Iodine biomarkers: a new interactive web interface

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Background
The role of food and nutrition in health promotion and disease prevention is irrefutable, and the ability to assess this relationship is contingent upon having accurate and reliable nutritional biomarkers. The need for better data on the prevalence of health conditions and micronutrient deficiencies to guide intervention programs nationally and set priorities globally has been codified in the Lancet series on maternal and child undernutrition (1). To address this need, the Biomarkers of Nutrition for Development (BOND) project was initiated in 2010 led by the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)/National Institutes of Health (NIH) and supported by a consortium of public (NIH, CDC, USDA, USAID) and private (Bill and Melinda Gates Foundation, PepsiCo) entities. The BOND project has two separate but complementary tracks:

• The Translational Track is focused on a process to i) harmonize the approach to decisions about what biomarkers are valid and reliable across a range of uses at clinical and population levels, and ii) develop materials based on a review of the available evidence to inform various user groups (i.e., researchers, clinicians, programmers, policymakers) about appropriate biomarker selection, and their use and interpretation.

• The Research Track is focused on the development of a targeted research agenda to address knowledge gaps along with new approaches to discovery, development and implementation of new biomarkers.

The BOND process
The initial phase of BOND project focused on six “case study” nutrients: iodine, vitamin A, iron, folate, vitamin B12 and zinc, chosen by the BOND Steering Committee for their public health importance and because they represent the range of challenges confronting the user communities. For each nutrient, an expert panel was constituted and charged with the development of comprehensive reviews covering key issues pertaining to their respective nutrients, the available biomarkers (relative strengths, weaknesses, technological requirements), research needs, and potential new biomarkers and related technologies. To support their deliberations, each expert panel had an opportunity to convene a 2-day nutrient-specific consultation to bring in additional expertise. After the consultation, the panels assessed the existing literature and completed their reviews. The completed draft reviews are undergoing a process of review and preparation to be posted as part of the BOND website. In addition, each review is also being published in a peer-reviewed journal.

Iodine was the first nutrient considered under BOND, and the iodine review has very recently been published in the Journal of Nutrition (2). The Expert Panel members include Dr. Michael Zimmermann (Chair, ICCIDD GN Executive Director), Dr. Fabian Rohner (GroundWork, LLC), Dr. Pieter Jooste (ICCIDD GN Regional Coordinator for Southern Africa), Dr. Chandrakant Pandav (ICCIDD GN Regional Coordinator for South Asia), and Dr. Kathleen Caldwell (Centers for Disease Control and Prevention).

BOND Query Based System (QBS) for iodine
One of the important objectives of the BOND project is to translate the existing evidence made available through the expert panel reviews to the wider audience through the BOND website. The website presents an overview of BOND, including links to all participating organizations and key resources. Of importance to the readers of the IDD Newsletter is the launch of the Iodine Query Based System (QBS) on the BOND website (3).
The QBS is an interactive tool that provides users with customized advice derived from the work of the nutrient expert panels about appropriate biomarker(s) to meet their specific needs and conditions of use. For example, if a program manager from sub-Saharan Africa wants to know which iodine biomarker to use for measuring iodine status in their study population (e.g. school-age children), they can access QBS and receive a recommendation on the biomarker by answering a series of questions. The uniqueness of the tool lies in that it is inclusive and provides biomarker information to different user groups (researcher/clinician/program manager/policymaker) in both developing and developed countries, irrespective of their expertise. All the information provided in QBS is backed by scientific evidence and linked to relevant publications in the PubMed whenever possible.

In addition to recommending a biomarker, the QBS informs the user about the caveats to consider (when using a given biomarker), lab methods and cut-off values for the biomarker. The BOND Secretariat encourages the readers of the IDD newsletter to visit the BOND website/QBS and provide input. That input will be used to determine new directions for BOND and related activities. In the upcoming months the BOND Secretariat is planning to launch QBS for folate, zinc, iron, vitamin A, and vitamin B12. For any feedback regarding the use of the website and the QBS in particular, please e-mail us on NICHDGlobalNutrition@mail.nih.gov.

Next phase of BOND
Based on the inputs received during the first wave of nutrients, the next phase of BOND will adopt a systems biology approach to consider nutrients as they interact within systems. Using a nutrient cluster approach, BOND phase II will potentially address i) Biomarkers in Growth (BIG), intended to focus on biomarkers of linear growth and body composition which could include e.g. vitamin D, calcium, magnesium and phosphorus; and, ii) Micronutrients in Neurological Development (MIND), to address the role and assessment of micro-nutrients in neurological development and those biomarkers/tools that may further the understanding of these relationships, and to evaluate the impact of interventions to improve cognitive/behavioral outcomes. BOND will incorporate the recommendations of the expert panel addressed in the initial phase into the appropriate nutrient cluster.

References

Other relevant BOND publications: