now become an industry but these innovations are not without problems because preserved fruits are known to have high content of sugar, food colouring and dangerous preservatives. If taken in excess, they can cause various diseases in a human being.

Plastic containers for keeping and carrying food too have been shown to release some types of toxins. This can cause a serious problem since it can directly absorb into the food and in a long term, it may cause certain types of cancers. This toxic containing plastic not only affecting our food but also found in toys played by our children.

Food processing is a major industry worldwide and variety of foodstuffs now is processed in large quantities. They contain preservatives, colouring agents, chemicals and most disturbing is its low nutritional quality. These foods are unhealthy but sadly loved by children



It is almost impossible today to get food that is free from preservatives, artificial colouring and remnants of pesticides. There is a choice however, if we grow our own vegetables, livestock for meat but are we capable to do it? It is indeed a possible alternative but how can we determine our soil, water and air free from pollution?

Today's lifestyle

In today's way of living fast food has become our daily routine and some considered fast food as a trendy lifestyle. It is a misconception to some that fast food is nutritionally adequate, whereas, in reality, fast food contains a high amount of fat, salt and sugar. Do we know that a can of carbonated drink contains 14 teaspoons of sugar? A piece of burger may

consist of 54 gm of fat and contribute to 59% of our daily caloric intake. Well, that is only two elements, what about its chemical content, salt, artificial flavour, and colouring, more importantly its mineral content and vitamins. This is one of the reasons why obesity, dental caries, chronic illnesses like diabetes, hypertension, coronary artery disease and risk of cancers are on the rise.



Cigarette smoking is the main cause of lung cancer, coronary artery disease, arterial disease, stroke and chronic lung illnesses. Smoke from cigarette is said to have no less than 60 types of carcinogens. Cigarette smoking may seriously affect pregnancy, to both mother and fetus in the womb. Do we know that even by being close to

smokers, we become passive smokers and have 50% risk of getting lung cancer?

Sedentary lifestyle such as lying idle in a couch all day watching television at home, life devoid of sports or useful physical activities expose oneself to obesity, coronary artery disease, hypertension, osteoporosis and arthritis. Most health problems are as a result of our unhealthy lifestyle, poor nutritional habit and low nutritional value of our food made worse by environmental pollution leading to triad of hypertension, diabetes mellitus and coronary artery disease, if left untreated or no change in lifestyle in due course will lead to death. Obesity, which is related to many health problems, used to be common in the West but lately the incidence in some developing countries reaches 60% of the population.



The rising incidence of cancer worldwide has been related to nutritional habits, exposure to carcinogen, viral infection and various types of poisonous chemical. The W.H.O has estimated about 50% rise in a cancer incidence by year 2020.

Cigarette smoking has been held responsible for causing lung cancer whilst obesity is related to cancer of breast and uterus. Radiation exposure can lead to skin cancer and leukemia. Nevertheless, are we aware that as high as one-third of cancer can be prevented through healthy lifestyle



and through a screening test? The more our environment is polluted the more we see problems related to respiration such as asthma, skin diseases, rhinitis, and stress-related problems.

Finally, with nutritional problem, environmental pollution, chronic illnesses and stress we see more and more people tend to look older than their true age, and it only validates that all factors mentioned above accelerate the ageing process.

20 reasons on why you need a nutritional supplement

Since the discovery of nutritional related diseases such as scurvy, pellagra and beriberi more scientists and nutritional experts believe that food supplement is important. It is a well-known fact that nutritional supplement such as folate supplement before and during pregnancy reduces the rate of a neural tube defect, so as taking extra calcium and vitamin D may help in prevention of osteoporosis. Although not many strong evidence on the benefits of routine nutritional supplement intake available, nonetheless not enough evidence does not mean no evidence at all and most evidence available are not large enough for reference.

Our discussion so far can be summarized with the following 20 reasons on what causes our low nutrient intake and why we need a supplement.

Reason 1 : Fast food has taken us by storm in the last decades not just in the West but encroaching at a phenomenal pace in less-developed countries, expanding in tandem with our modern lifestyle. Fast food has unusually high carbohydrate, fat and salt content. It may appear to provide a balanced nutrition, but in reality, it promotes obesity, diabetes, coronary artery disease and hypertension. Fast food is a processed food, and it generally lacks in micronutrients like vitamins and minerals. It is heartbreaking to see people in less-developed countries are blindly following the trend and lifestyle of those from a more developed world by indulging in fast foods alas, with rising incidence of similar health problems. Regrettably, due to discrepancies in health care resources, those from less-developed countries have been unable to cope with this food-related health problem that eventually leads to poor quality of life despite of long lifespan.



Reason 2 : The method of cooking through extreme heat has destroyed vitamin E, whilst food processing caused a reduction in vitamins B1 and C.

Reason 3 : We often 'overcook' to make meat soft and easily eaten, but at the same time we destroy the protein through denaturation. Vitamin B6 is destroyed when food is cooked using microwave.

Reason 4 : As high as 50% of men are cigarette smokers, and cigarette smoke contains many toxins and thousands of free radicals which can cause cancers. Cigarette not only poisons the respiratory tract but also gastrointestinal tract. It is said that when each cigarette is smoked, 30 mg of vitamin C is destroyed.

Reason 5 : More people are indulging in an alcoholic drink in large quantity, and many consider it as trendy. Alcohol can cause damage to organs like brain, liver, and pancreatic cells. Alcohol effects liver cells causing dysfunction in metabolizing good cholesterol (HDL) and bad cholesterol (LDL). Vitamins such as B: thiamine, niacin, B12; folic acid, vitamin A and C and some minerals, particularly zinc, magnesium and calcium are affected by alcohol consumption. The intestinal function to absorb nutrients can be affected by alcohol.

Reason 6 : Hot food and drinks have been shown to cause irritation to our intestinal linings, which in turn will impair its absorption function. Excessive intake of caffeine too may affect our gastrointestinal function.

Reason 7 : Due to our hectic lifestyle, food taken may not be chewed properly. This can reduce the nutrient release and absorb by our body. Improperly fixed dentures too can cause a problem in chewing.

Reason 8 : Diet low in fibre such as fruits and vegetables can cause constipation. Many resort to a quick-fix solution by taking laxative regularly which in a long run may impair intestinal absorption function. Laxative such as paraffin and mineral oils can increase loss of potassium, sodium and magnesium.

Reason 9 : Lack of vitamin B12 (leading to pernicious anaemia) is related to those who are strict vegetarian.

Reason 10 : It has been said that the body response to stress by increasing its demands on pyridoxine, vitamins B5, B6 and vitamin C. Environmental pollution results in a higher requirement of vitamin E.

Reason 11 : Soil quality has reduced tremendously over the last 50 years due to excessive agriculture. Although the harvest may be bountiful, larger in size and fresher but the nutrient content is 68% lesser than in the 70's.

Reason 12 : Widespread use of antibiotics, some even without prescription and easily obtained over the counter at pharmacy. This has resulted in destruction of normal gut bacteria. These 'good' bacteria are important for absorption of vitamins B, lacking of these vitamins may lead to some form of nervous system disorder.

Reason 13 : Food allergy is increasingly seen as a result of food containing gluten and lactose, especially in fast food industries.

Reason 14 : Some commercial dieting programs have to be blamed for causing reduced nutrients in food intake. Those responsible for these programs should work with nutritional expert to ensure enough nutrients are supplemented to the client. It is a known fact that sudden weight crash can be detrimental to health. Self-dieting practiced by some for beauty purposes, can be dangerous too since low caloric intake (<800 calories) may cause deficiency in thiamine, calcium and iron. Diet low in carbohydrate, protein and fat in a proportionate amount may cause problems such as lethargy, risk of osteoporosis and menstrual disorder and muscle wasting. Dehydration may also occur if water is not taken adequately.

Reason 15 : Combined oral contraception may cause an absorption problems such as absorption of folic acid whilst increase the demand for vitamin B6, vitamin c and riboflavin. It is necessary for a woman to be under the doctor's surveillance when she is taking contraceptive pills.

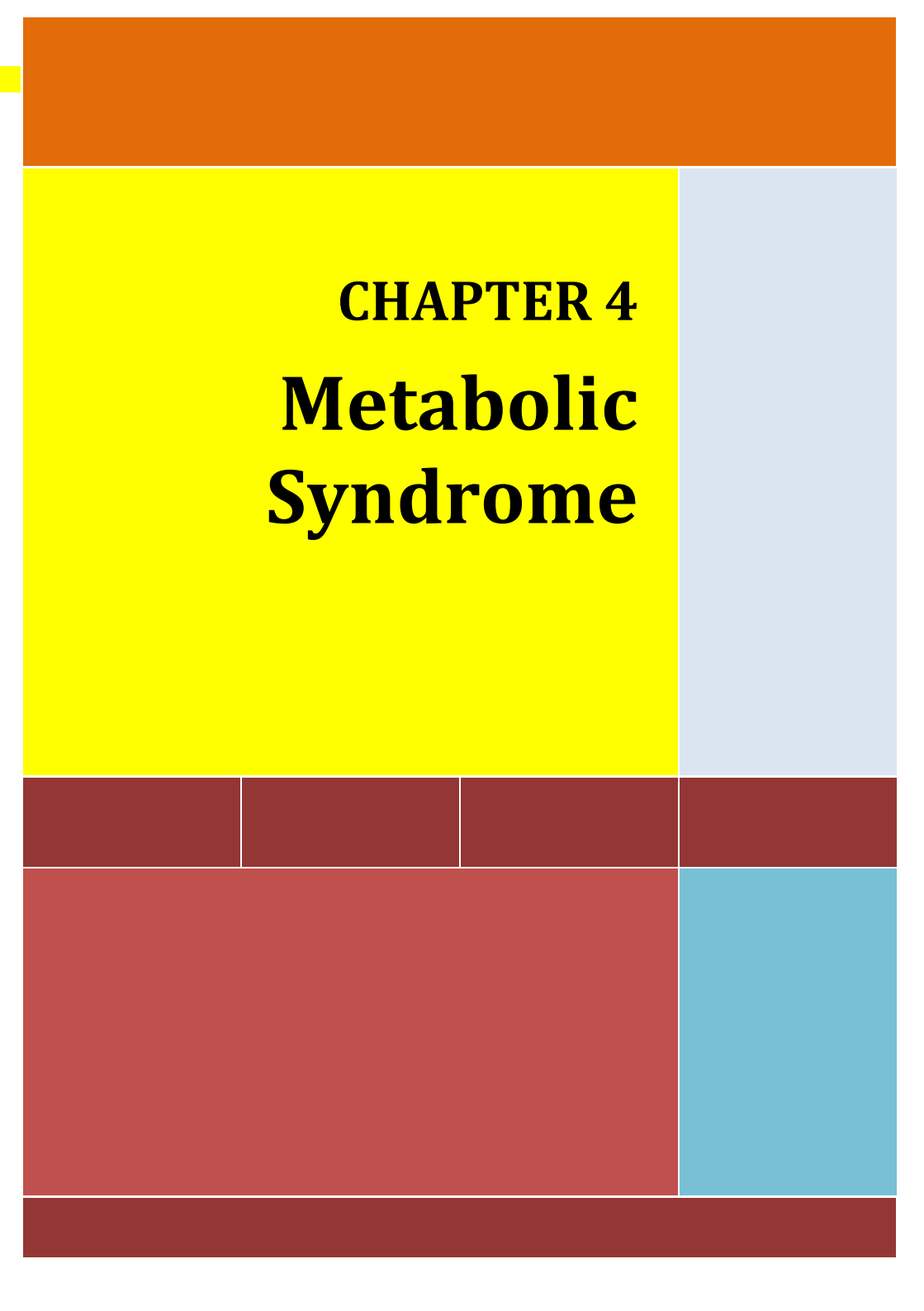
Reason 16 : Nutritional requirement increases at puberty as it is the time when the body experiencing the highest growth rate. A study in the US showed up to 30-50% of teenage girls consumed only about 2/3 of the requirement for vitamins A, C calcium and iron.

