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VITAMINS AND THEIR FUNCTIONS

This information is extracted from one of my “nutrition natters” during April 2007.

Thank you for joining me this evening. I am the resident Nutritional Advisor at The Maple Leaf Clinic and also a holistic therapist. I qualified in 1997, initially as Massage Therapist and as a Nutritional Advisor in 2000. These days I refer to myself as a Natural Health Practitioner as I specialise in combining my knowledge in Diet and Nutrition with holistic treatments, using massage, reflexology, Reiki and manual lymphatic drainage to encourage good health. I encourage the use of natural foods as much as possible and recommend organic produce.

The aim of these “natters” are to offer informal but accurate presentations to encourage making informed decisions on diet and supplementation. This evening is concerned with the functions and uses of Vitamins, and their food sources. Please make notes if you wish – there are also a few “hand-outs” which you can take at the end of the presentation. I do not support any particular “supplement brand” so I will not be offering a list of suitable supplement companies! I am happy to answer any questions relating to the subject at the end. I am aiming for this evening to take about 1 hour.

If you have a particular subject you would like to know more about please let me know, and, providing I can generate enough interest, I would be happy to present for you. If you have any specific questions you would like to discuss with me on a confidential or personal matter, I am here at the CLINIC on a Tuesday, Wednesday and Thursday. My evening practice is based in Hampton Hill on a Tuesday Wednesday and Thursday.

WHAT ARE VITAMINS?

Vitamins are classed as essential nutrients because the body cannot make them and they must be taken by way of food or supplementation every day to maintain health. They are organic substances. There are 13 known vitamins which act as components of our enzyme systems – this means they allow other chemical reactions to take place within our bodies. Why do we need them? Vitamins are required in tiny amounts to perform specific functions, promoting vitality, energy, growth, and reproduction. In fact hundreds of metabolic activities in the body rely on enzymes, which are vitamin dependant. Vitamins need to be sourced from the diet, with the exception of Vitamin D, which we can synthesis with the help of sunlight, Vitamin K that can be used synthesised within the gastro intestinal tract as can Biotin.

DEFICIENCIES

Deficiencies in vitamins give us many minor symptoms, but if we have a deficiency long enough it can result in a more serious illness. It is not unusual to see a marginal or “subclinical” deficiency through inadequate diet. An example of this would be vegetarians and the elderly, who often are deficient in Vitamin B12. The main symptom of vitamin B12 is anaemia. Deficiency can take many years to present itself through ill-health, often following years of eating the typical “western style diet”.

Vitamins can be put into two groups; fat soluble and water soluble vitamins.

FUNCTIONS OF WATER-SOLUBLE VITAMINS

Water-soluble vitamins cannot be stored by the body and need to be ingested every day.

Vitamin B1: (Thiamin) This is essential for energy metabolism i.e. carbohydrate and protein metabolism, brain function and digestion. It acts as a coenzyme in converting glucose into energy.

Natural food sources: pork, dried Brewer's yeast, yeast extract, brown rice, wheatgerm, nuts, wheat bran, soya flour, whole grains especially germinating grains and liver

Deficiency symptoms: tender muscles, fatigue, stomach pains, burning or numbness in legs/toes, soles of feet, eye pains, insomnia, confusion, poor concentration, constipation. A diet high in refined carbohydrates, pregnancies, breast-feeding, fever, surgery and physical and mental stress are often causes of this deficiency, as is a high alcohol consumption!

Vitamin B2: (Riboflavin) Needed for energy production including the conversion of fats, sugars and proteins, helps to regulate body acidity, good for skin, nails, hair, eyesight.

Natural Food Sources: milk and milk products, yeast extract, brewer's yeast, cheese, organ meats, wheatgerm, eggs, mushrooms, green vegetables, watercress, cabbage and asparagus

Deficiency Symptoms: caused through alcohol, contraceptive pill, poor dietary habits. Symptoms include cracks and sores in the corners of the mouth and eyes, bloodshot, tired eyes, feeling there is grit under the eyelids, conjunctivitis, cataracts, inflamed tongue and lips, scaling of skin around face, dull oily hair and hair loss, trembling, sluggishness, dizziness, insomnia and slow learning.

Vitamin B3: (Niacin) Needed for energy production, brain function (serotonin production), blood sugar control, lowers cholesterol, helps liver function, maintains skin and nerves and helps make sex hormones.

