Vitamin and Mineral Testing

The Vitamin and Mineral Assessment is a test that is recommended for individuals of all ages. This test is able to provide information on the nutritional state of a person, detecting the presence of vitamins, minerals and essential fatty acids in the body. Nutrients are essential to one's health and well-being and deficiencies in certain nutrients may contribute to a range of illnesses. Nutritional deficiencies may contribute to problems in the following areas:

- Hormone Function
- Neurotransmitter Function
- Food Digestion
- Skin Health
- Bone Formation
- Energy Production
- Antioxidant Function

Most nutrients are supplied to us through food and water, and are used by the body in its day to day activities. Most of the nutrients that our bodies require are “essential”. This means that our bodies cannot manufacture them and need to obtain them from the diet. Processed foods and modern agricultural practices tend to deplete essential nutrients from food and therefore many of today’s diets lack an adequate complement of essential nutrients. Living in a modern world has delivered the body an array of new challenges: increased stress, nutritionally-low convenience foods and a chemical-laden environment. All these factors impact negatively on our lifestyles and place additional strain on the body, increasing its nutritional requirements.

Research has consistently shown that adequate levels of essential nutrients allow the body to function at an optimal level and aid good health and recovery.

Understanding Your Results

Your results will be accompanied by a ‘score’ between -3 and 3:

<table>
<thead>
<tr>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant Deficiency</td>
<td>Deficiency</td>
<td>Slight Deficiency</td>
<td>Neutral</td>
<td>Adequate Levels</td>
<td>High Levels</td>
<td>Very High Levels</td>
</tr>
</tbody>
</table>

Scores between -3 and 0 require adequate supplementation to help restore levels to normal. Most nutrients work synergistically in the body to carry out their respective functions. This is taken into account when your results are analysed and nutritional recommendations are provided.
Scores are between -3 and +3. -3 = significant deficiency, 3 = very high levels

<table>
<thead>
<tr>
<th>Name</th>
<th>Score</th>
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<tbody>
<tr>
<td>Vitamin A (Retinol)</td>
<td>0</td>
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<tr>
<td>Vitamin B1 (Thiamin)</td>
<td>-1</td>
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<tr>
<td>Vitamin B2 (Riboflavin)</td>
<td>-1</td>
</tr>
<tr>
<td>Vitamin B3 (Niacin, Nicotinic acid, Nicotinamide)</td>
<td>-1</td>
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<tr>
<td>Vitamin B5 (Pantothenic Acid)</td>
<td>-1</td>
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<tr>
<td>Vitamin B6 (Pyridoxine)</td>
<td>-1</td>
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<tr>
<td>Vitamin B9 (Folic Acid)</td>
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<tr>
<td>Vitamin B12 (Cyanocobalamin)</td>
<td>-1</td>
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<tr>
<td>Vitamin C (Ascorbic Acid)</td>
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<td>Vitamin D</td>
<td>1</td>
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<td>Vitamin E</td>
<td>1</td>
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<tr>
<td>Vitamin H (Biotin)</td>
<td>-1</td>
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<tr>
<td>Vitamin K</td>
<td>1</td>
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<tr>
<td>Omega 3 Fatty Acids</td>
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<tr>
<td>Omega 6 Fatty Acids</td>
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<tr>
<td>Calcium</td>
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<td>Potassium</td>
<td>0</td>
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<td>Manganese</td>
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Please note that only reactive substances have been listed.
Vitamins

Vitamin A Retinol

**Function:** Maintains skin and epithelium, antioxidant protection, immunity to infections, reproduction activity, adrenal hormone production, eye pigmentation.

**Deficiency Signs:** Dry hair, eyes, rough cracked skin, poor night vision, acne, diarrhoea, poor immunity especially to respiratory infections, cancer, especially lung tumours.

**Best Food Sources:** Liver, eggs, milk and dairy products, fish liver oil, carrots, green and yellow vegetables, yellow fruits.

**Depleted by/ Factors Increasing Demand:** Low-fat diet, insufficient vitamin E, prolonged heating of food sources, laxatives, antibiotics, some cholesterol-lowering drugs.

Vitamin B1 Thiamin

**Function:** Important for carbohydrate metabolism, appetite maintenance, nerve function, growth and muscle tone, helps fight motion sickness, aids in the treatment of herpes zoster.

