

NEWS

Risk genes for autism overlap with those for attention deficit

BY NICHOLETTE ZELIADT

20 OCTOBER 2017



People with attention deficit hyperactivity disorder (ADHD) carry rare, harmful mutations in many of the same genes as people with autism, an analysis of thousands of sequences suggests.

The findings suggest that mutations in these genes increase the risk of both autism and ADHD, says **Kyle Satterstrom**, a computational biologist in **Mark Daly**'s lab at the Broad Institute in Cambridge, Massachusetts. Satterstrom presented the unpublished results today at the **2017 American Society of Human Genetics Annual Meeting** in Orlando, Florida.

Scientists have long suspected that **autism and ADHD share genetic roots**. Up to 80 percent of people with autism also meet the criteria for ADHD. Both conditions are highly heritable and often **co-occur in families**. And some large deletions or duplications of DNA seen in people with autism overlap with those found in people with ADHD.

The new study suggests that the two conditions share a different type of rare mutation, called truncating mutations: single-letter changes in the DNA that result in an incomplete version of a protein.

The researchers found this overlap by sequencing the **exome**, or protein-coding regions of the genome, in dried blood samples. The samples came from heel pricks performed during routine newborn screening in Denmark starting in 1982. The study includes 4,084 people diagnosed with autism, 3,563 diagnosed with ADHD, 727 people diagnosed with both conditions and 5,214 controls.

Satterstrom and his colleagues focused on truncating mutations in genes that rarely carry mutations in the general population — a sign that the mutations may be harmful. They found that this type of mutation crops up more frequently in people with autism, ADHD or both conditions than it does in controls.

Larger lists:

People with autism or ADHD often have other diagnoses, such as intellectual disability or schizophrenia. So the researchers excluded participants with these co-occurring conditions. Even so, they still saw about 1.4 times more harmful, truncating mutations in people with either diagnosis or both than in controls.

The mutations occur just as frequently in people with autism as they do in people with ADHD, the researchers found. And a statistical test suggests that the mutations in people with autism or ADHD affect the same set of genes.

The findings are particularly interesting because autism and ADHD share few common variants, Satterstrom says. Common variants are those seen in more than 1 percent of the population. "Maybe a rare variant predisposes you to psychiatric disorder, and your common variants shape which one in particular you actually get," he says.

Satterstrom and his colleagues are creating a list of genes mutated in the combined group of all

people with autism, ADHD or both. Their goal is to identify risk genes associated with both conditions.

So far, the top gene, called MAP1A, is mutated in 12 people with either or both conditions and none of the controls. This gene is highly expressed in the brain and helps organize the cellular skeleton of neurons. A 2011 study reported **missense mutations**, which alter the amino acid sequence of a protein, in MAP1A in people with autism or schizophrenia.

Larger studies might reveal additional risk genes for psychiatric conditions, Satterstrom says. He and his colleagues have more than 14,000 additional blood spots ready to be sequenced and analyzed.

*For more reports from the 2017 American Society of Human Genetics Annual Meeting, please **[click here](#)**.*