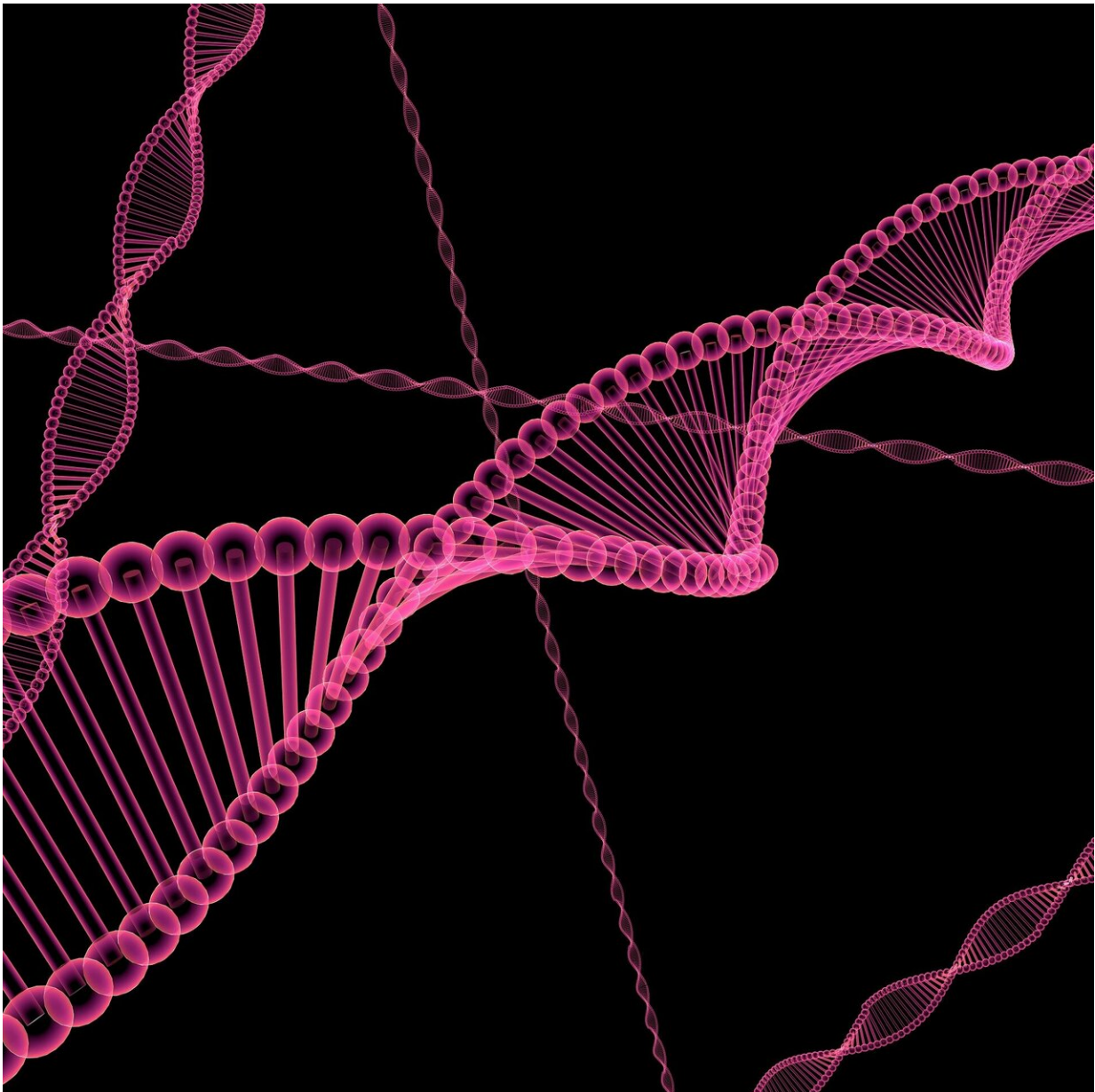


Scientists identify hormone potentially linked to hypersexual disorder

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A new study of men and women with hypersexual disorder has revealed a possible role of the hormone oxytocin, according to results published in the journal *Epigenetics*. The finding could potentially open the door to treating the disorder by engineering a way to suppress its activity.

