Rapid diagnostics shine a light on vitamin D deficiency

A prototype device that will enable the quick assessment of vitamin D deficiency could lead to better health outcomes and a more efficient use of healthcare resources.

Vitamin D plays an essential role in the human body, helping to regulate our metabolism and support bone cell activity. A deficiency can lead to debilitating conditions such as osteoporosis.

“It is very hard to obtain sufficient vitamin D from food,” explains OSAvit-D project coordinator Arrate Jaureguibeitia, head of Innovation at BIOLAN, Spain. “The main source of this vitamin for many people is sunlight. Since people spend a lot of time indoors, vitamin D deficiency is becoming widespread and prevalent.”

In fact, vitamin D deficiency is more common than previously thought, with people over 50 at particular risk. Other risk groups include children, pregnant and lactating women, and patients with digestive disorders. Low levels of vitamin D have also been linked with a higher risk of getting COVID-19.
“Quantifying vitamin D in blood currently involves specialised analytical laboratories that require highly qualified personnel,” says Jaureguibeitia. “This process is costly for patients, laboratories and insurance companies.”

**Point of care diagnosis**

To address this challenge, Jaureguibeitia and her team sought to develop an innovative, easy-to-use diagnostic device. An important consideration was the need for the diagnostic tool to be sensitive enough to differentiate between moderate and severe deficiencies, and prevent problems resulting from excessive vitamin intake.

The team also wanted to ensure that the device could be used by medical professionals at the point of care, removing the need for patients or samples to be tested at specialised labs.

“We identified an opportunity to develop a novel device for quantifying vitamin D in blood,” adds Jaureguibeitia. “The device is based on a lateral flow immunoassay (LFI), combined with electrochemical detection.” The OSAvit-D project was launched to support this goal, enabling BIOLAN to hire an expert in LFI technology.

“We began by defining the specifications and requirements of the device, and then selected the most appropriate components and the most suitable assay,” explains Jaureguibeitia. “We then designed the geometry and layout of the LF strip in combination with screen-printed electrodes.”

This led to the successful development of a first prototype LFI device with electrochemical detection, and a roadmap for eventually transforming the novel idea into a commercially viable product.

**Clinical validation**

The end result is a viable electrochemical immunosensor for the detection of vitamin D deficiency. “The goal from the beginning was to help medical professionals make decisive decisions on vitamin D supplementation for individual patients,” notes Jaureguibeitia. “This will improve health outcomes while reducing overall health costs.”

Next steps include further development of the prototype, and preparation of the necessary groundwork for eventual analytical and clinical validation. Jaureguibeitia and her team are confident that their innovation will help to fill a gap in the healthcare market, and bring direct benefits to patients.
“Vitamin D deficiency is reaching epidemic proportions and is set to continue to rise over the next few years,” she says. “This is why a tool capable of the early detection and monitoring of vitamin D deficiency is likely to be of great interest to the pharmaceutical industry, healthcare systems and patients.”

**Keywords**

OSAvit-D, vitamin D, metabolism, bone, osteoporosis, pharmaceutical, healthcare

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