

Iodine

the Sea Mineral You Need

by Sharon Erdrich



Q: Which nutrient-deficiency disorder was extremely common in New Zealand early last century?

Clue 1: The deficiency was virtually eliminated by the 1970s and is now appearing again at surprising levels.

Clue 2: This deficiency is most prevalent in upper-middle class groups.

If you guessed iodine you were correct. It's hard to figure really – here we are in a country that's totally surrounded by ocean, providing, so you'd think, a bounty of iodine-rich food from the sea ...

Local and global

Back in the 1920s and 30s, about one-third of New Zealand school children had either goitre or low iodine levels, so in 1939 iodine was added to salt. During the 1960s, iodine was introduced (for cleaning purposes) into the dairy industry, thus milk and milk products became an additional dietary source; by the 1970s and 80s, iodine levels were adequate. However, iodine use has declined in the dairy industry as has the use of iodised table salt, and in 2003 the World Health Organisation (WHO) classified New Zealand as having "mild iodine deficiency" and noted a 15 per cent prevalence of goitre. A nutritional survey of our school children in 2002 found that European children in upper-middle class socio-economic groups were the highest-risk groups.

While most developed and developing countries have combated the problem by adding iodine to salt, 200 million people living in remote places are still at risk of severe iodine deficiency, and

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severe iodine deficiency still exists in New Guinea, China, Indonesia and Thailand. The condition is reappearing in countries that had previously dealt with the issue. This is perhaps due to the fact that in developed countries an awareness of the health hazards of excess dietary salt means that people don't use as much as they used to in cooking, and also to a growing trend towards using gourmet, sea and rock salts, which do not contain iodine.



A few salient facts:

- Iodine is the most deficient trace element in the world.
- Iodine deficiency is one of the main causes of impaired cognitive development in children.
- Iodine deficiency results in a global loss of 10–15 IQ points at a population level.
- About 73 per cent of New Zealanders have insufficient iodine intake.
- Around 30 per cent of New Zealand school children are iodine deficient.
- An estimated 750 million people worldwide (*that's about 15 per cent of the population*) remain iodine deficient.
- Iodine deficiency is also a known problem affecting livestock in New Zealand, causing the same problems as in humans, so iodine should be added to fertilisers or feed.
- The number of countries where iodine deficiency is a public health problem have halved over the past decade according to a new global report on iodine status.
- 54 countries are still iodine-deficient. ⇒

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Why do we need it?

Iodine is a trace mineral essential for proper physical and mental development. It is used in the production of thyroid hormones and impacts on cell function, the metabolism of nutrients, production of energy, regulation of body temperature, functioning of nerves and muscles, proper development of the foetus, growth and repair of tissues, and the condition of skin, hair, teeth and nails.

The thyroid is a small gland in the front of the neck and it contains about 80 per cent of the body's total iodine. It uses iodine to make the thyroid hormones thyroxine (T4) and triiodothyronine (T3). These hormones control the body's metabolism.

Iodine also has a role as an antioxidant in the eye and breast as well as the thyroid gland. The use of high doses of iodine to protect the thyroid in situations where there has been high radiation exposure suggests that an iodine deficiency may make the thyroid (which is particularly radiation sensitive) more susceptible to radiation damage – particularly from head, neck and dental x-rays. Even low level radiation may induce thyroid gland changes when there is inadequate iodine intake.

What happens when we run short?

It takes months of too little iodine to produce iodine deficiency, but eventually the body stores become depleted and the thyroid gland struggles to make enough thyroid hormone. This will show in all systems of the body, creating symptoms such as:

- goitre, a noticeable swelling in the lower throat – the thyroid gland's attempt to trap more iodine
- fatigue
- sluggish digestion
- dry skin
- dry brittle and/or thinning hair
- slower pulse
- weight gain
- cold body temperature or increased sensitivity to the cold
- loss of the outer edges of eyebrows – and over time: dulling of the personality, deterioration of memory and attention, apathy and depression.

Pregnancy

Iodine deficiency has the dubious distinction of being the leading cause of totally preventable mental retardation. Even a mild deficiency during pregnancy affects the thyroid function of the mother and baby, and the mental development of the child. The higher the deficit, the greater the damage, and serious deficiency can result in stillbirth, spontaneous abortion, and congenital abnormalities such as cretinism.

Cretinism is a severe and irreversible form of mental retardation that is relatively common amongst people living in iodine-deficient areas of Africa and Asia. It is usually associated with stunted physical growth, deafness and spasticity. However, iodine deficiency also causes far less visible mental impairment that reduces intellectual capacity at home, in school and at work in people around the world.

Autism and ADHD

Thyroid hormones play a critical role in brain development and while lesser degrees of thyroid dysfunction during pregnancy do not cause frank mental retardation, it can cause more subtle deficits in early childhood.

