

Sunrise™ in Mongolia

Scientists involved in the study of vitamin D levels in the Mongolian population were in need of a microplate reader to help further their research. An amazing collaboration evolved, with staff from Tecan, CERLab, and Brigham and Women's Hospital working together to solve the problem.

Mongolians are at high risk of vitamin D deficiency because they reside at high northern latitude where, although it is always sunny, low temperatures prevent exposure of the skin for most of the year. In addition, the sun hits the earth at such an oblique angle that the UVB radiation – which is required for natural vitamin D synthesis – has to travel through a thick ozone layer that filters it until it is very weak, further limiting production of vitamin D. This situation is compounded by not eating fish and a lack of availability of vitamin D-fortified foods. Scientists at the Health Sciences University of Mongolia have been investigating the issue, as Dr Janet Rich-Edwards, an Associate Professor at Brigham and Women's Hospital, Harvard Medical School, Massachusetts, US, explained: "We have been working in Mongolia since 2004, and have seen the incredibly high incidence of rickets in the country. Vitamin D deficiency was considered an infant problem, because its most obvious symptom is rickets. In fact, vitamin D deficiency affects the entire population. Rickets was thought to be the tip of the iceberg; it was suspected that vitamin D deficiency was widespread across Mongolia, and yet there was no readily available vitamin D assay."

"Our original vitamin D pilot study involved a small group of children. At that stage there was no way of performing the assay in Mongolia, and we were forced to transport frozen samples to the US for testing, which was a logistical nightmare and a huge barrier to research. Gary Bradwin, Manager at the Clinical and Epidemiologic Laboratory (CERLab), Children's Hospital Boston, became involved, volunteering his time to help Mongolian scientists set up the assay and perform the vitamin D analysis themselves."

Gary added: "CERLab is a reference laboratory offering clinical chemistry services to laboratories worldwide, and we became involved with the project during the initial pilot study. I visited Mongolia to help set up the assay and we looked at all the different methods available, eventually opting for ELISA as the cost per sample is not too high and all that was really needed was a plate reader. However, the laboratory was very short of equipment and consumables and it was heartbreaking to see just how poor they were. Consumables that we take for granted as disposable, such as pipette tips and needles, were sterilized and reused. Tests also had to be performed on serum as there was no centrifuge to separate whole blood; instead they had to wait for the blood to clot and then remove the serum. The plate reader was ancient and could only handle one eight-well strip at a time, so they needed an assay that could break down into removable strips, which not all ELISAs are able to do. Performing an ELISA like this is very slow and you need to be extremely careful; it is so much easier with instruments such as the Sunrise, which can read an entire plate in just a few seconds. Data handling was also problematic; it was not computerized, relying instead on a small printer that simply recorded the raw absorbance numbers. To analyze actual samples, they had to draw the calibration curve manually on graph paper and then read the samples against it."

"The experience made me appreciate everything my laboratory had, and I really wanted to try to help make life easier for the Mongolian investigators. We had a Sunrise reader that we were not using, so I decided to make sure it was operational and then donate it to the Mongolian laboratory."



Mongolian schoolchildren in class

Initially, I had difficulty getting the Sunrise reader to communicate with the Magellan™ software and so I contacted Tecan.”

Leith Olson, Technical Service Specialist at Tecan, takes up the story: “Gary contacted our Helpdesk in October 2010 because he couldn’t connect to his Sunrise reader with Magellan. While we were attempting to troubleshoot the instrument, he mentioned that he wanted to get it up and running again so that he could donate it to a laboratory in Mongolia that was trying to establish a program to measure vitamin D in the country’s children. I realized that the Sunrise would need to come in for servicing, which we did free of charge in support of this worthy cause. We also wanted to perform a firmware upgrade, and so the system was sent to Tecan Austria for refurbishing.”

Gary continued: “I was amazed to discover that my Sunrise had been sent to Austria, and I really could not believe how much work Tecan had done to rebuild the system. It was completely unrecognizable; almost everything seemed to have been replaced, even the case. When the Mongolian investigators received the Sunrise, they were overwhelmed. The reader is easy to use and, as I gave them all the manuals, they were able to set it up themselves. The computerized data handling has made life so much easier for the scientists; they couldn’t quite believe that it was possible to just read a plate and automatically generate the results, and it’s so much faster than their previous system. The Sunrise is working beautifully and has totally transformed their workflow.”

Janet concluded: “The Sunrise is serving as a real fulcrum in enabling the first national survey of 25-hydroxyvitamin D levels, and this will directly contribute to setting Mongolian national policy on food fortification and the possible eradication of rickets.” Gary added: “I was really impressed that Tecan took so much interest and went as far as they did. They’ve certainly made a fan here.”

To find out more on Tecan’s Sunrise microplate reader, visit www.tecan.com/sunrise

To find out more on Harvard Medical School, visit www.hms.harvard.edu/hms/home.asp

To find out more on Brigham and Women’s Hospital, visit www.brighamandwomens.org/



Mongolian children undergoing a medical check-up during the study



Phlebotomist taking a blood sample from a Mongolian child