**Deficiency Sign:** Weakness, fatigue, laboured breathing, numbness and tingling, poor concentration and memory, appetite and weight loss, constipation.

**Best Food Sources:** Wheatgerm, rice bran, sun-flower seeds, brewer’s/savoury yeast, peanuts, soybeans, figs, sesame seeds, brazil nuts, pecans, peas, pork, beef, oats, most legumes, nuts and seeds.

**Depleted by/ Factors increasing demand:** High – especially refined – carbohydrate diet, high raw fish/seafood intake, high alcohol use, oral contraception, antibiotics, diabetes.

Vitamin B12 Cyanoco-balamin

**Function:** Fat, carbohydrate and protein metabolism. Maintains health of nervous system, blood cell formation, folate synthesis.

**Possible Deficiency Effects:** Mental confusion, tiredness, pale skin, recurrent mouth ulcers, pernicious anaemia usually involves lack of intrinsic factor for absorption of B12.

**Best Sources:** Liver, sardines, fish, shellfish, red meat, eggs, blue cheese, camembert, seaweed, chicken, turkey, Bacterial synthesis in intestines.

**Depleted by/ Factors increasing demand:** Low stomach acid/intrinsic factor, bile and other digestive disorders, vegetarian especially vegan diet, antacids, anti-gout and anticoagulant drugs.

Vitamin B2 Riboflavin

**Function:** For the metabolism of fat, carbohydrate and protein, formation of antibodies and red blood cells, Activation of B6 and folate.

**Possible Deficiency Effects:** Sore tongue and lips, cracks in skin around nose and mouth, eye irritation, burning feet, dry flaking skin, scrotal and vulva dermatitis.

**Best Sources:** Liver, brewer’s/savoury yeast, bee pollen, almonds, almonds, avocados, sprouts.

**Depleted by/ Factors increasing demand:** High refined carbohydrate diet, low protein, excess alcohol, smoking, high coffee intake, stress.
Vitamin B3 Niacin, nicotinic acid, nicotinamide

Function: Fat, carbohydrate and protein metabolism, health of skin, tongue and digestive system, blood circulation.

Possible Deficiency Effects: Dizziness, fatigue, mouth sores, cracked, flaky bleeding skin, red swollen tongue, headaches, nervousness, diarrhoea, depression, disorientation.

Best Sources: Brewer's/savoury yeast, peanuts, liver, salmon, tuna, turkey, white fish, sardines, red meat, dried peaches, potato, brown rice, mushroom, white rice, almond, wholegrains.

Depleted by/ Factors increasing demand: Infections, stress, overactive thyroid, strenuous exercise, high sugar diet, tryptophan deficiency, smoking.

Vitamin B5 Pantothenic Acid

Function: Converts nutrients into energy, formation of some fats, vitamin utilisation.

Possible Deficiency Effects: Tiredness, headaches, weakness, emotional swings, muscle cramps, nausea, diarrhoea, burning feet.

Best Sources: Brewer's/savoury yeast, soybeans, sunflower seeds, corn, egg yolk, peas, peanuts, wheatgerm, broccoli, crayfish, lentils, avocado, apricot, turkey, walnuts, mushroom, sardines, salmon.

Depleted by/ Factors increasing demand: Canning and prolonged heating of food sources, stress, caffeine, sulphur drugs, digestive and metabolic disorders.

Vitamin B6 Pyridoxine

Function: Fat, carbohydrate and protein metabolism, formation of antibodies, maintains sodium/potassium balance, oxygenation of tissues.

Possible Deficiency Effects: Numb extremities, red tongue, dry skin lesions, depression, nervousness, convulsions, carpal tunnel syndrome, insomnia, fluid retention.

Best Sources: Brewer’s/savoury yeast, sunflower seeds, wheat bran, salmon, rice, soybeans, liver, hazelnuts, shrimp, avocado, egg, fish.

Depleted by/ Factors increasing demand: Deficiency of magnesium or B2 excess protein, excess heating of food sources, ultraviolet light, pregnancy, OCP, HRT, cortisone and diuretics, excess intake of coffee, tea, alcohol or cigarette smoke.

