Looking Behind the Iron Curtain

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One of medicine's greatest strengths is its willingness to reexamine commonly accepted practices. This has been particularly true in the clinical application of screening tests. Frequently, the unsettling controversy that accompanies such reexamination helps shape the improvement that follows. In their article entitled "Screening for Iron Deficiency in Early Childhood by Using Serum Ferritin in the Primary Care Setting," Oatley et al[1] raise a fundamental and likely controversial question about the value of the current practice of measuring the hemoglobin level at 1 year of age. Are we screening for anemia, iron deficiency, or iron deficiency anemia? Only when that question is answered can we rationally choose the right test and the right timing.

Current practice, as recommended by the American Academy of Pediatrics, is to test for anemia, either with a complete blood count test or a dedicated hemoglobin analyzer, with further testing before or after iron replacement if the hemoglobin level is <11.[2] The problem, however, is that the positive predictive value for iron deficiency of a hemoglobin level <11 g/dL in toddlers is estimated to be 29%.[3] Although it is true that some of these children may be incidentally discovered to have another hematologic disorder such as spherocytosis or pyruvate kinase deficiency, most do not, and routine screening for such disorders has never been endorsed. Perhaps the stronger case for testing at 1 year of age is to detect early iron deficiency rather than anemia because abnormally low iron stores may be a precursor to anemia or may be associated with neurodevelopmental impairments even before anemia develops. Pursuing this approach to screening in their study of a large cohort of young children in Canada receiving routine health care, Oatley et al[1] found that the prevalence of anemia at 12 to 13 months of age was at its highest (19.2%), whereas the prevalence of low ferritin levels was at its lowest (6.4%). Over the next 12 months, the prevalence of anemia decreased while the prevalence of low ferritin levels more than doubled. A reasonable conclusion from these data and other analyses in this provocative study is that in otherwise healthy 12-month-old children, hemoglobin levels near the threshold of 11 g/dL frequently, if not usually, have little to do with iron stores but also may lead to unnecessary worry, treatment, and retesting. Moreover, if detection of iron deficiency remains the major goal of screening, we may currently be using the wrong test at the wrong time. A serum ferritin level test at 15 to 18 months may be optimally timed to identify the largest number of affected children.

Are we ready to replace the hemoglobin level test with a serum ferritin level test and move the screening back a few months? Not yet. First, further studies should be done to confirm the value of the serum ferritin level as a screening test by revealing that the thresholds have statistical meaning and clinical value.[4] Secondly, other key determinants of the clinical usefulness of a screening test include cost and convenience. Currently, most ferritin levels are measured in hospital-based or commercial laboratories by using blood obtained by venipuncture. (However, for a glimpse of the future, check out the *iron*Phone![5]) At least

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some hemoglobin measurements are performed as office procedures by using capillary blood samples. Pricing varies widely, but typically the price of a ferritin level test is about twice the cost of a complete blood count test. Finally, as pointed out by the US Preventive Services Task Force, no study has yet revealed that detecting either iron deficiency or iron deficiency anemia at 12 months of age is associated with better growth, cognition, or neurodevelopmental outcomes.[6]

Given the uncertainty about the current screening strategy and while waiting for the data behind new strategies to mature fully, I would suggest the following proposition for further debate. Let us take advantage of the thorough discussion of risk factors for iron deficiency in the American Academy of Pediatrics policy, particularly dietary alterations, and make sure these factors are consistently explored with families and made a part of a thoughtful decision about whom to test, or at the least, whose hemoglobin results need to be pursued. The added time required for this approach would be more than offset by reducing the time, not to mention the cost, of unnecessary screening and futile follow-up testing. And maybe before we finish the debate, we will all have *iron*Phones.

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