New measurement standard for vitamin D may lead to better bone health

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In a development that could help fight osteoporosis, rickets and other bone diseases, scientists are reporting an advance toward an accurate set of standards for measuring vitamin D levels in the blood. Milk (shown) is a well-recognized source of the vitamin. Credit: Max Rubner Institute

In a development that could help improve the prevention and treatment of osteoporosis, rickets, and other bone diseases, government chemists are reporting an advance in developing an accurate, reliable set of standards for measuring vitamin D levels in blood. Their findings could affect the health of millions of people worldwide, particularly children, women, and the elderly, who suffer from or are at risk of these debilitating diseases. The study will be presented here today at the American Chemical Society's 237th National Meeting.

The advance comes in the midst of a growing awareness that many children and adults are not getting enough vitamin D. New studies also link vitamin D deficiency to a higher risk of diseases ranging from cancer to cognitive impairment in the elderly. Everyone needs ample vitamin D not just to absorb calcium and maintain bone strength but to promote good overall health.

People produce the vitamin naturally when sunlight shines on their skin. Concerns about skin cancer, however, have reduced exposure to sunlight. Likewise, declines in consumption of certain dairy products have reduced intake of another natural source of vitamin D. The vitamin also is available as a dietary supplement.

Despite concerns about adequate vitamin D intake, there is no standard laboratory test for measuring vitamin D levels in humans, and no universal agreement on what are considered "normal" or "optimal" vitamin D levels. To understand vitamin D's role in health and disease, and use that knowledge in everyday medicine, laboratories need better measurement standards, the scientists say.

"No one really knows what methods or assays are correct at this point," says Mary Bedner, Ph.D., an analytical chemist with the National Institute of Standards and Technology (NIST) in Gaithersburg, Md. "Right now, you can send a blood sample to two different labs and get completely different results for vitamin D."

About three years ago, NIST, the Federal Government agency that sets measurement standards, began efforts to develop a standard for measuring vitamin D in collaboration with the National Institutes of Health's (NIH's) Office of Dietary Supplements. Later this year, after much consultation with experts and extensive laboratory testing, NIST scientists plan to unveil their standard to the public in a development that promises to lead to a better understanding of vitamin D in health and

disease.

The most commonly used indicator of a person's vitamin D status is the measurement of 25-hydroxyvitamin D in the blood. But several different forms of this vitamin exist in the blood — including 25-hydroxyvitamin D2 and 25-hydroxyvitamin D3 — that are of clinical significance and would be overlooked by scientists focusing on total 25-hydroxyvitamin D alone.

To account for these other forms of vitamin D, NIST developed Standard Reference Material 972 (SRM 972). The material is composed of four different pools of human blood serum obtained from a wide cross-section of blood donors. Each of the four pools contains different amounts of 25-hydroxyvitamin D2 and D3 to represent vitamin D profiles normally seen in a clinical setting. All were carefully measured using a combination of state-of-the-art liquid chromatography and mass spectroscopy — highly sensitive analytical chemistry tools.

One pool represents "normal" serum, which contains mostly 25-hydroxyvitamin D3. The second pool, which represents vitamin D deficient individuals, contains about half as much 25-hydroxyvitamin D3 as the "normal" pool. The third represents the blood profile of someone taking vitamin D supplements and contains elevated levels of 25-hydroxyvitamin D2. Finally, the fourth pool contains high levels of 3-epi-25-hydroxyvitamin D3, or the "epi" form of vitamin D, which is typically found in the blood of small children.

By using these four blood samples as reference points, clinical laboratories can calibrate their instruments and measurement techniques to assure more accurate and reliable vitamin D measurements for blood samples so doctors can make the right treatment decisions. As a result, testing based on this standard can more reliably tell patients whether they're getting enough vitamin D and provide information about what

forms of vitamin D they need to take to stay healthy, the researchers say.

"Accuracy is key," Bedner says. "We need to provide a reference material that other people can trust."

The researchers plan to make their reference standard commercially available within the next year. NIST and NIH funded the research.

Source: American Chemical Society (news : web)