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Most important career path

Boris B. Quednow studied psychology and pharmacy at the University of Bonn. He wrote his dissertation on the neurobiological consequences of ecstasy (MDMA) use at the University of Bochum and worked as a research assistant at the Departments of Psychiatry of the University of Bonn and Zurich. At present, he is an assistant professor at the University Hospital of Psychiatry in Zurich in the framework of a professorship grant of the Swiss National Science Foundation (PP00P11_123516). His main research interests are the neurotoxicology of illegal drug use, the neurochemistry of cognition, and disturbed information processing in psychiatric diseases.

Title of presentation

BRAIN SEROTONIN FUNCTION IN MDMA ("ECSTASY") USERS

Description of the contribution

Chronic administration of the MDMA ("Ecstasy") is associated with long-term depletion of serotonin and loss of serotonin axons in the brains of rodents and nonhuman primates. Moreover, it has been consistently shown that MDMA users display dose-related neurocognitive deficits suggesting that MDMA also affect the human serotonin system. However, because of a multitude of methodological problems and a limited number of studies, no firm conclusions can be established whether chronic MDMA exposure in fact produces a long lasting serotonin deficiency in humans. Therefore, we recently developed a novel method to assess serotonin release capacity in the human brain employing [18F]altanserin positron emission tomography (PET) after dexfenfluramine and placebo challenge. This approach enables measuring altered serotonin-2A receptor occupation after forced serotonin release.

From 2006 to 2008, we investigated serotonin release capacity in 15 current and 12 former male MDMA users, as well as in 15 matched male drug-naïve controls. Subjects received placebo or oral doses of 60 mg of the potent serotonin releaser dexfenfluramine on two days separated by an interval of 14 days. Two hours after dexfenfluramine intake, 250 MBq of the serotonin-2A receptor selective PET-radiotracer [18F]altanserin were administered intravenously as a 30 sec bolus. Dynamic PET data were subsequently acquired over 90 min. Moreover, in arterial blood samples drawn for measurement of total activity, dexfenfluramine levels as well as prolactin plasma concentration-time profiles were quantitatively determined.

Current MDMA users displayed blunted prolactin response, and decreased serotonin-2A receptor densities and diminished serotonin release capacity overall investigated brain regions when compared to drug-naïve controls. Former MDMA users still showed a blunted prolactin response and decreased serotonin-2A receptor densities, but they did not significantly differ in their serotonin release capacity from controls.

These first functional data suggest that MDMA use leads to long-lasting alterations in the serotonin system that might be reversible only in part.