

Nutrient Depletion that arises from using Prescribed Drugs

There are times when medication is essential, but it is important to realise that many drugs, particularly those taken over the longer term, can deplete levels of certain nutrients in the body, or increase our needs for the same. In fact, some of the drugs' side effects are simply the effects of nutrient depletion. It is therefore important to protect ourselves from other conditions that are associated with these nutrient deficiencies.

This guide is not exhaustive but covers the main nutrient depletions in each category. To help it make sense the mechanism for the "nutrient steal" is also identified, as well as the common names of drugs found in each category. It does not cover all drug side effects or conditions that can arise from nutrient depletions.

The recommended supplementation dosages are deliberately not included in this guide, as that will generally depend on the drug class and dosage and the individual's existing diet and lifestyle. In order to determine the best dosage please discuss this with your Chiropractor or a Nutritional Therapist under guidance with your GP or Consultant.

Analgesics

Use: Analgesics, or pain medications are used to treat pain and inflammation.

Common Analgesics: Opioids (e.g. Tramadol) • Paracetamol

Side effects: an allergic reaction (this can cause a rash and swelling) • blood disorders • flushing • liver and kidney damage (if you take too much - overdose) - this can be fatal in severe cases • low blood pressure • tachycardia (fast heartbeat)

Reason for side effect/nutrient depletion: detoxification of paracetamol may deplete stores of glutathione, which is one of the major antioxidants present in the lungs.

Nutrient depletion from Paracetamol: Glutathione • CoQ10 (long term) • Vitamin C (long term)

Nutrient depletion from Opioids: Calcium • Folate • low levels of serum iron and transferrin saturation • Magnesium • Potassium • Selenium • Vitamins A, B Complex, C, D and E • Zinc

Anti-fungals

Use: Antifungal medicines treat fungal infections. Fungus in the soil, air and on your skin can cause yeast infections, ringworm and nail and skin infections. Breathing in fungal spores can lead to respiratory illnesses. People who have weak immune systems are more prone to fungal infections that require antifungal medicine.

Common Anti-fungals: Amphotericin • Clotrimazole (Canesten) • Econazole • Fluconazole (Diflucan) • Ketoconazole (Daktarin) • Miconazole • Nystatin (Nystan) • Terbinafine (Lamisil)

Side effects: abdominal pain • burning sensation or skin rash • itchy skin • upset stomach and diarrhoea

Reason for side effect/nutrient depletion: anti-fungals deplete the minerals magnesium and potassium.

Nutrient depletion: CoQ10 • Magnesium • Potassium • Vitamin D

Antacids

Use: Antacids are used to help with acid reflux but can also be used for other conditions involving gastric discomfort. They are also often prescribed alongside other drugs such as steroids or non steroidal anti inflammatory drugs, as these can damage the stomach lining in the presence of stomach hydrochloric acid.

1. Common Proton Pump Inhibitors (PPIs): Lansoprazole • Omeprazole • Pantoprazole

Side effects: abdominal pain • constipation • diarrhoea • dizziness • dry mouth • fever • flatulence • headaches

Reason for side effect/nutrient depletion: PPIs reduce the level of stomach acid which disrupts a number of other body processes. Stomach acid plays a pivotal role in the digestion of proteins, enables B12 uptake and destroys bacteria in food to protect the body and balance mineral absorption.

Nutrient depletion: Beta Carotene • Calcium • Iron • Magnesium • Vitamin B12 • Vitamin C • Zinc

2. Common H2 Antagonists: Famotidine • Ranitidine

Side effects: see above under PPIs

Reason for side effect/nutrient depletion: Histamine type-2 receptor antagonists (H2 blockers) can have side effects because they change the chemistry of the stomach. The stomach is acidic to help the body digest food and when H2 blockers reduce the acidity, the body may have trouble digesting food. This can lead to indigestion, food-borne illnesses, malnutrition and peptic ulcers. The stomach may also increase acid production to compensate for the medication, which can lead to drug dependency over time.

Nutrient depletion: Calcium • Chromium • Folate • Iron • Vitamin B12 • Zinc

3. Common Antacids: Aluminium Hydroxide • Magnesium Carbonate

Side effects: see above under PPIs

Reason for side effect/nutrient depletion: Antacids with aluminium cations present can lead to constipation, due to its effects on the stomach (aluminium tends to reduce the rate at which the stomach and intestines contract). In antacids with magnesium cations, the opposite reaction is observed: magnesium increases stomach and intestinal contractions, speeding up digestion.

Since antacids disrupt the normal digestion processes in the stomach, the processed slurry that gets passed onto the small intestine is at a greater risk of triggering the body's immune response. The small intestine is specifically designed to process certain molecules and building blocks of foods. When our food does not get processed in the stomach correctly, issues develop down the line.

Nutrient depletion: Calcium • Folate • Iron

Further information:

Long term use of these drugs can predispose someone to widespread nutrient deficiencies of almost every nutrient, which can result in many different diseases.

Antibiotics

Use: Antibiotics are used to treat or prevent some types of bacterial infection. They work by killing bacteria or preventing them from spreading.