Natural Food Sources: yeast extract, brewer's yeast, turkey, chicken, fish, whole grains, peanuts, mushrooms, and milk products

Deficiency can be caused through alcohol, anti-leukemia drugs. Symptoms include dementia, depressions, anxiety, irritability, digestive disturbances, insomnia, dermatitis, rashes, acne, rough inflamed skin, inflamed mouth, tremors, allergies

Vitamin B5: (Pantothenic Acid) Involved in energy production, controls fat metabolism, production of anti-stress hormones, formation of antibodies and maintaining healthy nerves, skin and hair.

Deficiency can be caused through stress and antibiotics. The main deficiency symptoms include burning feet, poor concentration, apathy, fatigue, restlessness, vomiting, asthma, allergies, muscle cramps, loss of appetite and indigestion.

Food Sources include all animal and plant tissue, mushrooms, avocados, whole wheat, lentils and eggs.

Vitamin B6: (Pyridoxine) Needed for the production of stomach acid, acts as a co-enzyme in protein metabolism, crucial for energy production, maintains corrects water balance, is important in the metabolism of EFA, helps brain function and acts as an anti-depressant and anti-allergenic.

Deficiency is caused through the contraceptive pill, many drugs including penicillin, alcohol, smoking, fasting and weight-loss diets. Symptoms include irritability, depressions, bloatedness, fluid retention, hair loss, cracks around the mouth, numbness, muscle cramps, slow learning, pregnancy sickness, allergies, tingling hands and poor dream recall.

Food Sources include bananas, red kidney beans, watercress, cauliflower and cabbage, Brewer's yeast, yeast extract, animal and dairy produce.

Vitamin B12: (cyanocobalamin) B12's main function is its importance for the production of red blood cells, which carry oxygen to all other cells in the body. It protects our nerves, and is needed for making use of protein, needed for the synthesis of DNA, detoxifies tobacco smoke and other toxins in food.

Deficiency causes include intestinal parasites, veganism, pregnancy, ageing, alcohol and heavy smoking. Non absorption of B12 produces pernicious anaemia. B12 deficiency symptoms present themselves in psychiatric illnesses such as dementia, a smooth sore tongue, nerve degeneration, anaemia, weakness, menstrual disorders.

Food Sources include: oysters, pig's liver, and kidneys, sardines, pork, beef, lamb, white fish, eggs, cheese, Spirulina algae contains twice as much B12 as liver as is an excellent source for vegans and vegetarians.

It is important to understand that the B complex group of vitamins work as a family. An excess of one could produce a deficiency in another and hinder metabolic processes so if taking B vitamins within a supplement always use "Vitamin B complex"

Vitamin C: Essential for detoxification, an anti-oxidant that protects other nutrients, prevents cellular damage and makes collagen - keeps skin, bones, joints, arteries and gums healthy, encourages wound healing, and is vital for a healthy immune system, lowers cholesterol, aids iron absorption, produces anti-stress hormones, brain and nerve function and activates folic acid.

Deficiency causes are often connected with a diet high in refined foods, low in fresh fruit and vegetables, poor digestive absorption, stress, alcohol, ageing, contraceptive pill and other prescription drugs, Deficiency symptoms are frequent recurring colds and infections, lack of energy, bleeding gums, slow wound healing, anaemia, premature ageing. The deficiency disease is scurvy.

Food Sources: All fruits and vegetables specially guava, yellow peppers, cantaloupe melon, pimentos, papaya, strawberries, Brussel sprouts, grapefruit juice, sprouted seed and beans. Aloe Vera Gel and pomegranates are also an excellent source of Vitamin c

The best form of supplementing Vitamin c is in ascorbic acid, which is mildly acidic. High dosages of vitamin C (over 3000 mg daily) can lead to loose bowels so can be used as a natural laxative. I would suggest 500-1000mg daily to support the immune system.

Folic Acid: Helps regulate histamine levels, and is critical during pregnancy for the child's development, it is also involved in red blood cell formation, DNA and protein synthesis.

Deficiency is caused through pregnancy, the contraceptive pill, age, 50-90 of folic acid is also lost in cooking. Deficiency symptoms include anaemia (linked with B12), irritability, insomnia, forgetfulness, cracked lips, prematurely greying hair and depression. In pregnancy it can result in miscarriage, premature birth, toxemia, and possibly spina bifida.

Food Sources: chicken livers, bulgar wheat (also known as cous-cous), spinach, red kidney beans, orange juice, avocado, chickpeas broccoli, beetroot, raspberries, peanuts, asparagus, cashew nuts.

Biotin/Vitamin H: Not officially a vitamin as it can be synthesised by the body within gut flora. Acts as a coenzyme in many body actions including metabolism of proteins, fats and carbohydrates, maintains healthy skin and hair, sweat glands, nerves and bone marrow.

Deficiency symptoms can present themselves as fatigue, depression, nausea, sleepiness, smooth pale tongue, loss of appetite, muscular pains, loss of reflexes and hair loss. In babies it can be present as dermatitis, scaly skin, anaemia and diarrhoea. Like most the above stress plays a factor is deficiency causes as does low calorie diets. Although Biotin deficiency is rarely seen recurrent long term use of antibiotics can remove gut flora causing deficiency.

Food Sources found in all yeasts, liver, kidney, milk products, watermelon, cauliflower, sweet corn, almonds, eggs and tomatoes.

FUNCTIONS OF FAT-SOLUBLE VITAMINS

Fat soluble vitamins include vitamins A, D, E and K. They can be stored in the body and within liver cells and are transported through the body by fat. If taken in supplement form they need to be taken with meals containing fats and minerals to be properly dissolved and digested before they can be absorbed.

Vitamin A: needed for healthy skin - inside and out, mucous membranes, bones, immune system, anti-oxidant, cancer inhibition, growth and reproduction, needed for good vision. It is an "anti-oxidant"

Deficiency symptoms. Poor night vision, dry flaky skin, frequent colds or infections and mouth ulcers.

Food Sources: Yellow fruits and vegetables, which contain beta-carotenes that the body can convert to Vitamin A. Also fish liver oil, liver, eggs and dairy produce. Again Aloe Vera Gel and Pomegranates are an excellent form of food source. Pomegranate is particularly high in beta-carotene.

Vitamin D: needed for absorption of Calcium, thyroid function, absorption of vitamin A, nerve function. . Deficiency of vitamin D is rarely seen within the UK as all we need in 10 minutes of sunlight daily to be able to synthesise Vitamin D.

Deficiency Symptoms: joint pain or stiffness, lack of energy, rheumatism, arthritis, hair loss, osteoporosis, and rickets

Food Sources; Fish liver oils, sardines, herring, salmon, tuna, fortified milk, meat and eggs

Vitamin E: This vitamin is known as an anti-oxidant, like Vitamin A and C and is needed for cardiovascular system, prevents blood clots, maintains healthy blood vessels, increases good cholesterol, improves energy, immune system, growth and skin repair, wound healing, sex organ function.

Deficiency symptoms; easy bruising, exhaustion after light exercise, slow wound healing, lack of libido, varicose veins and loss of muscle tone. Deficiency can be caused through fat malabsorption, a very low fat diet, gall bladder removal, alcoholism, cirrhosis of the liver, celiac disease, intestinal surgery,

Food Sources: Soya beans, unrefined corn oils, broccoli, Brussel sprouts, green leafy veg, sunflower seeds, sesame seeds, peanuts, whole grain cereals, wheat germ, tuna and sardines, Aloe Vera and pomegranates

Vitamin K: like Vitamin D Vitamin K can be obtained from non-food sources. Bacteria in the gastrointestinal tract synthesises Vitamin K. All new born infants are injected with this vitamin, as they do not have sufficient intestinal flora present to produce any. Antibiotics destroy Vitamin k and foods containing Vitamin K should be increased after taking antibiotics. Vitamin K acts primarily in blood clotting, liver function, prevents internal bleeding and haemorrhages and aids in reducing excessive menstrual flow. Deficiency can be seen in excess bleeding and abnormal blood clotting.

Food sources include green tea, the cabbage family, lettuce, beans, peas, watercress, potatoes, tomatoes, asparagus and corn oil. Milk, meats, eggs, cereals and fruits also provide some smaller amounts.

Antioxidants:

Vitamins A, C and E, are known collectively as the "anti-oxidant vitamins". The mineral selenium is also an anti-oxidant . These vitamins have been shown to protect the heart by limiting the damaging effects of cholesterol on body tissues. Their main function is to protect body cells against free radical damage, are collagen binding and stabilise the cells. They are anti-inflammatory and anti-allergenic. They protect capillaries and when Antioxidants are substances that can protect foods and other substances from damage from oxidation. Taken together they aid the absorption of Vitamin C

Their main food sources are organic fresh fruit and vegetables.

Deficiency causes include stress, smoking, and using stimulants such as tea, coffee and alcohol. The main deficiency symptoms are premature aging, cataracts, high blood pressure, frequent infections, easy bruising, slow wound healing, varicose veins, loss of muscle tone and infertility.

