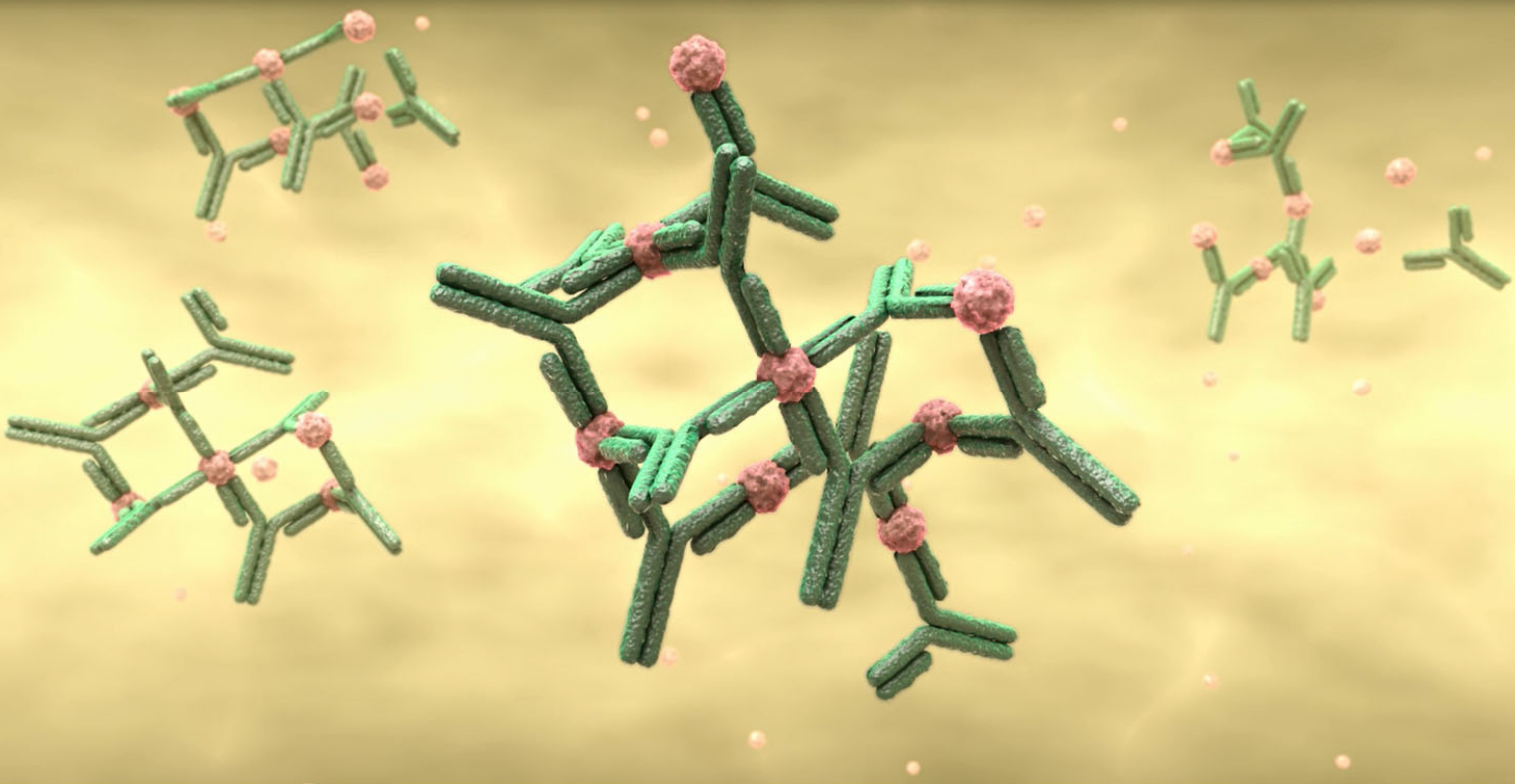


ONLINE DAT Cross-reactivity Booklet EU

From tough questions to reliable answers

Version 4.0



Dear User,

The following is a compilation of the cross-reactivity information provided in the package inserts of the ONLINE DAT Automated Assays for Drug Abuse, the Abuscreen® OnLine Automated Assays for Drug Abuse, and the DRI® Automated Assays for Drug Abuse. Also included is information from additional studies performed by Roche Diagnostics, often at customers' request, which may not appear in the package inserts. For better readability within the tables in this list all cross-reactivity values < 1 % are listed with one decimal position, values ≥ 1 % without decimal position and very low values with < 0.1 %. Exceptions are PCP, THC, BENZ and LSD due to their lower cut-off values. Therefore the numbers might differ slightly from the ones listed in the package insert. The tables list the highest concentration tested; this does not mean there was interference at a higher concentration.

Experiments were not always run on all platforms. Compounds were tested on the COBAS INTEGRA, Roche/Hitachi, and/or **cobas c** systems. The specific instrument used is not indicated where extrapolation between applications was considered reasonable.

Compounds are typically tested for their cross-reactivity or their positive interference; any effect to reduce recovery may not be captured.

When applying this information to the interpretation of a DAT screen result one must keep a few things in mind. The data is based on studies on parent compounds. The cross-reactivity of any untested metabolites is unknown. The concentrations of unchanged parent drug and its metabolites in a urine specimen are subject to all the variables of pharmacokinetics, dosage, and indeed the client's state of hydration.

As always, users are reminded that drug screens provide only preliminary analytical test results. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas chromatography/mass spectrometry (GC/MS) or Liquid Chromatography coupled with tandem Mass Spectrometry are the preferred confirmatory methods. Clinical consideration and professional judgement should be applied to any drug of abuse test result, particularly when preliminary positive results are used.

This is the latest list at the time of printing. Cross-reactivity studies are on-going. For the latest information contact your local Roche representative.

Thank you for your interest in Roche Diagnostics' products.

Publication Reference Number	Date	Revision purpose
Revision 1 Info 2004	July 2004	Original
Revision 2 Info 2006 013	November 2006	Updated with Barbiturate, Benzodiazepine, Propoxyphene, and PCP Plus assays, additional specific experiments
Revision 3	March 2010	Updated with Amphetamines II, Benzodiazepines II, DRI Oxycodone, DRI Methadone Metabolite and the cobas c systems. Roche/Hitachi Barbiturate, Benzodiazepine, Propoxyphene, and PCP were deleted.
Revision 4	June 2016	Amphetamines deleted as replaced by Amphetamines II editorial changes Updated with new compounds tested

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Amphetamines II

*Cross-reactivity with structurally related compounds/
Analytical specificity*

COBAS INTEGRA

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
Amfepramone	370 370	< 0.1	862 069	< 0.1	1 818 182	< 0.1
2-Aminoheptane	1 371	22	2 495	20	5 327	19
<i>d</i> -Amphetamine	311	96*	460	109*	1 024	98*
<i>l</i> -Amphetamine	6 443	5	11 174	4	23 445	4
4-bromo-2,5-dimethoxyamphetamine	400 000	< 0.1	909 091	< 0.1	1 639 344	< 0.1
± BDB HCl d,l-3,4-methylenedioxyphenyl-2-butanamine hydrochloride	648	46	1 209	41	2 262	44
Benfluorex	34 629	0.9	41 854	1	91 815	1
Benzphetamine	44 421	0.7	101 626	0.5	174 520	0.6
Benzylpiperazine	25250	1	37 953	1	88 760	1
Bupropion	14 928	2	27 059	2	51 862	2
Butylon HCl	7 417	4	N/A	N/A	N/A	N/A
R-Cathinone	379 747	< 0.1	819 672	< 0.1	1 408 451	< 0.1
S-Cathinone	267 857	0.1	1 086 957	< 0.1	1 886 792	< 0.1
N-Ethyl-Cathinone HCl	8 916	3	N/A	N/A	N/A	N/A
4'-Methylethyl-cathinone-HCl	9 102	3	N/A	N/A	N/A	N/A
Chloramphetamine	130	231	211	237	546	183
DMAA Dimethylamylamine = 4-Methylhexan-2-amine	21 111	1	37 701	1	79 780	1
N,N-Dimethylphenethylamine	1 455	21	2 600	19	2 366	19
<i>d</i> -Ephedrine	329 670	< 0.1	413 223	0.1	793 651	0.1
<i>l</i> -Ephedrine	94 792	0.3	154 321	0.3	317 460	0.3
N-Ethylamphetamine	2 020	15	2 902	17	7 049	14
Fencamfamine	18 205	2	34 517	1	64 194	2
Fenfluramine	1 120	27	2023	25	4 190	24
Fenproporex	25 890	1	46 261	1	122 699	0.8
Flephedrone HCl	60 903	0.5	N/A	N/A	N/A	N/A
<i>p</i> -Hydroxyamphetamine	5 542	5	9 894	5	23 172	4
<i>p</i> -Hydroxymethamphetamine	1 344	22	2 383	21	4 755	21
N-Hydroxy MDA	4 519	7	6 959	7	15 951	6
Hydroxynorephedrine	508 475	< 0.1	862 069	< 0.1	3 846 154	< 0.1
Labetalol metabolite:	1 792	17	2 925	17	5 479	18