Common Antibiotics: Amoxicillin • Ciprofloxacin • Doxycycline • Metronidazole • Penicillin

Side effects: diarrhoea (Macrolide Antibiotics, Cephalosporins, Penicillins and Fluoroquinolones may cause more stomach upset than others) • nausea • stomach cramps • vomiting

Reason for side effect/nutrient depletion: Antibiotics also kill many of the friendly bacteria that are present in our GI tract and are necessary for vital activities including: immune support, production of B vitamins, vitamin K and digestion of food.

Nutrient depletion: Beneficial intestinal bacteria • Vitamin K • Potassium • B Vitamins • Zinc • Magnesium • Calcium • Folate • Iron

Further information:

If you are taking antibiotics long term, it would be a good idea to look into the individual nutrients that may be depleted by the specific antibiotic, as this can differ. Probiotics should be taken for a number of weeks after a course of antibiotics. A high-dose multi-strain probiotic supplement may provide clinically relevant support for intensive re-colonisation due to intestinal microbiome depletion and may also prevent antibiotic-associated diarrhoea.

Anti-convulsants (AEDs)

Use: Anti-convulsants, also known as antiseizure medications or antiepileptic drugs, are used to treat a variety of conditions, including:

- **Seizures**

Anti-convulsants are used to prevent or treat seizures and convulsions by controlling abnormal electrical activity in the brain.

- **Nerve pain**

Anti-convulsants can help control pain caused by damaged nerves, such as burning, stabbing, or shooting pain.

- **Other medical conditions**

Anti-convulsants can also be used to treat anxiety, bipolar disorder, migraine headaches, fibromyalgia and restless leg syndrome. Some mood-stabilising anti-convulsants have also been tested for their ability to limit drug abuse.

Common AEDs: Barbiturates • Carbamazepine • Phenytoin • Primidone • Valproic Acid

Side effects: blurred vision • dizziness • drowsiness • fatigue • headaches • loss of coordination • mood changes • nausea • stomach upset • vomiting • weight gain or loss

Reason for side effect/nutrient depletion: AEDs can negatively affect mood and behaviour by potentiating GABA neurotransmission, causing folate deficiency and other mechanisms. Many side effects are linked to the speed of dose escalation and the total amount of medication given, rather than a specific mechanism of action.

Nutrient depletion: Vitamin B2, B6 and B12

Further information:

Long term use of anti-convulsants can interfere with vitamin D activity. Multiple anticonvulsant therapies can reduce folic acid levels. In women of childbearing age, low folic acid levels can increase the risk of foetal birth defects. For both men and women, low folic acid levels are associated with an increased risk of cardiovascular disease.

Anti-Inflammatories (NSAIDs)

Use: Anti-inflammatory drugs are usually prescribed short term to reduce pain and inflammation.

Common NSAIDs: Diclofenac • Ibuprofen • Naproxen

Side effects: diarrhoea • dizziness • headaches • high blood pressure • raised liver enzymes (detected by a blood test, this is more commonly associated with Diclofenac than other NSAIDs) • salt and fluid retention

Reason for side effect/nutrient depletion: NSAID medicines can cause increased urinary excretion of vitamin C and inhibition of folate-dependent enzymes, thus reducing levels of both of these nutrients. They are also known to decrease iron levels via microscopic GI bleeding.

NSAIDs inhibit an enzyme that facilitates the turnover of the gut lining, which enables fresh active tissue to line the gut. If this process is inhibited, the gut lining is far more susceptible to ulceration which is one of the main side effects of NSAIDs when they are used for more than a few days.

Nutrient depletion: Chromium • Folate • Folic Acid • Glutathione • Iron • Selenium • Vitamin C • Vitamin E • Vitamin K • Zinc

Corticosteroids

Use: Corticosteroid medicines are used to treat rheumatoid arthritis, inflammatory bowel disease (IBD), asthma, allergies and many other conditions. They are also used to prevent organ rejection in transplant recipients. They do that by helping to suppress the immune system.

Common Corticosteroids: Hydrocortisone • Prednisolone

Side effects: swelling in lower legs • high blood pressure • psychological effects (mood swings, confusion, delirium, memory and behaviour changes) • stomach upset • weight gain (stomach, face and back of the neck)

Reason for side effect/nutrient depletion: long term use of corticosteroids can decrease calcium absorption and increase renal excretion of calcium.

Nutrient depletion: Calcium • Chromium • Magnesium • Potassium • Vitamin A • Vitamin C • Vitamin D

Psychiatric drugs

This is a broad area so for this category we have changed the format to keep it concise and just highlighted the main nutrient depletions.

Anti-depressants / Anti-anxiety Anti-psychotics / Mood stabilisers

Use: Psychiatric medications, also known as psychotropic medications, are used to treat, reduce symptoms of and prevent the return of mental health problems. They work by affecting behaviour, mood, consciousness, thoughts or perception in the brain.

