

Q&A

Questions for Gahan Pandina: New tool may aid autism trials

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There are no drugs available to treat the core features of autism. And it's not for lack of trying: Pharmaceutical companies have tested a number of candidates **in clinical trials**, but none of the trials have shown a drug to be better than placebo.

One big roadblock for these trials is the lack of methods that can capture subtle changes in the problems with social communication and **repetitive behaviors** seen in people with autism. Another hurdle is that clinical trials typically include a broad range of participants with autism, but the condition can manifest differently in each individual.

To overcome these barriers, Janssen Research & Development, a New Jersey-based company, is

developing a 'knowledge engine' to gather data. The tool, called the Janssen Autism Knowledge Engine (JAKE), allows parents, caregivers and scientists to assess and record subtle autism behaviors in a single system.

The goal is to use these data to identify autism features that scientists can monitor in a clinical trial to track a drug's effectiveness. The data may also reveal subgroups of people with similar autism features who might respond to a drug.

We spoke with **Gahan Pandina**, senior director at Janssen Research & Development, about JAKE's potential to change how clinical trials are assessed.

***Spectrum:* Why did you develop JAKE?**

Gahan Pandina: There are currently no approved medications to treat the core features of autism. Why not? It's complex.

First of all, there's no one autism doctor, and care is uncoordinated, making data about the individual's autism scattered and incomplete. Second, the research tools used to measure autism features and diagnose autism are mainly subjective. They're often based on parent or caregiver reports or clinician observations, and they haven't been adapted to measure change in a clinical trial. And lastly, autism is heterogeneous, making it difficult to know which part of the population you might want to target in a trial, particularly when you are testing a medicine for the first time.

So, we need a way to organize and access data easily across the entire care team. All of the members of a person's care team are not interacting regularly, and we often rely on parents to help organize the information. We also need new, sensitive and objective endpoints to measure the features of autism, and to be able to more objectively detect changes. And we need smarter data to help us select subpopulations for clinical trials.

S: How exactly does your system work?

GP: JAKE is a three-part system to optimize clinical trials for autism. The first component is a web and mobile portal we call 'My JAKE.' It allows caregivers, as well as others in the care team — such as psychologists, medical doctors and behavioral therapists — to contribute information by completing various rating scales, questionnaires and other types of observations.

It tracks things such as medical and developmental history, as well as all different aspects of autism features. These include core features such as social communication strengths and weaknesses, restricted interests and stereotypical behavior such as hand-flapping or rocking. It also captures autism-associated difficulties such as anxiety, depression and sleep issues.

Parents and clinicians can use the app or web portal to report on those features over time. My

JAKE sends notifications to parents about when they should complete different components of the system.

The second component, which we call 'JAKE Sense,' allows researchers to gather objective biological data as a person with autism performs computer-based tasks during a clinic visit. It can import data from biosensors that the person wears. The sensors pick up things such as heart rate to measure autism features such as anxiety while a person views images that may elicit an emotional response.

We also use other tools, such as **eye tracking** and electroencephalography, to reveal where individuals are looking and to measure their brain's electrical activity patterns while they're looking at those things. Are they looking at the face to read emotions? Are they looking at gestures to see a person's points of emphasis? How often are they looking at something in the background that might be off-task, or unrelated to what a person is saying?

This approach may provide a more objective measure of social communication skills than asking a parent or a caregiver, or even the individual with autism, about a person's ability to do certain things, such as make eye contact or read emotions.

The third component, 'JAKE Stream,' combines the first two components. We bring the observational information from My JAKE and the biosensor data from JAKE Sense into this research data warehouse so we can begin to understand how they relate to each other.

We can compare the performance of people with autism on these measures with that of people who don't have autism. We can also look at how features and these potentially more objective measures change over time. And we can compare the objective measures with traditional rating scales.

S: How do you envision using the data from JAKE?

GP: We might use the sensor data to, say, understand how a social problem in autism manifests itself and responds to a treatment. A participant's sensor-based measures may change during a trial before a parent or clinician can perceive a change. These measures might allow us to see that change earlier, particularly during the early phase of research.

As we understand how these sensor readouts and parent or caregiver reports combine, we might pool three or four of them into a sensitive way to measure autism features.

We may also use these measures to select our clinical trial populations. Let's say someone has an impairment of a certain magnitude on a particular eye-tracking measure. We might focus a clinical trial on individuals who show a deficit on that measure. Refining our study population in this way might help us understand who might respond best to the treatment.

S: What is the project's status?

GP: We've just completed a study to help us understand how well the components of this system work, and which of the sensors or tasks correlate with autism features. We are also comparing JAKE with a number of standard scales, which we also want to relate to the biosensor data.

We're seeing differences in sensor readings and task performance that we think may be useful indicators of core autism features.

As you can imagine, JAKE generates a lot of information and a number of variables. And one of the challenges of this research is to understand which variables are the most useful for understanding autism, and measuring change.

S: What are your next steps?

GP: We hope to use the system in clinical studies with new medications as they are developed. We also would like to collaborate with others collecting similar types of data to replicate our results, and see whether the sensor data we collect can serve as **biomarkers** for autism. We think JAKE may offer a more sensitive measure of change than we have now.