Dear Editor:

Iodine requirements increase during pregnancy and lactation due to increased maternal thyroid hormone production and iodine excretion, fetal iodine requirements, and loss of iodine in breast milk. Seaweed preparations are a source of dietary iodine. Korean and many Korean-American women traditionally consume brown seaweed soup (Undaria pinnatifida) daily during the early postpartum period (Supplementary Data; Supplementary Data are available online at www.liebertonline.com/thy) (1). This tradition is maintained among Korean and Korean-American women such that their breast milk iodine correlates strongly with frequency and quantity of seaweed soup consumption (2,3). As the iodine content of this soup has not been reported, we randomly selected 10 brands of dried brown seaweed from Korea and China available in the United States. Seaweed soup from each brand was prepared utilizing the following ingredients: 1 oz of dried seaweed, 6 cups water, ½ pound beef, 1½ tablespoons soy sauce, 2 teaspoons sesame oil, 1 teaspoon garlic, and ~½ teaspoon noniodized sea salt (Supplementary Data). Iodine content of the dried seaweeds and the soups were measured spectrophotometrically after digestion with hydrochloric acid and dilution with iodine free deionized water, as described by Benotti et al. (see Supplementary Data).

The mean iodine content of the dried seaweed was 359 ± 254 μg/g (mean ± SD), or 10173 ± 7200 μg/oz. The mean iodine content of seaweed broth was 1.9 ± 0.7 μg/mL, with 1 bowl (250 mL) of broth containing an average of 487 ± 178 μg of iodine. The mean iodine content of blended seaweed soup contents (broth, cooked seaweed) was 1705 ± 930 μg/250 mL. Potential sources of variability in soup iodine (see Supplementary Data) include the iodine contents of dry seaweed and other ingredients (e.g., iodized salt, iodine-containing soy sauce, and anchovy soup base), cooking methodologies, and the quantity of seaweed in recipes (4). The iodine content of seaweed varies with harvest location and season, salinity and temperature of water, depth and portion of seaweed harvested, and storage conditions (4).

The World Health Organization (WHO) guidelines recommend 250 μg/day of iodine intake during pregnancy and lactation, whereas the Institute of Medicine (IOM) recommends 220 μg/day of iodine intake during pregnancy and 290 μg/day during lactation (Supplementary Data). The IOM recommends a tolerable upper limit of iodine intake of 1100 μg/day, whereas the WHO suggests an upper limit of 500 μg/day for pregnant and lactating women and 180 μg/day for infants. More than 90% of postpartum lactating Korean women consume seaweed soup at least three times daily in the first postpartum week, and up to 75% of these women have seaweed soup at least once daily up to 4 weeks postpartum (3). Our findings indicate that this constitutes an average iodine intake of at least 1400 μg/day in the first postpartum week based solely on 250 mL seaweed soup broth three times daily, and at least 5000 μg/day if the entire contents of each serving are consumed (broth and seaweed). High levels of breast milk iodine values in Korean postpartum women have been reported (2,3). Depending on quantity and frequency of intake, postpartum women who consume Korean seaweed soup may have daily iodine intakes and breast milk iodine concentrations that far exceed the WHO and IOM upper limits.

Iodine-induced hypothyroidism, iodine-induced thyrotoxicosis, and iodine-induced goiter are potential adverse effects of excess iodine consumption. However, the effects of high iodine intake are dependent on several factors, including iodine status (i.e., degree and duration of iodine deficiency or sufficiency) before excess iodine exposure, as well as any pre-existing thyroid autoimmunity, thyroid dysfunction, and/or thyroid nodularity. Chung et al. reported subclinical hypothyroidism in preterm Korean infants exposed to high iodine content in breast milk (2). Additionally, cases of iodine-induced neonatal hypothyroidism due to maternal seaweed consumption were reported in Australia. Increased incidence and/or exacerbation of postpartum thyroiditis are also potential risks of high iodine intake. However, these effects were not observed in the only Korean study to date evaluating this relationship. Further studies should be carried out to evaluate the potential adverse effects of sustained high dietary iodine in postpartum women of Korean descent and their infants. In addition, there should be a raised cultural awareness among endocrinologists and other medical providers regarding this common source of high dietary iodine. A careful dietary history should be part of the evaluation and follow-up of postpartum Korean women and their infants, especially in the setting of signs and/or symptoms of thyroid dysfunction, thyroid autoimmunity, nodular thyroid anatomy, or pre-existing thyroid dysfunction. In addition, Korean women...
should consider refraining from seaweed soup consumption in the postpartum period if their infants are preterm (i.e., born before 37 weeks of gestational age).

Disclosure Statement
The authors declare that no competing financial interests exist and there are no conflicts of interest.

References

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