Therapeutically they protect against heart disease, prevent and can treat vascular disorders such as varicose veins, improve circulation, help towards allergic reactions, protect the skin from wrinkles and lack of elasticity.

FOOD SOURCES

Fruit and vegetables

Fruit and vegetables are rich in many essential vitamins. To maintain good health and a reasonable intake of vitamins I recommend your daily diet comprises of

- At least five servings of fruit and vegetables daily.
- A wide variety of wholefood products
- Use organic foods, they have a higher nutrient value
- Eat at least 1 meal comprised of raw fruit and vegetables daily
- Steam vegetables or boil them in minimum water. This form of cooking reduces the amount of vitamins leached during cooking
- Use vegetable water to make gravies, soups, stock. This way the nutrients are returned to your plate rather than thrown down the drain!
- Keep all processed and packaged meals to a minimum
- It is almost impossible to maintain health though eating food and supplementation is required to achieve optimum nutrition.

A serving of fruit is:

- 1 medium size piece of fresh fruit e.g. half a large grapefruit, a slice of melon or 2 Satsuma's
- 2-3 small pieces of fruit e.g. plums, apricots
- 1 handful of grapes
- 1 medium banana
- 7 strawberries
- 3 heaped tbsp fruit (stewed or tinned in juice)
- 1 small glass fruit juice (150ml)
- 1 heaped tbsp dried fruit e.g. raisins, or 3 dried apricots

A serving of vegetables is:

- 3 heaped tbsp cooked vegetables e.g. carrots, peas or sweet corn
- 1 side salad (the size of a cereal bowl)
- 1 tomato, 7 cherry tomatoes

WHAT DOES RDA AND SONA MEAN ?

Health Authorities in the UK and USA have accepted the necessity for giving advice on the minimal amounts of vitamins and minerals to keep diseases at bay. These are referred to as RDA's and SONA'S. However, these are not dosages for optimum health. Everyone's needs are different and many people need more of one nutrient than others do. It is becoming increasingly apparent that larger dosages of microminerals can prevent disease and can be used therapeutically to prevent, maintain and recover good health. As you are probably aware there is publicity and campaigning to remove some nutrient supplementation from the public and new regulation has still not been agreed. The table below shows the current recommended and suggested nutritional allowances.

UK RDA's = UK Recommended Daily Allowances. These are the minimum amounts recommended as a guide within the UK. By consuming this allowance you will not get scurvy or beriberi but optimum health will not be achieved!

SONA's – Suggested Optimal Nutritional Allowances. SONA's were developed in the USA over a period of 15 years. Researchers found that the intake of nutrients associated with optimal health was often 10+ higher than the RDA levels. These levels are more likely to be the kind of intake required to maintain optimum health.

Therapeutic Intake. These are allowances that nutritionists may well use to treat specific illnesses.

Table of Daily Recommended Allowances (RDA's) (Adults) for Vitamins

<u>VITAMIN</u>	<u>UK RDA</u>	<u>SONA's</u>	<u>THERAPEUTIC</u>
A (Retinal)	600 mcgRE	2.000 mcgRE	2,250-6,000 mcgRE
D	10mcg	10-20 mcg	10-25mcg
E	3- 4mg	100 - 1000 mg	100-1,000 mg
K	Not establish	55-80 mcg	Not established
B1 - Thiamin	0.8-1mg	3.5- 9.2 mg	25-100mg
B2- Riboflavin	1.1-1.3 mg	1.8 - 2.5 mg	25-100mg
B3- Niacin	13-17mg	25-30 mg	5-150mg
B5 - Pantothenic	3-7mg	25 mg	10mg - 25mg
B6- Pyridoxine	1.2 - 1.4 mg	10-25 mg	50- 250 mg
B12 - Cobalamin	1.5 mcg	2-3 mcg	5-100 mcg
Biotin	10-200 mcg	50-200 mcg	50-200 mcg
Folate	200mcg	400 - 1,000 mg	400mcg
Vitamin C	40 mg	400 - 1,000 mg	400-10,000 mg

Other "natters" include:

The Benefits of Aloe Vera, What are Essential Fatty Acids (Omega 3 and 6) and what do they do?. The Importance of Water, What are Carbohydrates, Proteins and Fats and correct daily allowances, The Importance of Fibre.

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Diet and Nutrition by Rudolph Ballentine

The New Optimum Nutrition Bible – Patrick Holford

Nutrition – Suzanne Le Quesne