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Differentiation of Volatile Organic Metabolite (VOM) profiles in urine of testicular cancer patients before and after chemotherapy

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In European industrial countries testicular cancer is the most common cancer in young men in their twenties and thirties. In the Croatian population, the rapid rise in testicular cancer incidence appears to be one of the highest rates of increase recorded worldwide. Metabolic fingerprinting could be helpful to improve diagnosis and understand the pathophysiological mechanisms related to testicular cancer. There is a growing amount of literature on the analysis of volatile organic metabolites (VOMs) highlighting their importance on the identification and differentiation of cancer samples and elucidation of biochemical pathophysiological pathways. The search for urinary VOMs has been proposed as a powerful tool for the identification of alternative biomarkers in different cancers. An analytical approach consisting of headspace-solid phase micro-extraction (HS-SPME) sampling coupled with gas chromatography mass spectrometry (GC-MS) was developed to create the profile of VOMs in urine of testicular cancer patients. The measurements were performed on urine samples of testicular cancer patients collected before chemotherapy, after two cycles of chemotherapy and one year after chemotherapy. The metabolic analysis resulted in the detection of over 200 VOMs. Fiehn's method for data acquisition was evaluated and different VOMs profiles between samples from the same patient could be recognised. The open-source software AMDIS for data deconvolution and identification and MZmine for peak alignment and identification were employed for the identification of metabolites of interest. AMDIS deconvolutes the raw GC-MS data file and then compares mass spectral data against a library of target compounds (e.g. National Institute of Standards (NIST) mass spectral library). To confirm possible solutions of identification, Kovats retention index (RI) was used. These methods can serve as an effective tool for the identification of specific metabolites useful as new diagnostic, predictive, and prognostic disease biomarkers.

Biography

Tanja Živković Semren has completed her Master's degree in Analytical Chemistry. She is currently pursuing PhD at the Faculty of Pharmacy and Biochemistry, University of Zagreb, Croatia. She is employed at the Institute for Medical Research and Occupational Health (Analytical Toxicology and Mineral Metabolism Unit), Zagreb, Croatia, conducting research on men's reproductive health disorders. Currently she is focused on urine-based metabolomics research for potential biomarkers related to testicular cancer.

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