Amphetamine II

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
APB = 1-Methyl-3-phenylpropylamine						
Levodropropizine metabolite: 1-(4-hydroxyphenyl)piperazine	30 476	1	N/A	N/A	N/A	N/A
LSD	N/A	0.3	N/A	0.2	N/A	0.7
± MBDB HCl d,l-N-Methyl-1-(3,4-methylenedioxyphenyl)-2-butanamine hydrochlorid	339	88	713	70	1 194	84
± MDA d,l-3,4-Methylenedioxyamphetamine	249	121	433	115	785	127
± MDEA d,l-3,4-Methylenedioxyethylamphetamine	285	105	494	101	1 203	83
± MDMA d,l-3,4-Methylenedioxymethamphetamine	114	264	173	289	446	224
MDPV (3,4-Methylenedioxypropylammonium-HCl)	63 597	0.5	N/A	N/A	N/A	N/A
Mebeverine	55 455	0.5	122 549	0.4	202 020	0.5
Mefenorex	3 905	8	5 516	9	14 190	7
Mephedrone-D3-HCl	6 114	5	N/A	N/A	N/A	N/A
Mephentermine	13 272	2	23 214	2	31 517	3
<i>d</i> -Methamphetamine	327	92	444	113	970	103
<i>l</i> -Methamphetamine	2 754	11	4 098	12	9 008	11
Methedrone-HCl	17 821	2	N/A	N/A	N/A	N/A
Methoxyphenamine	175 439	0.2	306 748	0.2	641 026	0.2
Methylephedrine	247 934	0.1	490 196	0.1	1 075 269	< 0.1
Methylone-HCl	14 436	2	N/A	N/A	N/A	N/A
Methylpseudrine	1 549	19	2456	20	5 028	20
(1S,2S)-(+)-Methylpseudoephedrine	476 190	< 0.1	757 576	< 0.1	1 886 792	< 0.1
Methylthioamphetamine (MTA)	170	176	260	193	572	175
Mexilitine HCl	6 035	5	11 298	4	28 157	4
Naphazoline	11 163	3	20 364	2	52 329	2
Naphyrone-HCl	14 390	2	N/A	N/A	N/A	N/A
Norpseudoephedrine	94 595	0.3	194 553	0.3	390 625	0.3
Paroxetine	48 767	0.6	90 332	0.6	257 732	0.4
Phendimetrazine	47 473	0.6	72 500	0.7	156 740	0.6
Phenelzine	333 333	< 0.1	458 716	0.1	1 470 588	< 0.1
Phenethylamine	7 548	4	14 176	4	29 049	3
Phenmetrazine	1 744	17	2 959	17	10 065	10
Phentermine	66 385	0.5	118 483	0.4	294 118	0.3
<i>d,l</i> -Phenylephedrine	283 019	0.1	515 464	0.1	1 162 791	< 0.1
Phenylephrine	N/A	N/A	N/A	N/A	990099	0.1
± Phenylpropanolamine HCL	280 374	0.1	390 625	0.1	1 111 111	< 0.1

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
(Norephedrine)						
PMA para-methoxyamphetamine	143	210	231	216	599	167
PMMA paramethoxy-methamphetamine	181	166	299	167	695	144
Procaine	N/A	1	N/A	1	N/A	0.9
N-Propylamphetamine	6 919	4	13 881	4	24 941	4
Propylhexidine	1 802	17	3 496	14	8 654	12
<i>d</i> -Pseudoephedrine	87 578	0.3	132 275	0.4	269 542	0.4
Ranitidine	82 673	0.4	147 493	0.3	289 017	0.4
Ritodrine	545 455	< 0.1	961 538	< 0.1	2 325 581	< 0.1
Selegiline (Deprenyl)	28 545	1	36515	1	80695	1
Sertraline	81 277	0.4	151 976	0.3	377 358	0.3
Tetrahydrozoline	43 977	0.7	89 815	0.6	192 308	0.5
Δ^9 THC-9-carboxylic acid	N/A	0.2	N/A	< 0.1	N/A	0.2
Trazodone	121 457	0.3	180 505	0.3	306 748	0.3
Trazodone metabolite: mCPP = meta-Chlorphenylpiperazine, 1-(3-Chlorphenyl)piperazine	1 322	23	2 414	21	4 946	20
Trimethobenzamine	4 684	6	8 284	6	17 122	6
Tyramine	86 271	0.4	141 243	0.4	323 625	0.3
N-Methyltyramine	4 618	7	8 484	6	15 484	7

* Representative data from multiple lots demonstrate cross-reactivity in the range from approximately 75 - 125 %

Roche/Hitachi and cobas c

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
Amfepramone	198 675	0.2	362 319	0.1	810 833	0.1
2-Aminoheptane	2538	12	5 587	9	11 264	9
<i>d</i> -Amphetamine	251	120*	494	101*	981	102*
<i>l</i> -Amphetamine	7 085	4	13 342	4	24 220	4
\pm BDB HCl d,l-3,4-methylenedioxyphenyl-2-butanamine hydrochlorid	717	42	1 358	37	2 420	41
Benfluorex	81 683	0.4	163 757	0.3	331 126	0.3
Benzphetamine	69 863	0.4	137 110	0.4	254 239	0.4
Benzylpiperazin	21 339	1	38711	1	72 975	1
Bupropion	17 662	2	30 460	2	60 936	2
Butylon HCl	6 157	5	N/A	N/A	N/A	N/A

Amphetamine II

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
R-Cathinone	15 133	2	29 091	2	63 963	2
S-Cathinone	52 657	0.6	119 904	0.4	215 983	0.5
N-Ethyl-Cathinone HCl	9 464	3	N/A	N/A	N/A	N/A
4'-Methylethyl-cathinone-HCl	9 506	3	N/A	N/A	N/A	N/A
Chloramphetamine	151	199	361	138	660	151
DMAA Dimethylamylamine = 4-Methylhexan-2-amine	30 980	1	50 436	1	100 735	1
N,N-Dimethylphenethylamine	1 827	16	3 084	16	6 183	16
<i>d</i> -Ephedrine	215 827	0.1	458 716	0.1	657 895	0.2
<i>l</i> -Ephedrine	89 655	0.3	141 643	0.4	308 642	0.3
N-Ethylamphetamine	1 629	18	3 164	16	7 026	14
Fencamfamine	16 356	2	27 805	2	134 169	0.8
Fenfluramine	1030	29	1948	26	4146	24
Fenproporex	17 701	2	37 688	1	79 692	1
Flephedron HCl	67 080	0.5	N/A	N/A	N/A	N/A
<i>p</i> -Hydroxyamphetamine	9 234	3	17 320	3	32 843	3
<i>p</i> -Hydroxymethamphetamine	1 290	23	2 319	22	4612	22
N-Hydroxy MDA	9 952	3	17 980	3	35 276	3
Hydroxynorephedrine	284 819	0.1	500 000	0.1	1 388 889	< 0.1
Labetalol metabolite: APB = 1-Methyl-3-phenylpropyl-amine	1 942	15	2 992	17	5 116	20
Levodropropizine metabolite: 1-(4-hydroxyphenyl)piperazine	33 271	0.9	57 946	0.9	115 168	0.9
LSD	N/A	2	N/A	2	N/A	1
± MBDB HCl d,l-N-Methyl-1-(3,4-methylenedioxyphenyl)-2-butanamine hydrochlorid	323	93	598	84	1 175	85
± MDA d,l-3,4-Methylenedioxyamphetamine	249	120	394	127	771	130
± MDEA d,l-3,4-Methylenedioxyethylamphetamine	303	99	668	75	1 553	64
± MDMA d,l-3,4-Methylenedioxymethamphetamine	104	288	196	255	509	197
MDPV (3,4-Methylenedioxypropyl- <i>alpha</i> -methylphenethylamine-HCl)	59 955	0.5	N/A	N/A	N/A	N/A
Mebeverine	46 000	0.7	143 955	0.4	264887	0.4
Mefenorex	4 199	7	7 552	7	18 112	6
Mephedron-D3-HCl	6 651	5	N/A	N/A	N/A	N/A
Mephentermine	14 937	2	25 471	2	52 385	2
<i>d</i> -Methamphetamine	305	98	488	102	998	100
<i>l</i> -Methamphetamine	2 524	12	4 383	11	8 748	11
Methedron-HCl	12 987	2	N/A	N/A	N/A	N/A

Amphetamines II

Compound	300 ng Cutoff		500 ng Cutoff		1000 ng Cutoff	
	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity	~ ng/mL equivalent to d-Methamphetamine	~ % Cross-reactivity
Methoxyphenamine	142 403	0.2	253 383	0.2	561 798	0.2
Methylaminorex	6 915	4	13 009	4	26 155	4
Methylephedrine	200 441	0.2	356 303	0.1	755 687	0.1
Methylon-HCl	8 242	4	N/A	N/A	N/A	N/A
(1S,2S)-(+)-Methylpseudoephedrine	255 689	0.1	426 148	0.1	1 038 098	0.1
Methylthioamphetamine (MTA)	146	205	372	135	780	128
Mexilitine HCl	11 345	3	29 082	2	69 547	1
Naphazoline	13 185	2	22 558	2	46 908	2
Naphyrone-HCl	17 944	2	N/A	N/A	N/A	N/A
Norpseudoephedrine	104 895	0.3	176 678	0.3	325 733	0.3
Paroxetine	88 655	0.3	151 976	0.3	273 973	0.4
Phendimetrazine	31 818	0.9	65 566	0.8	138 504	0.7
Phenelzine	37 143	0.8	69 909	0.7	120 434	0.8
Phenethylamine	13 065	2	22 047	2	38 556	3
Phenmetrazine	1 668	18	3 192	16	9 143	11
Phentermine	70 391	0.4	123 457	0.4	238 663	0.4
<i>d,l</i> -Phenylephedrine	179 286	0.2	326 094	0.2	773 216	0.1
± Phenylpropranolamine HCL	211 268	0.1	344 828	0.2	606 061	0.2
PMA para-methoxyamphetamine	166	180	341	147	908	110
PMMA paramethoxymethamphetamine	191	157	344	145	690	145
Procaine HCl	N/A	3	N/A	2	N/A	2
N-Propylamphetamine	9 346	3	16 443	3	29 817	3
Propylhexidine	1 822	16	3752	13	7 786	13
<i>d</i> -Pseudoephedrine	73 822	0.4	112 613	0.4	261 780	0.4
Ranitidine	53 743	0.6	107 991	0.5	226 757	0.4
Ritodrine	284 819	0.1	522 630	0.1	1 276 650	< 0.1
Selegiline (Deprenyl)	20 710	1	40 000	1	78 257	N/A
Sertraline	83 037	0.4	163 042	0.3	348 032	0.3
Tetrahydrozoline	44 138	0.7	97 466	0.5	196 978	0.5
Δ^9 THC-9-carboxylic acid	N/A	0.6	N/A	0.5	N/A	0.4
Trazodone	126 941	0.2	210 376	0.2	393 190	0.3
Trazodone metabolite: mCPP = meta-Chlorophenyl-piperazine, 1-(3-Chlorophenyl)piperazine	1 631	18	2 560	20	5 478	18
Trimethobenzamine	7 722	4	11 669	4	16 293	6
Tyramine	85 115	0.4	141 643	0.4	284 091	0.4
N-Methyltyramine	6169	5	9270	5	17 929	6