Reason 17 : Pregnancy causes increased in a requirement of vitamins B1, B2, B3, folic acid, B 12, A, D and E. Minerals such as calcium, magnesium, iron, zinc, and phosphorus are also increased in demand in pregnancy. These elements are important not only for the mother but also to the baby. Pregnant women must also protect themselves from free radicals that may cause harm to both mother and the unborn child.

Reason 18 : Many of us are not adequately exposed to sunlight because of our lifestyle and indoor office work. Prolonged under exposure to sunlight may impair the formation of vitamin D which in turn poor calcium absorption.

Reason 19 : Longer life span now is contributed partly by advancement in health care. Figures from United Nations World Population Prospects report (2005-2010) showed that the life expectancy of the world population is 67.2 years (65 years for males and 69.5 years for female). Countries with lowest life expectancies are Angola, Botswana, Namibia etc. While, countries with longest life expectancies are Japan (Male 79, Female 86.1), Hong Kong, Iceland, Switzerland, Australia etc. In Malaysia, an average life expectancy in a woman is 76.2 years whilst in man, 72 years old. Longer life span unfortunately does not reflect in the quality of life, particularly those who live in less-developed countries. is basically related to chronic diseases and diet low in nutrient. Their weak physical, poor sense of taste and smell, deteriorating eyesight, reduced ability to swallow coupled with chronic diseases in due course leading to poor intake of adequate nutrition. Among common nutrients lack in senior citizens are fibre, folic acid, vitamins B2, B6, C and magnesium.

Reason 20 : The need for various nutrients is different among individuals. Due to a number of factors, quantifying the nutritional needs is difficult. Factors such as genetic, eating habits, environment, age, and type of work done play an important role in our nutrition. Because of this, most of us probably need to consume some form of food supplements. The nutritional requirement is also determined by the type and duration of activities performed by each individual.



CHAPTER 4

**Metabolic
Syndrome**

METABOLIC SYNDROME

Syndrome is defined as a group of symptoms/signs that indicates a specific disease. Metabolic syndrome is a name for a group of risk factors that occur together and increased the risk of suffering disease/s in future. The endpoint of an individual with metabolic syndrome is getting acute coronary syndrome subsequently die at younger age. Metabolic syndrome is also increased the risk of future type II diabetes and stroke. Metabolic syndrome is thought to be as a result of insulin resistance. A person with metabolic syndrome in the actual sense does not have the cardiovascular problem just yet but eventually will ends with an acute coronary syndrome if not treated early. One is said to have metabolic syndrome if the following criteria are met according to NCEP ATP III criteria, at least 3 out of 5 criteria below:

- **Waist circumference > 40 inches for men and > 35 inches for women**
- **Triglycerides level ≥ 1.7 mmol/l (150 mg/dl)**
- **HDL cholesterol ≤ 1.04 mmol/l (40mg/dl) for men and ≤ 1.29 mmol/l (50mg/dl) for women.**
- **Blood pressure $\geq 130/85$ mmHg**
- **Fasting blood sugar ≥ 6.1 mmol/l**

Individual who fulfill the above criteria, has to take care of diet and change to a healthy lifestyle or run at risk of getting diabetes mellitus (4.5 RR), hypertension and subsequently acute coronary syndrome. Approximately 20-30% of the population in developed countries have metabolic syndrome. In 2010, 50-75 million people were suspected to

have metabolic syndrome in US alone. With NCEP criteria also, it is estimated about 18.5% Malaysian are affected, ethnic Indian being the highest (21.8%), Chinese is second (18%) and Malay in a third position (16.4%). Gender-wise, more women are affected (20.9%) than men (17.5%). All is not loss for individual with metabolic syndrome, since there are ways to prevent getting diabetes and hypertension, thus avert dying young from an acute coronary syndrome.



The following are the recommendations for individual with Metabolic Syndrome:

- 1. Aim for ideal body weight through healthy diet program, regular exercise and taking appropriate food supplement which in turn will reverse the effect of insulin resistance.**
- 2. Controlling the level of cholesterol and triglycerides through proper diet, with medication like statins, niacin, fibrate or their combinations. Some food supplements have also been shown to reduce cholesterol.**
- 3. If you are prone to a formation of clots, then aspirin may be prescribed as metabolic syndrome affected individual has a higher risk of clot formation in the leg.**
- 4. Controlling the blood pressure to optimum level. It is said that up to 50% individual with this syndrome suffers from hypertension.**

Apart from diet, exercise, quit cigarette smoking, abstain from alcohol consumption, food supplement has an important role in alleviating effects of metabolic syndrome.

Metabolic syndrome is actually a kind of early-warning system for us to act before a more dreaded problem like acute coronary syndrome, stroke appears, and death ensues. In a more straight talk, if you wish to live longer, and you have metabolic syndrome, then lets waste no time to engage yourself to what has been mentioned above.

CHAPTER 5

**Food Supplements
through old
delivery system**

FOOD SUPPLEMENTS THROUGH AN OLD DELIVERY SYSTEM

NUTRITIONS AND SUPPLEMENTS: MODE OF DELIVERY

It could have been decades or centuries ago since men started to take the food supplements through pills, capsules, powder or juice and syrup form. Until recently there is no innovation in the delivery system, and we have no qualm possibly because we are too used to a good old system like pills. But do we realize that the old delivery systems have their inherent weaknesses? Or at least we agree that how old folks and children as far as possible will try to avoid taking pills or capsules. How many of us really swallow pills prescribed by doctors? Maybe we can accommodate pills in our life for a few days diligently but what if we are required to take on a long-term basis? Perhaps a thorough explanation below will open our mind about these archaic delivery systems.

The pill problems

Pill is said to have a long history since 1500 BC. The word is believed to originate from Greek philosopher Pliny, who lived between 23-79 A.D, who coined the term 'pilula'. Pill is the most common delivery system for food supplement. It is produced by adding the powdered ingredients with 'compressor' and 'binder' chemical. These 'addictives' may be undesirable, especially if they are made of yeast or other potential allergens. A lubricant is also added before the mixture is pressed under a high-pressure machine between 10,000 to 20,000 lb in a controlled temperature to harden it. Nutritional pill is usually large, difficult to swallow with unpleasant taste. Up to 40% people do not like pills either physically or psychologically.



Upon ingestion, the breakdown process of a pill can take 45 minutes, followed by dissolving process before getting absorbed into the circulation. The whole process lasted 3-4 hours. Even if the process is without a glitch only about 40-50% of an active ingredients will be absorbed, the rest will be excreted. Many pharmaceutical companies claimed their pill or capsules are easily absorbed, albeit the rate of those people who meticulously take the pill can be actually much lower, and the rate can be quite a shocker. It is also useless to produce 'miracle' pill if it is still

unappealing because of its size, difficult to carry, needs water for ingestion and difficult to swallow.

The powder form supplement and its problems

Powder form supplement is another mode of a delivery system. It needs to be mixed with water, milk or juice or other liquid before consumption. Therefore, powder form supplement is inconvenient. In hot and humid climate, the powder will absorb water and becomes



lumpy thus difficult to prepare and shorten its lifespan. Since it needs to be prepared according to a measured amount of water, the eventual dose may not be accurate. Powder can also be accidentally inhaled consequently causing a health problem.



Juice and syrup preparation and their problems

They are another form of a delivery system of a food supplement in the market. They contained fruits mixed with water and juice, usually the content is not consistent because fruits' skin and seeds are not dissolved in the water. After bottling process, the undissolved content will form sediment at the bottom. Shaking the bottle before consume is a must, and it must be kept refrigerated. It is easily contaminated under the room temperature. They are usually packed in a large bottle and difficult to carry and does not guarantee fixed and constant dose. Fruit juice is also not recommended for children especially younger than 6 months as its contained high calorie mainly from sugar known as fructose. Experts say that besides not providing needed nutrients, the extra calories from the sweet beverage is also contributing to the current epidemic of childhood obesity. Many sources say that the sugars in fruit juice contribute to major distortions of insulin balance which leads to hormone and neurotransmitter shifts which increase a child's risk of ear infections, allergies etc. It is discovered that a 10 ounce serving of apple juice contains 140 calories and 35 grams of carbohydrate which is almost equivalent to taking 2 apples.



The graphic features a solid orange horizontal bar at the top. Below it, the left side is a large yellow rectangle containing the chapter title. The right side is a light blue vertical rectangle. At the bottom, there are three dark red rectangular blocks: a row of three smaller blocks followed by a larger block that spans the width of the yellow area. A light blue block is positioned at the bottom right, overlapping the dark red blocks.

CHAPTER 6

**Gel Suspension
Technology**

GEL SUSPENSION TECHNOLOGY

Nutritional gel is a new innovation in a delivery system for nutritional supplements.

There are two important factors how a consumption of food supplement can be maximized by our body, i.e. time taken/consume and bioavailability. It is useless despite having an efficient delivery system and easily absorb by the body yet difficult to bring along, hard to consume, and appear unattractive. With today's lifestyle, it is difficult to keep a proper mealtime let alone taking food supplements. Timing is important for consumption of a food supplement because of difference in interaction if taken before or after meal. Some food supplement is taken before and some after meal depending on a type of supplement and gastric acid for breaking down and absorption. Second factor is bioavailability, which is defined as a percentage of nutrients available in the circulation in a particular time. The higher the bioavailability, the faster the effect to our body. These 2 factors are difficult to achieve if we still keep clinging to the old delivery systems.



