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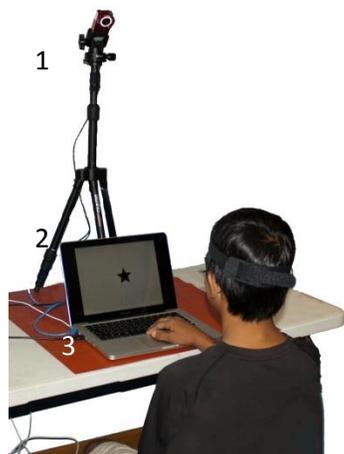
There is a long history of controversy surrounding attention deficit hyperactivity disorder, or ADHD. Decades ago, psychiatrists admitted the difficulty in precisely defining the condition, which was first referred to as minimal brain dysfunction and later attention deficit disorder. Stimulants such as Adderall and Ritalin have been shown to be effective in treating the disease but they also have a [high potential for abuse](#). Unsurprisingly, this has added to the controversy surrounding the condition, which affects children the most severely.

“Still, it is important to have an appropriate intervention at a young age because teenagers and adults that have ADHD that have not gotten help are much more likely to do things like drop out of high school or college and are much more likely to get involved with the juvenile justice system,” says Byron Hewett, the chairman and CEO of BioBDx (Philadelphia). “If these people are identified and are treated appropriately, they can actually do very well.”

To help improve ADHD diagnosis, the company has developed an FDA-cleared platform to improve the objectivity of diagnosing the disease. The version of the BioBDx Quotient ADHD test administered to children lasts 15 minutes. Every two seconds, one of two objects flashes on a screen for about 200 microseconds: either a black and white five-pointed star or an eight-pointed star. “If they see an eight-pointed star, they are supposed to hit the spacebar; if they see a five-pointed star, they are supposed to do nothing,” Hewett explains. While patients take the test, an infrared sensor tracks movements greater than one millimeter 50 times per second. The test, which draws on the research of Harvard psychiatrist Martin Teicher, MD, PhD, was created to measure the levels of hyperactivity, impulsivity, and inattention in children as well as adults.



The portable Quotient ADHD system uses Infrared technology to detect a patient's movements while taking a test.



The modular Quotient ADHD system makes use of an infrared motion-tracking system (1), an LCD screen (3), and a keyboard (4). Not visible in the above image is a small reflector, which is worn on the patient's forehead during testing.

The first iteration of the system was a kiosk that was designed to limit interruptions in the environment. The current Quotient systems are desktop-based. Powering this transition were breakthroughs in infrared technology that have occurred in the past decade or so. “When the technology was being developed, the camera of the motion-tracking system had to be about 20 feet away from the person whose motions we were tracking. It was not a practical technological approach for mass adoption of the test,” Hewett says. “As technology evolved on the infrared motion tracking systems and the cameras became much smaller and their focal length became much shorter, they enabled us to innovate the system in the past several years. It really has been an interesting evolution because you started out with these large expensive cameras and now they are relatively inexpensive and small.”

“The issue has become how can we move from a large footprint system to something that can be desktop and used in at a practice or the clinic. That was really the driver. The kiosk is very sturdy—rugged, in fact. It wound up being an outstanding product in terms of its performance. It allowed us to capture a lot of data and have a lot of control over the testing environment. As we ran tests and determined that the technology was pretty robust, we realized we could get away from the expensive kiosk system and move to something that was more desktop. The new system has two infrared tracking systems, which means we can do true 3-D. Today, we don't use 3-D metrics in our FDA-cleared product but it is a development area for us which we believe will bear fruit not only in further improving the accuracy as it relates to ADHD but we also think it may have value in treating other disorders.

Brian Buntz is the editor-in-chief of MPMN.