MedicalXpress

Study finds new ADHD genes, links susceptibility with autism and other neuropsychiatric conditions

August 10 2011

New research led by The Hospital for Sick Children (SickKids) and the University of Toronto has identified more genes in attention deficit hyperactivity disorder (ADHD) and shows that there is an overlap between some of these genes and those found in other neuropsychiatric conditions such as autism spectrum disorder (ASD). The study is published in the August 10 advance online edition of Science Translational Medicine.

The research team was led by Dr. Russell Schachar, Senior Scientist and Psychiatrist at SickKids and Professor of Psychiatry at the University of Toronto, and Dr. Stephen Scherer, Senior Scientist at SickKids, Director of The Centre for Applied Genomics at SickKids and the McLaughlin Centre at the University of Toronto.

The scientists used microarrays (gene-chip technology) to study the DNA of 248 unrelated patients with ADHD. They specifically searched for copy number variants (CNVs), which are insertions or deletions affecting the genes. In three of 173 children for whom the DNA of both parents was available, they found spontaneous CNVs, which occur when the parents are not affected and mutations are new to the child. Rare CNVs that were inherited from affected parents were found in 19 of 248 patients.

Within the group of inherited CNVs, the researchers found some of the

genes that had previously been identified in other neuropsychiatric conditions including ASD. To explore this overlap, they tested a different group for CNVs. They found that nine of the 349 children in the study, all of whom had previously been diagnosed with ASD, carried CNVs that are related to ADHD and other disorders.

The findings suggest that some CNVs, which play a causal role in ADHD, demonstrate common susceptibility genes in ADHD, ASD and other neuropsychiatric disorders.

"For the first time, we've tested these genetic alterations in ADHD and have a pretty good handle on a couple of decent ADHD candidate genes ," says Scherer, who is also Professor in the Department of Molecular Genetics at the University of Toronto and GlaxoSmithKline Chair in Genome Sciences at SickKids. "This is critical, as it gives us confidence in interpreting our results."

Like ASD, ADHD cases are largely unique, notes Schachar, who is also the TD Chair in Child and Adolescent Psychiatry at SickKids. People carrying the same CNVs can have different symptoms, he says. "It's not always the same risk. As we've seen in autism and other conditions, relatively few of these CNVs repeat in affected individuals."

Most individuals with ADHD also have at least one other condition, such as anxiety, mood, conduct or language disorders. Up to 75 per cent of people with ASD also have attention deficits or hyperactivity. "A lot of these associated problems probably arise from the fact that they are sharing genetic risk for different conditions," says Schachar.

The research results could be reassuring for clinicians who may see characteristics of different neuropsychiatric conditions in their patients – such as ASD-like social problems in a child with ADHD – but are concerned that they are over-interpreting these traits. "This research

reinforces the notion that their gut observation is correct," Schachar says.

According to Scherer, the historical mindset in research has been to define the specific clinical syndrome and explore it. "Researchers don't tend to look across disorders very often. This method is perhaps one of the most exciting findings in neuropsychiatric genetics and it is really starting to redefine how we think about neuropsychiatric conditions," he says.

"These are probably genetic factors that increase the risk for various kinds of neuropsychiatric disorders and it poses a huge challenge to us to figure out what makes an ADHD case, what makes an ASD case. There are lots of different possibilities to explain why some common risks can manifest into different kinds of disorders," Schachar says, adding that while the new study observed this phenomenon, more research is needed to determine the cause.

Provided by University of Toronto