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Oxytocin leads to monogamy: Hormone stimulates the brain reward system when viewing the partner

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How is the bond between people in love maintained? Scientists at the Bonn University Medical Center have discovered a biological mechanism that could explain the attraction between loving couples: If oxytocin is administered to men and if they are shown pictures of their partner, the bonding hormone stimulates the reward center in the brain, increasing the attractiveness of the partner, and strengthening monogamy. The results are published in the *Proceedings of the National Academy of Sciences* (*PNAS*).

Monogamy is not very widespread among mammals; human beings represent an exception. Comparatively many couples of the species Homo sapiens have no other partners in a love relationship. For a long time, science has therefore been trying to discover the unknown forces that cause loving couples to be faithful. "An important role in partner bonding is played by the hormone oxytocin, which is secreted in the brain", says Prof. Dr. René Hurlemann, Executive Senior Physician at the Inpatient and Outpatient Department of Psychiatry and Psychotherapy of the Bonn University Medical Center. A team of scientists at the University of Bonn under the direction of Prof. Hurlemann and with participation by researchers at the Ruhr University of Bochum and the University of Chengdu (China) examined the effect of the "bonding hormone" more precisely.

Oxytocin makes the partner more attractive

The researchers showed pictures of their female partners to a total of 40 heterosexual men who were in a permanent relationship – and pictures of other women for comparison. First a dose of oxytocin was administered to the subjects in a nasal spray; and then a placebo at a later date. Furthermore, the scientists also studied the brain activity of the subjects with the help of functional magnetic resonance tomography. "When the men received oxytocin instead of the placebo, their reward system in the brain when viewing the partner was very active, and they perceived them as more attractive than the other women", says lead author Dirk Scheele.

In another series of tests, the researchers tested whether oxytocin enhances the activation of the reward system only when seeing the partner or whether there is a similar effect with pictures of acquaintances and female work colleagues of many years. "The activation of the reward system with the aid of oxytocin had a very selective effect with the pictures of the partners", says psychologist Dirk Scheele. "We did not detect this effect with pictures of longstanding acquaintances". Based on these results, therefore, simple familiarity is not enough to stimulate the bonding effect. They have to be loving couples; of that the scientists are convinced.

Biological mechanism of couple relationships acts like a drug

Overall the data showed that oxytocin activates the reward system, thus maintaining the bond between the lovers and promoting monogamy. "This biological mechanism in a couple relationship is very similar to a drug", says Prof. Hurlemann. Both in love and in taking drugs, people are striving to stimulate the reward system in the brain. "This could also explain why people fall into depression or deep mourning after a separation from their partner: Due to the lack of oxytocin secretion, the

reward system is understimulated, and is more or less in a withdrawal state", says Prof. Hurlemann. However, therapy with the bonding hormone could possibly be counterproductive: Administration of oxytocin could possibly even increase the suffering, because it would only make the longing for the beloved partner even greater.

At first glance, monogamy does not make much sense. In the classical view of evolutionary biology, men have an advantage when they disseminate their genes as greatly as possible through many different partners. But another aspect also plays a big role: "When oxytocin strengthens the partner bond, it increases the stability of the persons providing nutrition and thus the chances of survival for the progeny", explains Prof. Hurlemann. And a person's genes are in turn further disseminated through the children.

More information: Oxytocin enhances brain reward system responses in men viewing the face of their female partner, *PNAS*, DOI: 10.1073/pnas.1314190110

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