Vitamin B9/Folic Acid/Folate

Function: Red blood cell formation; DNA and RNA synthesis; growth and cell division; protein metabolism; reproduction.

Possible Deficiency Effects: Weakness, fatigue, megaloblastic anaemia, neural tube defects where mother’s intake is inadequate, poor growth in children, cracks at corners of the mouth, painful sore tongue, mouth ulcers, depression, cancer - especially cervical, increased risk of cardiovascular disease.

Best Sources: Green leafy vegetables, offal, melons, brewer’s/savoury yeast, beans and lentils, broccoli, brussel sprouts, egg yolk, apricots, avocado.

Depleted by/ Factors increasing demand: Oral Contraceptive Pill use, excess alcohol, overcooking of food sources, insufficient raw food in diet, injury and illness, pregnancy and lactation, vitamin C deficiency.
**Linoleic Acid/Omega 6 Series Fatty Acids**

**Function:** Omega 6 series polyunsaturated fatty acid, precursor of prostaglandins and leukotrienes

**Possible Deficiency Effects:** Inflammation, blood vessel constriction, 'high' blood pressure, blood pressure, arthritis, pain, blood clotting, allergies, asthma, eczema, psoriasis, dry skin, migraine, infertility, PMT (especially breast tenderness), dry eye syndrome, behavioural problems.

**Best Sources:** Safflower oil – the richest natural source, sunflower oil, corn oil, sesame oil, hemp oil best balance of omega 6:3:9; pumpkin oil, soybean oil, walnut oil, wheatgerm oil, evening primrose oil.

**Depleted by/ Factors increasing demand:** Omega 6 and Omega 3 essential fatty acids are best consumed in a ratio of about 3:1 – three omega 6 for one omega 3. Most western diets range between 10 and 20 to 1 in favour of omega 6, which is not good for health. We eat too much omega 6 fat and not enough omega 3 fat.

**Vitamin C Ascorbic Acid**

**Function:** Helps heal wounds, strengthens blood vessels, collagen maintenance, resistance to infection, required for production of adrenal hormones, helps detoxification and excretion of a wide range of toxic chemicals.

**Possible Deficiency Effects:** Gums and nose bleed easily, frequent bruising, viral and bacterial infections, weakness, shortness of breath, slow wound healing, anaemia, swollen painful joints, cataracts, CVD, cancer - especially stomach, throat and lungs.

**Best Sources:** Rosehip, guava, red pepper, blackcurrants, Brussels sprouts, broccoli, green pepper, spinach, watercress, strawberry, orange, grapefruit, kiwifruit, cabbage, liver, lemon, tomato, potato, radish.

**Depleted by/ Factors increasing demand:** Storing, cooking, processing, exposing to air, cooking in iron or copper pots, illness, infection, smoking, stress, excess alcohol, analgesics, OCP, antidepressants, steroids.

**Vitamin D Ergocalciferol and Cholecalciferol**

**Function:** Hormone-like regulator of calcium, controlling bone stores, nerves, muscle contraction, heartbeat and blood clotting.

**Possible Deficiency Effects:** Weak muscles, brittle bones, osteoporosis, children – soft bowed legs and late tooth development, cancer.

**Best Food Sources:** Sunlight acting on the cholesterol in skin can produce much of the supply, halibut/cod liver oil, sardines, salmon, tuna, shrimp, mushrooms, sunflower seeds, liver, eggs, cheese, butter.

**Depleted by/ Factors increasing demand:** Insufficient fat in diet, mineral oil, insufficient sun on skin, liver, kidney or parathyroid disorders, barbiturates.

**Vitamin E Tocopherol**

**Function:** Antioxidant. Protects membrane and red blood cells; inhibits coagulation of blood and encourages blood flow; protects fat soluble vitamins; cellular respiration; protects cells from free radical damage, especially cellular fats.

**Possible Deficiency Effects:** Increased risk of coronary heart disease and some cancers; acceleration of some degenerative diseases eg cataracts, rheumatoid arthritis, acceleration of aging; menopausal hot flushes; hormonal/reproductive problems; slow wound healing.