Acknowledging the shortcoming in the available delivery systems, a company based in Utah, USA has created a new system designed to overcome the problems of the old delivery systems. The new system is known as GEL SUSPENSION TECHNOLOGY. This new technology is first of its kind, was launched in October 2005. The acceptance was so overwhelming in the US that USD 5 million alone worth of food supplements using technology was sold during their first month of launching. It is not impossible that most food supplements manufacturers will switch to gel suspension technology when the patent is expired. It shall be explained why this new system is not just better in terms of ensuring the appropriate time to take food supplements, but also faster in absorption and higher bioavailability.

Nutritional gel is simply a new system; it is not pill, capsule, powder, syrup or juice. It is FIRST of its kind and patented as the new delivery system. It is originally created for athlete as an energy supplement and a kind of food source for astronauts, however there is some difference in gel technology for food supplement. Gel developed for athletes have high-carbohydrate content, thus high glycaemic index, not suitable for someone who is diabetic and taste rather unpalatable. The technology in gel suspension used food supplements is different as it has low carbohydrate content, low glycaemic index, and low fat with various palatable tastes suitable for all age groups.

What is gel and how difference it is from other old delivery systems

Gel is produced from liquefying or hydrating two types of gum, Guar gum and Xanthan gum. Guar gum is extracted from guar beans whilst xanthan is obtained from corn. Gel is NOT gelatin. Gel is a chain of



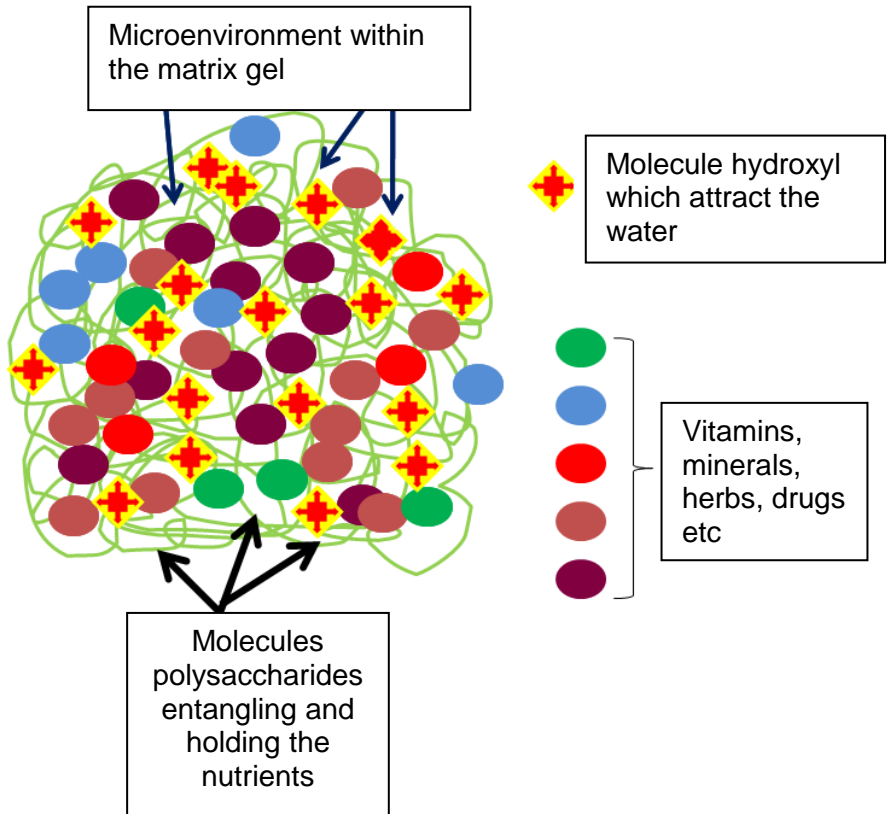
polysaccharide with hydroxyl molecules by its sides to attract water. Polysaccharide will expand in water, thus only a small quantity is required to produce a thick matrix of gel. These polysaccharides are arranged in a criss-cross pattern and chain-like manner forming a lump with a microenvironment in the

middle. It is within this microenvironment where nutrients like vitamins, minerals, fruits and vegetables extract are kept. Nutritional gel is actually microenvironment storage of hydrated nutrients ready to be consumed and easily absorbed into the circulation.



Polysaccharide created water-based gel and microenvironment. It is low in glycaemic index and fat. It has high fibre for digestion, reduces the absorption of cholesterol and sugar thus suitable for a diabetic patient. It's hard to imagine that this kind of delivery system exists, not only for storage and transfer of nutrients but by itself is healthy.

Model gel, microenvironment and pre-hydrated ingredients within the gel matrix



Nutrients in gel are distributed equally hence the question of difference in dosage is non-existent. With the presence of hydroxyl molecules that act like a water magnet, the active ingredients will dissolve easily when consumed and get to absorb quickly into the circulation. Up to 90% of nutrients in the gel get absorbed within minutes. No water is needed to assist in swallowing. It is highly palatable and well-liked by both old and young ones.

Another special feature is in its packing. It is handy, easily carried along and very convenient and each pack has a consistent quantity of nutrients. Each product has its own taste with natural flavour such as

orange, star fruits and chocolate. With these two features, it has fulfilled two main functions as an effective food supplement; it can be taken in timely manner and high bioavailability.

The Advantages of Gel-Based Nutritional Supplements

Comparing to old delivery systems, gel suspension technology has the following advantages;

- Natural sources
- Nutrients are absorbed because of it is naturally hydrated.
- High bioavailability (faster reaching the target cells or organ)
- Convenient to carry along and consumed.
- Tasteful and palatable and well liked by adult and children
- Low in fat, carbohydrate, and low in glycaemic index therefore suitable for a diabetic patient.
- Contain no illicit drugs/substances like stimulant, alcohol and ephedrine.
- Gel itself is nutritious and healthy due to its high fibre content, good for bowel movement and reduces cholesterol absorption.
- Constant dose.
- Needs no shaking.
- No need to mix with water.
- Needs no refrigeration.
- HALAL for muslim and received Kocher's Certification for Jews

Gel technology is a new innovation in food supplements replacing the old ways like pill, capsule, powder, and juice. It is akin to switching from old telephone with cord to mobile phone and listening to music from old gramophone record to state of the art ipod!

The gel technology uses crystalline fructose as a sweetener NOT artificial sweetener. It is not corn syrup with high-sugar content. Although it is corn-based, it has low glycaemic index and low in calorie. With same calories, it is 1.5 times sweeter than sugar cane, thus only a small amount is needed for sweetening purpose.

Laboratory tests done on gel based food supplements

Before being marketed these food supplements (gelceutical) have undergone four stages of test to ensure the quality.

1. **Microbiological test:** this is to ensure that the products are free from harmful microbes (bacteria, fungus and virus)
2. **Nutritional content test:** done to guarantee the nutrients stipulated are accurate in quantity and percentage for best effects
3. **Test on banned substance:** to ensure the products are free from stimulants and steroids. Anti doping certification ensures all gelceutical products are safe to be used by all especially the athletes.
4. **Stability test:** done to make sure that the ingredients in each pack can last for a long time whilst maintaining its efficacy.

Gel based products are Halal

Almost all gel-based products are Halal except for few e.g for joints health contains bovine cartilage. The halal certification is obtained from IFANCA (Food and Nutrition Council of America). It is a non-profit Islamic organization promoting Halal food all over the world. The headquarters is in Chicago, Illinois USA and offices in West coast of America, Toronto, Canada and Brussels in Belgium.



- IFANCA produces Halal certificate on food produced in more than 20 countries in the World.
- IFANCA certified almost all Halal products throughout the World.
- IFANCA produces Halal certificates for all food industries.
- IFANCA produces Halal certificates and advisory role to a slaughterhouse.
- IFANCA produces Halal certificates for cosmetic and chemicals.

The following organizations, governments and religious bodies have authorized IFANCA:

- From Malaysian government to produce Halal certificates from North America, European and Asian countries. IFANCA is the only organization received such privilege.
- Islamic committee office of Thailand
- Indonesian Ulama council
- Singapore Islamic council
- Muslim World league, Saudi Arabia.
- Phillipines Halal association

- USDA international programs
- Approved by all Islamic countries

All gel-based food supplements received anti-doping certificate

HFL sport science (WADA approved) has conferred gel-based food supplements with an anti-doping certificate. WADA or world anti-doping agency is a neutral body responsible for monitoring and fight against the use of stimulants and steroids among athletes. 80 countries and international sports bodies, including International Olympic committee recognized WADA. Every product is free from 28 types of banned substance such as ephedrine, amphetamine, Viagra and more than 10 types of steroids before an anti-doping certificate is awarded. It can be concluded that with the anti-doping certificate, all gel-based products are safe and free from banned substance. Without doubt, these products are safe to be taken by all athletes.



HFL SPORT SCIENCE

CHAPTER 7

**Discovering
The Nutrients
Stored in Gel
Matrix**

DISCOVERING THE NUTRIENTS STORED IN GEL MATRIX

TYPE OF NUTRIENTS THAT CAN BE STORED IN A GEL MATRIX

It is hoped that more food supplements and prescribing drugs utilize gel suspension technology for delivery system in order to maximize the benefits. Currently, the company that introduced this new delivery system has produced more than 10 categories of the food supplements encompassing all health aspects. Perhaps one day we may be taking paracetamol in gel form with chocolate flavor or taking antibiotics gel with orange flavor. Only time will tell us, and the future prospect looks very promising. We will discover how each nutrient being made into suspension in a gel matrix through this pioneer gel suspension technology.

FRUITS AND VEGETABLES EXTRACTS *

Fruits and vegetables are known to have benefits of micronutrients such as vitamins and minerals, and they are also rich source of antioxidants and fibres. Therefore, consuming them freshly is the best way for our body to acquire micronutrients whilst fibres help in restoring intestinal function and facilitates regular bowel movement. But are these fruits and vegetables in the market safe to be consumed? It is a long journey from harvesting, transported through ports, shipped across oceans before finally reaching nearby fruits stall. These fruits are exposed to pesticides and preservatives, despite washing and cleaning with water, are they free from these harmful elements? Is our water source free from harmful chemical and organisms? We usually will peel off the fruits' skin and discard the seeds before eating but little do we realize that these two parts are rich in micronutrients?