*Representative data from multiple lots demonstrate cross-reactivity in the range from approximately 75-125 %

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

None of these compounds gave values greater than 0.2 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound		Compound		Compound	
Acetaminophen		Fentiazin		Nordiazepam	
Acetylsalicylic acid		Fluoxetine		Norepinephrine	
Amitriptyline		Flurbiprofen		Norethindrone	
Amobarbital		Fluvoxamine		Nylidrin (Buphenine)	
Amoxicilline	CH	Furosemide		Omeprazole	
Ampicillin		Gentisic acid		Oxazepam	
Ascorbic acid	CH	Glutethimide		Oxymetazoline	
Ascorbic acid (10 mg/mL)*	I	Guaiacol glycerol ether		Penicillin G	
Aspartame		Heptaminol		Pentazocine	
Atropine		Hydrochlorothiazide		Pentobarbital	
Baclofen		Hydroxyindole acetic acid		Phencyclidine	
Benzocaine		Hydroxyindole carboxylic acid		Phenobarbital	
Benzoylcegonine		Hydroxytyramine (Dopamine)		Phenothiazine	
Benzylamine		Hydroxyzine		Phenylbutazone	
Buprenorphine		Ibuprofen		Piperonyl compounds (Sesamin)	
Butabarbital		Imipramine		Promethazine	
Caffeine		Isoproterenol		Propranolol metabolite:	CH
Calcium hypochlorite		Isoxsuprene		Hydroxypropranolol	
Cannabidiol		Ketamine		(0.25 mg/mL)*	
Captopril		Labetalol HCl		Prothipendyl (0.5 mg/mL)*	CH
Chlordiazepoxide		Labetalol metabolite:		Quinidine	
Chlorpheniramine		see related table due to higher		Quinine	
Chlorpromazine		x-react.		Salbutamol	
Chloroquine		Levodropropizine		Secobarbital	
Cimetidine		Levodropropizine metabolite:		Sulindac	
Citalopram		see related table due to higher		Terbinafine	I
Cocaine		x-react.		cis-Tramadol	I
Codeine		Levomopromazine		cis-Tramadol metabolite:	I
Cyclopentylamine		Levothyroxine		N-Desmethyl-cis-tramadol	
Desipramine HCl		Lidocaine		Tetracycline	
Dextromethorphan		Mazindol		Thioridazine	
Dextropropoxyphene		Melperone (0.25mg/mL)*	CH	Tiapride Hydrochloride	I
Diazepam		Meperidine		Tolmetin	
Digoxin		Metamizol metabolite:	CH	Trifluoperazine	
Diphenhydramine		4-Methylamino Antipyrine		Trimethoprim	
Diphenylhydantoin		(0.5mg/mL)*		Trimipramine maleate	
Doxepin		Metaproterenol		Venlafaxine HCl	CH
Doxylamine (0.5mg/mL)*	CH	Methadone		Venlafaxine metabolite:	CH
Ecgonine		Methaqualone		O-Desmethylvenlafaxine	
Ecgonine methyl ester		Methyl DOPA		Verapamil	
EDDP	I	Methylphenidate (Ritalin)		Vincamine	
EMDP	I	Methylprylon		Xylometazoline	

Amphetamines II

Compound	
Enalapril	
L-Epinephrine	
Erythromycin	
Estriol	
Famprofazone	
Fenoprofen	

Compound	
Mirtazapine	
Morphine sulphate	
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	
Nicotine	
Nifedipine	

Compound	
Zomepirac	
Zoxazolamine (2-amino-5-chlor-benzoxazole)	

Barbiturates/Barbiturates Plus

*Cross-reactivity with structurally related compounds/
Analytical specificity*

Barbiturates on COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 200 ng/mL secobarbital	Approximate % Cross-reactivity
Allobarbital	440	46
Amobarbital	1 143	18
Aprobarbital	293	68
Barbital	2 074	10
Barbituric acid	> 100 000	< 0.1
Butabarbital	567	35
Butalbital	549	36
Cyclopentobarbital	212	95
1,3-Dimethylbarbituric acid	> 100 000	< 0.1
Diphenylhydantoin	250 000	0.1
Glutethimide	290 698	0.1
Hexobarbital	> 100 000	< 0.1
Mephobarbital	111 111	0.2
Pentobarbital	600	33
Phenobarbital	857	23
<i>p</i> -Hydroxyphenobarbital	930	22
Thiopental	1 674	12

Barbiturates Plus on Roche/Hitachi and cobas c

Compound	Approximate ng/mL equivalent to 200 ng/mL secobarbital	Approximate % Cross-reactivity
Allobarbital	282	71
Amobarbital	702	29
Aprobarbital	215	93
Barbital	1 750	11
Barbituric acid	> 100 000	< 0.1
1,3-Dimethylbarbituric acid	> 100 000	< 0.1
Butabarbital	547	37
Butalbital	281	71
Cyclopentobarbital	197	101
Diphenylhydantoin	> 500 000	< 0.1
Glutethimide	> 500 000	< 0.1
Hexobarbital	> 100 000	< 0.1
Mephobarbital	> 100 000	< 0.1
Pentobarbital	561	36
Phenobarbital	925	22
<i>p</i> -Hydroxyphenobarbital	1 039	19

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

Barbiturates on the COBAS INTEGRA systems: None of these compounds gave values equal or greater than 0.5 % cross-reactivity.

Barbiturate Plus on the Roche/Hitachi and cobas c systems: None of these compounds gave values greater than 0.03 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound		Compound		Compound	
Acetaminophen		Epinephrine		Norethindrone	
Acetylsalicylic acid		Erythromycin		<i>l</i> -Norpseudoephedrine	
Aminopyrine		Estriol		Nortriptyline	CH
Amitriptyline		Fenoprofen		Octreotide	
<i>d</i> -Amphetamine		Flecainide acetate		Omeprazole (5 mg/mL)*	I
<i>l</i> -Amphetamine		Furosemide		Oxazepam	
Ampicillin		Gentisic acid		Paroxetine	I
Ascorbic acid		Guaiacol glycerol ether		PCP	
Aspartame		Hydrochlorothiazide		Penicillin G	
Atropine		<i>p</i> -Hydroxyamphetamine		β -Phenethylamine	
Benzocaine		Ibuprofen		Phenothiazine	
Benzoylcegonine		Imipramine		Phentermine	CH
Benzphetamine		loversol (80 mg/mL)*	I	Phenylbutazone	
Bupropion (4.0 mg/mL)*	I	Isoproterenol		<i>d</i> -Phenylpropanolamine	
Caffeine		Ketamine		<i>d,l</i> -Phenylpropanolamine	
Calcium hypochlorite		Lidocaine		Phenytoin (0.75mg/mL)*	I
Carbamazepine (1 mg/mL)*	I	LSD		Phenytoin metabolite:	I
Chlordiazepoxide		Loratadine volunteer sample (10mg daily dose)		<i>p</i> -Hydroxyphenytoin (2.5 mg/mL)*	
Chloroquine		Lorazepam (1 mg/mL)*	I	Primidone	I
Chlorpheniramine		MDA		Procaine	
Chlorpromazine		MDMA		Promethazine	
Cocaine		Melanin		<i>d</i> -Pseudoephedrine	
Codeine		Meperidine		<i>l</i> -Pseudoephedrine	
Desipramine	CH	Methadone		Quinidine	
Dextromethorphan		<i>d</i> -Methamphetamine		Quinine	
Dextropropoxyphene		<i>l</i> -Methamphetamine	CH	Sulindac	
Diazepam		Methaqualone		Tetracycline	
Diazoxide		Methylphenidate		Tetrahydrozoline	
Diphenhydramine		Methyprylon		Δ^9 THC-9-carboxylic acid	
Dopamine		Morphine		Trifluoperazine	
Doxepin	CH	Naloxone		Trimipramine	CH
Ecgonine		Naltrexone		Tyramine	
Ecgonine methyl ester		Naproxen		Verapamil	
<i>d</i> -Ephedrine		Niacinamide		Zalcitabine (2 mg/mL)*	I
<i>d,l</i> -Ephedrine				Zidovudine (2 mg/mL)*	I
<i>l</i> -Ephedrine					

Benzodiazepines/Benzodiazepines Plus

*Cross-reactivity with structurally related compounds/
Analytical specificity*

Benzodiazepines on COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 100 ng/mL nordiazepam	Approximate % cross-reactivity
Alprazolam	74	135
α -Hydroxyalprazolam	101	99
4-Hydroxyalprazolam	123	81
Bentazepam	253	39
Bromazepam	129	78
Brotizolam	126	79
Chlordiazepoxide	221	45
Desmethylchlordiazepoxide	338	30
Demoxepam	168	59
Clobazam	124	81
Clonazepam	178	56
Clonazolam	88	114
Clorazepate K ⁺ salt	127	79
Delorazepam	107	93
Deschloroetizolam	73	136
Diazepam	79	127
N-Methyloxazepam	172	58
Diclazepam	99	101
Etizolam	121	83
Flubromazepam	72	139
3-OH-Flubromazepam	130	77
Flubromazolam	97	103
Flunitrazepam	170	59
Desmethylflunitrazepam	188	53
3-Hydroxyflunitrazepam	819	12
Flurazepam	116	86
Hydroxyethylflurazepam	108	93
Didesethylflurazepam	147	68
Desalkylflurazepam	192	52
Lorazepam	228	44
Meclonazepam	847	12
Medazepam	292	34
Desmethylmedazepam	427	23
Midazolam	124	81

Benzodiazepins/Benzodiazepines Plus

Compound	Approximate ng/mL equivalent to 100 ng/mL nordiazepam	Approximate % cross-reactivity
Nifoxipam	536	19
Nitrazepam	149	67
7-Aminonitrazepam	282	35
7-Acetamidonitrazepam	115 740	0.09
Oxazepam	188	53
Pinazepam	115	87
Prazepam	145	69
Pyrazolam	101	99
Triazolam	113	88
α-Hydroxytriazolam	120	84

Indented drugs are metabolites of the preceding drug.

Many benzodiazepines appear in the urine largely as the glucuronidated conjugate. Glucuronidated metabolites may have more or less cross-reactivity than the parent compound.