**Best Sources:** Wheat germ, nuts and seeds, vegetable oils, green vegetables, eggs.
Depleted by / Factors increasing demand: Low-fat diet; liver/gallbladder problems/ coeliacs/malabsoprtion and other fat-digesting problems; Increased intake of damaged fats; Cooking, freezing and prolonged exposure of food sources to air.

**Vitamin H Biotin**

**Function:** Fat, carbohydrate and protein metabolism, helps utilise B vitamins

**Possible Deficiency Effects:** High cholesterol, scaly dermatitis, tiredness, weakness, severe cradle cap in infants, long term antibiotic use can cause deficiency.

**Best Sources:** Yeast, offal, eggs, milk, cheese.

**Depleted by / Factors increasing demand:** Bodybuilders and athletes consuming raw eggs should be careful of not running into a biotin shortage, since raw eggs contain avidin, which binds with the biotin, making it impossible to be absorbed by the body. Also long term users of antibiotics may also have to look at their biotin levels.

**Vitamin K1 Phylloquinone, K2/3 Menaquinone**

**Function:** Important in formation of blood clotting agents; involved in energy metabolism (conversion of glucose to storage form); protein formation in bone tissue.

**Possible Deficiency Effects:** Nose bleeds, increased blood clotting time, bruising, haemorrhagic disease in the newborn.

**Best Food Sources:** Green leafy vegetables, alfalfa sprouts, green tea, cauliflower, broccoli.

**Depleted by / Factors increasing demand:** Broad spectrum antibiotics destroy the gut flora that make Vitamin K; premature or low-weight babies; insufficient bile or problems with digestion/absorption; low-fat diets.

**Eicosapentaenoic Acid Omega 3 Series Fatty Acids**

**Function:** Omega 3 series polyunsaturated fatty acid;

**Possible Deficiency Effects:** Inflammation, blood clotting, rheumatoid arthritis, behavioural problems, muscle weakness, visual impairment

**Best Sources:** Fish oils and oily fish, flaxseed oil, pumpkin seeds.

**Depleted by / Factors increasing demand:** Generally depleted by western diet and lifestyle, an imbalance is omega 3 and 6 levels and a lack of anti-oxidants.

**Minerals**

**Boron**

**Function:** Possible role in reproduction and embryo development; bone formation; cell membrane function; possible anti-inflammatory effects.

**Food Sources:** Fruits, vegetables, nuts, legumes, avocado, peanuts, pecan nuts, grapes, raisins and wine.

**Non-Food Sources:** Enamel and glass; light weight components; antibiotics; antacid medication; lipstick; lotions; creams; soaps; water (depending on location).

**Possible Signs/Effects of Deficiency:** Arthritis.

**Possible Signs/Effects of Excess:** Acute toxicity: is rare but symptoms may include nausea, vomiting, diarrhoea, lethargy and dermatitis. Chronic toxicity: is rare but may include the above together with weight loss and poor appetite.

**Depleted By / Factors Increasing Demand:** None known.
**Calcium**

**Food Sources:** Seaweed, sesame seeds, cheese, molasses, carob, sardines with bones, tofu, parsley, almonds, brazil nuts, salmon with bones, watercress, brewer’s/savoury yeast, dried figs, pistachio, sunflower seeds, whole milk.

**Depleted By/Factors Increasing Demand:** Excess/insufficient body fat/exercise; excess phosphorus ie soft drinks, food additives, zinc, magnesium, caffeine, oxalic acid, menopause.

**Functions:** Primary ingredient in bone and teeth; blood vessels and clotting; nerve function, heart and muscle contraction, hormone storage and release; inhibits lead absorption; assists iron utilization.

**Possible Signs/Effects of Deficiency:** Sleep onset problems; muscle cramps, tooth decay, brittle nails with white spots, soft brittle bones, high blood pressure and LDL cholesterol, heart palpitations, osteoporosis.

**Chromium**

**Food Sources:** Brewer's/savoury yeast, yeast, oyster, broccoli, wholegrains, mushrooms, beer, wine.

**Depleted by:** High sugar and refined carbohydrate diet, obesity, insulin resistance, aging.

**Functions:** Increases cell sensitivity to insulin for stable blood sugar levels, raises HDL cholesterol, helping heart, blood vessels, brain.