Through gel suspension technology the fruits and vegetables extract can be dissolved and kept in the microenvironment of a gel matrix. The method not only combined various benefits of fruits extract but can also be taken all at the same time. It is an undeniable fact that more anti oxidant is taken, more benefits and positive effects are gained.

17 types of fruits and vegetables made into suspension into a gel matrix

1. **Acai fruit:** acai comes from Amazon jungle. It is also called assai, jicara or hausai. The natives originally use it as energy drink. Acai has high content of vitamins B, C and E. Acai has potassium and calcium, omega 6 and 9 fatty acid. The latter nutrients are good for heart. Most of all ,Acai has high content of anti oxidants, between 60-80 anti oxidants. All in all Acai is beneficial for circulation, normalize cholesterol level, healthy heart, increase energy and as an anti-ageing agent.



2. **Mangosteen:** mangosteen grow well in Asia, including Malaysia. Traditionally, mangosteen is taken fresh as a dessert, making jam, relief diarrhoeal diseases, and some skin diseases. It was dubbed as 'Queen of fruits' in the 19th century because Queen Elizabeth of England enjoyed it and ordered a regular consignment to be sent to England every year. It is high in anti oxidants and vitamins B1, B2, B6 and C. It is also high in potassium, calcium, phosphorus, and iron. It said to contain polysaccharide, which is anti bacteria and anti fungal. They are at least 80 anti oxidants identified. It benefit is similar to Acai.



3. **Noni:** it is found in abundant in Polynesia, South-East Asia and India. Noni has more than 100 useful components namely vitamin C, A, carotene, potassium, terpenoids, alkaloids, anthraquinone, linoleic acid, amino acid among others. It is said to have polysaccharide, which supports the immune system. Among its main benefits are immune system booster, helps in destroying abnormal cells, improvement of joints movement, anti inflammatory property and sedative to relief stress.



4. **Pomegranate:** it is found mainly in Mediterranean. It has 80% juice and 20% seeds. Its juice consists of 85% water, 10% fructose and glucose, pectin, vitamin c and anti-oxidant polyphenolic. It contains calcium and linoleic acid, which is said

to have anti cancer and fat-burning properties. Pomegranate has between 40-60 anti oxidants. It is beneficial for blood circulation, reduces blood pressure, for healthy heart, reduce the likelihood of blood clotting and fat deposition in blood vessels.



5. **Prunes:** it is popular for its taste and can be dried to last a long time. Its high in fibre, useful for regulation of bowel movement and absorption of iron. It is produced mainly in California, USA. It is rich in vitamin A and C, high in potassium and copper. It has high anti-oxidants ,beneficial for stabilizing blood pressure, regulate blood sugar, normal function of intestines, bones and heart. Prune has the highest ORAC scale of antioxidant i.e 5770 if compared to other fruits.



6. **Acerola:** acerola is found mainly in Puerto Rico, Jamaica and Cuba and the biggest acerola farm is in Brazil. It said to have vitamin C, 40 times more than orange. In Brazil it is made into jam, syrup, ice cream and drinks. Acerola is also high in vitamins A, B and minerals such as magnesium and potassium. It has 15-20 anti oxidants.



7. **Aloe Vera:** aloe vera resembles a cactus, but it is from genus Lilly. It originates from Africa. There are over 240 species of aloe vera and its beneficial properties are well-known for centuries. There are at least 20 types of minerals present namely calcium, chloride, iron, magnesium, manganese, potassium, sodium among others. It is rich in vitamins A, B1, B2, B 12, C and E. There are between 20-30 anti-oxidants present and other elements with anti-inflammatory and anti tumour properties. Aloe vera is especially beneficial for intestines, regulates blood sugar, wound healing and maintain bacteria balance in the intestines.



8. **Aronia:** also known as black chokeberry. It contains high anthocyanins and flavonoids and more than 20-50 anti oxidants, polyphenols,



minerals and vitamins.

9. **Bilberry:** it is related to blue berry. It was used to improve night vision of British pilots during World War 2. It has at least 15 types of flavonoids, 30-40 types of anti oxidants. Research done showed that it improves night vision, impede glaucoma and cataract formation, it improves blood circulation and heart function. Another important property of bilberry is an anti-inflammatory function.



10. **Blueberry:** found in North America, contain high fibre, manganese, vitamins C and E. It has between 40-60 types of anti oxidants. Blueberry is well known anti ageing, for coordination and memory. It maintains a healthy heart, reduces cholesterol and protects brain from the effect of ageing.

11. **Cranberry:** also found in North America. It has 60-80 natural anti oxidants.



12. **Elderberry:** a rich source of anti-oxidants and has been proven to have anti -virus, immune modulator and anti-angiogenesis properties. It contains 60-80 anti -oxidants.

13. **Gac:** gac fruit has nutrients and anti oxidants, carotenoids, lycopene, zeaxanthin, and others. Gac is currently undergoing research to determine its anti-tumour property and effect on heart.



14. **Grapes:** it has high content of phytonutrients such as anthocyanins, catechines and quercetins. Black grape is said to have 60 types of anti-oxidants. Among its benefits are improve blood circulation, reduces cholesterol, good effect on heart, protect brain and regulate blood pressure.



15. **Rooibos tea:** it is known as mountain tea, red tea, bush tea, and also long life tea. Rooibos is taken by Africa's explorers for insomnia (difficult to sleep), headache and stomach upset. It has high mineral content such as iron, calcium, magnesium, potassium, zinc and manganese. It does not contain caffeine but has high anti oxidants. Rooibos contains flavonoids, vitamins A,

C, E and all types of vitamins B. Research revealed its high anti oxidants (20-30 types), anti allergy, anti virus, anti-inflammatory and anti-angiogenesis activities. Among its benefits are maintaining healthy brain function, calming effect, possible effect in reducing appetite for weight reduction program and positive benefits to an immune systems .



16. **Seabuckthorn:** it found in China, Russia and Mongolia. It has long history in China since 12th century for stomach problems, blood circulation, and respiratory function. Currently, it is use to make juice, sports drink, jelly, ice cream, cosmetic and medicine. Seabuckthorn is rich in macro and micronutrients. It contains vitamins B1, B2, folic acid, C, E, K and beta-carotene. It has 15% of protein content and 90% of unsaturated fatty acid, among others are omega 3, 6, linoleic acid, linolenic acid which are useful for circulation and reduces cholesterol. There are about 60 anti-oxidants available in it. It has positive benefit on heart, calming effect, improves memory, skin health and anti-inflammatory.



17. **Wolfberry:** used in traditional Chinese medicine for thousands of years. It is found mainly in China. Wolfberry is said to improve immune system, good for vision, support liver function, regulates blood pressure and blood sugar. Wolfberry contains anti oxidants, 19 types of amino acids, 21 minerals type, vitamins E, C and beta-carotene.



VITAMINS AND MINERALS *

Most people all over have practiced vitamins and minerals consumption for health purposes. In the US alone 17 billion dollars is spent every year on food supplements, and studies have shown up to 100 million American consume vitamins and minerals every day. Most vitamins and minerals are in the form of pills, capsules or syrup, they are usually large

in size and difficult to swallow. With gel suspension technology, most vitamins and minerals can now be made into suspension in a microenvironment. Among others are vitamins A, C, D, E, thiamine, riboflavin, B3, B6, B12, Folate, Biotin, Panthotenic acid and minerals such as calcium, phosphorus, molybdenum, vanadium, inositol and mineral trace. In short, these are 100% requirement of 12 vitamins, and 75% of 10 minerals.

What are vitamins and why we need them have been answered in earlier chapters, whilst each role and source is given in lucid detail in Chapter 1, page 13.

Minerals found in gel-based products are special because they are in a chelated form produced in Albion laboratory, a world leader in this technology. Minerals produced in this lab is known as Albion Chelate (www.albionminerals.com). Why chelated mineral is special? Our body does not produce minerals, and these minerals are not plant in origin in fact, they are an inorganic matter which needs to be taken through food and drinks. For the body to absorb, minerals undergo a chelation process in the intestines, although the process is not so effective. Chelation means that the mineral is bound to an organic matter such as amino acids in order to facilitate absorption and utilize by cells for metabolism processes namely reproduction, growth and immune system. Albion Lab normally uses amino acid Glycine for chelation process.

In summary, minerals are needed for the following bodily functions,

- Immune system: copper, zinc, iron and selenium.
- Energy production: magnesium, phosphorus and manganese.
- Hormonal system: iron, manganese, zinc, copper, magnesium, and potassium.
- Production of vitamins: cobalt
- Blood production: copper and iron
- Enzyme system: zinc, copper, potassium, manganese, magnesium, iron, calcium, molybdenum
- Skeletal system: calcium, magnesium, zinc, manganese, boron, and phosphorus.
-

FUCOIDAN : IMMUNE SYSTEM MODULATOR*

Fucoidan is another nutrient produced with gel suspension technology. It is an important health element with more than 700 researches done on fucoidan. Fucoidan gets its name from Fucose, a polysaccharide containing sulfated polysaccharide, found mainly in brown seaweed along Pacific Ocean coastline. There are other seaweeds where fucoidan can be extracted such as comby, maui orange, mozuku, hijiki and sea cucumber (gamat). The seaweed's dry weight only contains 4% of fucoidan. There are 2 types of fucoidan, F-fucoidan, contains sulfated fucose and U-fucoidan with glucuronic acid. Both of the fucoidan have the beneficial health elements for our body.



Sulfate acid in fucoidan interacts with many types of proteins and enzymes in the body to modulate the immune system. Modulation literally means to strengthen the immune system during an attack by bacteria, virus and cancer cells at the same time as

stabilizing the immune system whenever there is an excessive immune response. Because of this property, fucoidan has been nicknamed as the Ultimate Molecular Immunity. It also acts as 'tag' for proteins, enzymes, cells and tissues that need to be destroyed and discarded from the body. The 'tag' allows the body to 'search and destroys' accurately, thus unwanted proteins, enzymes, cells, including foreign proteins and cells like bacteria, virus and cancer cells are eliminated. Glycoprotein, a component in a cell wall behaves like a messenger in a cell. Fucose is one of the important components in this glycoprotein known as saccharide. Some examples of informations relayed are, a) sending instruction to cell to produce enzymes and hormones, b) instruction for cell mitosis. Fucoidan acts to improve communication within a cell leading to better immune system and cell functions.





The benefits of fucoidan can be seen among Japanese, Taiwanese and Polynesian who have lower rate of cancer incidence, lower cholesterol level, and more active and longer lifespan. Fucoidan also plays a role in absorption and regulating blood sugar.