Benzodiazepines β-Glucuronidase Application on COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 100 ng/mL nordiazepam	Approximate % cross-reactivity
Alprazolam	75	133
α-Hydroxyalprazolam	111	90
α-Hydroxyalprazolam glucuronide	175	57
4-Hydroxyalprazolam	200	50
Bromazepam	107	94
Chlordiazepoxide	213	47
Desmethylchlordiazepoxide	204	49
Clonazepam	159	63
7-Aminoclonazepam	193	52
Clorazepate	72	139
Demoxepam	159	63
Diazepam	94	106
N-Methyloxazepam	159	63
Doxefazepam	107	93
Estazolam	96	105
Flumazenil	> 100 000	0.01
Flunitrazepam	175	57
7-Aminoflunitrazepam	124	81
Desmethylflunitrazepam	181	55
3-Hydroxyflunitrazepam	429	23
Flurazepam	149	67
Hydroxyethylflurazepam	108	93
Didesethylflurazepam	128	78
Desalkylflurazepam	86	116
Fosazepam	114	88
Halazepam	119	84
Ketazolam	157	64
Loprazolam	410	24
Lorazepam	164	61

Benzodiazepins/Benzodiazepines Plus

Compound	Approximate ng/mL equivalent to 100 ng/mL nordiazepam	Approximate % cross-reactivity
Lorazepam glucuronide	294	34
Lormetazepam	120	84
Medazepam	344	29
Desmethylmedazepam	164	61
Midazolam	101	99
α -Hydroxymidazolam	141	71
Nitrazepam	158	63
7-Aminonitrazepam	131	77
7-Acetamidonitrazepam	79000	0.13
Norchlordiazepoxide	172	58
Oxaprozín	4522	2
Oxazepam	142	70
Oxazepam glucuronide	247	40
Pinazepam	261	38
Phenazepam	110	91
Prazepam	152	66
Quazepam	160	63
Temazepam	123	81
Temazepam glucuronide	464	22
Tetrazepam	107	93
Triazolam	120	83
α -Hydroxytriazolam	117	86
4-Hydroxytriazolam	103	97
Zolpidem	> 100 000	0.09

Indented drugs are metabolites of the preceding drug.

Benzodiazepines Plus on Roche/Hitachi and cobas c

Compound	100 ng/mL Cutoff		200 ng/mL Cutoff		300 ng/mL Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Alprazolam	108	93	219	91	338	89
α -Hydroxyalprazolam	118	84	228	88	354	85
α -Hydroxyalprazolam glucuronide	182	55	370	54	553	54
4-Hydroxyalprazolam	123	82	248	81	389	77
Benzazepam	222	45	460	43	730	41
Bromazepam	110	91	241	83	346	87
Chlordiazepoxide	146	69	318	63	486	62
Desmethylchlordiazepoxide (Norchlordiazepoxide)	153	65	343	58	517	58
Clobazam	123	81	237	84	382	79
Clonazepam	148	68	307	65	445	67
7-Aminoclonazepam	144	69	288	70	489	61
Clonazolam	96	104	193	104	295	102
Clorazepate	124	81	237	85	372	81
Demoxepam	92	108	202	99	324	93

Benzodiazepins/Benzodiazepines Plus

Compound	100 ng/mL Cutoff		200 ng/mL Cutoff		300 ng/mL Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Deschloroetizolam	89	112	179	112	273	110
Diazepam	106	94	215	93	340	88
Diclazepam	102	98	201	99	307	98
Estazolam	108	92	213	94	325	92
Etizolam	133	75	263	76	397	76
Flubromazepam	79	127	157	128	238	126
3-OH-Flubromazepam	146	69	306	65	457	66
Flubromazolam	97	103	193	103	289	104
Flunitrazepam	142	71	283	71	424	71
7-Aminoflunitrazepam	97	104	212	94	333	90
Desmethylflunitrazepam	135	74	273	73	395	76
3-Hydroxyflunitrazepam	175	57	355	56	584	51
Flurazepam	165	61	352	57	490	61
Desalkylflurazepam	105	95	228	88	323	93
Didesethylflurazepam	136	73	274	73	423	71
Hydroxyethylflurazepam	100	100	228	88	347	87
Halazepam	171	59	353	57	507	59
Lorazepam	163	62	341	59	487	62
Lorazepam glucuronide	19 615	0.51	> 20 000	1	> 20 000	1
Lormetazepam	163	61	307	65	503	60
Meclonazepam	347	29	757	26	1282	23
Medazepam	224	45	395	51	694	43
Desmethylmedazepam	345	29	602	33	968	31
Midazolam	168	60	309	65	467	64
α -Hydroxymidazolam	140	71	267	75	431	70
Nifoxipam	375	27	800	25	1317	23
Nitrazepam	114	88	246	81	359	84
7-Acetamidonitrazepam	43 026	0.23	91 765	0.22	175 497	0.17
7-Aminonitrazepam	103	97	239	84	340	88
Oxaprozin	5 000	2	N/A	N/A	N/A	N/A
Oxazepam	122	82	259	77	398	75
Pinazepam	170	59	291	69	552	54
Prazepam	164	61	337	59	521	58
Pyrazolam	106	95	214	93	314	96
Temazepam	145	69	256	78	409	73
Temazepam glucuronide	> 20 000	0.8	> 30 000	0.7	> 20 000	1
Triazolam	115	87	236	85	352	85
α -Hydroxytriazolam	116	86	243	82	377	80
4-Hydroxytriazolam	121	83	250	80	385	78

Indented drugs are metabolites of the preceding drug.

Many benzodiazepines appear in the urine largely as the glucuronidated conjugate. Glucuronidated metabolites may have more or less cross-reactivity than the parent compound.

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), COBAS INTEGRA β -glucuronidase application (I β), Roche/Hitachi (H), or cobas c (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

Benzodiazepines on the COBAS INTEGRA systems: None of these compounds gave values greater than 0.5 % cross-reactivity.

Benzodiazepines β -glucuronidase application on the COBAS INTEGRA systems: None of these compounds gave values greater than 0.09 % cross-reactivity.

Benzodiazepines Plus on the Roche/Hitachi and cobas c systems: None of these compounds gave values greater than 0.07 %.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound		Compound		Compound	
Acetaminophen		Fenoprofen		Omeprazole (5 mg/mL)*	I
Acetylsalicylic acid		Flecainide acetate	ICH	Penicillin G	
Albuterol (4 mg/mL)*	I	Flumazenil	ICH	Pentazocine	I, I β
Aminopyrine		Fluoxetine (1 mg/mL)*	I	Pentobarbital	
Amitriptyline		Furosemide		Phencyclidine	
Amobarbital		Gabapentin (5 mg/mL)*	I	β -Phenethylamine	
<i>d</i> -Amphetamine		Gentisic acid		Phenobarbital	
<i>l</i> -Amphetamine		Glutethimide		Phenothiazine	
Ampicillin		Guaiaicol glycerol ether		Phentermine	CH
Ascorbic acid		Harmaline	CH	Phenylbutazone	
Aspartame		Harmane	CH	<i>d</i> -Phenylpropanolamine	
Atropine		Hydrochlorothiazide		<i>d,l</i> -Phenylpropanolamine	
Benzocaine		<i>p</i> -Hydroxyamphetamine		Procaine	
Benzoylcegonine		Ibuprofen		Prochlorperazine (2 mg/mL)*	I
Benzphetamine		Imipramine		Promethazine	
Bupropion (1 mg/mL)*	I	Isoproterenol		Propranolol (2 mg/mL)*	I
Butabarbital		Ketamine		Pseudoephedrine	I, I β
Caffeine		Ketoprofen (4 mg/mL)*	I	<i>d</i> -Pseudoephedrine	CH
Calcium hypochlorite		Labetalol (1 mg/mL)*	I	<i>l</i> -Pseudoephedrine	CH
Carbamazepine (4 mg/mL)*	I	Levomepromazine	I	Quetiapine hemifumarate	CH
Chloroquine		(Methotrimeprazine)		Quetiapine metabolite:	CH
Chlorpheniramine		(3 mg/mL)*		Norquetiapine	
Chlorpromazine		Lidocaine		Quetiapine metabolite:	CH
Cetylpyridinium chloride	I	LSD		Quetiapine sulfoxide	
(5 mg/mL)*		MDA		Quinidine	
Chlorprothixene (2 mg/mL)*	I	MDEA	I β	Quinine	
Citalopram	ICH	MDMA		Secobarbital	
Cocaine		Melatonin		Sertraline (2 mg/mL)*	I
Codeine		Melatonin (2 mg/mL)*	I	Sitagliptin Phosphate	CH
Cyclobenzaprine	CH	Meperidine		(0.2 mg/mL)*	
Cyclobenzaprine (5 mg/mL)*	I	Meprobamate (2.5 mg/mL)*	I	Sulindac	
Desipramine	CH	Methadone		Terfenadine (2 mg/mL)*	
Dextromethorphan		<i>d</i> -Methamphetamine		Terfenadine metabolite:	I
Dextropropoxyphene		<i>l</i> -Methamphetamine		Azacyclonal (1.5 mg/mL)*	
Diphenhydramine		Methaqualone		Tetracycline	
Diphenylhydantoin		Methylphenidate		Δ^9 THC-9-carboxylic acid	I

Benzodiazepins/Benzodiazepines Plus

Compound	
Dipyron (2.5 mg/mL)*	I
Dopamine	
Doxepin	CH
Doxepin (2 mg/mL)*	I
Doxepin metabolite: Nordoxepin (1 mg/mL)*	I
Ecgonine	
Ecgonine methyl ester	
<i>d</i> -Ephedrine	
<i>d,l</i> -Ephedrine	CH
<i>l</i> -Ephedrine	
Epinephrine	CH
Erythromycin	
Estriol	

Compound	
Methpyrlylon	
Minoxidil (1.5 mg/mL)*	I
Morphine	
Nalbuphine (1 mg/mL)*	I
6beta-Naltrexol	CH
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	
Norethindrone	
Norharmine hydrochloride monohydrate	CH
<i>l</i> -Norpseudoephedrine	
Nortriptyline	CH
Olanzapine (2 mg/mL)*	I

