CHANGES IN URINE METABOLIC PROFILES IN PATIENTS WITH CHRONIC INTAKE OF AMPHETAMINE AND OPIATES REVEALED USING 1H NMR SPECTROSCOPY WITH PATTERN RECOGNITION TECHNIQUE

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ABSTRACT

Introduction: Methods commonly used in addiction diagnosis are based on medical examinations and laboratory tests for drug-of-abuse presence in biological materials. All the analytical methods are effective only for adequately high drug concentration remaining within the limit of detection. The authors present an objective method for addiction diagnosis based on defining urine metabolic changes caused by chronic intake of drugs, giving an example of amphetamine and opiates abusers to show its usefulness. The presented procedure allows for establishing chronic drug consumption in the past even after three months of abstinence.

Material and methods: Urine of patients under the detoxification programme was tested for drug-of-abuse and only negative samples were considered. Patients declared abstinence for more than 3 months. Urine was adjusted to pH 5.8 and directly put to 1H NMR tests with external lock standard signals. Obtained free induction decay (FID) signals were Fourier transformed, auto-phased, manual baseline was done using MestReC software. All NMR spectra were then transferred to the Unscrambler software for multivariate analysis (principle component analysis – PCA).

Results: Obtained PCA patterns indicated different distances in multidimensional space for examined group. Variables were classified in clusters corresponding with the users of amphetamine, opiates, and the control group.

Conclusions: Chronic abuse of amphetamine and opiates results in changes in urine metabolic profiles even after long time of abstinence (3 months). All the changes can be observed and easily distinguished using 1H NMR with pattern recognition technique. The presented method may be useful in the diagnosis of chronic abuse of selected drugs in past for clinical and forensic purposes.

Key words: 1H NMR spectroscopy, urine profiles, pattern recognition

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