In summary, the benefits of fucoidan are helping in *:

- **Regulating the immune system**
- **Stimulate the immune system during an attack by microbes and cancer**
- **Maintaining joint's health**
- **As a source of nutrition**
- **Act in cell repair and regeneration**
- **Improves blood supply to cell**
- **Help in destroying and disposal of foreign cell**
- **Improves circulatory system**
- **Reduces cholesterol**
- **Anti-oxidant**

NUTRIENTS FOR ENERGY AND MENTAL FOCUS *

Lack of energy, lethargy and emotional stress are common problems in modern-day living. The hectic lifestyle of today has resulted in more and more problems of lethargy and lack of energy. In addition to that, work-related problems lead to stress and emotional breakdown.

Energy is power to perform everyday activities without an obstacle and in performing these physical activities; maximum results can only be achieved through focusing the mind.

The gel suspension technology has identified nutrients for source of energy, for calming effect and to increase brain-focusing function, thus 'suspending' it into a gel matrix. Among nutrients identified is **Vitamin C**, **B**, **d-ribose**, **inositol**, **taurine**, **chromium** and **vanadium**. Herbal extract too

has undergone the similar process of gel suspension technology, such as **Korean panax ginseng, schizandra fruit extracts and rhodiola roots extract.**

Macronutrients like proteins, fat and carbohydrates are our main source of energy, however without complimentary action of micronutrients such as vitamins and minerals, energy conversion cannot take place.



Water-soluble **vitamins C and B** are important for production of energy and brain focusing function. Almost all nutrients are transported via water throughout the body, and absorb easily into blood circulation and excreted through a kidney and sweat as a result they are easily depleted from the body. Our body needs to constantly replete vitamins B and C through a food supplements, especially during the moment where the demand is increased. Lack of vitamins B is manifested as tiredness, lethargy, lack of energy, lack vigor, confusion,

boredom and laziness. Apart from vitamins B and C, chromium and vanadium are also essential as a co-factor in energy production in cell mitochondria.

Inositol is a nutrient in Vitamin B family that is water-soluble. When combined with choline it is converted to lecithin, that play a role in reducing cholesterol level and fat deposits in the blood vessels. Inositol is also an important component of phospholipid, a basic unit in the cell wall. It regulates information relay in the nervous system, regulates metabolism and normal growth. Lack of inositol cause hair loss, eczema and high cholesterol. Inositol is abundant in internal organs of animal, beans, seafood and grapes.

Another energy producing amino acid is **taurine**. It is a free amino acid unbound to any proteins. It is found in the heart, muscle and nervous systems and maintains their healthy functions including healthy white blood cells. It has been used to treat bipolar disorder (mental disorder), coronary artery disease, diabetes mellitus, hepatitis, and alcoholism. Taurine can be obtained from dairy products, meat and fish.

D-ribose is part of DNA and RNA structure. D-ribose, which is a carbohydrate is easily absorbed and convert to energy. It is a kind of instant energy source, usually used by bodybuilders for energy and endurance and research shows that it may be helpful in fibromyalgia and chronic fatigue syndrome. Taken before sleep improves the quality of sleep, more energetic, better mental clarity and ability to handle pain.

Apart from vitamins B, C, **chromium** and **vanadium** have the capability to restore energy and mental focus, herbal extract can deliver same benefits. Fruits such as schizandra, ginseng, rhodiola roots have similar benefits. Scientific research shows **schizandra** improves energy, reduces fatigue, and restores liver cells. Schizandra improves the ability to utilize oxygen, thus better endurance for physical activities and fighting stress. Ginseng is taken among Asian for centuries, and **Korean panax ginseng** has the reputation of being the best.



Ginseng is tested and shown to improve memory, mental focus, support an immune system by producing antibodies and enhances the activity of natural killer cells. It is good for stress and improves one's potential in learning.

Rhodiola rosea roots are found mainly in Scandinavia, Russia, Himalaya and Alaska. The Vikings have been using rhodiola since 800 CE and believed that consuming extract from roots of Rhodiola will keep man in power for 200 years. Russian cosmonauts used rhodiola to improve brain and body function. As in ginseng, Rhodiola is helpful in stress, tiredness and improves physical energy. Rhodiola improves endorphin secretion (helps in relaxation and keeps afresh) and neurotransmitter in the brain. With gel suspension technology, the bitter taste of Ginseng and other herbal extract is no longer a barrier as they are given natural star fruit flavour!



All these nutrients (Vitamins B, C, inositol, taurine, d-ribose, 3 herbal extract) can be taken in the morning or noon by all age group, including teenagers. However, it is not recommended for pregnant women, those women who are breastfeeding and a cautionary word for uncontrolled

hypertension. Sleepiness can be a problem if taken early before bedtime and in large quantity.

There is no doubt this concoction is the best choice to improve mind and physical energy, since caffeinated drinks and stimulants are not healthy if taken for a long period. Caffeinated drinks and stimulant only appear to boost energy level, while, in reality, they don't whereas gel suspension technology products do provide an energy boost.

OVERCOMING OBESITY THROUGH GEL SUSPENSION TECHNOLOGY *

Obesity is a disease now affecting not only people in developed countries but also has become a global health problem, including developing countries. An estimate by WHO predicted as high as 1 billion overweight people and 300 million categorized as obese. Obesity rates worldwide have doubled in the last three decades. According to the definition, overweight is when a body mass index (BMI) $> 25\text{kg}/\text{m}^2$ while obese is when BMI $> 30\text{kg}/\text{m}^2$. People in the Pacific Islands, like American Samoa, are the heaviest. In developed countries, Americans are the fattest and Japanese are the slimmest. In the US, one in three in the age group 20-74 is overweight. It has increased to 33% from 25% within 10 years.



Obesity is the main contributor to world burden of chronic diseases and disability. Eating high carbohydrate, high sugar and fat, lack of micronutrients, coupled with inactive lifestyle is a recipe for

obesity. Obesity is partly contributed to higher socio economy, higher purchasing power leading to sedentary lifestyle without much movement or physical activities and made worse by unhealthy eating habit. Obesity is closely related to problems of diabetes mellitus, acute coronary syndrome, hypertension, stroke and cancers (breast cancer, colon, prostate, uterus, and gall bladder) and death at young age. Other problems are disability, joint pain, and psychological problem.

The children are not spared either, an estimate of incidence of obesity reported about 22 million children below 5 years of age are affected.

Three steps to overcome obesity – a recommendation by W.H.O.

1. Creating a healthy environment through healthy foods, balance diet, proper facilities and time for physical activities.
2. To self motivate the community the importance of weight reduction through,
 - a) More intakes of fruits, vegetables and grains.
 - b) To perform daily physical activities for about 30 minutes.
 - c) Reduce intake of sugar and fat.
 - d) To use polyunsaturated vegetable oil instead of saturated animal fat
3. To train health care providers the programs and methods of weight reduction and preventing it from recurring.

What are the benefits of weight reduction?

Some benefits seen following 10% of weight reduction:

- Reduction of blood pressure by 10-20 mmHg and lowering of blood pressure medication for hypertensive patients.
- 30% reduction of cholesterol and triglycerides.
- 50% risk reduction of getting diabetes mellitus.
- 50% reduced risk of osteoarthritis.
- Reduce mortality by 25%.

An ideal weight reduction program will result in gradual weight loss emphasizing on lifestyle changes, including diet and exercise. The program can be improved by taking food supplement to control appetite and increases breakdown of fat. The food supplements must not contain stimulants and banned chemicals. With the combination of food supplements, weight reduction program is more effective and ease the burden of the person who is dieting. The gel technology pioneer company has produced a supplement that has fulfilled the above criteria, all from natural resources and proven effectiveness. This gelceutical product contains **super citrimax**, which is better hydroxycitric acid (HCA) than



ordinary hydroxycitric acid. It is from **Garcinia Cambogia** tree bark and fruit. Super citrimax act by reducing the formation, storage of fatty acid and impede the glycogen breakdown. Glycogen breakdown leads to more sugar released into the circulation, and HCA (super citrimax) reduce this breakdown in the liver. This process causes a reduction in blood sugar, which in turn releases glucagon, to help in increases blood sugar, but due to the present of HCA acting as an energy source, one does not feel hungry. HCA is said to stimulate appetite centre in the brain to secrete serotonin that signals the body 'I am not hungry', and the effect according to research is long term.

In summary, the benefits of super citrimax are*:

- Reduce appetite
- Help in reduce intake of food
- Increases fat burning
- Impede fat build up and breakdown
- 3 times more effective in weight reduction programs (as compared to dieting and exercise alone)
- Keep a cholesterol level within a limit
- Maintain stable emotion and self-confidence following achieving ideal weight

In the same product, another element in the gel matrix is extracted from **Hoodia Gordonii**, a type of cactus from deserts of South Africa, Botswana, Namibia and Angola. The bushman of Kalahari desert is said



to eat the bitter taste extract of Hoodia Gordonii to ward off hunger pangs and thirst while hunting. There are at least 13 types of Hoodia, but not all of them contain the active ingredients p57. Only Hoodia Gordonii contains p57. It benefits is known since 1953 when it was observed in the experiment (by council for scientific and

industrial research of South Africa) that animal fed with Hoodia experienced weight loss. Since then Hoodia was marketed (as pill, capsule, powder, liquid and tea) to reduce appetite.

For the first time, the two extracts are delivered in the gel suspension system. It is easy to carry along, palatable and easily absorbed into the blood circulation. The bitter tasting Hoodia is now replaced with lime flavour.

NUTRIENTS FOR HEALTHY JOINTS *

Arthritis can happen to all age group, children, young people and particularly so in the elderly cohort of people. Even daily activities in life can cause joint pain especially if joints are not taken care. Athletes are even more prone to joint injury and besides rest, regular pain relief has to be taken which in a long run may be harmful. Joint pain is usually due to degenerative process or ageing. The joint inflammation is known as arthritis and the commonest form is osteoarthritis that affects men and



women as a result of ageing. It is caused by the degenerative process of joints leading to chronic pain, difficulty to ambulate and disability to almost 20 million people around the world. Another type of arthritis is rheumatoid arthritis as a result of disorder in an immune system. The treatment for arthritis is expensive and occasionally as a

last resort (in osteoarthritis), a joint replacement surgery is done. In short, arthritis has resulted in low quality of life million of people and affecting the activity of daily living. Many arthritis patients are hooked on to anti-inflammatory drugs, if taken for a long period of time may lead to kidney problem and peptic ulcer disease (ulcer in the stomach). These drugs treat arthritis empirically on the symptoms without actually curing it.