Compound	
Tetrahydrozoline	
Tramadol (2 mg/mL)*	I
Trazodone (5 mg/mL)*	I
Trifluoperazine	
Trimethobenzamide (0.5 mg/mL)*	I
Trimipramine	CH
Tyramine	
Valerian Root (250 mg/mL)*	
Venlafaxine (4 mg/mL)*	I
Verapamil	
Viminol (2 mg/mL)*	I
Zalcitabine (2 mg/mL)*	I
Zidovudine (2 mg/mL)*	I
Zolpidem	I
Zopiclone	ICH

Benzodiazepines II

*Cross-reactivity with structurally related compounds/
Analytical specificity*

COBAS INTEGRA

Compound	100 ng Cutoff		200 ng Cutoff		300 ng Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Alprazolam	108	93	231	86	354	85
α -Hydroxyalprazolam	104	96	228	88	343	87
4-Hydroxyalprazolam	129	78	299	67	394	76
Benzazepam	190	53	508	39	614	49
Bromazepam	107	93	239	84	325	92
Brotiazepam	138	72	290	69	450	67
Chlordiazepoxide	174	58	475	42	563	53
Desmethylchlordiazepoxide (Norchlordiazepoxide)	146	68	393	51	494	61
Clobazam	139	72	324	62	441	68
Clonazepam	155	65	367	55	508	59
7-Aminoclonazepam	130	77	303	66	390	77
Clonazolam	86	116	188	106	259	116
Clorazepate	123	81	271	74	404	74
Delorazepam	121	83	254	79	382	79
Demoxepam	122	82	316	63	378	79
Deschloroetizolam	76	132	172	116	228	132
Desmethylmedazepam	225	45	628	32	713	42
Diazepam	142	71	284	70	405	74
Nordiazepam	96	105	209	96	304	99
Diclazepam	100	100	215	93	298	101
Estazolam	92	109	199	100	306	98
Etizolam	121	82	239	84	362	83
Flubromazepam	79	127	177	113	246	122
3-OH-Flubromazepam	120	83	274	73	386	78
Flubromazolam	101	99	210	95	304	99
Flunitrazepam	136	74	320	62	450	67
7-Aminoflunitrazepam	124	80	293	68	408	74
Desmethylflunitrazepam	115	87	281	71	372	81
Flurazepam	159	63	330	61	494	61
Desalkylflurazepam	104	96	238	84	344	87
Hydroxyethylflurazepam	123	81	260	77	389	77
Didesethylflurazepam	138	73	306	65	456	66
Halazepam	176	57	355	56	562	53
Ketazolam	491	20	1 005	20	1 452	21

Compound	100 ng Cutoff		200 ng Cutoff		300 ng Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Lorazepam	169	59	398	50	587	51
Lorazepam glucuronide	289	35	695	29	874	34
Lormetazepam	141	71	318	63	429	70
Meclonazepam	160	63	467	43	509	59
Midazolam	181	55	347	58	577	52
α-Hydroxymidazolam	117	85	255	78	405	74
Nifoxipam	184	54	543	37	601	50
Nimetazepam	1 099	9	2 431	8	3 435	9
Nitrazepam	114	88	305	66	386	78
7-Acetamidonitrazepam	26 180	0.38	87 903	0.23	72 581	0.41
7-Aminonitrazepam	84	120	186	107	269	111
Oxaprozoin	2 773	4	10 595	2	8911	3
Oxazepam	128	78	290	69	405	74
Oxazepam glucuronide	244	41	593	34	719	42
Phenazepam	98	102	219	91	325	92
Pinazepam	159	63	393	51	554	54
Prazepam	152	66	532	38	635	47
Pyrazolam	81	123	171	117	273	110
Temazepam	143	70	350	57	469	64
Temazepam glucuronide	393	25	894	22	1 186	25
Tetrazepam	163	61	339	59	456	66
Triazolam	123	81	266	75	392	77
α-Hydroxytriazolam	138	73	276	72	405	74
Zolpidem	125 000	0.08	250 000	0.08	200 000	0.15

Indented drugs are metabolites of the preceding drug.

Many benzodiazepines appear in the urine largely as the glucuronidated conjugate. Glucuronidated metabolites may have more or less cross-reactivity than the parent compound. The presence of β-glucuronidase enzyme enhances the COBAS INTEGRA Benzodiazepines II assay cross-reactivity to some of the glucuronidated metabolites.

Roche/Hitachi and cobas c

Compound	100 ng Cutoff		200 ng Cutoff		300 ng Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Alprazolam	113	89	236	85	372	81
α-Hydroxyalprazolam	115	87	241	83	347	86
4-Hydroxyalprazolam	117	86	246	81	342	88
Benzazepam	173	58	376	53	504	60
Bromazepam	101	99	208	96	299	100
Brotiazolam	144	70	292	68	464	65
Chlordiazepoxide	156	64	371	54	499	60
Desmethylchlordiazepoxide (Norchlordiazepoxide)	138	73	313	64	452	66
Clobazam	122	82	256	78	386	78
Clonazepam	152	66	318	63	483	62
7-Aminoclonazepam	107	94	232	86	406	74

Benzodiazepines II

Compound	100 ng Cutoff		200 ng Cutoff		300 ng Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Clonazepam	96	104	185	108	290	103
Clorazepate	115	87	227	88	374	80
Delorazepam	131	76	258	77	389	77
Demoxepam	114	88	253	79	352	85
Deschloroetizolam	80	125	159	126	242	124
Desmethylmedazepam	168	59	422	47	539	56
Diazepam	128	78	258	78	400	75
Nordiazepam	101	99	204	98	316	95
Diclazepam	118	85	225	89	346	87
Estazolam	93	107	197	101	303	99
Etizolam	122	82	234	86	343	88
Flubromazepam	94	107	180	111	274	110
3-OH-Flubromazepam	126	79	246	81	358	84
Flubromazolam	119	84	221	91	351	85
Flunitrazepam	136	73	284	70	439	68
7-Aminoflunitrazepam	109	92	244	82	368	82
Desmethylflunitrazepam	114	88	248	81	338	89
Flurazepam	164	61	333	60	511	59
Desalkylflurazepam	106	95	225	89	336	89
Hydroxyethylflurazepam	127	79	259	77	394	76
Didesethylflurazepam	144	70	297	67	458	65
Halazepam	187	53	354	56	595	50
Ketazolam	476	21	990	20	1489	20
Lorazepam	153	65	335	60	506	59
Lorazepam glucuronide	275	36	584	34	825	36
Lormetazepam	138	73	284	70	410	73
Meclonazepam	132	76	329	61	424	71
Midazolam	190	53	343	58	564	53
α -Hydroxymidazolam	125	80	253	79	428	70
Nifoxipam	157	64	391	51	552	54
Nimetazepam	1 045	10	2 191	9	3 247	9
Nitrazepam	104	96	243	82	354	85
7-Acetamidonitrazepam	16 909	0.59	55 488	0.36	55 328	0.54
7-Aminonitrazepam	71	141	159	126	218	138
Oxaprozin	2 283	4	7 500	3	7 507	4
Oxazepam	105	95	224	89	325	92
Oxazepam glucuronide	234	43	506	40	684	44
Phenazepam	112	89	230	87	346	87
Pinazepam	160	63	364	55	572	52
Prazepam	194	51	408	49	637	47
Pyrazolam	105	95	188	106	279	107

Compound	100 ng Cutoff		200 ng Cutoff		300 ng Cutoff	
	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity	~ ng/mL equivalent to nordiazepam	~ % Cross-reactivity
Temazepam	133	75	282	71	416	72
Temazepam glucuronide	302	33	647	31	923	33
Tetrazeepam	156	64	323	62	458	66
Triazolam	136	74	279	72	425	71
α -Hydroxytriazolam	145	69	287	70	440	68
Zolpidem	106 383	0.09	206 186	0.10	200 000	0.15

Indented drugs are metabolites of the preceding drug.

Many benzodiazepines appear in the urine largely as the glucuronidated conjugate. Glucuronidated metabolites may have more or less cross-reactivity than the parent compound. The presence of β -glucuronidase enzyme enhances the Benzodiazepines II assay cross-reactivity to some of the glucuronidated metabolites.

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

COBAS INTEGRA systems: None of these compounds gave values greater than 0.09 % cross-reactivity.

Roche/Hitachi and cobas c systems: None of these compounds gave values greater than 0.08 % cross-reactivity at the 100 ng/mL and 200 ng/mL cutoff, or greater than 0.13 % at the 300 ng/mL cutoff.

Compound	
Acetaminophen	
Acetylsalicylic acid	
Amitriptyline	
Amobarbital	
<i>d</i> -Amphetamine	
<i>l</i> -Amphetamine	
Ampicillin	
Ascorbic acid	
Aspartame	
Atropine	
Benzocaine	
Benzoyllecgonine	
Benzphetamine	
Buspirone	
Butabarbital	
Caffeine	
Calcium hypochlorite	
Cannabidiol	
Captopril	
Chloroquine	
Chlorpheniramine	
Chlorpromazine	
Clozapine	CH
Cocaine	

Compound	
Fenoprofen	
Flumazenil	
Furosemide	
Gentisic acid	
Glutethimide	
Guaiacol glycerol ether	
Harmaline	CH
Harmane	CH
Hydrochlorothiazide	
Hydroxyindole acetic acid	
Hydroxyindole carboxylic acid	
Ibuprofen	
Imipramine	
Isoproterenol	
Ketamine	
Lidocaine	
LSD	
MDA	
MDMA	
Melatonin	
Meperidine	
Methadone	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	

Compound	
Omeprazole	
Penicillin G	
Pentazocine	
Pentobarbital	
Phencyclidine	
Phenobarbital	
Phenothiazine	
Phenylbutazone	
<i>d,l</i> Phenylpropanolamine	
Procaine	
Promethazine	
<i>d</i> -Pseudoephedrine	
Quetiapine	CH
Quetiapine hemifumarate	CH
Quetiapine metabolite:	CH
Norquetiapine	
Quetiapine metabolite:	CH
Quetiapine sulfoxide	
Quinidine	
Quinine	
Secobarbital	
Sertraline	CH
Sulindac	
Tetracycline	

Benzodiazepines II

Compound	
Codeine	
Desipramine HCl	
Dextromethorphan	
Dextropropoxyphene	
Digoxin	
Diphenhydramine	
Diphenylhydantoin	
Doxepin	
Ecgonine	
Ecgonine methyl ester	
Enalapril	
<i>d</i> -Ephedrine	
<i>l</i> -Ephedrine	
Epinephrine	
Erythromycin	
Estriol	