While there seems to be no correlation between low levels of thyroxine at birth in children later diagnosed with ADHD, labour and the birth process can elevate thyroid hormones, which raises the possibility of unreliable results. Also, measurement at birth is not an indicator of the possibility of sub-optimal iodine status (and thus thyroid function) earlier in the pregnancy.

Does your diet put you at risk? It will if the following are normal to you:

- vegetarian or vegan diet – particularly where the food is grown on iodine-deficient soils such as in New Zealand
- no or very low ocean fish or seaweed
- low sodium diets (between 1970 and 1990 iodine deficiency quadrupled in the US, mainly due to the promotion of the low salt diet)
- non-iodised salt such as rock salt, sea salt or gourmet salt
- foods high in goitrogens
- consumption of large quantities of prepared/takeaway foods (iodised salt is currently not used in the food manufacturing industry but there are moves afoot to change this)
- if you are pregnant or lactating

How much do we need?

Current US Dietary Reference Intakes for iodine are: 150 mcg/day for adults, 220 mcg/day for pregnant women and 290 mcg/day for breast-feeding women with 1100mcg a recommended upper limit. However, many researchers suggest that daily intakes equating to the average Japanese diet would impart more health benefits.

Tobacco and some foods contain goitrogens, substances that can interfere with iodine uptake or hormone release from the thyroid gland. These foods (cabbage, Brussels sprouts, broccoli, cauliflower, swedes, turnips, mustard, millet, cassava, lima beans, linseed, bamboo shoots and sweet potatoes) generally only pose a problem if iodine intake is low and if these foods are consumed raw.



Foods high in iodine

Kelp (sea vegetable)	1/4 cup	415mcg
Salt, iodised	1 t	250-650mcg
Strawberries (soil iodine-dependant)	1 cup	13mcg
Egg whole, boiled		22mcg
Haddock	80g	122 mcg
Shrimp	80g	30 mcg

Other sea vegetables such as dulse, hiziki, and wakame are great sources of iodine.

Where do we get it?

The addition of iodine to table salt (usually 20 to 80mg iodine per kilogram salt) is the main source for many people; however, this is generally not the healthiest way to obtain iodine as salt can also contain aluminium (used as a free flow agent).

In New Zealand, areas receiving high rainfall and inland areas are most at risk from iodine deficiency, whereas coastal rainfall is likely to supply significant iodine. Iodine could be dubbed the sea mineral as it is found in extremely high amounts in seaweed and so finds its way into the seafood chain, thus fruits and vegetables from gardens where seaweed and/or fish fertiliser has been used in the making of compost are a good source.

Iodine's 'cousins'

Chlorine, fluorine, bromine and iodine have much in common – they are all halides and are molecularly very similar. In theory, this means that where iodine is insufficient or the other halides are in excess, they may displace iodine on the iodine-receptors, thus disrupting thyroid hormone production. When iodine is low, fluorine can impair the thyroid's ability to make thyroid hormones, but this does not happen when there is adequate iodine present. Consumption of chlorinated drinking water can also inhibit thyroxine synthesis.

Beyond the thyroid

Oral iodine supplements reduce fibrosis and inflammation, inadequate iodine may be a factor in fibrocystic breast disease (lumpiness of the breast). Correction of the deficiency causes reversal of this condition. There is also a higher incidence of breast, endometrial, and ovarian cancers in those with hypothyroidism and/or iodine deficiency. Japan's low breast cancer rate has been associated with the high consumption of iodine, mainly from seaweed products. Iodine deficiency can also have adverse effects on the cardiovascular system, mainly due to the thyroid abnormalities that develop when iodine intake is insufficient.

Testing and correcting insufficiency

While a doctor suspecting thyroid dysfunction simply measures levels of

thyroid hormone and supplements with that hormone when low thyroid function is diagnosed, few will question iodine intake or test the iodine level.

Many natural health practitioners use a skin patch test to determine the body's need for iodine, claiming that rapid fading of the yellow colour is indication of a high need. The same practitioners will often also prescribe iodine to be painted on the skin as a means of supplementation. However, studies have shown that the skin test is not a reliable method to assess whole body sufficiency for iodine nor as a supplement. The preferred test is a 24-hour urinary collection or an iodine loading test which must be done under medical supervision due to the high amount of iodine used.

Supplemental iodine is required in cases of severe deficiency and should be taken only under guidance of a qualified healthcare practitioner. It is worth noting that iodine deficiency can conceal hyperthyroidism (the opposite of low thyroid function), and so correction of the deficiency will reveal this condition in those cases, also that selenium supplementation prior to correction of iodine deficiency can worsen low thyroid function.

Once a deficiency is corrected, it is important to ensure adequate dietary intake and iodine function:

- avoid excess consumption of (raw) goitrogens
- don't smoke
- filter your drinking water
- add seaweed to soups and salads
- make fish and/or seafood a regular part of your diet
- enjoy sushi regularly
- make your own sea mineral salt by mixing one part kelp powder to nine parts sea salt. 🍷

References available on request.

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