

## “When I’m rushing on my run” – novel psychoactive substances

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“When I’m rushing on my run” is part of the lyrics to the song “Heroin” by Velvet Underground, which overtly depict the subjective effects of heroin use. Whereas the incidence of new heroin users has been declining in Switzerland and western countries since 1990 [1], other psychoactive substances such as cocaine and novel psychoactive substances (designer drugs) are rising in popularity with drug users.

In his overview, Liechti [2] accurately describes clinical characteristics and pharmacodynamics of the novel psychoactive substances. Moreover, he summarises the drug screening and the current treatment of drug intoxication.

It is well known that all drugs of abuse have several positive and negative effects on cognition and emotional feelings. Initially, drug use is mainly driven by pleasurable hedonic effects (so-called “rush”), which promote renewed drug intake through positive reinforcement mechanisms. We know that these subjective rewarding effects of acute drug intake are crucially mediated by reinforcement signals in the striatum [3].

However, most of the drugs of abuse are illegal. The classical illicit drugs include the plant-based drugs heroin, cocaine and cannabis, synthetic drugs such as amphetamines, and pharmaceutical drugs such as opioids and nonprescribed benzodiazepines. The induced health risk increases with the frequency and quantity of drug use. One main risk of drug use is the development of addiction.

Drug addiction is generally known as a chronically relapsing disorder characterised by compulsive drug use and loss of control over drug intake. It can be diagnosed by the International Classification of Diseases 10th Revision (ICD-10). The WHO estimates that the three substances – amphetamine, cocaine and opioids – account for nearly 1% of global disease burden analysed as disability-adjusted life years (DALYs) [4].

In the last years, the so-called “designer drugs” or “novel psychoactive substances” have become increasingly popular as a new class of drugs, especially in adolescents and young adults. These drugs are taken particularly at parties and in night clubs. The term “novel psychoactive substances” refers to chemical created recreational drug use to evade drug legislation – usually by modification of the molecular structure of classical drugs – producing similar effects. That is why novel psychoactive substances have been

referred to as “legal highs”. Moreover, the components and constituents seem to be changing over time. Novel psychoactive substances are mainly sold online for recreational public or private use.

The term “novel psychoactive substances”, “designer drugs” and “legal highs” cover a wide range of classes of drugs. They can be classified by their psychotropic effects as stimulants, enactogens (MDMA, ecstasy-like substances), hallucinogens, and synthetic cannabinoids. They are well known to exhibit a broad spectrum of dopaminergic, noradrenergic, or serotonergic pharmacological effects. How do they act exactly? What is their pharmacodynamic profile and how does this relate to the clinical effects?

We do not exactly know the potential of these novel drugs to cause drug addiction, nor their long-term consequences. Until now, only limited examples of tolerance and withdrawal symptoms from long-term consumption have been reported [5, 6]. Therefore, it is important to learn the pharmacological basis of the acute rush effect and the treatment options in case of intoxication.

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