**Possible Signs/Effects of Deficiency:** Hypoglycaemia, anxiety, fatigue, obesity, diabetes, cardiovascular disease.

*Caution: Chromium supplements can diminish a diabetic’s insulin needs. See your health professional for monitoring.*

**Copper**

**Functions:** Copper is important to the function of many enzymes in the body. It also is of benefit to the health of the brain and nervous system, heart and cardiovascular system, healthy bone formation, immune system, skin, blood formation and forms part of the cellular free radical scavenger (antioxidant) system called superoxide dismutase.

**Food Sources:** Plant sources include nuts, seeds, legumes, dried fruits, potatoes, wholegrains and cocoa. Animal sources include organ meats and shellfish. The copper content of these foods is reduced by processing.

**Non-Food Sources:** Copper water pipes (particularly in soft water areas); swimming pool water; some medications; pesticides; fungicides; contraceptive pill and some contraceptive devices may raise copper levels; brake linings; wirings; dental amalgam and coins.

**Possible Signs/Effects of Deficiency:** Possible role in rheumatoid arthritis; possible role in cardiovascular disease; impaired immune function; affects bone and blood formation in infants.

**Possible Signs/Effects of Excess:** Rheumatoid arthritis; cardiovascular disease; gastrointestinal irritation, possible link to schizophrenia; possible link to cancer; Wilson’s disease (copper storage syndrome).

**Depleted By / Factors Increasing Demand:** Excess zinc intake may cause copper deficiency. Copper deficiency may lead to iron-deficiency anaemia due to the interaction in blood formation. Copper deficiency may reduce selenium-dependent antioxidant functions in the body.

**Iodine**

**Food Sources:** Iodine content of food will vary depending on the region in which it is grown (i.e. soil content). Fish (marine fish have a higher content than freshwater fish), milk, eggs, legumes, grains and iodised salt.

**Depleted by/Factors Increasing Demand:** Goitrogens are compounds found in cruciferous vegetables such as cabbage, cauliflower and broccoli. These compounds may compete with or block the uptake of iodine into cells. Cooking these foods can greatly reduce the effect of goitrogens on iodine uptake. The over-consumption of iodine and iodine-containing foods can lead to iodine toxicity syndromes.
**Functions:** Required for the synthesis of thyroid hormones T4 (thyroxine) and T3 (triiodothyronine). Thyroid hormones stimulate the body's basal metabolic rate, increase oxygen consumption and heat production, and influence the activity of most organs.

**Possible Signs/Effects of Deficiency:** Goitre (swelling of the thyroid gland); cretinism.

**Iron**

**Food Sources:** Seaweed, caviar, pumpkin seeds, sesame seeds, wheatgerm, molasses, liver, chickpeas, pistachios, lentils, walnuts, mussels, oysters, red meat, cashews, figs, spinach, prunes, raisins, egg yolk, chicken.

**Depleted By/Factors Increasing Demand:** Insufficient HCL, vitamin C, calcium or copper, excessive menstrual loss, drinking tea with meals, excessive exercise, zinc or phosphorus, pregnancy, antibiotics, antacids.

**Functions:** Red blood cell production, oxygenation of cells, energy and enzyme production, immunity, growth.

**Possible Signs/Effects of Deficiency:** Pale skin and nails, mental and physical fatigue, cracked lips and tongue, inflamed mouth, hair loss or brittle hair, difficulty swallowing, poor growth in children.

**Magnesium**

**Food Sources:** Molasses, sunflower seeds, wheatgerm, almonds, most fish, seafood, soybeans, peanuts, pistachios, hazelnuts, oats, rice, dark leafy greens, most legumes.

**Depleted By/Factors Increasing Demand:** Stress, excessive wheatbran, protein, alcohol, calcium, zinc, phosphorus or vitamin D, diuretics, poor adrenal or kidney function, diarrhoea, vomiting, fluoridated water.

**Functions:** Muscle relaxation, nerve transmission, converting glycogen to glucose, bone formation, hard tooth enamel, assists calcium and potassium uptake.

**Possible Signs/Effects of Deficiency:** Hyper-excitable nerves and muscles, sleep maintenance problems, muscle cramps, confusion, quivering tongue, abnormal heart rhythms, cardiovascular disease.

