Researchers analyse the effects of cocaine on people with mental disorders

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Alejandro Fuertes-Saiz, fourth-year Psychiatry intern at the Hospital Provincial de Castellón and doctoral candidate at the CEU Cardenal Herrera (CEU UCH) university of Valencia, along with his thesis

directors, Gonzalo Haro and Ana Benito, have just published in journal *Brain Sciences* the final results of three year-long research where they have studied the effects of cocaine on patients diagnosed with schizophrenia or antisocial personality disorder.

These results are the continuation of the ones presented in 2019 by the same authors in the *Journal of Dual Diagnosis*, where they identified an alteration shared between the two groups of patients in the ability to filter the sensory information of their surroundings.

This brain disorder leads them to make false interpretations of reality and predisposes them to consume toxic substances. This time, the results have been published in high-impact Swiss journal *Brain Sciences*. In it, the researchers explain how cocaine, unlike the treatment with antipsychotic medicines, is unable to reverse the sensory filtering o patients with schizophrenia or antisocial personality disorder.

IPP, new experimental technique

The study was conducted on a sample of 74 individuals, divided into four groups. The first was comprised by healthy people, the second by patients with a disorder from consuming cocaine without another associated mental disorder, the third by patients who consumed cocaine and had schizophrenia, and the last, by patients who consumed cocaine and had antisocial personality disorder. They were all studied with a tool, financed by the Research Foundation of the Hospital Provincial de Castellón, specifically designed to measure this ability to filter the sensory stimuli of their surroundings cAlled "prepulse inhibition of the blink reflex." (PPI)

Dr. Gonzalo Haro, psychiatrist in charge of the Severe Dual Pathology Program of the Hospital Provincial and lecturer at the CEU UCH in Castellón, says, "We know that consuming toxic substances such as

cocaine can trigger severe mental disorders. PPI is an experimental technique, whose health results obtained in this study help identify people who are especially vulnerable to developing these disorders, giving us the opportunity to design specific prevention programs for cocaine consumers."

Stimuli and blinking

PPI is an operational measurement of filtering out sensory information. In other words, it measures people's ability to give importance to truly relevant stimuli and discard irrelevant stimuli. This is important because "aberrant salience," or assigning relevance to irrelevant stimuli, is the basis of developing delusional ideas such as paranoia. The technique is performed by placing electrodes on the blinking muscle: these record its contraction when the individual receives a sonic stimulus (pulse) through earphones. When applying a stimulus with lower intensity (prepulse), which does not trigger the blink reflex, and separating it mere milliseconds from the pulse, patients with schizophrenia or the antisocial personality disorder have a common limitation in the inhibition of the blinking reflex, unlike the control group. However, in the group of patients with cocaine consumption disorder without other mental disorders, this sensory filtering is heightened compared to the control group.

One of the classic hypotheses on why people consume drugs is attributed to the search for a substance that helps them alleviate symptoms such as sadness, a lack of energy or motivation, or the feeling of sensory overload. The researchers explain that one of the most interesting results of the study is that it reflects the importance of pharmacotherapy compared to the self-medication attributed to consuming toxic substances, as it shows the inability that a psychoactive substance such as cocaine has to revert this lack of filtering, in contrast with the efficiency proven by antipsychotic medicines.

Alejandro Fuertes-Saiz says, "as the dysfunctional neural circuits of different mental disorders are identified, science progresses towards specific customized and non-invasive techniques of cerebral neuromodulation, such as transcranial magnetic stimulation. These are very safe techniques with barely any secondary effects that can be truly effective."

Research group

The research group that has published the results of this project is comprised by Alejandro Fuertes-Saiz, doctor Isis Gil-Miravet from the TXP research group, doctor Ana Benito, clinical psychologist at the Mental Health department of Torrent and co-director of the doctoral thesis, doctor Isabel Almodóvar, Nursery lecturer at the CEU UCH and doctor Enrique Ochoa, head of the Molecular Biopathology Department of the Hospital Provincial de Castellón, all under the guidance of doctor Gonzalo Haro. María Luisa Graña and Vicente Mañes, from the Addictive Behavior Department of the Hospital Provincial also took part. The research was conducted with funding from the Research Foundation of the Hospital Provincial de Castellón, which for the authors of the study "was vital to suitably perform the project and ensure its viability."

More information: Isis Gil-Miravet et al. Prepulse Inhibition in Cocaine Addiction and Dual Pathologies, *Brain Sciences* (2021). DOI: 10.3390/brainsci11020269 Isis Gil-Miravet et al. Prepulse Inhibition in Cocaine Addiction and Dual Pathologies, *Brain Sciences* (2021). DOI: 10.3390/brainsci11020269

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