Compound	
Methaqualone	
Methylphenidate	
Methyprylon	
Mirtazapine	I
Morphine sulphate	
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	
Nicotine	
Norethindrone	
Norharmane hydrochloride	CH
monohydrate	
<i>l</i> -Norpseudoephedrine	

Compound	
Δ^9 THC-9-carboxylic acid	
Tetrahydrozoline	
Thioridazine	
Tolmetin	
Tramadol	I
Tramadol metabolite:	I
N-Desmethyl-Tramadol	
Trifluoperazine	
Trimiprimine	
Tyramine	
Verapamil	
Zomepirac	
Zopiclone	CH

Cocaine II

*Cross-reactivity with structurally related compounds/
Analytical specificity*

COBAS INTEGRA

Compound	150 ng Cutoff		300 ng Cutoff	
	approximate equivalent to 150 ng/mL Benzoyllecgonine	approximate % Cross-reactivity	approximate equivalent to 300 ng/mL Benzoyllecgonine	approximate % Cross-reactivity
Cocaine	7 112	2	18 508	2
Cocaethylene	37 260	0.4	70 108	0.4
Ecgonine	> 100 000	< 0.1	> 100 000	< 0.1
Ecgonine methyl ester	> 100 000	< 0.1	> 100 000	< 0.1
m-Hydroxy-benzoyllecgonine	157	96	357	84
Norcocaine	> 100 000	< 0.1	> 100 000	< 0.1

Roche/Hitachi and cobas c

Compound	150 ng Cutoff		300 ng Cutoff	
	approximate equivalent to 150 ng/mL Benzoyllecgonine	approximate % Cross-reactivity	approximate equivalent to 300 ng/mL Benzoyllecgonine	approximate % Cross-reactivity
Cocaine	7 733	2	18 132	2
Cocaethylene	34 933	0.4	67 435	0.4
Ecgonine	> 100 000	< 0.1	> 100 000	< 0.1
Ecgonone methyl ester	> 100 000	< 0.1	> 100 000	< 0.1
m-Hydroxy-benzoyllecgonine	164	91	350	86
Norcocaine	> 100 000	< 0.1	> 100 000	< 0.1

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H) or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

None of these compounds gave values greater than 0.05 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound		Compound		Compound	
Acetaminophen		EMDP		Nicotine	
Acetylsalicylic acid		Erythromycin		Nordiazepam	
Aminopyrine		Estriol		Nordoxepin	
Amitriptyline		Fenoprofen		Norethindrone	
Amobarbital		Fluconazole		<i>l</i> -Norpseudoephedrine	
<i>d</i> -Amphetamine		Fluoxetine		Nortriptyline	
<i>l</i> -Amphetamine		Furosemide		Orphenadrine	
Ampicillin		Gabapentine (2mg/mL)*	CH	Oxazepam	
Ascorbic acid		Gentisic acid		Oxycodone	
Aspartame		Glutethimide		Penicillin G	
Atropine		Guaiacol glycerol ether		Pentobarbital	
Benzocaine		Haloperidol		Perphenazine	
Benzphetamine		Hydrochlorothiazide		Phencyclidine	
Butabarbital		Hydroxymethadone		β -Phenethylamine	
Caffeine		Ibuprofen		Phenobarbital	
Calcium hypochlorite		Imipramine		Phenothiazine	
Cannabidiol		Isoproterenol		Phentermine	
Carbamazepine		Ketamine		Phenylbutazone	
Chlordiazepoxide		LAAM (Levomethadyl acetate)		Phenylpropanolamine	
Chloroquine		Lidocaine		<i>d</i> -Phenylpropanolamine	
Chlorpheniramine		LSD		Phendimetrazine	
Chlorpromazine		Maprotiline		Procaine	
Chlorprothixene		MDA		Promazine	
Clomipramine		MDMA		Promethazine	
Codeine		Melanin		Propoxyphene	
Cotinine		Meperidine		Protriptyline	
Cyclobenzaprine		Methadol		<i>d</i> -Pseudoephedrine	
Cyproheptadine		Methadone		<i>l</i> -Pseudoephedrine	
Desipramine		<i>d</i> -Methamphetamine		Quinidine	
Dextromethorphan		<i>l</i> -Methamphetamine		Quinine	
Dextropropoxyphene		Methaqualone		Secobarbital	
Diazepam		Methotrimeprazine		Sulindac	
Diphenhydramine		Methyl dopa	I	Tetracycline	
Diphenylhydantoin		Methylphenidate		Δ^9 -THC-9-carboxylic acid	
Disopyramide		Methyprylon		Tetrahydrozoline	
Dopamine		Mianserin		Thioridazine	
Doxepin		Morphine sulfate		Thiothixene	
Doxylamine		Naloxone		Trifluoperazine	
<i>d</i> -Ephedrine		Naltrexone		Trimipramine	
<i>d,l</i> -Ephedrine		Naproxen		Tyramine	
<i>l</i> -Ephedrine		Niacinamide		Verapamil	
Epinephrine				Zomepirac	
EDDP					

LSD*Cross-reactivity with structurally related compounds /Analytical specificity***COBAS INTEGRA**

Compound	Approximate ng/mL equivalent to 0.5 ng/mL LSD	Approximate % cross-reactivity
2-Bromo- α -ergocryptine	29 070	0.0017
α -Ergocryptine	750 000	< 0.0001
Ergonovine Maleate	12 500	0.004
Ergotamine Tartrate	32 468	0.0015
Iso-LSD	11	5
<i>d</i> -Lysergic acid	86 207	0.0006
Lysergic Acid N-(hydroxyethyl) amide	15 957	0.003
Lysergic Acid N-(methylpropyl) amide	16	3
Nor-LSD (N-desmethyl-LSD)	1.8	28
2-Oxo-3-hydroxy-LSD	4.4	11
Methysergide Maleate	3 191	0.016
Serotonin	211 864	0.0002
<i>d</i> -Tryptophan	116 822	0.0004

Cobas c

Compound	Approximate ng/mL equivalent to 0.5 ng/mL LSD	Approximate % cross-reactivity
2-Bromo- α -ergocryptine	31 724	0.0016
α -Ergocryptine	1 000 000	0.0001
Ergonovine Maleate	10 769	0.0046
Ergotamine Tartrate	36 296	0.0014
Iso-LSD	14	3.6
<i>d</i> -Lysergic acid	113 636	0.0004
Lysergic Acid N-(methylpropyl) amide	15	3.3
Nor-LSD (N-desmethyl-LSD)	2	33
2-Oxo-3-hydroxy-LSD	4	12
Methysergide Maleate	2 904	0.017
Serotonin	238 095	0.0002
<i>d</i> -Tryptophan	166 667	0.0003

Cross-reactivity with structurally unrelated compounds

The data applies to both the COBAS INTEGRA and **cobas c** systems unless noted. If noted, it applies only to the COBAS INTEGRA (I) or **cobas c** (C) system. LSD is not available on the Roche/Hitachi system.

Unless otherwise noted in brackets the following compounds were tested at a concentration of 100 000 ng/mL.

COBAS INTEGRA systems: None of these compounds gave a positive response.

cobas c systems: None of these compounds gave values greater than 0.4 ng/mL (0.0004 % cross-reactivity).

Compound		Compound		Compound	
Ambroxol (2 mg/mL)	I	Ephedrine		Norethindrone	
Acetaminophen		<i>l</i> -Ephedrine		<i>l</i> -Norpseudoephedrine	
Acetylsalicylic acid		Epinephrine		Nortriptyline	C
Aminopyrine		Erythromycin		Oxazepam	
Amitriptyline		Estriol		Penicillin G	
Amobarbital		Fenoprofen		Pentazocine	C
<i>d</i> -Amphetamine		Flumazenil	C	Pentobarbital	
<i>d,l</i> -Amphetamine	I	Fluoxetine	I	β -Phenethylamine	
<i>l</i> -Amphetamine		Fluvoxamine	I	Phencyclidine	
Ampicillin		Furosemide		Phenobarbital	
Ascorbic acid		Gentisic acid		Phenothiazine	
Aspartame		Glutethimide		Phentermine	
Atropine		Guaiacol glycerol ether		Phenylbutazone	
Benzocaine		Hydrochlorothiazide		<i>d</i> -Phenylpropanolamine	
Benzoylcegonine		<i>p</i> -Hydroxyamphetamine		<i>d,l</i> -Phenylpropanolamine	
Benzphetamine		Ibuprofen		<i>l</i> -Phenylpropanolamine	I
Brompheniramine	C	Imipramine		Pipamperone dihydrochloride	
Butabarbital		Isoproterenol		Procaine	
Caffeine		Ketamine		Procyclidine	C
Calcium hypochlorite		Lidocaine		Promethazine	
Chlordiazepoxide		Methylenedioxyamphetamine		<i>d</i> -Pseudoephedrine	
Chloroquine		MDA		<i>l</i> -Pseudoephedrine	
Chlorpheniramine		Methylenedioxymethamphetamine MDMA		Quinidine	
Chlorpromazine		Melanin		Quinine	
Clemastine	C	Meperidine		Secobarbital	
Cocaine		Methadone		Sulindac	
Codeine		<i>d</i> -Metamphetamine	C	Tetracycline	
Desipramine	C	<i>l</i> -Methamphetamine		Δ^9 THC-9-carboxylic acid	
Dextromethorphan		Methapyrilene		Tetrahydrozoline	
Dextropropoxyphene		Methaqualone		Thioridazine	C
Diazepam		Methylphenidate		Trifluoperazine	
Diphenhydramine		Methypylon		<i>d,l</i> -Trihexyphenidyl	C
Diphenylhydantoin		Morphine		Trimipramine	C
Dopamine		Naloxone		Tripelenamine	C
Doxepin	C	Naltrexone		Tyramine	
Doxylamine	I	Naproxen		Venlafaxine	I
Ecgonine		Niacinamide		Verapamil	
Ecgonine methyl ester		Nordiazepam		Zolpidem	C
<i>d</i> -Ephedrine				Zopiclone	C