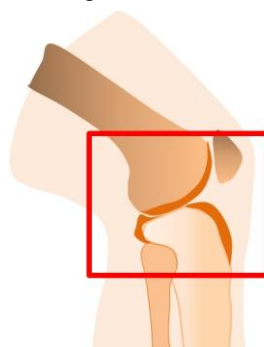
Every joint movement depends upon several factors namely, the muscles that move it, the cartilage quality surrounding the joint, the joint lubricant i.e. the synovial fluid and the space in between joint. Defect in any of these factors may result in inflammation of the joint or arthritis. The answer to the problem is by treating the cause and one of them

is by taking regular food supplement, among others are glucosamine, chondroitin . The other two ingredients for healthy joint are are celadrine



and methylsulfonylmethane (MSM). These supplements are available in the market in the form of pill, capsule and injection. Most of the products are either contains glucosamine alone or in combination with chondroitin. It is now available in gel suspension form, easy to consume, to carry along, absorb easily into the system and in tasty flavour of citrus. It contains all four ingredients mentioned above.

Glucosamine is amino sugar (amino acid with sugar molecule), found naturally in glycoprotein and glycosaminoglycan, components of supporting tissues, including cartilage. Glucosamine is a basic unit for cartilage structure. Glucosamine also plays a role in depositing sulfur into cartilage to help in formation and repair of cartilage. Glucosamine in gel is glucosamine hydrochloride (HCL) whilst most glucosamine available is glucosamine sulfate salt/NaCl/KCl. Because of its unstable state, glucosamine needs a transporter that is either HCL or sulfate. Some products contain only 30% of an active ingredients because salts are added. They are usually cheap and of low quality.



Chondroitin sulfate is a glycosaminoglycan produced by the body for the formation of and maintaining cartilage in joints. It protects and strengthens cartilage by reducing water loss from cartilage and slows the enzymatic breakdown of cartilage. Chondroitin formation in the body needs glucosamine in which the level is gradually depleting and therefore, has to be replaced through a food supplement. Both chondroitin and glucosamine complement each other to improve the joint's ability from the inevitable process of wear and tear. In combination their benefits are,

- Stimulates collagen formation and strengthens the cartilage
- Synergistic effect on cartilage formation
- Alleviate joint pain
- Protect cartilage and joint by retaining water in the cartilage
- Protect cartilage by retarding the enzymatic breakdown

The third element for healthy joint is celadrin. It is a complex fatty acid that helps in 'lubricating' the joint. It has an anti-inflammatory property thus reduces pain. It is recommended as a food supplement to increase joint 'lubrication' for joint movement and alleviating pain. The suggested

dose of celadrin is 500-1000 mg everyday, and this gel product contains 750 mg of celadrin.

Methylsulfomethane (MSM) is sulfur contained natural component for cartilage health, and it is safe for consumption. The sulfur in MSM fortifies the cartilage and said to reduce pain of rheumatoid arthritis and osteoarthritis.

TOPICAL GEL FOR JOINT ACHE *

Topical gel for joint pain is a new form of a delivery system developed based on gel suspension technology, helping in the management of joint pain and body ache. Topical gel has advantages over the oral form as the active ingredients are delivered directly to the source of pain and with gel suspension technology;

the absorption is faster and more effective. Topical gel has fewer systemic problems as compared to oral gel. In this form of a delivery system, the active ingredient is suspended in the gel matrix. Among the ingredients that are suspended in the gel matrix are **Menthol 1.25%**, **Carthamus tinctorius (Safflower) seed oil**, **Vitamin E**, **MSM** and more.



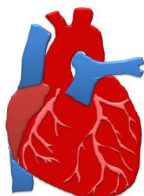
Menthol is a compound made from oils such as peppermint oil. Menthol is an active ingredient frequently used in topical products for aches and pains. Unlike steroids and non-steroidal anti-inflammatory drugs, menthol is safe and has much fewer side-effects. Menthol improves blood circulation to the area and provides a soothing effect for 2-4 hours.

Safflower oil, as the name suggests, is a form of oil that is taken out from the seeds of the safflower plant. Safflower is a thistle like plant with a strong central branch stem, a varying number of branches and a taproot system. Each branch usually will have from one to five flower heads containing 15-20 seeds per head. Safflower oil, as the name suggests, is a form of oil that is taken out from the seeds of the safflower plant. Safflower oil is a type of vegetable oil that is becoming increasingly popular among people who are very conscious about their health.

Safflower oil has the highest source of polyunsaturated fats than that found in any other type of vegetable oil. It also contains monounsaturated fatty acids (oleic acid) and saturated fatty acid. The other essential nutrients present in safflower oil are omega-6 fatty acids, cis-linoleic acid, vitamin E, etc. omega-6 fatty acid is an essential free fatty acid that known to produce an anti-inflammatory effect on our body. Study also had shown that **Vitamin E** has an anti-inflammatory and anti-cancer effect. Vitamin E and its metabolite inhibit pro-inflammatory Prostaglandin E2 formation.

NUTRIENTS FOR HEALTHY HEART *

Heart is the most important organ in a human body. A healthy heart leads to healthy life and improves lifespan. Cardiovascular disease is the main cause of death in developed and developing countries. According to Ministry of Health Malaysia, 16.5 % death in government hospitals is due to a heart problem, more than death due to infectious diseases and cancer combined. Among the known risk factors causing heart disease, i.e. acute coronary syndromes are obesity, hypertension, diabetes mellitus, lack of exercise, stress, high cholesterol and family history of heart disease (see chapter on Metabolic Syndrome).



Steps to reduce a risk of heart disease:

- **Quit smoking. Smokers have 2-fold risk of heart disease compared to non-smokers.**
- **Keep a cholesterol level within a normal limit.**
- **Maintain normal blood pressure.**
- **Control the normal level of blood sugar.**
- **Eat a balanced diet, low in fat, carbohydrate, plenty of fruits and vegetables**
- **Exercise regularly**
- **Control emotion and reduce stress.**

Most Scientists believe apart from steps mentioned above, supplementing with certain nutritional elements may give added benefits to the heart. These nutrients are now available in a gel form based on the gel suspension technology. There are eight types of nutrient packed together in a convenient container, namely, **CoEnzyme Q10 (CoQ10), L-carnitine, Policosanol, Folic acid, Selenium, Oyster mushroom powder, Taurine, and Niacin**. Each of these nutrients will be described in detail shortly.



CoQ10 is found naturally in mitochondria of a cell. Mitochondria plays a role as an energy producer to a cell. CoQ10 plays an active role in the production of ATP (adenosine triphosphate) which is a source of energy, including control of many biological functions such as muscle contraction and protein synthesis. It is a potent anti-oxidant against free radicals and immune system booster.

Many scientists believe CoQ10 in combination with modern drugs may give the following benefits*:

- It helps in prevention and treatment of heart disease (in combination with prescription drugs for heart) by providing more energy to heart muscle, prevent clotting and as an anti-oxidant.
- It is said that patient with heart failure has low CoQ10 and taking CoQ10 supplement can improve energy availability to heart muscle, reduce leg edema, improves respiration and physical wellbeing.
- From small studies, CoQ10 is capable of reducing the blood pressure in a long term.
- On its own, CoQ10 can reduce the blood cholesterol level and for a patient who is taking statins usually has low CoQ10 levels and taking food supplement containing CoQ 10 can help restore the level.
- CoQ 10 has also been shown to protect the heart from the toxic effect of chemotherapy.
- Its direct anti-oxidant effect

L-carnitine is another nutrient beneficial to heart, now available in gel suspension form. Carnitine found naturally in the body can convert fat into energy. It is produced in the kidney and liver, stored in muscle, heart, brain and spermatozoa. Many conditions, such as kidney failure can lead to low carnitine level. Together with modern treatment, carnitine helps in alleviating angina pain, pain due to intermittent claudication, recovering from heart failure, improves sperm count and beneficial in chronic fatigue syndrome. It is L-carnitine that is suitable as a food supplement not D-carnitine.



Policosanol reduces LDL, the bad cholesterol and increases the good one i.e. HDL, by its action in the liver. Selenium only found in minute quantity in the body, by itself an anti oxidant but in combination with vitamin A, it becomes a more potent anti oxidant. Lack of Selenium is believed to be one of the contributing factors to heart failure. It is said to reduce the formation and deposition of fat leading to atherosclerosis (narrowing of the blood vessels).

Taurine is a free amino acid helps in regulating blood pressure and improves conduction system of the heart and therefore, regulating the control of a heart beat.

Oyster mushroom which is beneficial for regulating blood pressure and reducing cholesterol, contains many micronutrients, including vitamins B; thiamine, riboflavin, minerals such as potassium, zinc and others. It also contains an amino acid glutamic. Dried oyster mushroom extract contains high iron for a formation of red blood cells.

Niacin or nicotinic acid (vitamin B3) is a water-soluble vitamin, important for digestive system, nervous system and skin health. It plays a role in converting food into energy, maintaining high HDL level in the circulation to protect the heart from an acute coronary syndrome.

Folate is one of many vitamins B and another micronutrient for healthy heart. It is found abundant in green vegetables, beans, and fruits. Lack of folate causes high homocysteine which in turn lowering the HDL (good cholesterol) level and raise the LDL (bad cholesterol), an overall negative effect for the heart.

NUTRIENTS FOR SKIN'S INNER HEALTH *

A healthy skin is highly desirable by both woman and man. It is the biggest organ in our body, and skin's health may reflect on other medical conditions. Unhealthy skin may mirror conditions such as diabetes mellitus, hormonal imbalance, kidney diseases, weak immune system, allergy and many more. Caring for skin health from inside is a good concept since one not only acquires beautiful skin but an overall bodily



health as well. A healthy skin is characterized by being well-hydrated, strong collagen fibre to reduce visible wrinkle lines and has strength to ward off relentless pollution elements such as chemicals and free radicals.



