The Lab Rat: A Better Way to Diagnose ADHD

By **JOHN CLOUD** Friday, February 25, 2011 | **4 COMMENTS**

Does your child have ADHD, or is he merely rambunctious? Few questions divide parents, teachers, and mental-health professionals as often as this one. Some 5.4 million children ages 4 to 17 had ever been diagnosed with ADHD as of 2007, according to the most recent data available from the Centers for Disease Control and Prevention. The previous year, the total was 4.6 million, meaning 17.4% of all recorded ADHD cases were diagnosed in a single calendar year. There is little hard evidence to suggest that the pace of growth since 2007 has slowed.

The surge in ADHD diagnoses has worried mental-health clinicians because diagnosis of the disorder can be highly subjective. And yet between 1992 and 2000, production of the stimulant methylphenidate — which is marketed as Ritalin — increased 730% according to the *British Medical Journal*. But there is a better way to diagnose ADHD — an objective, widely available test developed at McLean Hospital, the psychiatric arm of Harvard Medical School. The test is so good that it could settle the ADHD-diagnosis debate. (**More on TIME.com:** Clues to the Genetic Roots of ADHD)

Diagnosing any mental illness is difficult. Except in rare cases, specific gene mutations causing mental disorders haven't been discovered (and may not exist). And while physical injuries and illnesses sometimes trigger mental problems, most of the time psychiatrists play guesswork. They use questionnaires and rating scales to try to determine whether symptoms add up to illness.

Most of these questionnaires have been vetted through psychometric analysis to ensure test-retest reliability, meaning your score on one day is about the same as your score two months later. But any questionnaire is only as reliable as the clinician administering it. In one typical diagnostic interview, the Kiddie Schedule for Affective Disorders and Schizophrenia, Present and Lifetime (K-SADS-PL), the clinician is asked to pose the following set of questions to a child:

Do your teachers complain that you don't follow instructions?
When your parents or your teacher tell you to do something, is it sometimes hard to remember what they said to do? Does it get you into trouble?
Do you lose points on your assignments for not following directions or not completing the work?
Do your forget to do your homework or forget to turn it in?
Do you get into trouble at home for not finishing your chores or other things your parents ask you to do? How often?

Believe it or not, that's just one of 29 sets of questions on the K-SADS-PL that can be used to diagnose ADHD. Although not every set of questions is asked of every child, the diagnostic interview can take up to three hours, according to Dr. Martin Teicher, director of the developmental biopsychiatry research program at McLean and a leading ADHD researcher. Never mind that a typical 10-year-old has a difficult time focusing on anything for more than 10 min. except, say, *Toy Story 3*. (**More on TIME.com:** Is ADHD a Global Epidemic or Just a Bunch of Fidgety Kids?)

And even if the child can manage to remember with accuracy all the answers, the clinician might be biased before the interview begins by parent or teacher reports that the child is hyperactive, inattentive or impulsive (the three main signs of ADHD). Past studies have shown that parents sometimes over-predict diagnosis of ADHD in their kids because the parents misremember their own childhoods as times of attentive and tranquil learning. Teachers also sometimes over-predict ADHD diagnosis because they expect ADHD treatment to result in quieter classrooms. And children often under-predict ADHD diagnosis because the kids have no reference point beyond their own behavior, which — even if wildly hyperactive — they see as normal. In any given case, the parents, the teacher, and the child rarely agree on whether the kid has ADHD.

Because of these diagnostic shortcomings, Teicher began experimenting 20 years ago with a test that could more objectively diagnose ADHD. At the time, many researchers were already using continuous-performance tests (CPTs) to help diagnose the disorder. CPTs require test subjects to focus on a boring task — say, pressing the space bar when a random shape appears on-screen but not when another random shape appears — for approximately 15 to 20 min.

CPTs accurately capture whether a student is inattentive (meaning he doesn't focus on the task) or impulsive (meaning he presses the space bar too often). But they don't measure how much kids fidget when they take the test, and restlessness (a.k.a. hyperactivity) is a key component of an accurate ADHD diagnosis. An older tool called the actigraph was widely used in the 1990s to measure body movements during tests. Actigraphs use sensors attached to body parts (usually wrists and ankles) to quantify movements.

But at a Society for Neuroscience meeting in the mid-'90s, Teicher learned of a far more sophisticated technology for gauging body movements. The new technology used infrared signals to record movements 50 times per sec. to a resolution of 0.002 in. (0.04 mm). By 1996, Teicher and his colleagues had not only developed a device that combined a CPT with the infrared analysis but published the results of a study showing that it could predict with near-perfect accuracy which students

would be diagnosed with ADHD and which ones would not.

Today his device is being marketed as the Quotient ADHD System. Pediatric practices and even school districts would be wise to invest in one of the devices if they want to quell bitter debates among parents, teachers, and counselors over whether a child really has ADHD and needs to take potentially dangerous stimulants or simply has another condition known as "being 10 years old."

Not long ago, I visited Teicher at the bosky McLean campus and underwent the Quotient test, which is also used for adults who think they may have attention-deficit problems. A habitual fidgeter, I get bored easily and tend to spend beyond my salary. All these are traits associated with attention-deficit disorders.

The Quotient device is a bit smaller than one of those arcade games in which you get to shoot Nazis or zombies. But instead of a fake gun, there's just a keyboard. You are asked to press the space bar whenever you see one random star-like symbol but not when you see another random symbol. The test, which takes 20 min. for adults and 15 min. for kids, is excruciatingly dull. By minute 15 or so, my brain was screaming that the test end. (**More on TIME.com:** Study Shows ADHD Checklist is Too Easy to Fake)

For all that, I didn't do so badly. I scored 90% in accuracy, although I showed significant impulsiveness before pressing the spacebar when I wasn't sure of the answer. My test results coincide with my scores on a diagnostic interview Teicher conducted with me. The interview picked up my propensity to act before thinking when I'm bored. In the end, I didn't meet the threshold for an ADHD diagnosis. But the Quotient system confirmed that I fidget a lot. The infrared sensors showed that for many periods during the 20-min. test, I moved incessantly — far more than most of my fellow 40-year-olds. Still, I didn't quite meet the threshold for an ADHD diagnosis.

I was impressed by the Quotient system because it generates such a large body of statistics and because it's nearly impossible to cheat.

At some point in the future, we will have an ADHD diagnostic test that accurately measures catecholamine transmission and dopamine D2-receptor density, two neurotransmitter gauges that predict an ADHD diagnosis. Until then, the Quotient system is the best diagnostic tool in the psychiatric armamentarium. Parents and teachers should stop squabbling over which kids are ADHD and which are merely unruly. Before any meds are administered, kids should be seated in front of a Quotient device that can settle almost any quarrels with solid data.