Methadone II

*Cross-reactivity with structurally related compounds/
Analytical specificity*

COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 300 ng/mL methadone	Approximate % cross-reactivity
Chlorpromazine	26 019	1
Chlorprothixene	168 539	0.2
Clomipramine	94 767	0.3
Cyamemazine	5 229	6
EDDP	> 600 000	< 0.1
EMDP	> 600 000	< 0.1
Hydroxymethadone	2 571	12
LAAM = l- α -acetylmethadol	291 262	0.1
l- α -Methadol	215 827	0.1
Methotrimeprazine = Levomepromazine	6 244	5
Promazine	92 857	0.3
Promethazine	168 539	0.2
Thioridazine	109 091	0.3
Thiothixene	24 268	1
Tramadol	87 278	0.3
Trimipramine	229 008	0.1

Roche/Hitachi and cobas c

Compound	Approximate ng/mL equivalent to 300 ng/mL methadone	Approximate % cross-reactivity
Chlorpromazine	26 071	1
Chlorprothixene	186 335	0.2
Clomipramine	135 747	0.2
Cyamemazine	8 477	4
EDDP	N/A	< 0.1
EMDP	N/A	< 0.1
Hydroxymethadone	3 289	9
LAAM = l- α -Acetylmethadol	370 370	0.1
l- α -Methadol	220 588	0.1
Methotrimeprazine = Levomepromazine	8 939	3
Promazine	142 857	0.2
Promethazine	288 462	0.1
Quetiapine metabolite: Norquetiapine	112 782	0.3
Thioridazine	146 341	0.2
Thiothixene	39 267	0.8
Tramadol	102 465	0.3
Trimipramine	422 535	0.1

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted it. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

*None of these compounds gave values higher than 0.2 % cross-reactivity.

**An exception is Clotiapine which showed a cross-reactivity of 0.3 %. Nevertheless false positives due to Clotiapine are not likely as the maximum expected Clotiapine concentration in urine is only 20 000 ng/mL.

Compound	
Acetaminophen	
Acetylsalicylic acid	
Aminopyrine	
Amitriptyline	
Amobarbital	
<i>d</i> -Amphetamine	
<i>l</i> -Amphetamine	
Ampicillin	
Ascorbic acid	
Aspartame	
Atropine	
Benzocaine	
Benzoyllecgonine	
Benzphetamine	
Butabarbital	
Caffeine	
Calcium hypochlorite	
Carbamazepine	
Chlordiazepoxide	
Chloroquine	
Chlorpheniramine	
Citalopram	I
Clotiapine**	CH
Clozapine metabolite: Norclozapine	CH
Cocaine	
Codeine	
Cotinine	
Cyclobenzaprine	
Cyproheptadine	
Desipramine	
Dextromethorphan	
Dextropropoxyphene	
Diazepam	
Diphenylhydantoin	
Diphenhydramine	
Disopyramide (1mg/mL)*	
Dopamine	
Doxepin	
Doxylamine	

Compound	
Ecgonine	
Ecgonine methyl ester	
<i>d,l</i> -Ephedrine	
<i>d</i> -Ephedrine	
<i>l</i> -Ephedrine	
Epinephrine	
Erythromycin	
Estriol	
Fenoprofen	
Fluoxetine	
Furosemide	
Gentisic acid	
Glutethimide	
Guaiacol glycerol ether	
Haloperidol	
Hydrochlorothiazide	
Ibuprofen	
Imipramine	
Isoproterenol	
Ketamine	
Lidocaine	
LSD	
Maprotiline	
MDA	
MDMA	
Mefloquine	CH
Melanin	
Meperidine	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	
Methaqualone	
Methylphenidate	
Methyprylon	
Mianserin	
Mirtazapine	I
Morphine sulfate	
Naloxone	
Naltrexone	
Naproxen	

Compound	
Niacinamide	
Nicotine	
Nordiazepam	
Nordoxepin	
Norethindrone	
Nortriptyline	
<i>l</i> -Norpseudoephedrine	
Ofloxacin (0.22 mg/mL)*	
Orphenadrine	
Oxazepam	
Penicillin G	
Pentobarbital	
Phencyclidine	
β -Phenethylamine	
Perphenazine	
Phenobarbital	
Phenothiazine	
Phentermine	
Phenylbutazone	
Phenylpropanolamine	
<i>d</i> -Phenylpropanolamine	
Procaine	
Protriptyline	CH
<i>d</i> -Pseudoephedrine	
<i>l</i> -Pseudoephedrine	CH
Quetiapine hemifumarate	
Quetiapine metabolite: norquetiane	
Quetiapine sulfoxide	
Quinidine	
Quinine	
Secobarbital	
Sulindac	
Tetracycline	
Δ^9 THC-9-carboxylic acid	CH
Tetrahydrozoline	
Trazodone	
Trifluoperazine	CH
Tyramine	
<i>d,l</i> -Verapamil	
Venlafaxine	

Please note:

Specimens from Seroquel (quetiapine hemifumarate) users have screened positive for methadone. Quetiapine hemifumarate showed no cross-reactivity with the Methadone assay. Tested concentrations of 100 000ng/mL and 500 000 ng/mL had a cross-reactivity of < 0.01 %. But Quetiapine hemifumarate metabolites as Norquetiapine may cause false positives due to high daily dosis.

Methadone Metabolite

Cross-reactivity with structurally related compounds/ Analytical specificity

At the concentrations shown, the following compounds are considered to have no cross-reactivity because they produced a negative result, compared to the 100 ng/mL and 300 ng/mL cutoff. Testing was performed on a Roche/Hitachi 917 analyzer.

Compound	Concentration tested in ng/mL
EMDP	200 000
LAAM HCl	100 000
Methadone	500 000
Nor-LAAM HCl	10 000

Cross-reactivity with structurally unrelated compounds

Structurally unrelated compounds and/or concurrently used drugs produced a negative result, on a Roche/Hitachi 917 analyzer, at the concentrations listed below.

Compound	Concentration tested in ng/mL
Acetaminophen	1 000 000
6-Acetyl morphine	500 000
Acetylsalicylic acid	1 000 000
Amitriptyline	100 000
Amoxicillin	500 000
Amphetamine	1 000 000
Benzoylcegonine	1 000 000
Caffeine	100 000
Captopril	500 000
Carbamazepine	500 000
Chlordiazepoxide	100 000
Chlorpromazine	100 000
Cimetidine	500 000
Clomipramine	100 000
Cocaine	200 000
Codeine	1 000 000
Desipramine	1 000 000
Dextromethorphan	30 000
Diazepam	30 000
Dihydrocodeine	1 000 000
Diphenhydramine	500 000
Disopyramide	1 000 000
Doxepine	200 000
Doxylamine	500 000
Ephedrine	2 000 000

Compound	Concentration tested in ng/mL
Imipramine	1 000 000
Ketamine	400 000
Levorphanol	200 000
Levothyroxine	500 000
Maprotiline	1 000 000
Meperidine	1 000 000
<i>d</i> -Methamphetamine	100 000
<i>l</i> -Methamphetamine	100 000
Metronidazole	250 000
Morphine	1 000 000
Nalbuphine	1 000 000
Naloxone	3 000 000
Naltrexone	3 000 000
Norcodeine	1 000 000
Normorphine	1 000 000
Nortriptyline	500 000
Oxazepam	500 000
Oxycodone	500 000
Phencyclidine	50 000
Phenobarbital	1 000 000
Phentermine	1 000 000
Promethazine	100 000
Propoxyphene	50 000
Ranitidine	500 000
Salicylic Acid	500 000

Methadone Metabolite

Compound	Concentration tested in ng/mL
Fentanyl	200 000
Fluoxetine	1 000 000
Fluphenazine	500 000
Heroin	1 000 000
Hydrocodone	200 000
Hydromorphone	200 000
Ibuprofen	1 000 000

Compound	Concentration tested in ng/mL
Secobarbital	1 000 000
Talwin	500 000
11-Nor-(Δ^9) THC-COOH	10 000
Thebaine	100 000
Thioridazine	150 000
Tramadol	500 000

Methaqualone

Cross-reactivity with structurally related compounds/ Analytical specificity

COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 300 ng/mL methaqualone	Approximate % cross-reactivity
Mecloqualone	211	142
3'-Hydroxy-methaqualone	352	85
4'-Hydroxy-methaqualone	266	113
6-Hydroxy-methaqualone	1 560	19
2'-Hydroxymethyl-methaqualone	492	61
2-Hydroxymethyl-methaqualone	625	48

cobas c

Compound	Approximate ng/mL equivalent to 300 ng/mL methaqualone	Approximate % cross-reactivity
3'-Hydroxy-methaqualone	428	70
4'-Hydroxy-methaqualone	337	89
6-Hydroxy-methaqualone	1 825	16
2'-Hydroxymethyl-methaqualone	547	55
2-Hydroxymethyl-methaqualone	720	42

Cross-reactivity with structurally unrelated compounds

The data applies to both the COBAS INTEGRA and **cobas c** systems unless noted. If noted, it applies only to the COBAS INTEGRA (I) or **cobas c** (C) systems. Methaqualone is not available on Roche/Hitachi systems.

The following compounds were tested at a concentration of 100 000 ng/mL.

None of these compounds gave values greater than 0.2 % cross-reactivity.