Common Anti-depressants: Amitriptyline (Elavil) • Bupropion (Wellbutrin) • Citalopram (Celexa) • Desipramine (Norpramin) • Doxepin (Adapin) • Escitalopram (Lexapro) • Fluoxetine (Prozac) • Imipramine (Tofranil) • Mirtazapine (Remeron) • Nortriptyline (Aventyl) • Paroxetine (Paxil) • Protriptyline (Vivactil) • Sertraline (Zoloft) • Venlafaxine (Effexor)

Nutrient depletion: Calcium • CoQ10 • Magnesium • Melatonin • Vitamin B2 • Vitamin B6 • Vitamin B12 • Vitamin D

Common Anti-psychotics: Aripiprazole (Abilify) • Haloperidol (Haldol) • Olanzapine (Zyrexia) • Paliperidone (Invega) • Quetiapine (Seroquel) • Risperidone (Risperdal) • Ziprasidone (Geodon)

Nutrient depletion: CoQ10 • Melatonin • Vitamin B2 • Vitamin B12

Common Benzodiazepines: Alprazolam (Xanax) • Clonazepam (Klonopin) • Clorazepate (Tranxene) • Diazepam (Valium) • Lorazepam (Ativan)

Nutrient depletion: Melatonin • Vitamin B6 • Vitamin B12

Common Anti-convulsants and Mood Stabilisers: Carbamazepine (Tegretol) • Gabapentin (Neurontin) • Lithium (Lithobid) • Phenytoin (Dilantin) • Primidone (Mysoline) • Methsuxamide (Elontin) • Topiramate (Topomax) • Valproic Acid (Depakote)

Nutrient depletion: Vitamin B2 • Vitamin B6 • Vitamin B12

Central Nervous Stimulants: Amphetamine (Adderall) • Atomoxetine (Strattera) • Dexmethylphenidate (Focalin) • Dextroamphetamine (Dexedrine) • Lisdexamfetamine (Vyvanse) • Methylphenidate (Ritalin, Concerta)

Nutrient depletion: Magnesium • Vitamin B12

Vitamin & Mineral deficiencies from psychiatric drugs and their symptoms

Vitamin B2 also known as riboflavin, plays a key role in energy metabolism. Lower levels of vitamin B2 have been found in people with depression, so giving them psychiatric medications can actually make them feel worse in the long run.

Symptoms of B2 deficiency: blurred vision • cracked skin, itching and dermatitis around the mouth • depression • fatigue • hair loss • hyperemia and oedema around the throat • liver degeneration • reproductive issues • swollen throat

Vitamin B6 is a key nutrient that boosts mood, deepens sleep and supports the entire nervous system. It plays a key role in the production of many neurotransmitters in your brain, including serotonin, GABA and dopamine. Psychiatric medications alter these neurotransmitters so vitamin B6 levels can be affected. Drugs that deplete vitamin B2 will also indirectly deplete vitamin B6 because B2 is required to activate B6.

Symptoms of Vitamin B6 deficiency: depression • insomnia • confusion • severe PMS symptoms • weakness

Vitamin B12 and Folate are essential B vitamins for optimal energy and nervous system function. If you are depressed, you likely have lower levels of B12 and folate.

Symptoms of B12 deficiency: confusion and forgetfulness • depression • disturbed vision • fatigue • irritability • mouth ulcers • muscle weakness • pins and needles (paraesthesia) • sore and red tongue

Vitamin D is essential for good health and is important for regulating calcium and phosphate, which help keep bones, teeth and muscles healthy. Together with calcium, vitamin D also helps protect older adults from osteoporosis. Vitamin D has other roles in the body, including reducing inflammation and modulation of such processes as cell growth, neuromuscular and immune function and glucose metabolism.

Symptoms of Vitamin D deficiency: bone pain • increased sensitivity to pain • muscle pain • muscle weakness in body parts near the trunk of the body • pins and needles sensation in the hands or feet.

Melatonin is a hormone released by the pineal gland in the brain. Melatonin helps control your sleep and wake cycles (circadian rhythm). It is critical for deep and restorative sleep, which is necessary for optimal brain and mental health.

Symptoms of Melatonin deficiency: daytime fatigue and mood changes • heart palpitations • hot flushes • morning depression • sleep problems • trouble concentrating

Magnesium is a vital mineral that participates in more than 300 biochemical reactions in your body. It plays a key role in neurotransmitter, enzyme and hormonal activity, all of which can have a huge impact on your mood and brain function. It is one of the most important nutrients for optimal brain health and it reduces anxiety, depression and irritability.

Symptoms of Magnesium deficiency: muscle cramps • headaches and migraine • heart arrhythmia • increased blood pressure • insomnia • muscle weakness • nausea • osteoporosis • suicidal thoughts • tremors and spasms

Coenzyme Q10 (CoQ10) is a molecule found in every cell of your body and plays a key role in the production of energy. It is also an antioxidant and protects your body and brain from free radical damage and is depleted by psychiatric drugs.

Symptoms of CoQ10 deficiency: brain fog • depression and irritability • high blood sugar • increased blood pressure • memory lapses • mental fatigue and difficulty concentrating • muscle cramps • shortness of breath

Calcium is the most abundant mineral in the body. Almost all calcium in the body is stored in bones and teeth, giving them structure and hardness. Your body needs calcium for muscles to move and for nerves to carry messages between your brain and every part of your body. calcium deficiency, also known as hypocalcemia, can cause a wide range of symptoms that can be mild or severe, temporary or chronic and may not be noticeable at all.

Symptoms of Calcium deficiency: abnormal heart rhythms and congestive heart failure • brittle nails • difficulty swallowing • dry, scaly skin • fainting • fatigue • hair that is coarser than normal • muscle spasms and muscle aches • muscle spasms in the throat that make it difficult to breathe • perioral numbness • tingling in the hands and feet • vomiting • weakness

Anti-diabetics

Use: Anti-diabetics, or anti-diabetic drugs, are used to treat or help prevent diabetes by lowering abnormally high blood sugar levels. Diabetes is an endocrine system disorder that occurs when the body cannot control its blood sugar levels. There are several different types of anti-diabetics, including insulin and oral medications dependant on whether you have been diagnosed with Type 1 or 2.

