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SYNTHESIS AND USE OF NOVEL MOLECULARLY IMPRINTED POLYMERS FOR SELECTIVE EXTRACTION OF CATECHOLAMINES AND THEIR METABOLITES

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JAUNU MOLEKULĀRI IMPRINTĒTU POLIMĒRU SINTĒZE UN TO PIELIETOŠANA SELEKTĪVAI KATEHOLAMĪNU UN TO METABOLĪTU CIETFĀZES EKSTRAKCIJAI

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Catecholamines (CAs) are important hormones and neurotransmitters. Abnormal levels of CAs in bodily fluids can be associated with neurodegenerative diseases as well as adrenogenic tumors. Simultaneous determination of CAs and their metabolites in biological fluids is an efficient way of diagnosis and treatment of the aforementioned diseases. Molecularly imprinted polymers (MIPs) are slowly replacing conventional sorbents used in solid-phase extraction (SPE) to achieve superior selectivity for target analyte isolation from complicated matrices. So far there were no attempts to obtain selective sorbents for simultaneous isolation of CAs and their metabolites except the one made by our group [1].

To provide enhanced aqueous stability for polymer particles and improve molecular recognition for both CAs and their metabolites, the MIP is synthesized using methylenebisacrylamide (MBAA, cross-linker, 4) with acrylated homovanillic alcohol (HVAAC, 1), N-(4-vinylbenzyl)-N-methylamine (NVNM, 2) and homovanillic acid (HVA, 3) that act as templates/monomers for CAs and their metabolites, respectively.

MIP sorbents and non-imprinted polymers (NIPs) with varied cross-linker/monomer ratios were prepared and packed into cartridges. Standard analyte mixture was passed through. The imprinting factor (IF), selectivity factor and recovery for each compound were compared to the corresponding NIPs. The preliminary results show that the MIPs have improved retention of CAs compared to NIPs (pH 6). The best-performing MIP will be chosen for further studies.

Table 1. Structural formulas of the compounds chosen for synthesis of the MIPs.

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References:

[1] Podjava, A.; Šilaks, A. Synthesis and sorptive properties of molecularly imprinted polymer for simultaneous isolation of catecholamines and their metabolites from biological fluids. *J. Liq. Chromatogr. Relat. Technol.* 2021, 44, 181–188.

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