

Amphetamines only work when 'well lubricated'

June 26 2013



The misuse of amphetamines is increasing steadily. Ahead of the "International Day against Drug Abuse" (26th June 2013) MedUni Vienna researchers are presenting a study which unlocks a significant mechanism involved in their action. This could result in treatment options for those dependent on amphetamines.

In their study Harald Sitte and Stefan Böhm from the Centre for Physiology and Pharmacology at the MedUni Vienna investigated the effects of amphetamines on the [human brain](#). The results of this basic medical research are very specific: according to these, the effect

amphetamines have only unfolds when the cell membranes "lubricate" the serotonin transporters well with the [membrane lipid](#) PIP2.

The [serotonin transporter](#) is a medically significant membrane protein as it is the target of various medications (e.g. antidepressants), but also of various substances that are abused – such as cocaine and amphetamines. The latter substances were therefore also the focus of this study.

The head of the study, Harald Sitte, comments: "Amphetamines are an important group of substances as their use is often played down, and they are promoted as happy pills and cognitive enhancers. A further danger is that new amphetamine-like substances are continually coming onto the market. So-called "[bath salts](#)" are included as one of these research chemicals for example. We want to understand what risks are connected with these substances and how these substances work in the body."

An important step for the treatment of amphetamine dependence

As well as the discovery that the membrane, in which the serotonin transporters are embedded, exerts a significant influence on the action of amphetamines, the researchers around Sitte were able, in collaboration with the research group around Gerhard Ecker (the University of Vienna), to also identify the site where PIP2 binds to the serotonin transporter.

Sitte goes on to explain the major, practical relevance this discovery has: "The significance of the membrane lipids for the effects of [amphetamines](#) as has been now demonstrated can bring us an important step closer towards the treatment of dependencies on these substances."

"Transmembrane Transporters in Health and Disease" Special Research Department

The study has just been published in the renowned *Proceedings of the National Academy for Sciences* of the United States of America (PNAS). The article is titled "Amphetamine actions at the serotonin transporter rely on the availability of phosphatidylinositol-4,5-bisphosphate."

More information: www.pnas.org/content/early/2013/06/26/1220552110.abstract

Provided by Medical University of Vienna

Citation: Amphetamines only work when 'well lubricated' (2013, June 26) retrieved 4 May 2024 from <https://medicalxpress.com/news/2013-06-amphetamines-lubricated.html>

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