

# A breath of fresh air for detecting vitamin B12 deficiency

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Researchers have developed a new test to detect the levels of vitamin B12 using your breath, allowing for a cheaper, faster, and simpler diagnosis that could help to avoid the potentially fatal symptoms of B12 deficiency.

In a study published today, 23 June 2011, in IOP Publishing's *Journal of Breath Research*, researchers have developed a simple, non-invasive, low-cost [breath test](#) to more accurately measure vitamin B12.

Vitamin B12 deficiency is a growing public health problem in which the most common tests – using blood serum levels – are limited in accuracy and sensitivity and are non-specific for vitamin B12.

Vitamin B12 plays a crucial role in the functioning of the brain and nervous system whilst also being essential for the formation of red blood cells; however in low levels it can cause fatigue, clinical depression and memory loss as well as more detrimental and irreversible effects on the brain and nervous system.

Several reports have also linked B12 deficiency to pernicious anaemia and Alzheimer's disease.

Moreover, vitamin B12 deficiency can often be asymptomatic; accentuating the need for a more accurate and reliable test.

The researchers, from the University of Florida at Gainesville and

Metabolic Solutions, Inc. of Nashua, NH, acknowledged that vitamin B12 plays a crucial role in the breakdown of a common preservative in bakery products, called sodium propionate, into carbon dioxide.

As such, the researchers deemed it possible to administer propionate to subjects, which would be broken down with the aid of vitamin B12 in the body, and then measure the resultant carbon dioxide.

The amount of carbon dioxide exhaled would be proportional to the amount of vitamin B12 present in the subject's body: individuals with a vitamin B12 deficiency would produce smaller amounts of carbon dioxide.

In order to differentiate this carbon dioxide from the normal amounts that we breathe out, the researchers labelled the administered propionate with a stable isotope of carbon, which would then be exhaled in the breath as labelled carbon dioxide.

The initial testing of the B12 breath test conducted measurements on subjects with chronic pancreatitis, Crohn's disease, and small intestinal bacterial overgrowth, as well as patients over 65 – all of which are associated with a higher incidence of vitamin B12 deficiency.

After fasting and not smoking for 8 hours, the study subjects were orally administered 50 mg of propionate and then tested every 10 minutes for the first hour and every 15 minutes for the second hour, with the best diagnostic accuracy appearing to be the 10 and 20 minute intervals.

To ascertain the accuracy of the breath test, the obtained vitamin B12 levels were compared with several blood compounds that are currently used to ascertain vitamin B12 deficiency.

The authors concluded that the results from their study indicate that the

vitamin B12 breath test is a non-invasive, sensitive, specific, and reproducible diagnostic test to detect [vitamin B12](#) deficiency.

Lead author Dr. David Wagner said, "Initially, larger studies must be conducted including treatment of B12 deficient subjects showing resolution of the abnormal breath test results. If these results are positive, FDA approval with many study centres will need to be conducted.

"With adequate funding, the test could be approved in 3-5 years."

**More information:** "A new 13C breath test to detect vitamin-B12 deficiency: a prevalent and poorly diagnosed health problem" 2011 *J. Breath Res.* 5 046001 [iopscience.org/jbr/5/4/046001](http://iopscience.org/jbr/5/4/046001)

Provided by Institute of Physics

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