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

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Objective: This study reports the analytical evaluation of a biochip array applied to the Evidence Investigator analyser for the simultaneous screening of commonly used prescription and over the counter drugs from a single urine sample. This multi-analytical approach increases the screening capacity and facilitates the monitoring of the use or misuse of these compounds.

Methods: Simultaneous competitive biochip-based immunoassays (acetaminophen, dextromethorphan, escitalopram, ethyl glucuronide, fluoxetine, haloperidol, ibuprofen, ritalinic acid, salicylate, sertraline, tramadol, trazodone and tricyclic antidepressants) 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.

Results: The analytical performance parameters limit of detection (LOD), inter-assay precision and recovery for different concentration levels are indicated in the table below:

Assay	LOD (neat sample)	Assay range	Inter-assay precision CV (%) (n=20)	Recovery range (%)
Acetaminophen Units: µg/mL	3.98 (acetaminophen)	0-2680	≤13	94-118
Dextromethorphan Units: ng/mL	6.93 (dextromethorphan)	0-256	≤9	104-112
Escitalopram Units: ng/mL	0.29 (N-desmethyl escitalopram)	0-780	≤15	92-119
Ethyl Glucuronide Units: µg/mL	0.36 (ethyl-β-D- glucuronide)	0-36	≤8	97-107
Fluoxetine Units: ng/mL	1.16 (fluoxetine)	0-5180	≤14	90-100
Haloperidol Units: ng/mL	3.44 (haloperidol)	0-320	≤13	90-101
Ibuprofen Units: µg/mL	17.34 (ibuprofen)	0-2240	≤12	70-99
Ritalinic Acid Units: ng/mL	4.02 (ritalinic acid)	0-1660	≤14	112-121
Salicylate Units: µg/mL	17.70 (salicylic acid)	0-2640	≤11	98-114
Sertraline Units: ng/mL	2.69 (N-desmethyl sertraline)	0-2340	≤16	83-104
Tramadol Units: ng/mL	1.23 (tramadol)	0-152	≤9	99-113
Trazodone Units: ng/mL	9.21 (m-CPP HCl)	0-960	≤8	94-107
Tricyclic Antidepressants Units: ng/mL	5.90 (nortriptyline)	0-2580	≤12	76-84

Conclusion: Data show applicability of the biochip array to the simultaneous screening of prescription and over the counter drugs from a single urine 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.