

Simultaneous screening of over the counter and commonly used prescription drugs from a single blood sample with a biochip array on the Evidence Investigator analyser

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Background. A variety of over the counter and prescription drugs can cause drug overdoses when not used properly. The monitoring of these drugs involves measuring drug concentrations in biological matrices. Biochip array technology allows the simultaneous screening of over the counter and commonly used prescription drugs from a single sample, which increases the screening capacity and facilitates the monitoring of the use or misuse of these compounds. This study reports the application of a biochip array to the simultaneous screening of acetaminophen, dextromethorphan, ethyl glucuronide, fluoxetine, haloperidol, ibuprofen, methylphenidate, salicylate, sertraline, tramadol, trazodone, tricyclic antidepressants from a single blood sample on the Evidence Investigator analyser.

Methods. Simultaneous competitive biochip-based immunoassays applied to the semi-automated biochip analyser Evidence Investigator were employed. The capture ligands were immobilized and stabilized on the biochip surface (9mm x 9mm) defining discrete test regions, the biochip was also the vessel for the immunoreactions. The system incorporates dedicated software to process and archive the multiple data generated. Samples were diluted 4-fold prior analysis.

Results. The limit of detection values (LOD) in neat whole blood of the simultaneous immunoassays were as follows: 4.18 µg/ml (acetaminophen), 0.24 ng/ml (dextromethorphan hydrobromide monohydrate), 0.17 ng/ml (N-desmethyl escitalopram), 0.09 µg/ml (ethyl-β-D-glucuronide), 0.73 ng/ml (fluoxetine HCl), 0.50 ng/ml (haloperidol), 1.88 µg/ml (ibuprofen), 8.81 ng/ml (methylphenidate), 1.98 µg/ml (salicylic acid), 1.08 ng/ml (N-desmethyl sertraline), 0.08 ng/ml (tramadol HCl), 0.15 ng/ml (trazodone), 2.03 ng/ml (nortriptyline). The assays exhibited intra-assay precision and inter-assay precision, expressed as CV (%), ranging from 4.2 to 12.6% and from 5.0 to 15.9% respectively. Recovery values ranged from 75% to 127% for different concentration levels.

Conclusions. Data show applicability of the biochip array to the simultaneous screening of prescription and over the counter drugs from a single blood sample when applied to the Evidence Investigator analyser. This application increases the screening capacity and facilitates the monitoring of the use or misuse of drugs.

Key words: Prescription drugs, Over the counter drugs, Biochip array, Blood, Evidence Investigator, Screening