A gel suspension product for healthy skin contains **oil from grape seed, green tea extracts, aloe vera, lecithin, lutein, acerola cherry extract, horsetail extract, turmeric extract, tocotrienol and CoQ10**. Grape seed is said to contain 50 times more vitamin E than beta-carotene. Green tea extract is an amazing moisturizer, fights inflammation and rich in vitamins A, B and E. Aloe vera extract moisturizes skin, and is said to penetrate the skin faster than water. It is rich in proteins, enzymes, vitamins E and C. It has antimicrobial properties, containing zinc, amino acids and polysaccharides. It helps in cell repair, stimulates a formation of collagen, and elastin in the skin. Lecithin is a phospholipid with vitamins B, phosphoric acid, choline, linoleic acid and inositol. It fights off free radicals. Lutein is a good moisturizer making skin supple and fuller. Acerola cherry extract



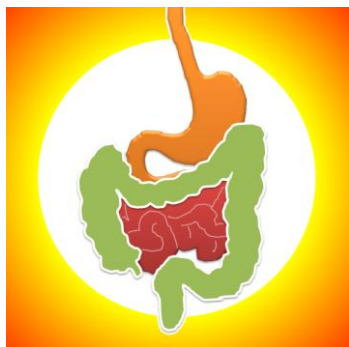
contains 30 times more vitamin C than orange, a potent anti-oxidant with anti-inflammatory properties. Acerola cherry has a potential in skin treatment, and repair damaged skin. Horsetail extract is a type of herb use to improve circulation and improves support tissue.



Interestingly, this product also contains CoQ10. CoQ10 fights free radicals and improves collagen and elastin content in the skin. It repairs damaged skin cells. Turmeric extract has anti-inflammatory and anti-oxidant, continuing use reduces wrinkles and makes skin smooth. Tocorrienol is from vitamin E family which is an anti-oxidant; it reduces the effect of ageing and repairs the damage on the skin.

BODY DETOXIFICATION AND GASTROINTESTINAL CLEANSING WITH PHYTONUTRIENTS (COMPLETE NUTRIENTS FROM PLANTS) *

Plants, not just a lifeline for environment, but also as a source of nutrients for sustenance of all living organisms from microorganisms to a human being. Among many nutrients in plants, phytonutrient has been shown to be of great benefits to the body. It is neither vitamin nor a type of mineral but a biologically active nutrient useful in cleansing and detoxifies the body. Phytonutrient has a well-known property in nourishing and stimulating the digestive tract. With more people



worldwide are suffering from chronic digestive problems such as Colitis, Crohns disease and Irritable bowel syndrome the demand for high quality digestive system health products is on the rise in order to alleviate the discomfort caused by these conditions. Extract from plants and herbs with high phytonutrients content are made into suspension in a gel matrix to produce a more effective and better phytonutrient source for consumption. The following 9

sources of phytonutrients are made into a gel in a single pack for maximum digestive system health benefits.

Chlorella Vulgaris *. Chlorella vulgaris contains a balance of phytonutrients and co-factors beneficial to overall restoration and maintenance of health, including support a healthy cardiovascular system. It contains a high concentration of chlorophyll, amino acid, nucleic acids, vitamins and minerals. Studies have shown that Chlorella

Vulgaris supports an immune system, detoxifies the body from heavy metal (including breast milk and therefore, beneficial to both mothers and babies), support the digestive system and a source of food for good bacteria in our bodies. Chlorella Vulgaris and Chlorella Pyrenoidosa are known to bond with a vast array of bio-toxins and shuttle them out of our bodies, largely via the bowel, thereby lessening the burden on the kidneys. Chlorella Vulgaris is also said to strengthen the body's own 'anti-oxidant system' including elevating glutathione production. It can also support healthy bones and tissue growth in children and provide vital nutrients to bones, joints and muscles in adults.

Wheat Grass*. Wheat Grass is a type of grass that is produced at the early stages of the wheat plant's growth cycle. Studies have suggested that Wheat Grass helps in cleansing the blood and other organs as well as assisting in the removal of gastrointestinal tract debris. It also aids in reducing blood pressure by dilating the blood pathways throughout the body. Wheat Grass is also known as a powerful detoxifier, and liver and blood protector. It can also restore alkalinity to the blood.

Barley Grass*. Barley grass is one of many types of green grass, hails as the only vegetation on the earth that can supply sole nutritional support right from birth to old age. Barley Grass has great benefits, including boosting energy, assisting the immune system and helps to detoxify the body from pollutants. They contain all the vitamins, minerals, and proteins necessary for the human diet, plus chlorophyll. Green barley leaves are extremely alkaline, so ingesting them can help keeping the body alkaline and acidity ratio in balanced. Studies have shown that when green barley juice is added to injured cells, the cells' DNA repairs itself rapidly. Huge amounts of vitamins and minerals are found in green barley leaves, including antioxidants.

Spirulina Algae *. Spirulina algae or Spirulina Arthrospirais a planktonic blue-green algae (Cyanobacteria) found in warm water alkaline volcanic lakes and is rich in raw protein and seven major vitamins: A1, B1, B2, B6, B12 (one of the best natural sources for B12, although the bioavailability of its B12 is



disputed by many researchers), C and E. Spirulina has a 62% amino acid content and contain all essential fatty acids and eight amino acids required for complete nutrition. Spirulina provides all the required amino acids, and in a form that is five times easier to digest than meat or soy protein. It is also rich in gamma-linolenic acid (GLA), linoleic acid (LA), stearidonic acid (SDA), eicosapentaenoic acid (EPA), docosapentaenoic acid (DHA) and arachidonic acid (AA). Spirulina most profound benefit is the improvement of an immune system, and it may protect a liver as well.

Spinach*. This leafy green vegetable is an excellent source of vitamin K, vitamin A, magnesium, folate, manganese, iron, calcium, vitamin C, vitamin B2, potassium, and vitamin B6. It is a very good source of protein, phosphorus, vitamin E, zinc, dietary fiber, and copper. It is also a good source of selenium, niacin, and omega-3 fatty acids. Spinach is loaded with flavonoids, which act as antioxidants, protecting the body from free radicals. Researchers have discovered at least 13 different flavonoid compounds that act as anti-cancer substances.



Broccoli*. The health benefits of broccoli along with the easy availability of this super vegetable make it one of our most popular vegetables. Broccoli provides a high amount of vitamin C, which aids iron absorption, high folic acid to sustain normal tissue growth, potassium and high calcium contents. It is also rich in fibers to enhanced the gastrointestinal tract function.



Peppermint leaf*. Peppermint is a perennial plant that grows to a height of about 3 feet. One primary benefit of peppermint is its function aid to the digestive system. It will calm the stomach, aid in getting more nutrition from the food, kill harmful bacteria in the stomach, and relax intestinal muscles, thus helping with a problem of cramping. Peppermint also contains vitamins A and C, magnesium, potassium, inositol, niacin, copper, iodine, silicon, iron, and sulfur. Peppermint also increases the quantity of bile flowing from the liver. This helps in the digestion of fats and decreases bad cholesterol. Peppermint Leaf is high in bio-flavonoids and exhibits anti-oxidant activities.



Spearmint Leaf*. Spearmint Leaf has many of the same properties as Peppermint Leaf. They work synergistically together to amplify their digestive health properties. The tea that is made with spearmint leaves has traditionally been used to cure headaches, fevers, digestive disorders and several minor ailments. Spearmint is often used as an antispasmodic, restorative, urine-inducing and vomits preventing remedy. Spearmint Leaf can also reduce gas produced by normal food digestion.

Sodium Copper Chlorophyllin (Chlorophyll)*. Chlorophyll is the green pigment which is responsible for the green colour in most plants. Chlorophyll has anti-inflammatory, antioxidant, and wound-healing

properties. Chlorophyll is an efficient deliverer of magnesium and helps the blood carry oxygen to the cells and tissue. Chlorophyll also removes carbon dioxide and carbon monoxide. Chlorophyll has been used traditionally to improve bad breath, as well as to reduce the odors of urine, faeces, and infected wounds. Chlorophyll and chlorophyllin are able to form tight molecular complexes with certain chemicals known or suspected to cause cancer, including polyaromatic hydrocarbons found in tobacco smoke

OMEGA-3 : AN ESSENTIAL FATTY ACID *

Fatty acid is the building block for fat. Fat is important not only as a source of energy but also vital in many other body functions. Omega-3 is an essential fatty acid and categorized as polyunsaturated fatty acid. Unlike saturated fat, polyunsaturated fat has more spaces for hydrogen



atoms. Nutritional experts agree that this type of fat is good for health, especially to the heart. It is said to protect the heart from coronary artery disease by reducing the cholesterol level, and many believe it is useful for arthritis and some skin diseases. Omega-3 is an essential fatty acid that needs to be obtained from external sources such as from fishes and plants. Our body does not naturally synthesize essential fatty acid. Essential fatty acids are known to be important for the function of nervous system, skin and

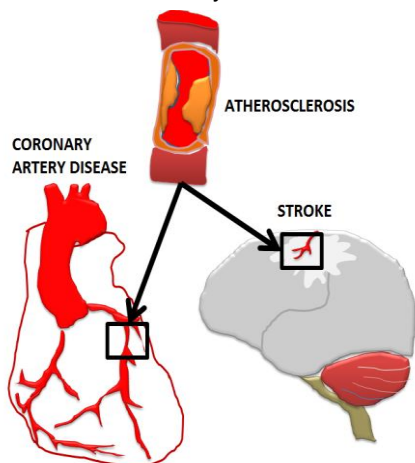
cardiovascular system. It also plays a significant role in metabolism. There are at least 10 types of omega-3 fatty acids. Three acids. Three most important omega-3 fatty acids are alpha-linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). In 2004, US Food and Drug Administration (FDA) gave “qualified health claim” status to EPA and DHA fatty acids, stating that “supportive but not conclusive research shows that consumption of EPA and DHA fatty acids may reduce the risk of coronary heart disease”.

In a study published by the American Journal of Health-System Pharmacy in 2007, it was reported that patients who consumed a daily supplement of EPA and DHA had 50% reduction in their triglyceride levels and 50% bad cholesterol levels, respectively. Similar findings

(using EPA only or combination of EPA plus cholesterol-lowering drug were also reported in the Lancet 2007, involving more than 18,000 patients with unhealthy cholesterol levels. Patients in the EPA group had a superior cardiovascular function and fewer non-fatal coronary events. Currently, there is growing evidences that many people are lacking in this essential fatty acid and inadequate intake of essential fatty acid can also be a risk factor in a wide range of other health issues including problem related to a central nervous system. Adequate supply of omega-3 fatty acids acids in particularly DHA may well influence the development of cognitive abilities in infants as well as improve the memory of older people. DHA is also prevalent in the retina of the eye, and evidence is also showing that adequate supply of DHA in the diet helps with the development of childhood vision as well as helps protect the elderly from macular degeneration, the most common cause of blindness in elderly.



