# Should pregnant women receive iodine supplementation?

## Iodine deficiency is on the rise in the United States, thanks in part to changing dietary habits

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One of this nation's greatest public health successes resulted from the

decision to cheaply supplement table salt with iodine. Since iodine supplementation of our diets began in the 1920s, we in the United States have almost eliminated severe iodine deficiency. Before then, endemic iodine deficiency was prevalent in the so-called goiter belt--the Great Lakes, Appalachian, and Northwestern region--where 26% to 70% of children had clinically apparent goiter.[1]



Iodine deficiency is still a major global health problem; approximately 2 billion people are currently at risk. It remains a leading cause of preventable mental retardation in children worldwide.[2] In the past, the stigmata of iodine deficiency and the ensuing hypothyroid states could not be ignored. In addition to large goiters, affected women had pregnancy complications and their offspring had severe developmental delays. Fortunately, such overt clinical manifestations are vanishingly rare in this country today, but more subtle forms of iodine deficiency are on the rise and pose a potential risk to pregnant women and their fetuses. Thus, US obstetricians need to once again be concerned about maternal iodine deficiency.

## Thyroid hormone homeostasis in pregnancy

Iodine is crucial to maintaining a euthyroid state because it forms the elemental backbone of both thyroxine (T4) and triiodothyronine (T3). Normal thyroid function is critical to energy homeostasis and metabolism as well as normal cognition and neurological functioning in adults and children. Pregnant women are particularly vulnerable to iodine deficiency because early pregnancy is characterized by a rapid surge in thyroid hormone production (and iodine requirements).[3] Late pregnancy also stresses maternal iodine stores because of increased renal clearance. Normally this enhanced iodine demand is easily overcome by adequate iodine intake, but these changes can easily overwhelm a woman who begins pregnancy with borderline or low iodine stores.

## The increasing prevalence of iodine deficiency in pregnancy

The World Health Organization recommends 250 µg of iodine daily for pregnant and lactating women while the Institute of Medicine recommends 220 µg daily during pregnancy and 290 µg daily during lactation.[2] While achieving such intake levels was easily accomplished in the past, contemporary dietary trends are making it harder for US mothers to meet these recommendations. Currently, the major sources of dietary iodine are iodized salt/table salt, breads/grains, and dairy products.[4] However, the current push to reduce salt intake in order to lower risks of hypertension and cardiovascular disease as well as increasing intake of noniodized salt from processed foods and sea salts or kosher salts have measurably reduced US dietary iodine intake.[5,6]

Seafood is also an excellent source of iodine but reduced seafood consumption during pregnancy, caused by concerns about excess mercury ingestion, has further exacerbated reduced iodine intake in pregnant women. As a consequence of these cumulative trends, US iodine stores have dropped by 50% from 1970s levels when assessed by urinary iodine concentration (UIC), the most common method of evaluating iodine status in populations[7] From 1971 to 1974, the median UIC was 320 µg/L, but by 2005 to 2008, the median UIC level had fallen to 164 µg/L.[8] National survey data also suggest that among women of childbearing age, the median UIC decreased from 294 µg/L to 128 µg/L, and the most recent National Health and Nutrition Examination Survey (2003–2004) reported that 37.2% of women of childbearing age had UIC values below 100 µg/L, which suggests mild iodine deficiency.[2,8]

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## Does mild iodine deficiency matter?

Severe maternal iodine depletion causes severe fetal hypothyroidism, which impairs myelination of the central nervous system, causing developmental delays and--at the extreme--cretinism. Maternal sequelae include infertility, spontaneous abortion, stillbirth, preterm birth, and preeclampsia. There is no controversy concerning the importance of identifying and managing severe iodine deficiency to prevent these complications. But the evidence is less clear regarding whether or not mild-to-moderate iodine deficiency in pregnancy is harmful. There does appear to be some evidence for developmental concerns with milder forms of iodine deficiency and uncontrolled trials have noted modest benefits of maternal supplementation on childhood neurologic development.[9,10] However, available randomized trials of iodine supplementation have yielded discordant results and none has been designed to demonstrate improved neurodevelopment in the offspring. There are, however, at least 2 ongoing trials seeking to assess such neurodevelopmental outcomes.[11]

