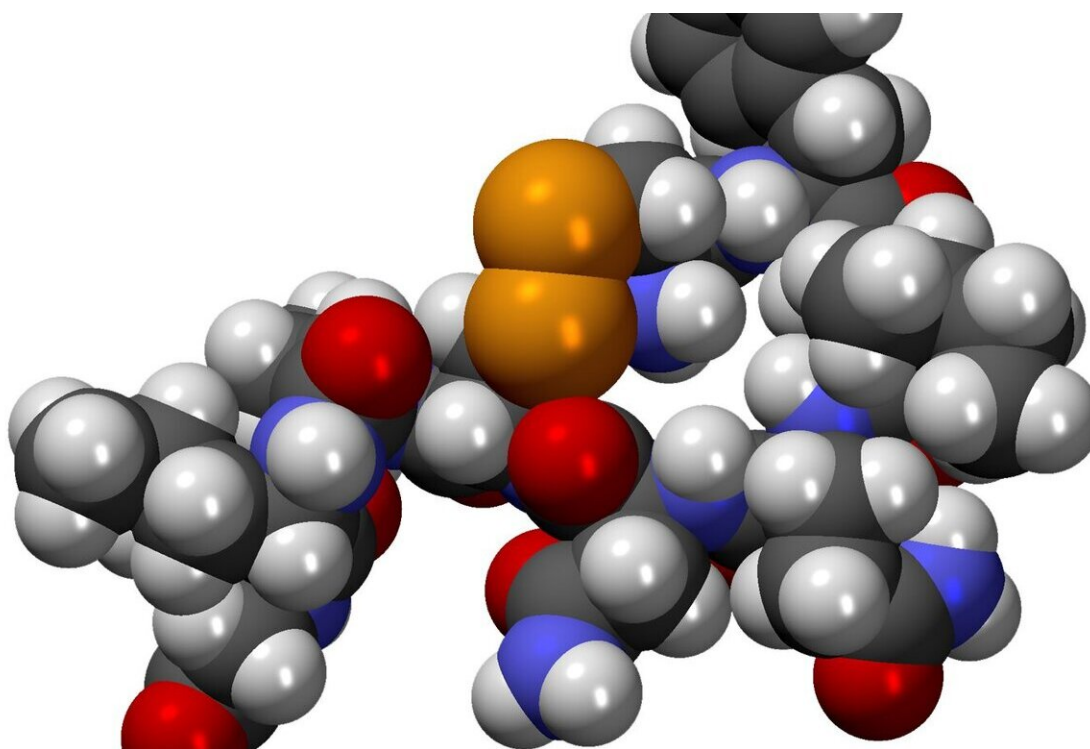


Optimizing use of the 'hug hormone' to help those with social difficulties

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CPK model of the Oxytocin molecule $C_{43}H_{66}N_{12}O_{12}S_2$. Model constructed using ACD/ChemSketch and Accelrys DS Visualizer. Credit: MindZipper/CC0 1.0

Oxytocin is known for its role in childbirth and breastfeeding and it has also been shown to have a wider application in the development and regulation of social behaviour in many species. There has been

increasing interest in its potential use to help people overcome social difficulties as this can be one of the most difficult symptoms to treat in many psychiatric conditions such as schizophrenia, autism, anxiety and depression.

Research into the use of [oxytocin](#) almost always uses nasal spray application but little is known about how well this method delivers the required dose and reaches different areas of the brain.

Published in *Nature Communications*, the study is the first to compare different routes and administrations of synthetic oxytocin in terms of how they affect regional blood flow in the [human brain](#), a surrogate measure of neuronal activation, as measured using fMRI scans.

Researchers compared three different methods in a sample of 17 male participants: injection of oxytocin into the blood; administration of oxytocin with a standard [nasal spray](#); and administration with a nebuliser. The nebuliser, a special nasal delivery device which administered a fine spray of oxytocin in a pulsatile fashion, was investigated as it is thought it can better reach important parts of the nasal cavity.

The results showed that, compared to when no oxytocin is delivered, both the intravenous and the nasal route of administering oxytocin reduced regional blood flow to the amygdala which is a key brain area involved in processing of social information, emotion and social anxiety.

Researchers also showed that the nasal route targeted other specific brain areas and that the patterns of regional blood flow differed depending on whether oxytocin was delivered through a standard spray or the nebuliser.

Senior author, Yannis Paloyelis from the Institute of Psychiatry, Psychology & Neuroscience (IoPPN) King's College London said: 'Our

results show that a one-size-fits-all approach to administering oxytocin is not the best approach and, to a certain extent, it may be possible to target where in the brain it takes effect.

'This has important implications for the potential application of oxytocin to patients as it suggests that, for some disorders, one route or mode of administration may be superior to others. For example, clinical applications aiming to target the frontal gyrus, insula or parts of the basal ganglia may achieve better results using the nasal route. Nevertheless applications that increase the amount of synthetic oxytocin in the [blood](#), such as intravenous administration, could still have an application, as they can achieve localised effects in, for example, the amygdala or the anterior cingulate cortex and allow precise control over the administered dose. This could be very useful for future clinical trials.'

The researchers highlighted that the research might also be relevant for a range of compounds used in the treatment of neuropsychiatric and other disorders, for example nasal administration has been identified as an important route for delivery of insulin and ketamine. More research is needed to provide a more detailed insight into which [brain](#) areas are better targeted by nasal delivery and how this can be better optimised.

More information: Martins, D.A. et al (2020) Effects of route of administration on oxytocin-induced changes in regional cerebral blood flow in humans. *Nature Communications*. [DOI: 10.1038/s41467-020-14845-5](https://doi.org/10.1038/s41467-020-14845-5)

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