

Improper function of the thyroid gland biology essay

[Science](#), [Biology](#)



\n[[toc title="Table of Contents"](#)]\n

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1. [INTRODUCTION:](#) \n \t
2. [INITIAL STAGE:](#) \n \t
3. [Vitamin D:](#) \n \t
4. [Vitamin K:](#) \n \t
5. [FOLLOW-UP STAGE](#) \n

\n[/toc]\n \n

INTRODUCTION:

The most effective method of preventing and reversing osteoporosis is by increasing bone mineral density as this is measured during clinical tests. This is achieved mainly in two stages which deal with three major causes of osteoporosis as stated below: High calcium intake with low magnesium intake, imbalance of oestrogen in females and testosterone in males, improper function of the thyroid gland. The process of preventing and reversal involves magnesium and other supplement intake for only couple of months (up to ~ 4 months). This is known as the initial stage. During this time period, the amount of calcium consumed is limited to virtually zero to adjust the amount of magnesium present in the body to the acceptable level and also deals with other issues an individual might suffer from such as calcified joints, kidney stones, etc. As stated in Chapter 4, magnesium stimulates calcium absorption from blood. Thus, increasing magnesium levels in the body without increasing calcium would result in a faster rate of adjustment of the ratio. This would also cause stimulation of calcitonin which removes

deposited calcium from the blood, calcified joints and kidney stones and absorbs it into the bone increasing bone mineral density. After about 3-4 months a balanced amount of calcium and magnesium intake in the correct ratio of 2: 1 is recommended. If an individual has had an acceptable amount of magnesium in the diet for at least 8-12 months, then the initial stage can be skipped.

INITIAL STAGE:

The key focus of this stage is to emphasise the importance of magnesium in the diet which is mainly dis-marginalised due to popular misconception which highlight the importance of calcium in increasing bone mineral density. However, it is has been failed to report the importance of magnesium for calcium absorption into the bones. Bone formation lies on the building blocks of life i. e. cells and therefore, it is important to ensure the optimum function of osteoclasts for healthy bone formation and osteoblasts for optimal bone breakdown and removal. This is achieved by optimising cellular membrane potentials which effect cell protection by blocking access to pathogens and toxins while increasing cell, cell repair and recovery by increasing oxygen and nutrient flow and cell hygiene by increase waste transfer and emission. Positive and negative ionic concentrations affect the optimum functionality of the cell membrane as they create electrical gradient within the cells and tissues. Sodium, potassium, chloride and calcium are mainly involved and allow transfer of nutrient into the cells and waste out of the cell while ensuring high strength of the cell membrane. As described earlier, these elements can be easily obtained through diet but in

majority of individuals suffer from imbalanced ratios of these elements at a cellular level resulting in bone cells working below optimum levels and compromised bone formation. High levels of magnesium, approximately 600mg, without calcium are required during the first stage to return the balance of calcium-magnesium to normal. Other elements that are important for bone health include zinc, chromium, manganese, lithium and germanium which stimulate calcium and chloride ions. Ensuring optimum cell membrane potential increases the cells' methylation capacity, supports mood elevation, decreases levels of toxins at cellular level and acts as a natural pain-reliever. The following ingredients are recommended at therapeutic levels for effectual recovery during the initial stage along with magnesium[1] as they promote anti-inflammation in the bones at cellular levels thus decreasing pain experienced by osteoporotic patients. However, currently these are prescribed as supplementation medication administered in the form of tablets. However, to avoid side-effects, it is possible to obtain them from natural sources as described below: Boron Boron is another trace mineral which aids to maintain strength of the bone in quantities as little as 2-3mg daily. It is known to prevent demineralization of the bone where magnesium and calcium depletion occurs in the bone. Apples, apricots, mangoes, nectarines, pineapples, cucumber, carrots, broccoli and many other fruits and vegetables contain boron.[2] Copper Copper deficiency can be due to zinc toxicity but is rare because the human body is able to store this mineral but it has been observed that individuals suffering from copper deficiency also suffer from osteoporosis. This mineral is easily obtained from cooked lentils, hazelnuts, mushrooms, chocolate and sunflower seeds and the daily required

