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Editor-in Chief

Jerome M. Hershman, MD
VA Greater Los Angeles Healthcare System
and UCLA School of Medicine
Endocrinology 111D
11301 Wilshire Blvd
Los Angeles, CA 90073
Telephone: 310-268-3852 Fax: 310-268-4879
Email: clinicalthyroidology@thyroid.org

Associate Editors:

Albert G. Burger, MD
Professor, University of Geneva
Geneva, Switzerland
Email: clinicalthyroidology@thyroid.org

Stephanie L. Lee, MD, PhD
Director of the Thyroid Health Center
Boston University Medical Center
Boston, MA
Telephone: 617-638-8530 Fax: 617-638-7221
Email: clinicalthyroidology@thyroid.org

Jorge H. Mestman, MD
Professor of Clinical Medicine and OB/GYN
University of Southern California
Keck School of Medicine
Los Angeles, CA
Telephone: 323-442-6179
Email: clinicalthyroidology@thyroid.org

Stephen W. Spaulding, MD
Professor of Medicine
Department of Medicine
University at Buffalo, SUNY
Telephone: 716-862-6530 Fax: 716-862-6526
Email: clinicalthyroidology@thyroid.org

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American Thyroid Association
6066 Leesburg Pike, Suite 550
Falls Church, VA 22041
Telephone: 703-998-8890
Fax: 703-998-8893
Email: thyroid@thyroid.org

Designed By

Karen Durland (kdurland@gmail.com)

Clinical Thyroidology

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Clinical THYROIDOLOGY

VOLUME 23 • ISSUE 7

JULY 2011

U. S. DIETARY IODINE STATUS REMAINS SUFFICIENT OVERALL, BUT WOMEN OF CHILD-BEARING AGE MAY BE MILDLY IODINE-DEFICIENT

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;21:419-27.

SUMMARY

BACKGROUND

Adequate dietary iodine intake is required for thyroid hormone synthesis. The iodine nutritional status of the U.S. population has been assessed periodically since 1971 by the National Health and Nutritional Examination Survey (NHANES). The recommended dietary allowances for iodine are 150 µg daily in nonpregnant adults and 220 µg daily in pregnant women. Major sources of iodine in the U.S. diet include iodized salt, dairy foods, and some grain products. Because 90% of ingested iodine is excreted in the urine, median urinary iodine concentrations can be used to assess the dietary iodine status of populations. The World Health Organization has determined that a median urinary iodine level of 100 to 199 µg/L reflects optimal iodine nutrition for populations of nonpregnant adults. During pregnancy, because dietary iodine requirements and renal iodine excretion are both increased, a median urinary iodine concentration of 150 to 249 µg/L is considered optimal.

METHODS

Spot urinary iodine measurements were obtained in about one third of the 5000 participants in the 2005–2006 NHANES and in all of the 5000 participants 6 years of age or older in the 2007–2008 NHANES. Sampling was designed to be nationally representative. Subjects were categorized by age group, sex, and race/ethnicity. Pregnant women were identified on the basis of urine testing.

RESULTS

Overall population median urinary iodine concentrations were 164 µg/L (95% CI, 154 to 174) in 2005–2006 and 164 µg/L (95% CI, 154 to 173) in 2007–2008. These values have not changed substantially in NHANES surveys since 2000. Children had higher urinary iodine concentrations than adults; the median urinary iodine concentration for children 6 to 11 years of age was 239 µg/L (95% CI, 193 to 279) in 2005–2006 and 215 µg/L (95% CI, 194 to 240) in 2007–2008.

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Non-Hispanic black individuals had lower urinary iodine concentrations (2007–2008 median urinary iodine concentration, 137 µg/L; 95% CI, 123 to 155) than non-Hispanic white individuals (2007–2008 median urinary iodine concentration, 168 µg/L; 95% CI, 154 to 180) and Mexican Americans (2007–2008 median urinary iodine concentration, 174 µg/L; 95% CI, 162 to 190).

In the combined dataset from 2005–2006 and 2007–2008 there were a total of 184 pregnant women. Their median urinary iodine concentration was 125

µg/L (95% CI, 86 to 198). The combined dataset also included 1578 nonpregnant women of child-bearing age (15 to 44 years); the median urinary iodine concentration for this group was 130 µg/L (95% CI, 116 to 139).

CONCLUSIONS

Iodine nutrition in the United States remains adequate overall, and U.S. dietary iodine intake has remained stable since 2000. However, children may be ingesting slightly excessive amounts of iodine, and pregnant U.S. women are mildly iodine-deficient.

COMMENTARY

The 2007–2008 NHANES survey is the first in which urinary iodine values were measured in all participants, and it represents the largest dietary iodine assessment in the United States to date. In light of the 50% drop in urinary iodine values between NHANES I (1971–1974) and NHANES III (1988–1994) (1), it is reassuring that U.S. urinary iodine values have since stabilized and that overall U.S. iodine intake is adequate.

However, the fact that pregnant women in the samples from 2005–2006 and 2007–2008 were mildly iodine-deficient is quite worrisome. Because thyroid hormone is essential for normal neurodevelopment in utero and in early life, the groups most vulnerable to the effects of iodine deficiency are pregnant and lactating women and their offspring. Decreases in maternal and fetal free T4 associated with even mild iodine deficiency in pregnancy may have adverse effects on cognitive function in children (2,3). While larger than in previous NHANES datasets, the sample size of 184 is far too small to be truly representative of all pregnant U.S. women. More information is needed

about risk factors for low dietary iodine intake among pregnant U.S. women. Data about regional and racial/ethnic variations in urinary iodine concentrations would be useful in this regard. To achieve a sample size adequate to allow for more subgroup analyses, oversampling of pregnant women should be carried out during the next NHANES survey. Until we are better able to identify particular U.S. women at risk for iodine deficiency, all pregnant and lactating women in the United States are best advised to take a prenatal multivitamin containing 150 µg of iodine daily (4).

In all of the NHANES surveys to date, children have had higher median urinary iodine concentrations than adults. This is most likely explained by children’s higher dairy intakes. Whether the marginally excessive iodine intake among U.S. children will predispose them to higher rates of thyroid autoimmunity and/or thyroid dysfunction later in life is unknown. More studies are needed to better understand the effects of different levels of iodine ingestion throughout the life cycle.

— Elizabeth N. Pearce, MD,
Boston, Massachusetts

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