Common h-diabetics: Biguanides (e.g. Metformin) • Insulin • Sulfonylureas (e.g. Chlorpropamide, Glyburide, Glimepiride, Glipizide, Tolazamide and Tolbutamide)

Side effects of Insulin: anxiety • bleeding or bruising where you inject • confusion, or difficulty concentrating • fatty lumps under the skin (lipohypertrophy) • hunger • hypoglycaemia (hypos) • paler than usual skin • skin rash • sweating • tingling lips • trembling or shaking • vision changes

Reason for side effect/nutrient depletion: Insulin increases renal magnesium excretion

Nutrient depletion from Insulin: Magnesium • Vitamin B1 • Vitamin B2 • Vitamin B3

Side effects of Sulfonylureas/Biguanides: abdominal pain • bloating • diarrhoea • loss of appetite • nausea

Reason for side effect/nutrient depletion of Metformin (a Biguanide): used to treat type 2 diabetes by improving insulin sensitivity and decreasing glucose production and absorption. Long term use of Metformin can lead to decreased vitamin B12 levels. This may be due to: altered intestinal motility • bacterial overgrowth • impaired recycling of vitamin B12 • reduced uptake of vitamin B12 in the small intestine • reduced secretion of intrinsic factor (IF) by stomach parietal cells

Nutrient depletion from Biguanides (Metformin): Calcium • Folate • Vitamin B12 • Vitamin D
Nutrient depletion from Sulfonylureas: CoQ10 • Magnesium

Anti-hyperlipidemics (Statins)

Use: Statins are a class of drugs that lower cholesterol levels in the blood and protect artery walls. They work by reducing the amount of cholesterol the liver produces and by helping the liver remove cholesterol that is already in the blood. Statins can also reduce inflammation in artery walls, which can otherwise lead to blockages that damage organs like the brain and heart.

Common Statins: Atorvastatin • Pravastatin • Rosuvastatin • Simvastatin

Side effects: muscle weakness • inability to exercise to a level prior to taking the drug

Reason for side effect/nutrient depletion: Muscle weakness is wholly attributable to the reduction in CoQ10 which is an important nutrient in energy production of the body as well as mediating cholesterol production. The enzyme HMA Co-A reductase (inhibited by Statins) is involved in one of the key steps in the production of CoQ10.

Nutrient depletion: CoQ10 • Beta Carotene • Vitamin D • Vitamin E

Further information:

Normally CoQ10 would facilitate energy production in muscles and post recovery. Therefore most of the side effects associated with Statin use could be negated if CoQ10 supplementation were an integral part of the drug or treatment programme. If you still experience side effects from Statins even after supplementing as above it is worth talking to your GP about Red Rice Yeast, which is a natural Statin that can be used instead.

Anti-hypertensives

Use: Anti-hypertensives, also known as blood pressure medications, are used to treat high blood pressure, or hypertension. They work in different ways to lower blood pressure, including: removing excess fluid and salt from the body, relaxing and widening blood vessels and slowing the heartbeat.

The goal of anti-hypertensive therapy is to prevent complications from high blood pressure, such as heart failure, stroke, kidney failure and myocardial infarction. Maintaining a systolic blood pressure of less than 130mm Hg can help prevent complications in patients with heart failure, diabetes, coronary artery disease, stroke and other cardiovascular diseases.

Common Anti-hypertensives: diuretics, sympatholytics and sympathomimetics, vasodilators, calcium channel blockers, angiotensin-converting enzyme (ACE) inhibitors, adrenergic antagonists (alpha-blockers and beta-blockers) and angiotensin II receptor antagonists. A person may respond better and have fewer side effects with one drug than another and some patients may need more than one antihypertensive agent.

Reason for side effect/nutrient depletion: Antihypertensives, can cause nutrient depletion by blocking the body's ability to absorb, store, metabolise or synthesise essential nutrients.

1. Common ACE-inhibitors: Benazepril • lisinopril • Ramipril

Side effects of ACE-inhibitors: dry cough • extreme tiredness or dizziness from low blood pressure • headaches • loss of taste • short-term worsening of kidney function (rare) • too much potassium in the blood

Nutrient depletion: Zinc

2. Common Angiotensin II receptor blockers: Irbesartan • Losartan • Valsartan

Side effects of Angiotensin II receptor blockers: back pain • diarrhoea • dizziness • fainting • fatigue • headaches • leg swelling • respiratory symptoms • vomiting

Nutrient depletion: CoQ10

3. Common Calcium Channel blockers: Amlodipine

Side effects of Calcium Channel blockers: constipation • dizziness • extreme tiredness • flushing • headache • nausea • swelling in the feet and lower legs • tachycardia (fast heartbeat)

Nutrient depletion: CoQ10 • Vitamin C

4. Common Beta blockers: Atenolol • Carvedilol • Metoprolol

Side effects of Beta blockers: cold fingers or toes (beta blockers may affect the blood supply to your hands and feet) • difficulties sleeping or nightmares • difficulty getting an erection or other difficulties with sex • feeling tired, dizzy or light headed (these can be signs of a slow heart rate) • nausea