Prenatal vitamin supplementation would seem to be a simple expedient to eliminate any such risk. It would also be a reasonable alternative to pregnant women dramatically increasing their intake of iodized table salt or seafood! Unfortunately, only 28% (27 of 96) prescription prenatal vitamins tested by Leung, et al contained any iodine, and what is listed on the label may not reflect bioavailable iodine, especially when derived from seaweed sources rather than from potassium iodide.[2]

## Take-home message



For every public health action there is a reaction—usually in the form of unintended consequences. Pregnant women are now told not to consume excess salt or eat too much seafood, and this has caused an increase in mild iodine deficiency. But what are the real consequences of such deficiency? We need randomized trials examining the benefits of iodine supplementation on neonatal and childhood neurodevelopment in mildly deficient pregnant women. In the interim, I agree with Stagnaro-Green and associates.[12] They call for professional organizations such as the American College of Obstetricians and Gynecologists to “work collaboratively with pharmaceutical and vitamin manufacturers to ensure that all prenatal multivitamins contain 150 µg of potassium iodine.” They state that “in the interim, clinicians should recommend only those prenatal vitamins that contain iodine. The path seems clear. It is time for all prenatal vitamins to contain iodine.”

Dr. Lockwood, editor in chief, is Dean of the College of Medicine and Vice President for Health Sciences at The Ohio State University, Columbus.

**References**

1. Leung AM, Braverman LE, Pearce EN. History of U.S. iodine fortification and supplementation. *Nutrients.* 2012;4(11):1740-1746.

2. Leung AM, Pearce EN, Braverman LE. Iodine content of prenatal multivitamins in the United States. *N Engl J Med.* 2009;360(9):939-940.

3. Glinoer D. The importance of iodine nutrition during pregnancy. *Public Health Nutr.* 2007;10(12a):1542-1546.

4. Murray CW, Egan SK, Kim H, Beru N, Bolger PM. US Food and Drug Administration’s Total Diet Study: dietary intake of perchlorate and iodine. *J Expo Sci Environ Epidemiol.* 2008;18(6):571-580.

5. Dasgupta PK, Liu Y, Dyke JV. Iodine nutrition: iodine content of iodized salt in the United States. *Environ Sci Technol.* 2008;42(4):1315-1323. Erratum in: *Environ Sci Technol.* 2008;42(18):7025.

6. Lee SY, Leung AM, He X, Braverman LE, Pearce EN. Iodine content in fast foods: comparison between two fast-food chains in the United States. *Endocr Pract.* 2010;16(6):1071-1072.

7. Hollowell JG, Staehling NW, Hannon WH, et al. Iodine nutrition in the United States. Trends and public health implications: iodine excretion data from National Health and Nutrition Examination Surveys I and III (1971-1974 and 1988-1994). *J Clin Endocrinol Metab.* 1998;83(10):3401-3408.

8. Caldwell KL, Makhmudov A, Ely E, Jones RL, Wang RY. Iodine status of the U.S. population, National Health and Nutrition Examination Survey, 2005-2006 and 2007-2008. *Thyroid.* 2011; 21(4):419-427.

9. Velasco I, Carreira M, Santiago P, et al. Effect of iodine prophylaxis during pregnancy on neurocognitive development of children during the first two years of life. *J Clin Endocrinol Metab.* 2009;94(9):3234-3241.

10. Berbel P, Mestre JL, Santamaria A, et al. Delayed neurobehavioral development in children born to pregnant women with mild hypothyroxinemia during the first month of gestation: the importance of early iodine supplementation. *Thyroid.* 2009;19(5):511-519.

11. Melse-Boonstra A, Gowachirapant S, Jaiswal N, Winichagoon P, Srinivasan K, Zimmermann MB. Iodine supplementation in pregnancy and its effect on child cognition. *J Trace Elem Med Biol.* 2012;26(2-3):134-136.

12. Stagnaro-Green A, Sullivan S, Pearce EN. Iodine supplementation during pregnancy and lactation. *JAMA.* 2012;308(23):2463-2464.

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### Charles J. Lockwood, MD, MHCM

Dr. Lockwood, Editor-in-Chief, is Dean of the Morsani College of Medicine and Senior Vice President of USF Health, University of South ...

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