New genes found with a link to autism

New genes have been found by whole-exome sequencing that are linked to the development of autism

Three papers recently published in *Nature* reveal mutations in at least three proteins that can be linked to autism spectrum disorders (ASDs) through work by the Autism Sequencing Consortium. The papers suggest that *de novo* mutations are a common risk factor for the development of ASDs.

Three proteins, SCN2A, CHD8 and KATNAL2 stood out as having mutations that are highly linked to a risk of developing autism. However, mutations were also discovered in more than 200 other proteins that may be involved in some way towards the development of ASDs.

Researchers from multiple institutions took part in the study, including Yale University School of Medicine (CT, USA), Harvard Medical School (MA, USA), Mount Sinai School of Medicine (NY, USA) and University of Washington School of Medicine (WA, USA).

The three studies all used whole-exome sequencing, analysis of only the protein coding exons of the genome, to determine mutations in genes that were found in individuals with ASDs. The combined studies looked at the genomes from 580 families with a child with an ASD, but with no family history of autism. This enabled
**Study suggests three genes are associated with post-traumatic stress disorder**

A study recently published in the *Journal of Affective Disorders* has suggested that two genes, *TPH1* and *TPH2* and a common polymorphism, *SHTTLPR*, associate with symptoms of post-traumatic stress disorder (PTSD) and depression in individuals who have experienced traumatic events.

Researchers from University of California, Los Angeles (CA, USA) studied multiple generations of 12 families who were affected by the 1988 Spitak earthquake in Armenia. Two hundred individuals, from up to five generations of a family, were assessed for symptoms of PTSD and depression as well as the severity of their exposure to the trauma. An association was found between the ‘t’ alleles of both the *TPH1* and *TPH2* genes and PTSD symptoms. These genes play an important part in the conversion of tryptophan to serotonin, a neurotransmitter whose activity is linked to mood and sleep regulation.

Armen Goenjian, lead author of the study says, “We suspect that the gene variants produce less serotonin, predisposing these family members to PTSD after exposure to violence or disaster.”

The third association implicates a polymorphic region of the *SLC6A4* gene, *SHTTLPR*, as important in altering the risk of developing depressive symptoms. The gene encodes the serotonin transporter, also important in the regulation of serotonin activity.

Goenjian also envisages other potential uses for these findings. As he explains, “A diagnostic tool based upon *TPH1* and *TPH2* could enable military leaders to identify soldiers who are at higher risk of developing PTSD, and reassign their combat duties accordingly.”

In the future, the researchers are looking to see if these findings are true for different racial groups. According to Goenjian; “Our next step will be to try and replicate the findings in a larger, more heterogeneous population.”

Alternative classification system for autism may allow a more rapid diagnosis

Autism diagnosis is usually a slow process, and must be performed by a clinical practitioner. Researchers at Harvard Medical School (MA, USA) have developed an alternative system for diagnosing autism spectrum disorders (ASDs), using machine-learning algorithms in an artificial intelligence setting.

Currently, the main tools for the diagnosis of ASDs are the Autism Diagnostic Observation Schedule-Genetic (ADOS) and the Autism Diagnostic Interview, which is a survey involving 93 questions; both can take hours to reach a diagnosis.

The alternative system, developed by Dennis Wall and colleagues, involves more streamlined versions of these systems to allow a diagnosis in a much shorter time frame.

The researchers analyzed the ADOS to find the most important items in module one, the module of the ADOS used for the diagnosis of young children. They used this to produce a new classifier that uses artificial intelligence techniques to allow machines to make decisions.

They then tested the classifier against more than 400 individuals from the Boston Autism Consortium and the Autism Genetic Resource Exchange. The results show that the new classifier performs at almost 100% accuracy. In addition to producing a diagnosis, the classifier also provides a measure of confidence in the diagnosis.

As well as being faster, the new classification system, which can use a short video of the individual being diagnosed, may be an easier option for an initial diagnosis in more remote areas, reducing the need to travel to a suitable diagnostic center.

As autism therapies produce better results when started early, it is important to be able to diagnose individuals with ASDs as young as possible.

Wall hopes that the increased speed and accessibility of this approach “will make it possible for more children to be accurately diagnosed during the early critical period when behavioral therapies are most effective.”

Wall explains the significance of the findings; “This approach is the first attempt to retrospectively analyze large data repositories to derive a highly accurate, but significantly abbreviated, classification tool.”

The aim for the future is that “the parent or caregiver will be able to take the crucial first steps to diagnosis and treatment from the comfort of their own home and in just a few minutes.”

One step closer to discovering the mechanisms that lead to psychosis

Childhood trauma, such as sexual abuse or bullying, significantly increases the chance of developing psychosis as an adult, according to a new study

New research, published in *Schizophrenia Bulletin* and involving researchers from the University of Liverpool (UK) and Maastricht University (The Netherlands), provides more evidence that psychotic conditions, such as schizophrenia and bipolar disorder, are heavily impacted by environmental factors, particularly trauma during childhood.

The study analyzed results from 27,000 previous papers to draw conclusions about the effects of trauma at a young age on symptoms of psychosis in adulthood.

The results provide evidence for current theories of the origins of psychotic symptoms, including hallucinations and paranoia, suggesting that, contrary to previous hypotheses, environmental influences are very important in the development of these conditions, and must be considered in addition to genetic predispositions.

Childhood trauma, including sexual abuse, bullying, physical trauma, losing a parent and institutional care, increases the risk of developing psychoses in later life by an average of three-times, increasing to 50-times in severe cases.

Richard Bentall, first author of the study from the University of Liverpool, said that the results “suggest that studies on the neurological and genetic factors associated with these conditions, which are not yet fully understood, are more likely to advance our knowledge if we take into account a patient’s life experiences.”

He stresses that “We need to know, for example, how childhood trauma affects the developing brain, as well as whether there are genetic factors that increase vulnerability or resilience to traumatic events.”

This has important implications for clinicians during diagnosis and treatment of psychotic disorders; as well as recording genetic or familial risk factors, clinicians should put emphasis on learning more about the historical background of their patients.

Bentall explains that “Now that we know environment is a major factor in psychosis and that there are direct links between specific experiences and symptoms of the condition, it is even more vital that psychiatric services routinely question patients about their life experience.” He continues; “Surprisingly, some psychiatric teams do not address these issues and only focus on treating a patient with medication.”

Another important finding from the study is that particular types of trauma more often lead to certain psychoses, providing insights into the mechanisms behind the development of psychosis. For example, abuse was more likely to lead to hallucinations, but disrupting relationships during childhood lead to symptoms of paranoia.

Future research will focus on a better understanding of the mechanisms that lead to the development of psychosis, as well as looking into why there is such a large time difference between trauma and the resulting psychotic symptoms.


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