**Manganese**

**Functions:** Manganese is important to the function of many enzymes in the body and forms part of the cellular free radical scavenger (antioxidant) system called superoxide dismutase.

**Food Sources:** Wholegrains, nuts, green leafy vegetables, dried fruits, green and black tea.

**Non-Food Sources:** Textile bleaching; glass manufacture; fertilisers; compounds used in unleaded petrol and pesticides; pottery glazes.

**Possible Signs/Effects of Deficiency:** Joint pains; dizziness; possible links to schizophrenia.

**Possible Signs/Effects of Excess:** Lethargy; involuntary movements or impairment of voluntary movements; changes in muscle tone.

**Depleted By / Factors Increasing Demand:** Excess iron and copper may inhibit manganese absorption. Excess manganese intake may inhibit iron absorption. Oxalates and phytates in foods may reduce manganese absorption.
Potassium

Functions: Potassium is important in maintaining electrolyte and pH balance. It also has a role in influencing muscle contraction and nerve stimulation. It is found predominantly inside the cells of the body.

Food Sources: Potassium is found widely in the diet in raw foods. Rich sources include banana, melons, mango, prune juice, papaya, avocado, green leafy vegetables, legumes, nuts and seeds.

Possible Signs/Effects of Deficiency: Potassium deficiency goes mainly unnoticed due to the fine control that the body has in maintaining a balance. However, a deficiency in potassium in the presence of elevated sodium may predispose one to cardiac disease. Diuretic medication use in individuals with high blood pressure may also lead to potassium depletion.

Possible Signs/Effects of Excess: Potassium excess from normal or dietary sources is rare due to the fine control mechanism that the body has in maintaining a balance. Potassium excess may be the result of excessive supplementation of this mineral or a disturbance in the sodium-potassium balance.

Depleted By / Factors Increasing Demand: None known.

Selenium

Food Sources: Brazil nuts, tuna, sunflower seeds, oysters, chicken liver, wholegrains, organ meats, Brewer’s/savoury yeast.

Depleted By/Factors Increasing Demand: Low soil content, lost in food processing, overcooking, liver disease, alcoholism, chemical exposure.

Functions: Component of antioxidant enzyme and defense against peroxide damage including cancer helps tissue elasticity and counteracts mercury, works with vitamin E to help heart, liver and produce antibodies.

Possible Signs/Effects of Deficiency: Prostate and liver problems, depression, fatigue, premature ageing, poor immunity, Cardio Vascular Disease, cancer – especially tumours.

Sodium

Functions: Sodium plays an important role in maintaining fluid balance in the body. It is also involved in nerve transmission, impulse conduction and muscle contraction.

Food Sources: The most common source of sodium in foods comes in the form of added salt (sodium chloride). Naturally-occurring sources of calcium include milk, meat, eggs and most vegetables

Possible Signs/Effects of Deficiency: Sodium deficiency is linked to dehydration and therefore deficiency signs will be related to signs and symptoms of dehydration.

Possible Signs/Effects of Excess: Sodium excess is linked to an increased intake of dietary sodium i.e. from foods. Elevated sodium levels may contribute to high blood pressure, kidney disease and electrolyte imbalances.

Depleted by / Factors Increasing Demand: The main cause of sodium depletion is excessive sweating and dehydration.

Zinc

Food Sources: Oyster, herrings, turkey, wheatgerm, pumpkin and sesame seeds, Brewer’s/savoury yeast, molasses, liver, maple syrup, soybeans, sunflower seeds, lamb, bacon, chicken, coconut, pork, beef, beetroot, wholewheat.

Depleted By/Factors Increasing Demand: Vegetarians, excess refined grains, calcium, Oral contraceptive pill, pregnancy, diarrhoea, kidney disease, diabetes, phytates found in wheat bran, oats, pita and other unleavened bread.

Functions: Synthesis of enzymes, insulin, DNA and RNA for cell growth and repair, activation of vitamin A in
the eyes, antioxidant.

**Possible Signs/Effects of Deficiency:** Poor sense of taste and smell, slow wound healing, poor night vision, nails – thin, peel, white spots, acne, infertility, prostate and immunity problems, low birth weight and defects, slow growth.

