Surveillance of urinary iodine values of the U.S. population has been carried out at intervals since 1971. In this issue, Caldwell et al. (1) report on the most recent U.S. National Health and Nutrition Examination Survey (NHANES) iodine data, for the 2003–2004 sample. Reassuringly, there has been no significant change since the last NHANES survey in 2001–2002. Following a precipitous drop in urinary iodine values between NHANES I (1971–1974) and NHANES III (1988–1994), U.S. dietary iodine intake appears to have stabilized. Importantly, the U.S. population overall remains iodine sufficient.

Spot urinary iodine values are used most frequently to screen for iodine deficiency in general populations. A limitation of urinary iodine testing is that identifying individuals at risk for iodine deficiency is not possible, as there is substantial diurnal and day-to-day variation in urinary iodine excretion (2,3). Urinary iodine concentration thresholds have only been identified for populations. In NHANES 2003–2004, 2.4% of all adults and 4.0% of women of childbearing age had urinary iodine concentrations <20 μg/L. It is not possible to know whether these outliers are truly iodine deficient or whether their low values just represent random fluctuation. However, given the potential adverse consequences of iodine deficiency disorders, and the ease with which these can be prevented, the possibility that there might be subsets of the U.S. population at risk for mild iodine deficiency is reason for concern.

The groups most vulnerable to the effects of iodine deficiency are pregnant and lactating women, infants, and very young children. Decreases in maternal thyroxine (T₄) associated with even mild iodine deficiency may have adverse effects on the cognitive function of offspring (4–6). It has recently been suggested that mild iodine deficiency may also be associated with attention deficit and hyperactivity disorders (7). Although median urinary iodine thresholds in children under age 2 have recently been established (4), the NHANES surveys do not provide any information about the urinary iodine status of children younger than age 6 because of the difficulty of obtaining urine samples in this group. Dorey and Zimmermann (8) have recently validated a simple method for collecting infant urine samples in diaper pads for measurement of iodine concentrations, which should provide useful information in the future. There are currently no published data for urinary iodine in U.S. infants. In this country and elsewhere, neonatal screening programs are designed to detect congenital hypothyroidism, elevated neonatal thyroid stimulating hormone values being more frequent in severely iodine deficient regions (4). Alterations in maternal dietary iodine intake have been proposed as one potential cause for an observed 73% increase in the incidence of congenital hypothyroidism in the United States between 1987 and 2002 (9).

Unfortunately, U.S. women of reproductive age remain the most likely group to have low urinary iodine values. Because of increased thyroid hormone production, increased renal iodine excretion, and fetal iodine requirements, dietary iodine requirements are higher in pregnancy than they are for non-pregnant adults (10). The Institute of Medicine’s Recommended Dietary Allowance for iodine is 220 μg/d for pregnant women, higher than the 150 μg/d recommended for nonpregnant adults and adolescents (11). Similarly, World Health Organization (WHO) guidelines suggest an intake of 200–300 μg/d iodine daily for pregnant women and the Endocrine Society has recommended an average daily intake of 250 μg iodine daily for pregnant women (12). According to WHO guidelines, median urinary iodine values for pregnant women between 149 and 249 μg/L are consistent with iodine intake in this optimal range. The median value among 90 pregnant women in the 2003–2004 NHANES sample was 181 μg/L, which is consistent with adequate iodine nutrition. This result needs to be interpreted with caution, however, given the relatively small sample size; it has been suggested that 100–500 samples for each subgroup are required to accurately estimate a population’s iodine sufficiency (2).

Dietary iodine intake for women who are breastfeeding should be at least as high as for pregnant women; the Institute of Medicine recommends 290 μg daily (11). WHO guidelines suggest that median urinary iodine values >100 μg/L are consistent with adequate iodine intake in lactating women (4). These values are lower than for pregnant women because some iodine is excreted in breast milk rather than in urine. NHANES does not provide any information about the iodine...
status of lactating women. Recent small convenience samples of breast milk and urinary iodine values in lactating U.S. women suggest that there may be cause for concern (13–15), but national data are lacking.

How should the NHANES data inform clinical and public health practice? Iodine nutrition in the United States has been achieved by a process sometimes described as “silent prophylaxis.” Sources of iodine in the U.S. diet have been difficult to identify because there are a wide variety of potential sources, there is a marked variation in the iodine content of some common foods, and the amount of iodine in foods is not listed on the packaging. There are no validated U.S. questionnaires for the determination of dietary iodine intake. Because individuals at risk cannot be reliably identified either by spot urine measurements or by dietary history, a public health approach to iodine supplementation in the United States has been advocated, particularly for pregnant women and women of childbearing age (16). The use of iodized salt should continue to be promoted. In addition, the National Academy of Sciences has recommended that consideration be given to adding iodine to all U.S. prenatal vitamins (17). The American Thyroid Association has also recommended that all women receive dietary supplements containing 150 μg iodine daily during pregnancy and lactation and that all prenatal vitamins contain 150 μg of iodine (18). These recommendations have not yet been adopted. Currently, only 69% of 127 nonprescription and 28% of 96 prescription prenatal multivitamins marketed in the United States contain any iodine and many contain less than the recommended amount (19).

The U.S. urinary iodine data compare favorably to median values in much of the world, including most of Western Europe. Although enormous progress has been made over the last several decades, the International Council for the Control of Iodine Deficiency Disorders (ICCIDD) estimates that iodine deficiency still affects over 2 billion individuals worldwide (38% of the world’s population), and iodine deficiency remains the leading cause of preventable mental retardation worldwide (20). The mainstay of iodine deficiency prevention worldwide has been providing access to iodized salt, an intervention characterized as one of the three most cost-effective solutions to major world problems by the 2008 Copenhagen Consensus, a panel of eight economists including five Nobel Laureates (21).

Although it is reassuring that overall U.S. iodine consumption currently seems to be both adequate and stable, more work remains to be done in identifying vulnerable subpopulations that may be at risk for mild iodine deficiency. Additional research is needed to identify the causes for increased U.S. congenital hypothyroidism rates. Ongoing surveillance of both population urinary iodine values and of the food supply should be performed every 3 years (22). Encouragingly, the Food and Drug Administration has recently published results of its 2003–2004 Total Diet Study, the first systematic survey of U.S. food iodine sources since the early 1990s (23). Like the NHANES data, the Total Diet Study results suggest that average U.S. iodine intake is currently sufficient. It is anticipated that the in-progress NHANES sample will include thyroid function tests and urinary iodine measurements for all participants. This may provide enough statistical power so that a better assessment of iodine intake in population subgroups will be available in the future.

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