OPINION

One gene, many diseases

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Could the same genetic factors that cause autism also be responsible for bipolar disease, schizophrenia and other mental illnesses?

I was at an **autism conference in Santa Fe** this week and among the many fascinating things I learned, this was one that really piqued my interest.

In the last year, the idea that copy number variations (CNVs) are associated with autism has really taken hold among researchers. These CNVs are deletions or duplications of a chunk of DNA, and they may cause diseases by affecting the dosage ? too much or too little ? of a particular gene product.

Jonathan Sebat, who last year published one of the **first CNV/autism papers**, says the rate at which CNVs appear is about 100-fold higher than for single nucleotide polymorphisms (in which a single base of the genetic sequence is altered).

There are particular spots in the genome "hotspots," if you will, that are prone to these deletions and duplications. Sebat says what this means is that, in essence, humans are a lot more genetically different than we previously thought and a large proportion of that difference is because of CNVs.

In January, one group of scientists published evidence that CNVs are found more often in people with autism (1%) than in controls (0.01%) and identified one potential **hotspot on chromosome 16**. At the meeting in Santa Fe, Sebat said that deletions in that same zone, and in a few others also implicated in autism, are also seen in people with schizophrenia.

What's more, he says, in some families with inherited duplications of the chromosome 16 hotspot, there is a history of different psychiatric illnesses, suggesting that some CNV risk factors may be shared between these different illnesses.

There are similar overlaps in genes that have been implicated in autism, schizophrenia and bipolar disorder. Mining samples from people with schizophrenia and bipolar disorder for CNVs would help answer whether what Sebat and his colleagues have observed is a real phenomenon.

Not everyone was sold on this hypothesis, however.

Huda Zoghbi, famous for solving the genetic puzzle underlying the **autism-like Rett Syndrome**, noted that the 16p CNVs are sometimes seen in controls, and that even in families with a history of autism, not all affected individuals have the deletion.

Zoghbi's point is that even if these CNVs are not benign and may increase the risk of autism which would be consistent with the fact they are seen at higher rates in those with autism a lot more evidence would be needed to prove that they cause autism.