**Heavy Metals**

**Aluminium**

Common Sources: Aluminium cooking pans, aluminium foil, aluminium cans, table salt, baking powder, bleached flour, antacid medication, mains water treatment (aluminium sulphate), some food additives, deodorants (anti-perspirant activity), soil (acid rain leaches aluminium out of the soil).

Possible Toxic Effects: Contact dermatitis, skeletal demineralisation, slow learning, interference with calcium and phosphorus metabolism.

**Beryllium**

Common Sources: Light structural materials, ceramics (beryllium oxide).

Possible Toxic Effects: Reduces tissue stores of magnesium, reduces organ function. Direct contact with dust may cause shortness of breath, coughing and lung inflammation.

**Cadmium**

Common Sources: Cigarette fumes, plastics, PVC (as a plastic stabiliser), galvanised iron, fertilisers, tyres, plating, component in alloys and solders, pigments, paints, pottery.

Possible Toxic Effects: Anaemia, kidney damage, high blood pressure, lung damage, cardiovascular disease, possible carcinogen.

**Cobalt**

Common Sources: Dental work, cobalt compounds used in paints and varnishes, batteries.

Possible Toxic Effects: Goitre, hypothyroidism, cardiac disorders, polycythaemia.

**Gold**

Common Sources: Dental work, jewellery, gold salts for the treatment of rheumatoid arthritis.

Possible Toxic Effects: Mouth ulceration, itching, eczema, seborrhoeic dermatitis, alopecia (hair loss), inflamed gums, gastritis, colitis, blood abnormalities, kidney damage (from the effects of gold salts).

**Lead**

Common Sources: Leaded petrol fumes, old water pipes, leaded paint, lead plumbing, solder, improperly glazed pottery, cigarette ash, pewter, lead crystal ware.

Possible Toxic Effects: Loss of appetite, constipation, headache, weakness, discolouration of the gums (blue or black), anaemia, vomiting, irritability. Heavy exposure may lead to visual disturbances, unsteady gait, delirium, paralysis and kidney failure. It is mainly deposited in the bones and teeth. Exposure has been implicated in arthritis, seizures, schizophrenia, autism and cancers.
Mercury

**Common Sources:** Dental amalgams, pesticides, fungicides, emissions from coal-burning power stations, contaminated fish, vaccines.

**Possible Toxic Effects:** Tremor, muscle instability, sensory disturbances, gastrointestinal symptoms, anaemia, dermatitis, discolouration of the gums (blue or black). Heavy exposure has been implicated in multiple sclerosis, Alzheimer’s disease, autism and some cancers.

Nickel

**Common Sources:** Stainless steel, water kettle elements, jewellery, keys, coins, diesel fumes, catalyst for hydrogenating vegetable oils.

**Possible Toxic Effects:** Frontal headache, vertigo, nausea, vomiting, chest pain, cough, dermatitis (from direct contact with the skin). Exposure may also be a factor in lung cancer.

Palladium

**Common Sources:** Road dust from catalytic converters, dental work, electrical components.

**Possible Toxic Effects:** Possible carcinogen.

Platinum

**Common Sources:** Road dust from catalytic converters, high quality glassware.

**Possible Toxic Effects:** Exposure to platinum salts have been implicated in alteration to the DNA; allergic reactions of the skin and mucous membranes; damage to organs such as the intestines, kidneys and bone marrow; hearing damage and some cancers.

Silver

**Common Sources:** Dental amalgans, jewellery, electrical components.

**Possible Toxic Effects:** Argyria (blue-grey darkening of the eyes, nose, throat and skin), kidney damage.

Thallium

**Common Sources:** By-product of zinc and lead production, optical lenses, jewellery, dyes, pigments, recreational drug contaminant.

**Possible Toxic Effects:** Polyneuritis, fatigue, weight loss, reduced immunity.

Tin

**Common Sources:** Dental amalgams, canning, solder in iron and copper pipes, compounds used in fungicides and glass coatings.

Possible Toxic Effects: Nausea, abdominal colic, headache, weakness, fever, muscle pain, joint pain, tinnitus.

Titanium

**Common Sources:** Dental work, surgical metal prosthetics and parts, jewellery, sunscreen, cosmetics.
**Possible Toxic Effects:** Seizures. The effects of titanium dioxide in sunscreen and cosmetics is under review for its possible carcinogenicity.