

Screening of cocaine in hair using a homogeneous immunoassay procedure

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Introduction

Hair is a useful specimen for the detection of long-term drug use. In general, drug concentrations in hair are lower than those identified in other matrices such as urine and blood. Further, specimen volume may be limited, so sensitive screening methods are necessary. Following cocaine use, the main drug detected in hair is the parent drug itself, so a screening immunoassay should be targeted to cocaine.

Methods

- Hair from cocaine users (n = 19); drug free volunteers (n = 20)
- Cut into small pieces; weigh out 10 mg
- 0.1 M phosphate buffer (pH 2.7; 0.5 mL)
- Incubate (3 hrs/75°C).
- Analyze supernatant using ELISA; and via homogeneous immunoassays (EIA) on an Olympus 400 platform
- For ELISA, the supernatant was diluted 1:5 with PBS before plating
- For EIA, 10µL of supernatant was used, making the process compatible with most commercial chemistry analyzers

Cross-reactivity

Drug	XR (%)
Cocaine	100
Benzoyllecgonine	200
Cocaethylene	96
m-Hydroxy BZE	53
BZE Isopropyl Ester	84
Norcocaine HCl	N.D.
Nor-BZE HCl	1.0
Norcocaethylene HCl	N.D.
Ecgonine HCl	1.4
Ecgonine Methyl Ester	<0.3

Summary: The assay is precise, sensitive and conducive to rapid hair screening using commercial chemistry analyzers

Results

Screening cutoff : 500 pg/mg (recommendation: Proposed Federal Guidelines 2004)

Precision at 250, 500, 1000, 2500 pg/mg: EIA intra-assay: 7.1%, 12%, 9.3% and 3.8%

All negative specimens screened negatively using both ELISA and EIA; positive screen results are shown

Sample	ELISA	EIA	GC/MS (pg/mg)			
Cut-off	500 pg/mg	500 pg/mg	BZE	Cocaine	NC	CE
1	P	P	3492	>10,000	2746	ND
2	P	P	9531	>10,000	2419	ND
3	P	P	375	4501	62	389
4	P	P	9614	>10,000	2847	9521
5	P	P	>10,000	>10,000	4797	>10,000
6	P	P	5779	>10,000	662	ND
7	P	P	3978	>10,000	ND	8282
8	P	P	2492	>10,000	644	1589
9	P	P	6564	>10,000	722	840
10	P	P	>10,000	>10,000	3556	9868
11	P	P	7672	>10,000	2347	ND
12	P	P	>10,000	>10,000	2287	756
13	P	P	>10,000	>10,000	7927	214
14	P	P	132	1181	ND	ND
15	N	P	231	728	ND	ND
16	P	P	>10,000	>10,000	ND	7113
17	P	P	>10,000	>10,000	ND	833
18	P	P	>10,000	>10,000	ND	ND
19	N	P	107	573	ND	ND

Disclosure: Immunalysis Corporation manufactures and distributes the immunoassays described in this presentation