LITERATURE THESIS

Title: Adulterants, cutting-agents and impurities in cocaine as potential candidates for retrospective data mining

Keywords: illicit drugs, adulterants, GC-MS, drug signature, chemical profile, data mining

Forensic Expertise Area: Forensic Chemistry – Illicit Drugs

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SHORT DESCRIPTION

Cocaine is the second most used illicit-drug in both The Netherlands and the EU with an estimated illicit-drug market of 9.1 billion euro in the EU in 2017. The Netherlands is reported as one of the entry points and distribution hubs of cocaine in the EU.1 Cocaine production, trafficking and trade is thus a severe problem, both locally and worldwide. Throughout the illegal production chain, pure cocaine is cut and adulterated with various compounds, mainly to increase volume (and thus economic profit).2,3 Also impurities resulting from the cultivation- and production processes may be present and could say something about the origin of the cocaine.4,5

Information about both the presence of cutting-agents and impurities in the end-product can provide valuable tactical forensic information about batch origin and comparison.6 An overview of trends in cutting-agents over time could also provide valuable information about the uniqueness of certain cutting profiles and provides additional insight in the cocaine processing. When a cutting-agent and impurity profile is unique, it could be used as a marker to compare with other seizures. In this way, retrospective analysis of already present GC-MS data from forensic laboratories can give valuable additional insights about the drug materials based on information that is now often neglected. This approach was already successfully demonstrated for synthetic drugs.7,8

Goal of this literature thesis is to create an overview of the most important cutting-agents, adulterants and impurities in cocaine, their popularity and occurrence, and regional and historic differences. Important parameters to assess are those describing their usability for a retrospective data-mining approach on GC-MS data, such as concentration in end-product, selectivity for a certain origin or manufacturing process, and detectability in a general GC-MS screening after direct organic extraction. Other useful information includes molecular mass and GC-MS mass spectrum.

REFERENCES


REQUIRED / RECOMMENDED EXPERTISE

Basic understanding in forensic chemistry. Affinity with illicit drugs analysis is recommended.

Cocaine sample origin and seizure analysis. Source: EMCDDA 2019

The cocaine production process. Source: EMCDDA 2019

Source: United Nations Office on Drugs and Crime (UNODC), World Drug Report 2019