Currently, there are many products on the market that claim to contain health-promoting “omega-3,” but contain only ALA, not EPA or DHA. These products contain mainly plant oils and must be converted by the body to DHA, and are therefore, less effective. The main and important source of DHA and EPA are actually from marine microalgae. These are then consumed by fish and accumulate to high levels in their internal



organs. Apart from cardiovascular protection and for the health of central nervous systems, there is also an evidence that DHA and EPA may help people with a circulatory problem such as varicose veins, rheumatoid arthritis, irregular heartbeats, stroke and depression. In 2007, systematic review of the benefits of omega-3 fatty had shown that this supplement may benefit cancer patients in terms of improving appetite, increased their weight and improved their quality of life.

Omega-3 fatty acid supplementation is now available in gel form based on suspension gel technology. Both EPA and DHA were suspended in the gel matrix and the total ultra-purified omega 3 fish oil was 2250 mg. The proprietary gel technology protects the critical nutrients in the Omega-3 fatty acids, while ensuring a faster, simpler, tastier and more complete delivery system.

NUTRIENTS FOR ENERGY BOOSTER *

Experiencing a lack of energy in our life can be exasperating. It's hard to wake up, fail to focus, sleepy, tired and lack of concentration. A lack of energy can also induce mental stress and poor performance. There are countless of energy pills or drinks on the market. Many of these supplements contain a high level of stimulants and may have detrimental effects to our health. They do not have a natural source of energy



boosters. The suspension gel technology has come out with a new high energy product contain a combination of vitamin B and C as well as an extract from guarana, to benefits many people who need extra energy. FDA lists caffeine as a “multiple purpose generally recognized as safe food substance” if it is consumed below 300 mg daily. Caffeine if taken in a small or moderate amount may have beneficial effect on the function of our body.

An oral caffeine of 200mg appears to improve our reaction time and in some instances, caffeine leads to fewer mistakes caused by tiredness. In some study, caffeine was found to improve the endurance during running and cycling. Caffeine citrate has proven to be of short and long-term benefit in treating the breathing disorders of the apnea and lung problem in

premature infants. In some study, caffeine consumption reduced the risk of diabetes by 9%, risk of Parkinson's disease, and it also may have liver protective effects. The amount of caffeine suspended in the gel matrix is approximately 165 mg per serving, which is far below the safety limits. Apart from caffeine, the other ingredients incorporated within the gel matrix are **vitamin C (as acerola cherry)**, **Vitamin B3 (Niacin and Niacinamide)** and **Vitamin B12 (cyanocobalamin)**. It also has an extract from the Paullinia Cupana seed (Guarana Syrup). Please refer to earlier section of vitamins to know more about the benefits of Vitamin C, B3 and B12.

Guarana , whose botanical name is **Paullinia Cupana** is a shrub grown in the Amazon which produces berries that have been used for traditional medicine. Guarana is chemically identical to caffeine and is also known as guaranine. It has been used for thousands of years by native Amazonians to help maintain their stamina and increase physical endurance. The seeds of Guarana have 7% more caffeine than most plants, including coffee bean. The biggest difference between the caffeine found in coffee beans and that of guarana, is that guarana's



caffeine is released much more slowly, providing lower dose, longer and more sustained stimulation. According to Dr. Ray Sahelian, in combination with other nutrients, guarana may be also helpful for weight loss. The double-blind, placebo-controlled trial (J.

Psychopharmacol, 2007) evaluating the acute behavioral effects of guarana in humans have shown that Guarana improved secondary memory performance and increased alert and content mood ratings. This research supports previous findings of cognitive improvements following 75 mg Guarana, and it also suggested that these effects cannot be attributed to caffeine alone. Extracts derived from the dried seeds of guarana was also found to have anti-platelet aggregatory properties, and this might offer health benefits towards decreasing risk of blood clot formation in the blood vessels (thrombosis) and cardiovascular disease (Ravi, SMT, Yunker R, Int J Vitam Nutr Res, 2008).

NUTRITIONAL SUPPLEMENTS IN GEL STRIPS *

Strip is perhaps one of the most exciting modes of delivering the nutrients. Strip was first invented by the company that produces oral hygiene products. Oral hygiene sales (in mouthwash form) have been sluggish in 1997-2002 period. Many companies then came out with dental gums, which have proven popular. However, in early year 2000, a company in US known as Pfizer had invented a new product for oral hygiene in a form of breath strips (Listerine Pocket Breath Freshening Strips). Breath strip was found to be a very convenient and fashionable alternative to traditional mouth fresheners such as tablets, sprays and drop. It has revolutionized the previously stagnant US mouth fresheners sector upon their 2001 debut, with total category sales increasing nearly 540% between 2000 and 2002. Time Magazine called the product one of the best inventions of 2002.



In 2004-2005, there was a company in US (Momentum Solution) who decided to make a vitamin supplement in a form of dissolving strips and currently there are few vitamins that had been manufactured in strips such as Vitamin B12 Strips and Vitamin C strips. These products were also sold on-line, but it was not taken up quite well by publics, probably because of the availability of more popular and well accepted chewable form (dissolving tablets) of vitamins supplements.



However, in reality, as compared to dissolving tablet, strips has many advantages such as smaller packages, ease of use, easy to bring everywhere and the time taken for the strips to dissolve is faster and so the absorption of the ingredients into the blood stream. Now, the company that pioneered the nutritional supplements based on gel suspension technology has come out with so called Gel Strips and this is probably the first of its kind. These new fast-acting strips quickly dissolve to form a powerful dose of suspension gel. The company claimed that gel strips are more stable, durable and quicker dissolving than other conventional

supplement forms. Gel Strips ability to dissolve rapidly without the need for water provides an alternative to individuals with difficulty in swallowing pills or softgels. Due to its convenient, gel strips can improve the compliance and ensure the adequate and constant level of micronutrients delivered to the consumers.

At present, there are two types of gel strips available that is Gel Strips containing **Yohimbine HCL** 10mg and Gel Strips containing **Melatonin** 1 mg.

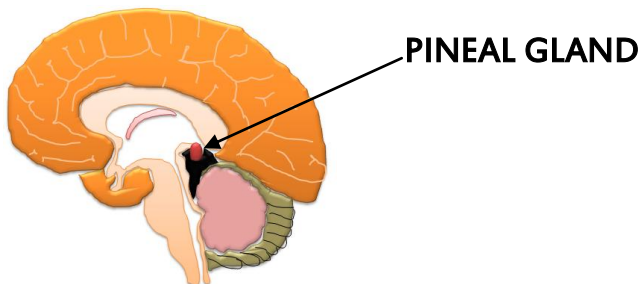
Yohimbine is the principal alkaloid of the bark of the West African evergreen *Pausinystalia yohimbe*. Alkaloid is a basic organic compound of plant origin, containing combined nitrogen. Alkaloids are amines, so their names usually end in "ine" (e.g., caffeine, nicotine, morphine, quinine). Most have complex chemical structures of multiple ring systems. They have diverse, important physiological effects on humans and other animals. There are actually more than 30 types of yohimbe alkaloids found in Yohimbe. However, the main active chemical present



in yohimbe bark is yohimbine hydrochloride (HCL). Yohimbine is said can increase blood flow and nerve impulses to the penis and vagina, it also helps counteract the sexual side effects of certain medications used for depression. Based on the National Medicines

Comprehensive Database rates effectiveness based on scientific evidence, Yohimbine is rating under possibly for **Erectile Dysfunction (ED)** and for sexual problems caused by selective-serotonin reuptake inhibitors (SSRIs). There is evidence that yohimbine can be helpful for erectile dysfunction for both men and women. US Food and Drug Administration (FDA) has approved Yohimbine for the treatment of erectile dysfunction. Some studies have shown that yohimbine can improve sexual problems encountered by patients on SSRIs treatment for depression. However, taking in a high dose (more than 50mg) can cause many undesirable side-effects such as irregular heartbeat, stomach upset, dizziness, high blood pressure, headache and confusion. Yohimbine is not suitable for children, pregnant and lactating women. Patient with heart disease, hypertension and diabetes is not advisable to

take yohimbine. It should not be taken with caffeine-containing supplements or herbs due to high blood pressure side-effect. Normal dose for sexual performance is 10-30 mg, normally taken few hours prior to sexual activity. The amount of Yohimbine HCL in the gel strips is 10mg, which is within the lower dose range.



Melatonin is a hormone secreted by the pineal gland in the brain. The pineal gland (also called pineal body) is a small endocrine gland, reddish gray in color and about the size of a grain of rice (5-8 mm) located in the brain. Melatonin helps regulate other hormones and maintain the body's circadian rhythm. The circadian rhythm is an internal 24 hour "clock" that plays a critical role when we fall asleep and when we wake up. Melatonin is produced more in the dark and when it is light, the production of melatonin drops. Jet lag, shift work and poor vision can disrupt melatonin cycles. Melatonin is also important in regulating sex hormones. Melatonin also has strong anti-oxidant effects and in some preliminary study suggested that it may help strengthened the immune system.



*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.

REFERENCES:

1. Cole Wooley, Phd. Ageless Nutrition, second edition, 2005, nutritional science LLC
2. Guidelines on treatment of Obesity, MOH 2004
3. Health portal. MOH (www.myhealth.gov.my)
4. Medical news today (www.medicalnewstoday.com)
5. WHO website : www.who.int.
6. University of Maryland Medical Center (www.uum.edu)
7. Agel website (www.agel.com)
8. Dangerous Food; CAP guides on hidden danger in food CAP 2002
9. Kearney T, Tu N, Haller C. Adverse drug events associated with yohimbine-containing products: a retrospective review of the California Poison Control System reported cases. *Ann Pharmacother* 2010;44:1022-9
10. Ernst E, Pittler MH. Yohimbine for erectile dysfunction: a systematic review and meta-analysis of randomized clinical trials. *J Urol* 1998;159:433-6.
11. Varnell MA. Enhanced herb may help female sexual dysfunction. *Reuters Health* 2000;Jun 27. www.reutershealth.com/frame/eline.html (Accessed 28 June 2000).
12. Ninfali, Paolino, et al. Antioxidant capacity of vegetables, spices and dressings relevant to nutrition". *British Journal of Nutrition* 2005;93:257-266
13. Huang D, Ou B, Prior R. The chemistry behind antioxidant capacity assays. *J. Agric. Food Chem.* 2005;53(6):1841-56
14. Cao G, Alessio H, Cutler R. Oxygen-radical absorbance capacity assay for antioxidants. *Free Radic Biol Me*, 1993;14(3):303-11
15. Ou B, Habmpsch WM, Prior R. Development and validation of an improved oxygen radical absorbance capacity assay using fluorescein as the fluorescent probe. *J Agric Food Chem*, 2001;49(10):4619-26

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