Nutrient depletion: CoQ10

5. Common Loop diuretic: Furosemide

Side effects of Loop diuretics: dehydration • dizziness • gastrointestinal upset • headache • hypokalemia (low potassium) • hyponatremia (low sodium)

Nutrient depletion: CoQ10 • Calcium • Folate • Magnesium • Potassium • Vitamin B1 • Vitamin B6 • Zinc

6. Common Thiazide diuretic: Hydrochlorothiazide

Side effects of Thiazide diuretic: • hypercalcemia (high calcium) • hyperglycemia (high blood sugar) • hyperlipidemia (high cholesterol) • hyperuricemia (high uric acid level) • hypokalemia (low potassium) • hyponatremia (low sodium) • metabolic alkalosis (high body alkaline levels) • sulfonamide allergy

Nutrient depletion: CoQ10 • Calcium • Folate • Magnesium • Potassium • Vitamin B1 • Vitamin B6 • Zinc

Anti-platelets

Use: Anti-platelet drugs are sometimes used to prevent blood clots, heart attacks and strokes, but are primarily used to prevent the recurrence of blood clots after a heart attack or stroke. They can also help relieve symptoms such as chest pain, poor circulation and shortness of breath.

Common Anti-platelets: Aspirin • Vitamin K Antagonists (e.g. Warfarin)

Side effects of Anti-platelets: aspirin-induced asthma • bleeding longer or heavier with cuts or during menstruation periods • bruises • haemorrhage • nose bleeds (epistaxis) • shortness of breath • stomach upset

Reason for side effect/nutrient depletion: Aspirin can interact with nutrients in a number of ways, which can lead to nutrient depletion:

Aspirin can prevent white blood cells from absorbing vitamin C, increase its excretion in urine and faeces and reduce its uptake from the blood and gut. It can make folate less absorbable by interfering with its binding. Aspirin can cause low or marginally low blood levels of vitamin B12, which is important for brain health and metabolism and can also damage the stomach, which plays a role in vitamin B12 absorption. Aspirin can decrease blood levels of zinc and can cause gastrointestinal bleeding, which can lead to iron loss and iron-deficiency anaemia.

Warfarin is an anticoagulant that can cause nutrient depletion by inhibiting vitamin K epoxide reductase complex 1 (VKORC1), an enzyme that activates vitamin K. This prevents the body from using vitamin K to synthesise clotting factors, such as coagulation factors II, VII, IX and X and coagulation regulatory factors protein C and protein S. To maintain a consistent effect, people taking Warfarin should eat foods and take supplements that provide a consistent intake of vitamin K. Sudden changes in vitamin K intake can increase or decrease the anticoagulant effect.

Nutrient depletion: CoQ10 (Vitamin K antagonists e.g. Warfarin) • Folate (Salicylates e.g. Aspirin) • Iron • Vitamin C • Vitamin B12

Anti-rheumatics

Use: Anti-rheumatic drugs are used to treat inflammatory arthritis, such as rheumatoid arthritis, psoriatic arthritis, idiopathic juvenile arthritis and ankylosing spondylitis. They can also be used to manage connective tissue diseases and some cancers.

Classes of Anti-rheumatic drugs:

Disease-modifying anti-rheumatic drugs (DMARDs)

These drugs are often used to treat rheumatoid arthritis. They work by blocking the chemicals released when the immune system attacks the joints, damaging nearby bones, tendons, ligaments and cartilage. DMARDs can decrease inflammation and pain, reduce tissue damage and slow the progression of the disease. Some examples of DMARDs include Methotrexate, Leflunomide, Hydroxychloroquine and Sulfasalazine.

Non-steroidal anti-inflammatory drugs (NSAIDs)

These drugs include Ibuprofen and Naproxen. They can be taken with methotrexate if clinically necessary, but it is recommended to take them for as short a time as possible because of the potential for side effects. For more on anti-inflammatories, see page 4.

Biologics

These drugs can also have a positive effect on inflammatory arthritis, but they can take time to work. Some people may notice the effects within days to weeks, while others may not feel the full effects for three to six months. Biologic agents and kinase inhibitors can interfere with the immune system's ability to fight infection, so they should not be used by people with serious infections.

Common Anti-rheumatic drugs: Methotrexate • Sulfasalazine

Side effects of Anti-rheumatic drugs: abdominal pain • diarrhoea • increased risk of infections • liver problems • loss of appetite • low white cell count (leukopenia), red blood cell count (anaemia) and platelet count (thrombocytopenia) • nausea • rash/allergic reaction

Reason for side effect/nutrient depletion: Sulfasalazine is a folate antagonist that can inhibit the reduced folate carrier and the proton-coupled folate transporter, decreasing intestinal absorption of folate.

Methotrexate inhibits enzymes involved in nucleotide synthesis, including dihydrofolate reductase. Due to its antagonism, methotrexate use can lead to folate deficiency.

Nutrient depletion: Folate • Vitamin D

Bisphosphonates

Use: Bisphosphonates are drugs that are used to treat and prevent bone-related conditions. They work by slowing down the breakdown of bone tissue by inhibiting osteoclasts, which are specific cells. Bisphosphonates can help to strengthen bones and reduce the risk of bones breaking.

