
SELECTIVE EXTRACTION OF COCAINE FROM PLASMA BY SOLID PHASE EXTRACTION SUPPORTS USING APTAMERS

Benjamin Madru, Florence Chapuis-Hugon and Valérie Pichon

Dept of Environmental and Analytical Chemistry, UMR PECSA 7195 UPMC/CNRS/ESPCI, ESPCI ParisTech, 10 rue Vauquelin 75231, Paris Cedex 05, France

The analysis of drugs in biological fluids (urine, plasma) at the trace level needs a sample clean-up before LC/MS analysis to limit the role of matrix effect. Despite their attractive features, classical sorbents used in Solid-Phase Extraction (SPE) often lead to the co-extraction of many interfering compounds. As an alternative to this lack of selectivity, selective materials based on a molecular recognition mechanism can be used. Immunosorbents (ISs) based on immobilized antibodies produced towards a target analyte, and molecularly imprinted polymers possessing specific cavities designed for a template molecule have already shown a high potential for the selective extraction of target analytes from complex matrices.

Selective extraction based on a molecular recognition mechanism can also be obtained using aptamers immobilized onto a solid support. Aptamers are oligonucleotides able to bind a specific molecule with the same affinity as antibodies. Aptamers are less expensive to produce and present a higher stability than antibodies. This support appears also as a good alternative to MIPs especially for expensive analytes because their production needs lower amount of target molecule.

An aptamer selected against cocaine was immobilized on various solid supports. These sorbents were characterised in terms of binding efficiency, specific and non specific retention as well as influence of the spacer length. One support was chosen to develop an extraction procedure in pure media that demonstrated a high specific retention taken place in the oligosorbent contrary to the control sorbents. Using the optimized extraction procedure, the capacity of the support was evaluated and compared to those of ISs and MIPs. To evaluate the ability of this oligosorbent to extract cocaine from complex samples, a human plasma spiked with cocaine was treated by the support. Moreover, this oligoextraction was compared to a standard SPE. The analysis of the plasma treated by the oligosorbent led to a very clean chromatogram making the quantification of cocaine possible whereas peak co-elutions were observed when using the classical C18 silica SPE support. This illustrated the improvement of the purification step by exploiting the high selectivity of aptamers.

In the future, others immobilization conditions and pressure resistant supports should be evaluated to try to increase the capacity and include the oligosorbent in an on-line extraction procedure.