Hypersexual disorder, or an overactive sex drive, is recognized as a compulsive sexual behaviour disorder, listed as an impulse-control disorder by the World Health Organisation. It can be characterised by obsessive thoughts of sex, a compulsion to perform sexual acts, a loss of control, or sexual habits that carry potential problems or risks. While prevalence estimates vary, literature indicates that hypersexual disorder affects 3-6% of population.

Controversy surrounds diagnosis because it often occurs alongside other [mental health issues](#), suggesting it could be an extension or manifestation of an existing mental disorder. Little is known about the neurobiology behind it.

"We set out to investigate the epigenetic regulatory mechanisms behind hypersexual disorder so we could determine whether it has any hallmarks that make it distinct from other health issues," says lead author Adrian Boström from the Department of Neuroscience at Uppsala University, Sweden who conducted the study with researchers from the Andrology/Sexual Medicine Group (ANOVA) at Karolinska Institutet, Stockholm, Sweden.

"To our knowledge, our study is the first to implicate dysregulated epigenetic mechanisms of both DNA methylation and microRNA activity and the involvement of [oxytocin](#) in the brain among patients

seeking treatment for hypersexuality."

The scientists measured DNA methylation patterns in the blood from 60 patients with hypersexual disorder and compared them to samples from 33 healthy volunteers.

They investigated 8,852 regions of DNA methylation associated to nearby microRNAs to identify any variations between samples. DNA methylation can affect gene expression and the function of genes, typically acting to reduce their activity. Where changes in DNA methylation were detected, the researchers investigated levels of [gene expression](#) of the associated microRNA. MicroRNAs are particularly interesting as they can pass the blood-brain-barrier and modulate or degrade the expression of up to several hundred different genes in brain and other tissues.

They also compared their findings to samples from 107 subjects, 24 of whom were alcohol-dependent, to explore an association with addictive behaviour.

Results identified two regions of DNA that were altered in hypersexual disorder patients. Normal function of DNA methylation was disrupted and an associated microRNA, involved in gene silencing, was found to be under-expressed. Analysis revealed that the microRNA identified, microRNA-4456, targets genes that are normally expressed at particularly high levels in the brain and that are involved in the regulation of the hormone oxytocin. With gene silencing reduced, oxytocin may be expected to be at elevated levels, although the current study does not confirm this.

It has been seen in specific vole and primate species the neuropeptide oxytocin plays a central role in the regulation of pair-bonding behaviour. Previous studies have demonstrated that oxytocin is associated with the

regulation of social and pair-bonding, sexual reproduction and aggressive behaviour in both men and women. The comparison with alcohol-dependent subjects revealed the same DNA region to be significantly under-methylated, suggesting that it may be primarily associated with the addictive components of hypersexual disorder, such as sex addiction, dysregulated sexual desire, compulsivity and impulsivity.

"Further research will be needed to investigate the role of microRNA-4456 and oxytocin in hypersexual disorder, but our results suggest it could be worthwhile to examine the benefits of drug and psychotherapy to reduce the activity of oxytocin," says Professor Jussi Jokinen from Umeå University, Sweden.

The authors note that a limitation of the study is that the mean difference in DNA methylation between hypersexual disorder patients and healthy volunteers was only around 2.6%, so the impact on physiological changes might be called into question. However, a growing body of evidence suggests that just subtle methylation changes can have wide-ranging consequences for complex conditions such as depression or schizophrenia.

More information: Adrian E. Boström et al, Hypermethylation-associated downregulation of microRNA-4456 in hypersexual disorder with putative influence on oxytocin signalling: A DNA methylation analysis of miRNA genes, *Epigenetics* (2019). [DOI: 10.1080/15592294.2019.1656157](https://doi.org/10.1080/15592294.2019.1656157)

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