

Assessing the Iron Status of the U.S. Population

Public Health Problem

Iron is an element that is essential to good health. Too little iron (iron deficiency) or too much iron (iron overload, or hemochromatosis) can lead to illness or death. Iron deficiency affects 10% of the U.S. population and is most common among young children and pregnant women. Iron overload is the most common genetic disorder in the United States today and is frequently misdiagnosed or underdiagnosed until diabetes, cardiovascular disease, hepatitis, liver failure, or death has occurred.



CDC Laboratory Response

Assessing iron status is critical to preventing illness or death from either iron deficiency or overload. CDC addresses this problem on many fronts.

- Provides validated and reference methods to public health laboratories for analyzing --
 - Serum iron (Fe)
 - Total iron-binding capacity (TIBC)
 - The ratio between Fe and TIBC (Fe/TIBC)
 - Transferrin saturation (% TS)
 - Erythrocyte protoporphyrin (EP)
 - Serum ferritin
 - Serum transferrin receptor (TfR)
 - Blood lead (Pb)
 - Genetic markers

National Health and Nutrition Examination Survey (NHANES) methods for analyzing Pb, Fe/TIBC, and EP are models for reference methods for National Clinical Laboratory Standards, and Fe/TIBC is highly correlated with the reference method of the International Committee for Standardization in Hematology.

- Provides field-study support for portable equipment such as hemoglobin and blood-lead analyzers.
- Produces reference and proficiency-testing materials that are distributed worldwide through CDC's Blood Lead Laboratory Reference System.
- Introduced serum TfR enzyme immunoassay to provide the earliest indicator of changes in iron status and to support health studies of refugee populations for whom iron status may be confounded by parasitism, sickle-cell disease, thalassemia, or intensive iron

supplementation.

- Assisted the College of American Pathologists in adding TIBC as a new component to the general chemistry survey. About 5,500 U.S. laboratories now participate in the survey.
- Provided genetic screening for two markers of hereditary hemochromatosis for participants in a hospital study and a subset of participants in NHANES III, Phase 2 (1991-1994).
- Provided support for worldwide epidemiologic field studies of iron deficiency/overload, lead poisoning, and refugee health.

Public Health Impact

CDC's laboratory methods and materials provide clinicians and laboratories with the reliable and standardized measurements that they need to assess iron status and to provide treatment for a variety of conditions. For example, early diagnosis of hemochromatosis using simplified screening assays or genetic confirmation means that people can manage their disease with phlebotomy and not suffer adverse health effects such as diabetes, liver failure, or death. Early detection of childhood lead poisoning, including concomitant iron deficiency, can prevent adverse physical and developmental outcomes among children.

Future Plans

To aid blood-sample collection, transport, and storage, CDC will evaluate the suitability of using dried blood spots as alternative media to assess iron status in populations in the United States and elsewhere. CDC will continue to evaluate inexpensive and low-technology methods for assessing iron status, especially for use in developing and less-developed countries.

Questions or Comments

<http://www2.cdc.gov/nceh/contactnceh/frmSubmit.asp>

The Centers for Disease Control and Prevention (CDC) protects people's health and safety by preventing and controlling diseases and injuries; enhances health decisions by providing credible information on critical health issues; and promotes healthy living through strong partnerships with local, national, and international organizations.

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