Down's chromosome cause genome-wide disruption

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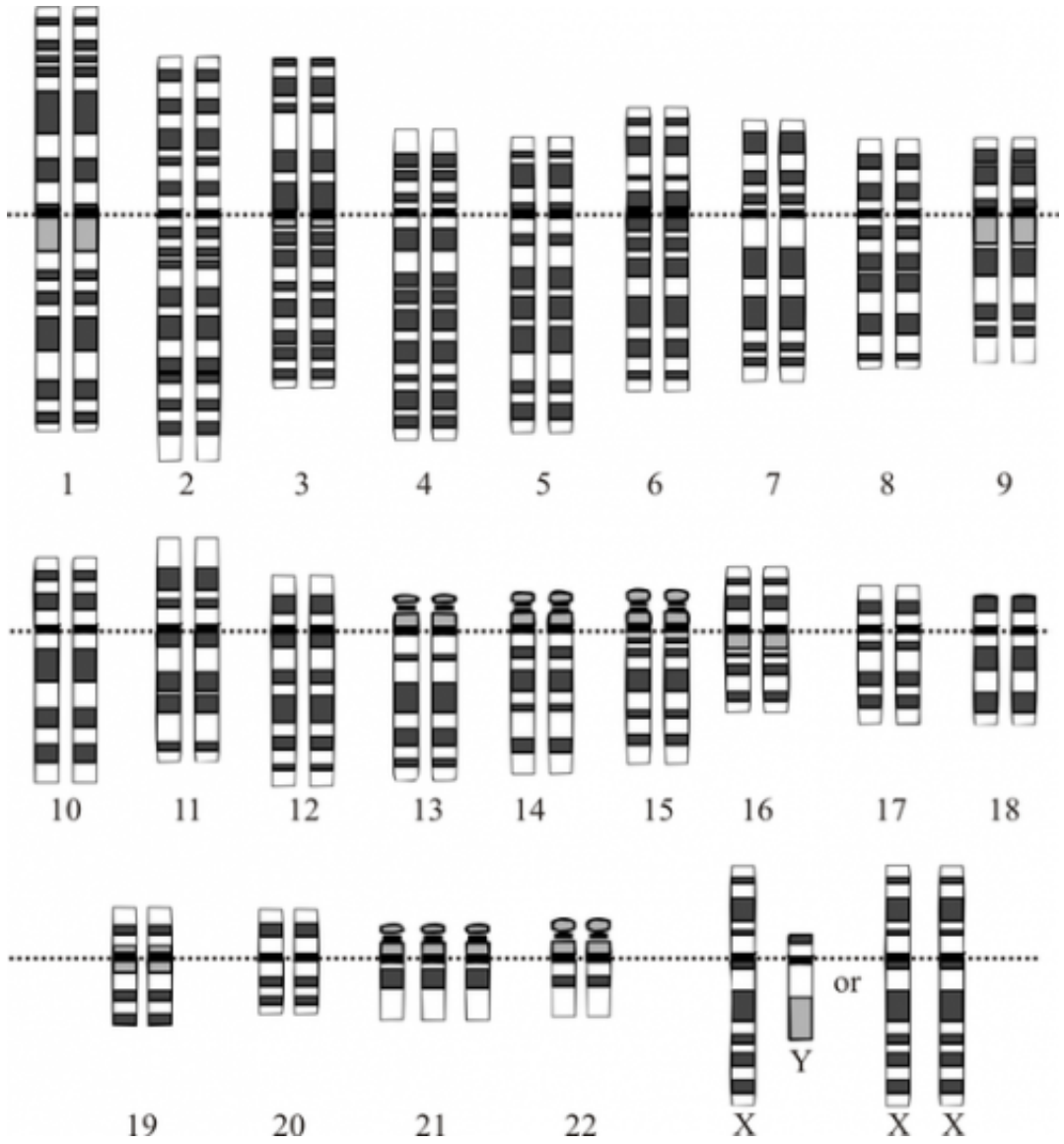

Karyotype for trisomy Down syndrome. Notice the three copies of chromosome 21. Credit: National Human Genome Research Institute

The extra copy of Chromosome 21 that causes Down's syndrome throws a spanner into the workings of all the other chromosomes as well, said a study published Wednesday that surprised its authors.

Using data from a set of twins, one with Down's and one without, researchers found a major difference in how genes functioned between the two.

The twins were born from a single egg that split, which means their DNA code started off identical.

But the individual with Down's had an extra copy of Chromosome 21—a difference enabling the scientists to see how this might affect the same genome.

The additional chromosome had a knock-on effect on all the 22 other chromosomes, the team reported in the journal *Nature*.

"We were very surprised by this finding," said Audrey Letourneau of the University of Geneva Medical School who co-authored the study.

"It seems that this small, extra chromosome has a major influence on the entirety of the genome."

Chromosomes are made up of bundles of DNA called genes, which hold the information for cell function.

Humans have 23 pairs of chromosomes— or a total of 46 per cell.

People with Down's Syndrome, about one in every 750, have a third, extra Chromosome 21—the smallest of all the chromosomes with about

one percent of the DNA in a cell.

Down's is the world's leading genetically-caused mental disease, and also carries a heightened risk of heart defects, leukaemia, immune-system malfunction and premature Alzheimer's disease.

The results may help researchers "find substances that could reverse this gene-expression dysregulation, i.e. drugs that revert the expression of genes... back to normal," co-author Stylianos Antonarakis told AFP.

More information: A. Letourneau et al., "Domains of genome-wide gene expression dysregulation in Down's syndrome," *Nature*, 508:345-50, 2014. dx.doi.org/10.1038/nature13200