Common Bisphosphonates: Alendronate (Fosamax, Fosavance) • Ibandronate (Bondronat, Bonviva) - a monthly pill or quarterly intravenous (IV) infusion • Risedronate (Actonel) • Zoledronic acid (Reclast) - an annual IV infusion

Side effects of Bisphosphonates: dizziness • dysphagia (pain or burning under the ribs or in the back) • flatulence • headache • heartburn • jaw pain • muscle and joint pain • numbness and swelling • stomach pain • throat irritation • weakness

Reason for side effect/nutrient depletion: by inhibiting bone resorption, bisphosphonates reduce calcium efflux from bone into the circulation, leading to the possible development of hypocalcemia (low calcium in the blood system). Bisphosphonates also deplete magnesium and phosphorus, some of the very minerals needed to produce and maintain strong bones therefore these drugs are not advised to be taken by those who already have low calcium levels.

Nutrient depletion: Calcium • Iron • Magnesium • Phosphorus • Zinc

Bronchodilators

Use: Bronchodilators are a type of medication that make breathing easier by relaxing the muscles in the lungs and widening the airways (bronchi). They are often used to treat long term conditions where the airways may become narrow and inflamed, such as asthma (a common lung condition caused by inflammation of the airways).

Common Bronchodilators:

Beta-2 Agonists: Formoterol • Salbutamol • Salmeterol • Vilanterol

Anticholinergics: Aclidinium • Ipratropium • Theophylline • Tiotropium

Side effects of Bronchodilators: cough • diarrhoea • dry mouth • headaches • heart palpitations • increased urination • muscle cramps • nausea and vomiting • trembling (particularly in the hands)

Reason for side effect/nutrient depletion: some bronchodilators, such as Beta-agonists, can increase the metabolic rate, which may lead to higher nutrient and energy demands. Certain bronchodilators, particularly those that contain theophylline, have a diuretic effect, causing increased urination. This can lead to the loss of water-soluble vitamins and minerals like potassium and magnesium. These medications can sometimes interfere with the absorption of nutrients in the gastrointestinal tract.

Nutrient depletion: Calcium • Vitamin D

Hormones (OCP & HRT)

1. Oral Contraceptive Pill

Use: Oral contraceptive pills (OCPs), also known as birth control pills, are primarily used to prevent pregnancy. They contain hormones that prevent ovulation and also from sperm from entering the cervix. The most common type of OCP is the combined oral contraceptive pill (COC), which contains synthetic versions of oestrogen and progesterone. The oestrogen regulates menstrual bleeding, while progesterone prevents pregnancy. Another type of OCP, sometimes called the mini pill, contains only progesterone.

Common OCPs: Microgynon • Ovranette • Rigevidon

Side effects of OCPs: abdominal cramping • bloating • breakthrough bleeding or spotting (the most common side effect and more likely to occur with continuous dosing or extended pill cycles) • breast tenderness • changes to the skin • headaches • increased blood pressure • increased vaginal discharge • mood changes • nausea (you can try taking the pill at night before bed to help with nausea)

Reason for side effects/nutrient depletion: hormones in oral contraceptives can upset the balance of bacteria in the gut. They also increase the pH of the GI tract which increases the risk of opportunistic infection by pathogens. Reduced native bacteria and increased pH inhibit uptake of minerals and production and uptake of B vitamins. This also increases the need for Vitamin C.

Nutrient depletion: Calcium • CoQ10 • Folate • Magnesium • Selenium • Vitamin B6 • Vitamin B12 • Vitamin C • Vitamin E • Zinc

2. Hormone Replacement Therapy - Oestrogen only HRT

Use: HRT helps to relieve symptoms of the menopause and strengthens your bones. Low levels of oestrogen at the menopause can weaken the bones and make it more likely to break a bone on falling. Oestrogen-only HRT can be taken if after a hysterectomy.

Common Oestrogen only HRT: Elleste-Solo • Evorel • FemSeven • Lenzetto • Oestrogel • Progynova • Sandrena

Side effects of Oestrogen only HRT: breast tenderness • headaches • indigestion • leg cramps • nausea • vaginal bleeding

3. Hormone Replacement Therapy - Progesterone only HRT

Common Progesterone only HRT: Medroxyprogesterone Acetate (MPA) • Utrogestan

Side effects of Progesterone only HRT: acne • bloating • breast tenderness • depression/mood changes • vaginal bleeding

Reason for side effect/nutrient depletion: hormones in HRT can upset the balance of bacteria in the gut. They also increase the pH of the GI tract which increases the risk of opportunistic infection by pathogens. Reduced native bacteria and increased pH inhibit uptake of minerals and production and uptake of B vitamins. This also increases the need for Vitamin C.

Nutrient depletion: B Vitamins (particularly vitamin B6) • Calcium • Live native bacteria • Magnesium • Vitamin C • Zinc

Inotropic agents

Use: Inotropic agents such as Digoxin, is a type of medicine called a cardiac glycoside. It is used to control some heart problems, such as irregular heartbeats (arrhythmias) including atrial fibrillation. It can also help to manage the symptoms of heart failure, usually with other medicines.

Common Inotropic agents: Digoxin

Side effects of Inotropic agents: diarrhoea • dizziness • nausea or vomiting • skin rashes • vision changes (including blurred vision and not being able to look at bright light)

Reason for side effect/nutrient depletion: the most common trigger of Digoxin toxicity is hypokalemia (low blood potassium), which may occur as a result of diuretic therapy. Dosing errors are also a common cause of toxicity in the younger population. Factors that increase the risk of Digoxin toxicity include: hypothyroidism/hyperthyroidism (under/overactive thyroid).