intake for adults is 0.9mg[3]. Fluoride and phosphorusAs stated earlier in chapter 4, these trace minerals are important for bone strength and integrity fluoride affects osteoblast formation and also replaces part of the hydroxyapatite crystals for bone strength whereas; phosphorus is a constituent of the collagen matrix of the bone. Germanium 132This mineral is important for returning imbalanced system to normal state and ensures optimum efficiency. It is easily acquired as tablets but can also exist in broccoli, celery, garlic, aloe vera etc. in high concentrations[4]. IodideIodine is important for health as it regulates thyroid function. Deficiency can cause hypothyroidism while high doses of iodine can result in hyperthyroidism where bone resorption is increased. It can be easily obtained by having a balanced diet which includes peas, carrots, bananas, spinach, garlic etc. [5]LithiumProlonged use of lithium, a salt, is associated with hyperparathyroidism which increases bone resorption and calcium leaches out of the bone into the blood stream. Keeping a balanced amount of lithium to approximately 0.6-1.2 mmol/L[6]is achieved using either supplements or dietary measures such as; grains, vegetables, dairy and meat products. ManganeseThis mineral needs to be in traces in the body to ensure healthy development of the bone. Males require at least 2.3mg daily whereas; females need at least 1.8mg of manganese in their daily diet which can be obtained from pineapple, peanuts, sweet potatoes, whole wheat bread etc. [7]N-Acetyl GlucosamineAnother supplement which exists as 250mg, 500mg and 750mg tablets but can also be found in mushroomsSeleniumCurrently, magnesium is prescribed to patients along with optimum doses of other supplements including selenium. This mineral is known for its antioxidant

properties and foods rich in selenium mainly include fish and meat such as; Brazilian nuts, tuna, lamb, sunflower seeds etc. but it patients are prescribed tablets which focus on short-term effectiveness instead of long-term results[8].

SiliconThis mineral exists in the connective tissues of the bones, teeth, skin etc. as a constituent of collagen in the form of silica or silicon dioxide. It is that silica binds to toxic elements and removes them from body via urine and also has a deoxidising function keeping cells healthier/non-oxidising. It is necessary to avoid calcium and magnesium leeching from the bones and ensure the strength and integrity of the bones by removing metals that cause excretion of these minerals. The required daily intake of this mineral is 9-14mg daily and is easily obtainable from onions, rice, barley, beetroot, and wheat.

StrontiumKnown to be chemically similar to calcium, this trace element increases the rate of osteoblast activity while decreasing rate of osteoclasts activity in order to increase overall bone formation. Dietary sources of strontium include; vegetables, grains, seafood, meat, milk and dairy products etc.[9]

TriMethylglycineAlso known as betaine, this supplement can be found naturally in plants and can be obtained from dietary sources such as raw; beets, spinach, broccoli, seeds etc. and required dosage is 6g[10].

VanadiumThis is another trace element which contributes to the development and growth of healthy bones by promoting osteogenesis with a recommended daily intake of less than 0.5-1.0mg. This is easily obtained from olives, vegetable oils, cod fish, black pepper and other food sources[11]

VitaminsAs stated earlier in Chapter 4, Vitamin A, C, D and K are most important for healthy bone formation.

Vitamin D:

This vitamin is extremely important for calcium absorption and can be taken from three main sources: diet, sunlight exposure or supplements. It is highly recommended to ensure daily requirement of 600IU from either sunlight exposure or diet and avoid supplements completely. The amount of vitamin D produced depends on skin colour, frequency of sunlight and amount of exposure. Dietary intake of vitamin D include; herring, cod liver, catfish, salmon, mushrooms, cereal, liver, milk etc.[12]

Vitamin K:

Vitamin K is dependent on the GLA amino acid and is responsible for osteocalcin binding to calcium for bone formation. Deficiency leads to insufficient osteocalcin so amount of calcium present in bone decreases leading to formation of compromised bone. Optimum levels of vitamin K ensure the individual would suffer from kidney stone, calcified joints or arterial disorders due to deposited calcium. This vitamin can be easily obtained through diet rich in vegetables such as; kale, spinach, parsley, broccoli, brussels sprouts etc.[13]ZincZinc is a trace mineral and its deficiency affects the bone remodelling cycle by increasing rate of osteoclast activity. This means low levels of zinc in the body results in a higher rate of bone resorption which is not balanced with bone formation resulting in osteoporosis[14]. A low dose of zinc, 11mg/day for adult men and 8mg for adult women[15]is required which is easily obtained from diet rich in oysters, salmon, garlic, chickpeas, kidney beans, turkey, lamb etc. Another useful technique is to increase human growth hormone levels inside the body.

Conventionally, these are produced and released by the pituitary gland and are age dependant. They play an important role in repair and regeneration of cells. This means older individuals have a lower amount of growth hormone than younger ones and therefore cellular repair is slower than normal. There are two major ways to increasing growth hormone levels. Intravenous growth hormoneNatural production in the bodyWhile injecting is a faster, more efficient technique it results in temporary, immediate increase in growth hormone which can over time produce an ageing effect. There are known herbs such as; Ginseng, Herba Epimedii and Chaste Tree Berry[16]which can stimulate the release of growth hormones in safer and long-lasting technique.

