Selenomethionine supplements may contain high levels of iodine as a result of an inactive ingredient in the tablet—kelp

Arum SM, He X, Braverman LE. Excess iodine from an unexpected source. N Engl J Med 2009;360:424-6.

SUMMARY

BACKGROUND This is a case report of a man with thyroid cancer and elevated body iodine concentrations from an unknown source.

METHODS A 55-year-old man with a large mass on the right side of his neck was found on fine-needle aspiration biopsy to have papillary thyroid cancer (PTC) in the right thyroid lobe. Total thyroidectomy and modified right neck dissection revealed a multifocal PTC, the largest mass being 1.8 cm in diameter, with thyroid capsular invasion without extrathyroidal extension. Lymph-node metastases were found in 26 of 78 cervical lymph nodes. After surgery, the patient was advised to have thyroid remnant ablation; however, he had undergone computed tomographic (CT) scanning with an iodine-rich contrast agent and was accordingly placed upon a low-iodine diet. Two months later, urinary iodine concentration was elevated to 394 μg/L (reference range, 42 to 350). The patient reported having ingested a large number of over-the-counter supplements, including selenium, vitamin C–bioflavonoid complex, calcium citrate, coenzyme Q10, α-lipoic acid, glucosamine–chondroitin complex, pygeum and saw palmetto, vitamin E, cellular forte, Pros-forte, green tea extract, methylsulfonylmethane, Vitamin B complex, glucosamine, Nettle, ß-carotene, vitamin D, Medizym, Bio zinc, folic acid, maitake mushroom extract, and L-threonine. The patient reported having reviewed the labels and finding no sources of iodine. As a result, the elevated iodine level was attributed to the CT.

RESULTS A 24-hour urine collection revealed an iodine content of 363 μg/L (optimal level, 94 to 360) according to spectrophotometric measurements in the authors' laboratory. After treatment with furosemide (20 mg daily) and a low-iodine diet, the 24-hour urinary iodine excretion remained elevated at 370 μg/L. As a result, the iodine content of 21 supplements the patient had been taking was measured (Figure 1). The selenium supplement was the source of the excess iodine (215 μg per tablet), with a total iodine ingestion of 29 μg, which was the result of an inactive ingredient in the supplement: kelp. When the patient stopped taking all supplements for 8 weeks and maintained a regular diet, his 24-hour urinary iodine excretion returned to a normal level (192 μg). After he stopped taking supplements and was placed on a low-iodine diet for 4 weeks, his 24-hour urinary iodine excretion fell to 36 μg/L.

CONCLUSION Excessive iodine intake came from an unexpected source: kelp-enriched selenium.

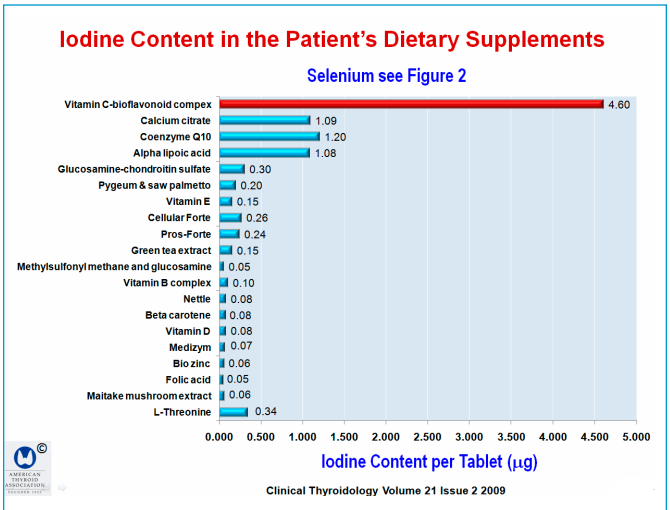

Figure 1. Iodine content in the patient's dietary supplements.

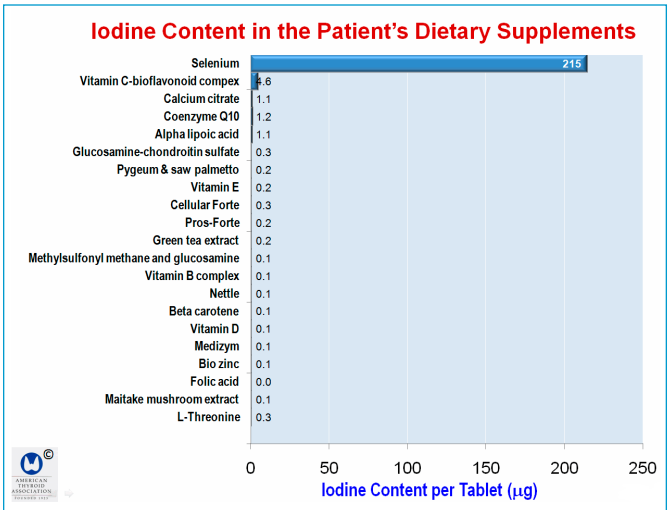

Figure 2. Urinary iodine content showing the disproportionately high iodine level in the Selenium tablets.

COMMENTARY

It is well known that excess exogenous iodine impairs the efficacy of ^{131}I therapy. In the patient under discussion, kelp-enriched selenium was the cause of the elevated urine iodine levels. The senior author of this study, Dr. L.E. Braverman is one of the leading worldwide authorities on iodine. As pointed out in this article, the iodine content of kelp is highly variable (1), and it is accordingly likely that the iodine levels are also variable in different batches of kelp-enriched selenium supplements. The key to this sleuthing was the accurate measurements of urinary iodine content performed by the standard, spectrophotometric measurements in Dr Braverman's laboratory.

A study that investigated whether urinary iodine levels change during the day found that 24-hour urinary iodine concentrations follow a circadian rhythm, with the lowest levels being between 8 and 11 hours and gradually peaking at about 24 hours (2). Urinary iodine returned to baseline levels between 21 and 22 hours in children only, peaking 4 to 5 hours after the main meals. The authors concluded that the existence of a circadian rhythm of urinary iodine is probably universal, but its profile depends on alimentation. As the nadir of urinary iodine is found in the morning, this might be an appropriate collecting period; the changes were small enough over a 24-hour period as to not interfere with spot-sample measurements of urine iodine levels throughout the day to assess adequacy of a low iodine diet for ^{131}I therapy. The iodine concentration for ^{131}I therapy is ideally <50 μg/L but without fastidious avoiding dietary iodine the level is more often around 100 μg/L. To regularly lower the urinary iodine level to <50 μg/day, patients should adhere to a low-iodine diet for 2 weeks (3).

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References

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