Nutrient depletion: Magnesium

Laxatives

Use: Laxatives are a type of medicine that can treat constipation. They are often used if lifestyle changes such as increasing the amount of fibre in your diet, drinking plenty of fluid and taking regular exercise, have not helped.

Common Laxative agents: Bisacodyl

Side effects of Laxatives: bloating • dehydration • flatulence • nausea • stomach cramps

Reason for side effect/nutrient depletion: Laxatives work by drawing water into the intestines from other tissues, which can lead to dehydration. The body compensates for dehydration by retaining water, which can cause bloating.

Nutrient depletion: Calcium • Potassium • Vitamin D

Thyroid hormones

Thyroid hormones play a critical role in bone turnover and density.

Hypothyroidism (an underactive thyroid)

Hypothyroidism occurs when the thyroid gland does not produce enough of the hormone thyroxine (T4). This can be caused by low levels of selenium, copper, manganese and iodine. All these minerals are vital for thyroid health, production of thyroid hormones and in particular, conversion of T4 (thyroxine) to T3, the metabolically active thyroid hormone.

Immune system attack

The most common cause of hypothyroidism in developed countries is Hashimoto's disease, an autoimmune disorder that causes the immune system to attack the thyroid gland. Hashimoto's disease runs in families and is also common in people with other immune system disorders, such as type 1 diabetes and vitiligo.

Thyroid damage

Thyroid damage can also occur after thyroid or other neck surgery, or external radiotherapy for cancer treatment. Radiation exposure increases the risk of hypothyroidism, especially for children exposed early in life.

Iodine deficiency

Worldwide, the most common cause of hypothyroidism is an inadequate dietary intake of iodine. The thyroid gland requires iodine to produce thyroid hormones.

Other causes

Other causes of hypothyroidism include thyroiditis, congenital hypothyroidism, certain medicines and in rare cases, a pituitary disease, non-cancerous growths in the thyroid or pituitary gland, tumors in the testes or ovaries, high levels of human chorionic gonadotrophin and vitamin E deficiency.

Common medication for underactive Thyroid: Levothyroxine

Side effects of Thyroid medicine: excessive sweating • headache • heat intolerance • heart-related problems, such as heart palpitations • insomnia • irritability • larger than normal appetite • muscle spasms or weakness • tremors • weight loss

Reason for side effect/nutrient depletion:

Levothyroxine can increase bone turnover and increase calcium loss via urination. The amount lost may be insignificant, but it is worth being aware of this risk.

Further information- hypothyroidism

If you supplement with calcium it should be taken at a different time of day from Levothyroxine as calcium can interfere with the uptake of the drug. If you are low in iron or selenium then Levothyroxine will not work as well to increase your metabolic rate as both of these minerals are essential in the conversion of T4 to T3 which is a key factor in healthy thyroid function.

Nutrient depletion: Calcium

Hyperthyroidism (an overactive thyroid)

Hyperthyroidism can have many causes, including:

Graves' disease

An autoimmune disorder that is the most common cause of hyperthyroidism. It occurs when the body's immune system mistakenly attacks the thyroid, causing it to produce too much thyroid hormone. Graves' disease is most common in young to middle-aged women and often runs in families.

Nodules on the thyroid

Also known as toxic nodular goiter, this condition occurs when one or more lumps on the thyroid gland become too active and produce extra thyroid hormones.

Thyroiditis

Inflammation of the thyroid that can be caused by viral infections, some medications, or after pregnancy. Thyroiditis temporarily causes the thyroid to be overactive and then it often becomes underactive.

Some medications, such as Amiodarone, can cause hyperthyroidism. Amiodarone is an anti-arrhythmic medication that contains iodine and can harm thyroid tissue.

Common medication for overactive Thyroid: Carbimazole • Methimazole

Side effects of overactive Thyroid medicine: diarrhoea • dizziness • headache • itchy skin or rash • nausea • painful joints • thinning hair • vomiting

Reason for side effect/nutrient depletion: Carbimazole can cause side effects due to its mechanism of action and its impact on the thyroid gland and other bodily systems. The drug works by inhibiting thyroid hormone synthesis, which can sometimes lead to an imbalance in hormone levels. More serious side effects, like a decrease in white blood cells, can lead to increased susceptibility to infections.

Nutrient depletion: Zinc

Vitamins and minerals that play a role in Thyroid health

Vitamin A (not carotene)

Carotene is a precursor of vitamin A. An underactive thyroid gland cannot efficiently convert carotene to usable vitamin A, so however many carrots you eat, it will not help! Vitamin A must also be accompanied by protein to make it available to the body, so if you are on a low protein diet, you may be deficient in this vitamin. If you are low on vitamin A, your ability to produce TSH (thyroid stimulating hormone) is limited. This vitamin is required by the body to convert T4 to T3. If you find that lights are too bright or night driving is a problem, try taking vitamin A supplements along with more protein and see if it helps.

Vitamin B Complex

All of the B vitamins are vital for good thyroid function but they each have a different role:

B1 (Thiamine)

This vitamin is needed if you have an overactive thyroid.

B2 (Riboflavin)

Lack of vitamin B2 suppresses thyroid function in that the thyroid and adrenal glands fail to secrete their hormones.