FOLLOW-UP STAGE

After the cellular imbalance between magnesium and calcium is corrected, it is necessary to ensure that this balance is maintained to obtain optimum calcium intake and therefore a higher bone mineral density. This is achieved in the follow-up stage and involves intake of calcium, magnesium and other trace minerals and vitamins already stated in the initial stage in the required amount for optimum bone formation. As stated earlier, the ratio of calcium to magnesium to provide optimum absorption is 2: 1. If the daily requirement of calcium is approximately 1000mg per day for adults aged 50 and below, the amount of magnesium should be 500mg daily. However, as most osteoporotic patients tend to be elderly individuals the amount of calcium consumed daily increases to 1200mg resulting in a higher amount of magnesium, 600mg, required for optimum absorption. A natural multi-

mineral source which exists in 3 locations in the world and contains major and all other trace minerals including magnesium, calcium, zinc, sodium, selenium and potassium exists in the form of seaweed and is commonly known as Aquamin. It is produced from red marine algae which originates from the Lithothamnion species and absorbs up to 74 crucial minerals from the sea including magnesium, calcium, silica, germanium, lithium, selenium and many others. It then eventually breaks down and exists as calcified skeleton[17]. It is easily incorporated into foods and drinks including breads, cereal bars, smoothies, ice-cream, yogurts etc. without affecting any of the characteristics. A research conducted by Aslam, M. et al. (2010) investigated the effect of Aquamin on Western style diet and concluded that mice that consumed a high fat diet with the mineral have a higher failure load and energy i. e. the bone becomes stronger due higher bone mineral density[18]. This characteristic makes this mineral highly desirable for reversing the imbalance of ions and reversing osteoporosis. It is also viable for treatment of osteoarthritic stiffness, inflammation due to rheumatoid arthritis, inflammatory bowels syndrome etc. To obtain all the nutrients and minerals stated in the initial stage in the specific required dietary intake, an individual can include the following in their daily diet[19]20

Mineral	Adults RDI (mg)	Source	How much obtained
Betaine (TriMethylglycine)	Not established	100g dried apricots	1 cup whole milk (3. 25% fat)
	100g non-fat fruit yogurt	1 slice of pineapple (166g)	81g beef liver
	200g raw carrot	0. 3mg	1. 5mg
		1. 7mg	0. 2mg
		5. 1mg	0. 8mg
Boron	2-3	100g dried apricots	2. 11mg
Calcium	1000	1 cup whole milk (3. 25% fat)	100g non-fat fruit yogurt
		100g dried apricots	1 slice of pineapple (166g)
			6 cups tap

water100g dried seaweed spirulina81g beef liver276mg152mg71. 5mg21. 6mg42. 6mg120mg4. 9mgCopper0. 9100g dried apricots1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver0. 4mg0. 2mg6. 1mg11. 8mgFluorideMale: 4. 0Female: 3. 06 cups tap water1 cup black tea (tap water)81g beef liver1. 02mg0. 88mg0. 004msgIodine0. 15100g dried seaweed spirulina0. 1-18mgMagnesiumMale: 420Female: 310100g non-fat fruit yogurt1 cup whole milk (3. 25% fat)100g dried apricots1 slice of pineapple (166g)6 cups tap water1 cup black tea (tap water)100g dried seaweed spirulina81g beef liver15. 0mg24. 4mg41. 6mg19. 9mg2. 4mg7. 1mg195mg17. 8mgManganeseMale: 2. 3Female: 1. 8100g dried apricots1 slice of pineapple (166g)1 cup black tea (tap water)100g dried seaweed spirulina81g beef liver0. 3mg1. 5mg0. 5mg1. 9mg0. 3mgPhosphorus700100g dried apricots1 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)1 cup black tea (tap water)100g dried seaweed spirulina81g beef liver92. 3mg222mg119mg13. 3mg2. 4mg118mg393mgPotassium47001 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)1 cup black tea (tap water)100g dried seaweed spirulina81g beef liver349mg194mg181mg87. 7mg1363mg284mgSelenium0. 055100g dried apricots1 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver2. 9mcg9. 0mcg6. 0mcg0. 2mcg7. 2mcg26. 6mcgSilicon9-14100g high bran cereal200g raw carrot10. 2mg4. 6mgSodium1500100g dried apricots1 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)6 cups tap water1 cup black tea (tap water)100g dried seaweed spirulina81g beef liver13mg97. 6mg58.

0mg1. 7mg9. 5mg7. 1mg1048mg62. 4mgVanadium0. 5-1. 0100g black pepper100g dill seed100g cod fish0. 099mg0. 043mg0. 003mgVitamin A
Male: 9mg (3000IU)Female: 7mg (2310IU)1 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver249IU12. 0IU96. 3IU570IU21134IUVitamin C
Male: 90Female: 75100g non-fat fruit yogurt1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver0. 7mg79. 3mg10. 1mg0. 6mgVitamin D
0. 05mg / 200IU1 cup whole milk (3. 25% fat)97. 6IUVitamin K0. 031 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver0. 5mcg1. 1mcg1. 2mcg25. 5mcg3. 2mcgZinc
Male: 11Female: 8100g dried apricots1 cup whole milk (3. 25% fat)100g non-fat fruit yogurt1 slice of pineapple (166g)100g dried seaweed spirulina81g beef liver0. 5mg1. 0mg0. 7mg0. 2mg2. 0mg4. 2mg