

Study discovers abnormal expression of genes in psychopathy, possible treatments proposed

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The abnormal expression of many genes that have previously been associated with autism are also present in cases of violent psychopathy, a new study shows. The researchers used stem cell technology to analyze the expression of genes and proteins in the brain cells of psychopathic violent offenders. Published in *Molecular Psychiatry*, the findings may

open up new avenues for the treatment of psychopathy. The study was carried out in collaboration between the University of Eastern Finland, the University of Helsinki and Karolinska Institutet in Sweden.

Psychopathy is an extreme form of antisocial behavior, with about 1 percent prevalence in the [general population](#), and 10–30 percent prevalence among incarcerated criminal offenders. Psychopathy is known to be strongly hereditary, but whether or not it was associated with abnormal expression of genes or proteins in neurons remained until now unclear.

In the newly published study, the researchers used stem cell technology to analyze the expression of genes and proteins that have been associated with psychopathy. The study participants' skin cells were used to create [pluripotent stem cells](#), which were then differentiated into [cortical neurons](#) and astrocytes. The study population comprised psychopathic violent offenders and healthy controls. Since psychopathy is accompanied by [substance abuse](#), the study population also included non-psychopathic substance abusers. This made it possible for the researchers to determine which abnormalities were associated exclusively with psychopathy.

The study shows that psychopathy is associated with robust alterations in the expression of genes and immune response-related molecular pathways. Several of these genes have also been linked to autism. In neurons, psychopathy was associated with marked upregulation of RPL10P9 and ZNF132 and downregulation of CDH5 and OPRD1. In astrocytes, RPL10P9 and MT-RNR2 were upregulated. The expression of these genes explained 30–92 percent of the variance of psychopathic symptoms. Psychopathy was also associated with altered expression of proteins related to [glucose metabolism](#) and the opioid system.

Several earlier studies have suggested that violent and psychotic behavior

are associated with alterations in glucose metabolism and opioidergic neurotransmission. The new findings support the idea of abnormal opioid system function being a factor underlying psychopathy. This suggests that using long-lasting injections of naltrexone or buprenorphine to balance the opioid system could be a feasible treatment for [psychopathy](#).

More information: Jari Tiihonen et al. Neurobiological roots of psychopathy, *Molecular Psychiatry* (2019). [DOI: 10.1038/s41380-019-0488-z](#)

Provided by University of Eastern Finland

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