B3 (Niacin)

This is needed to keep all the body's cells (including the endocrine glands) in efficient working order.

B6 (Pyridoxine)

Without this vitamin, the thyroid cannot utilise its iodine raw material efficiently to make the hormones. Vitamin B6 is needed even more by an overactive thyroid. Muscle weakness is very common in people with an overactive thyroid and in those who are also lacking in B6.

B12

People with an underactive thyroid or people with no thyroid cannot absorb vitamin B12. A serious lack of B12 can cause mental illness, various neurological disorders, neuralgia, neuritis and bursitis. Some doctors believe the 'normal range' of B12 is too low and that the normal range should be at least 500-1,300 pg/ml (rather than 200-1,100 pg/ml).

Calcium

Many of us consume too little calcium in the form of dairy products. This is needed to combat bone loss, which is especially important in people with an overactive thyroid.

Vitamin C

The thyroid gland needs vitamin C to keep it healthy. Long-standing deficiency causes the thyroid gland to secrete too much hormone. People with an overactive thyroid need extra vitamin C as this is actually drained from the tissues in their bodies.

Vitamin D

It has been found that when people with an overactive thyroid take vitamin D, it counteracts the rapid excretion of calcium, so osteoporosis can be avoided.

Vitamin E

Lack of vitamin E encourages the thyroid gland to secrete too much hormone, as well as too little TSH (thyroid stimulating hormone) by the pituitary gland. A higher intake of this vitamin is often needed by people with an overactive thyroid to counteract the large amounts of the vitamin depleted from the body.

Magnesium

Magnesium is required for the conversion of T4 into T3, so this mineral should be supplemented for both conditions. Some people may lose magnesium at a great rate through urination. It also seems that a diet high in refined food and caffeine will encourage magnesium loss.

Selenium

Selenium is a crucial component of the enzyme that converts T4 to T3 in the body. Without it, T3 cannot be produced in the right amounts and organs will function as if they were hypothyroid, even though blood test levels are normal.

Zinc

Research has shown that both hypothyroidism and hyperthyroidism result in zinc deficiency. It also plays a role in the functioning of the immune system. Low zinc levels have been found in obese people. Zinc is needed to convert T4 into T3, so this mineral is a must.

Further Information

If you have an overactive thyroid, you should take supplements even if your levels are high. If you are hypothyroid, it is safer to start taking them when your levels are normal or close to normal. If you take iron at the same time as thyroid hormone, it will bind with some of the thyroid hormone and block its absorption. Fibre and calcium carbonate, if taken simultaneously with thyroid hormone, may also interfere with absorption of the hormone.

Nutrient deficiencies cause unexplained symptoms that are difficult to diagnose when your body is already fighting against other illnesses.

Paying attention to your nutrient levels is a great way to ensure your prescription drugs are doing their best to benefit your health. **You can supplement your vitamin and mineral stores by following these steps:**

Step 1: Eat a Nutritional Diet and Listen to Your Cravings

Eating a variety of organic fruits and vegetables is the best way to ensure no vital nutrients are missing from your body. Try using something like the plate method to meal plan so that you get ample portions of both macro and micronutrients. See our separate **Nutrition and Diet guide on our website.**

Another way to pay attention to your nutrients is to listen to your cravings. If you are craving heavy portions of citrus fruits, potatoes and bell peppers, your body may need more vitamin C and potassium. If you are craving chocolate, you may need more magnesium.

Step 2: Supplement Missing Key Nutrients

With nutrient deficiencies in soil and a reliance on heavily processed foods, it is already difficult for us to get the nutrients we need without the added burden of having to take a medication. Use a good quality supplement to help replenish your body with minerals and electrolytes.

Step 3: Monitor Your Medication and Supplement Levels

Speak to your Chiropractor or a Nutritionist and your GP about your needs regularly. Drugs can deplete essential nutrients at any time depending on your original nutrient status, so just because your vitamins and minerals are balanced one month does not mean they will stay that way. Regular checkups and blood tests can help you stay in balance.

Nutrient depletion overview

Taking Supplements May Be Essential to Increasing Effectiveness of Medicinal Drugs

You will notice common themes in many of the medications in this article. For example, magnesium, zinc and folic acid are already difficult for your body to get and absorb in our modern-day world and medications force the body to use up even more of these nutrients. Even symptom-free people who do not take over-the-counter medications often have deficiencies.

When taking medication regularly, we recommend using high-quality supplements to supply the nutrients you need. For your convenience we stock most of the supplements listed in this guide at the Clinic.

SEARCH TOOL

For your convenience, you can use [this search tool](#) link to identify the majority of individual nutrients depleted by specific medications and their drug interactions. Simply click on the link and type in the medication that you are on and keep a note of the vitamins, minerals or other nutrients that are affected. There is also a guide on the recommended supplement dosage

The information in this article is not to be used for diagnostic purposes but rather to give an idea of the nutrients that might be needed by people on commonly prescribed medications, particularly if taken long term.

Also remember:

Alcohol depletes Glutathione production (the body's primary antioxidant).

Sunscreen depletes Vitamin D absorption (especially important to remember for those that use an SPF moisturiser).



If you have questions or are unclear on any of the points, be sure to let us know. You can email us at: enquiries@chiropractic-clinic.com or visit our website www.chiropractic-clinic.com