Compound	Compound	Compound
Acetaminophen	<i>d</i> -Ephedrine	<i>l</i> -Norpseudoephedrine
Acetylsalicylic acid	<i>l</i> -Ephedrine	Nortriptyline C
Aminopyrine	Epinephrine	Oxazepam
Amitriptyline	Erythromycin	Penicillin G
Amobarbital	Estriol	Pentazocine C
<i>d</i> -Amphetamine	Fenoprofen	Pentobarbital
<i>l</i> -Amphetamine	Flumazenil C	Phencyclidine
Ampicillin	Furosemide	β -Phenethylamine
Ascorbic acid	Gentisic acid	Phenobarbital
Aspartame	Glutethimide	Phenothiazine
Atropine	Guaiaicol glycerol ether	Phentermine
Benzocaine	Hydrochlorothiazide	Phenylbutazone
Benzoylcegonine	<i>p</i> -Hydroxyamphetamine	<i>d</i> -Phenylpropanolamine

Methaqualone

Compound	
Benzphetamine	
Brompheniramine	C
Butabarbital	
Caffeine	
Calcium hypochlorite	
Chlordiazepoxide	
Chloroquine	
Chlorpheniramine	
Chlorpromazine	
Clemastine	C
Cocaine	
Codeine	
Desipramine	C
Dextromethorphan	
Dextropropoxyphene	C
Diazepam	
Diphenhydramine	
Diphenylhydantoin	
Dopamine	
Doxepin	C
Doxylamine	I
Ecgonine	
Ecgonine methyl ester	
<i>d,l</i> -Ephedrine	

Compound	
Ibuprofen	
Imipramine	
Isoproterenol	
Ketamine	
Lidocaine	
LSD	
MDA	
MDMA	
Melanin	
Meperidine	
Methadone	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	
Methapyrilene	C
Methylphenidate	
Methyprylon	
Morphine Sulfate	I
Morphine	C
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	
Nordiazepam	
Norethindrone	

Compound	
Phenylpropanolamine	
Procaine	
Procyclidine	C
Promethazine	
<i>d</i> -Propoxyphene	I
<i>d</i> -Pseudoephedrine	
<i>l</i> -Pseudoephedrine	
Quinidine	
Quinine	
Secobarbital	
Sulindac	
Tetracycline	
Δ^9 -THC-9-carboxylic acid	
Tetrahydrozoline	
Thioridazine	C
Trifluoperazine	
<i>d,l</i> -Trihexyphenidyl	C
Trimipramine	C
Tripelenamine	C
Tyramine	
Verapamil	
Zolpidem	C
Zopiclone	C

Opiates II

*Cross-reactivity with structurally related compounds/
Analytical specificity*

COBAS INTEGRA

Compound	300 ng/mL Cutoff		2000 ng/mL Cutoff	
	~ ng/mL equivalent to 300 ng/mL of morphin	~ % cross-reactivity	~ ng/mL equivalent	~ % cross-reactivity
6-Acetylmorphine	359	84	2 246	89
Codeine	233	129	1 517	132
Diacetylmorphine	462	65	3 030	66
Dihydrocodeine	324	93	2 224	90
Dihydromorphine	449	67	3 919	51
Ethyl morphine	333	90	2 177	92
Fentanyl	175 000	0.2	3 000 000	0.1
Hydrocodone	734	41	6 118	33
Hydromorphone	924	32	5 734	35
Meperidine	62 337	0.5	644 767	0.3
Morphine-3-glucuronide	721	42	5 398	37
<i>n</i> -Norcodeine	72 078	0.4	551 941	0.4
Oxycodone	46 575	0.6	461 613	0.4
Oxycodone metabolite: Oxymorphone	78 611	0.4	N/A	N/A
Oxycodone metabolite: Noroxycodone	N/A	< 0.1	N/A	< 0.1
Oxycodone metabolite: Noroxymorphone	N/A	< 0.1	N/A	< 0.1
Pholcodine	337	89	2215	90
Rifampicin	2714	11	15552	13
Thebaine	767	39	5 737	35

Roche/Hitachi and cobas c

Compound	300 ng/mL Cutoff		2000 ng/mL Cutoff	
	~ ng/mL equivalent to 300 ng/mL morphin	~ % cross-reactivity	~ ng/mL equivalent	~ % cross-reactivity
6-Acetylmorphine	386	78	2 598	77
Codeine	224	134	1 541	130
Diacetylmorphine	366	82	2 915	69
Dihydrocodeine	510	59	3 170	63
Ethyl morphine	297	101	2 474	81
Hydrocodone	1 086	28	7 166	28
Hydromorphone	1 425	21	10 768	19
Meperidine	> 100 000	< 0.3	> 670 000	< 0.3
Morphine-3-glucuronide	552	54	3 785	53
<i>n</i> -Norcodeine	18 590	2	99 264	2
Oxycodone	> 75 000	< 0.4	> 670 000	< 0.3
Oxycodone metabolite: Oxymorphon	94 667	0.3	N/A	N/A
Oxycodone metabolite: Noroxycodone	N/A	<0.1	N/A	<0.1
Oxycodone metabolite: Noroxymorphone	N/A	<0.1	N/A	<0.1
Pholcodine	315	96	2069	97
Rifampicin	1 800	17	28 600	7
Thebaine	1 210	25	7 579	26

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H) or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

None of these compounds gave values higher than 0.5 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound	
Acetaminophen	
Acetylsalicylic acid	
Aminopyrine	
Amitriptyline	
Amobarbital	
<i>d</i> -Amphetamine	
<i>l</i> -Amphetamine	
Ampicillin	
Ascorbic acid	
Aspartam	
Atropine	
Benzocaine	
Benzoyllecgonine	

Compound	
<i>d,l</i> -Ephedrine	
<i>l</i> -Ephedrine	
Epinephrine	
Erythromycin	
Estriol	
Fenoprofen	
Furosemide	
Gentisic acid	
Glutethimide	
Guaiacol glycerol ether	
Hydrochlorothiazide	
Ibuprofen	
Imipramine	

Compound	
Norethindrone	
<i>l</i> -Norpseudoephedrine	
Ofloxacin (0.5mg/mL)*	CH
Omeprazol	
Oxazepam	
Penicillin G	
Pentobarbital	
Phencyclidine	
Phenobarbital	
Phenothiazine	
Phenylbutazone	
Phenylpropanolamine	
<i>d</i> -Phenylpropanolamine	CH

Opiates II

Compound	
Benzphetamine	
Butabarbital	
Buprenorphine	
Buprenorphine metabolite:	CH
Norbuprenorphine	
Caffeine	
Calcium hypochlorite	
Cannabidiol	
Chlordiazepoxide	
Chloroquine	
Chlorpheniramine	
Chlorpromazine	
Citalopram	I
Clomipramine	I
Cocaine	
Desipramine	I
Dextromethorphan	
Dextropropoxyphene	
Diazepam	
Diphenhydramine	
Diphenylhydantoin	
Dopamine	I
Ecgonine	
Ecgonine methyl ester	
<i>d</i> -Ephedrine	

Compound	
Isoproterenol	
Ketamine	
Lidocaine	
LSD (2500 ng/mL)	CH
LSD	I
Mefloquine	CH
Melanin	
Mirtazapine	
Methadone	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	CH
Methaqualone	
Methylphenidate	
Methyprylon	
Mianserin	I
Nalbuphine	CH
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	

Compound	
Phenyltoloxamine	CH
Phenyltoloxamine metabolite:	CH
Benzylphenole	
Procaine	
Promazine	I
Promethazine	
<i>d</i> -Pseudoephedrine	
<i>l</i> -Pseudoephedrine	
Quetiapin fumarate	
Quinidine	
Quinine	
Secobarbital	
Sulindac	
Tapentadol-D3 HCl	CH
Tetracycline	
Δ^9 THC-9-carboxylic acid (10 000 ng/mL)	CH
Δ^9 THC-9-carboxylic acid	I
Tetrahydrozoline	
Tramadol	I
Tramadol metabolite: N-Desmethyltramadol	I
Trifluoperazine	
Verapamil	

Please note:

MgSO₄ concentrations > 625 mg/mL (51.9 mmol/L) were found to interfere with the assay.

Poppy seed products can contain sufficient morphine and/or codeine to interfere to an Opiates assay.

Oxycodone

Cross-reactivity with structurally related compounds/ Analytical specificity

Compound	Concentration tested (ng/mL)	Recovery (ng/mL)	Approximate % Cross-reactivity
Noroxycodone	50 000	41.5	< 0.1
Noroxymorphone	500 000	303.5	< 0.1
Oxycodone	300	300	100
Oxymorphone	300	308	103

At the concentrations listed, the following compounds tested negative at the 100 ng/mL cutoff.

Compound	µg/mL
6-Acetyl morphine	50
Codeine	500
Dihydrocodeine	100
Heroin	300
Hydrocodone	75
Hydromorphone	30
Levorphanol	200

Compound	µg/mL
Morphine	350
Morphine-3-glucuronide	900
Naloxone	200
Naltrexone	500
Norcodeine	1 000
Normorphine	1 000

Cross-reactivity with structurally unrelated compounds

At the concentrations listed, the following compounds tested negative at the 100 ng/mL cutoff.

Compound	µg/mL
Acetaminophen	1 000
Acetylsalicylic acid	1 000
Amitriptyline	500
Amoxicillin	500
Amphetamine	2 000
Benzoylcegonine	2 000
Caffeine	1 000
Carbamazepine	1 000
Chlorpromazine	2 000
Cimetidine	1 000
Clomipramine	1 000
Desipramine	1 000
Dextromethorphan	200
Doxepin	200
Ephedrine	2 000
Fentanyl	200
Fluoxetine	1 000
Fluphenazine	500
Ibuprofen	1 000

Compound	µg/mL
Imipramine	1 000
Maprotiline	1 000
Meperidine	1 000
Methadone	1 000
Metronidazole	2 000
Nalbuphine	1 000
Nortriptyline	500
Oxazepam	500
Phencyclidine	1 000
Phenobarbital	1 000
Ranitidine	3 000
Secobarbital	1 000
Talwin	500
Thebaine	20
Thioridazine	1 000
Tramadol	500

PCP/PCP Plus

Cross-reactivity with structurally related compounds/ Analytical specificity

PCP on COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 25 ng/mL PCP	Approximate % cross-reactivity
Chlorprothixene	92 857	0.03
Dextromethorphan	137 787	0.02
Thienylcyclohexylpiperidine (TCP)	30	83

PCP Plus on Roche/Hitachi and cobas c

Compound	Approximate ng/mL equivalent to 25 ng/mL PCP	Approximate % cross-reactivity
Amitriptyline	N/A	0.031
Chlorprothixene	~ 100 000	0.025
Desipramine	N/A	0.022
Dextromethorphan	> 100 000	0.01
Imipramine	N/A	0.037
Ketamine	> 100 000	<0.01
Thienylcyclohexylpiperadine (TCP)	49	51

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

PCP on the COBAS INTEGRA system: None of these compounds gave values greater than 0.05 % cross-reactivity.

PCP Plus on Roche/Hitachi and **cobas c**: None of these compounds gave values greater than 0.018 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound	
Acetaminophen	
Acetylsalicylic acid	
Aminopyrine	
Amitriptyline	I
Amobarbital	
<i>d</i> -Amphetamine	
<i>l</i> -Amphetamine	
Ampicillin	
Ascorbic acid	
Aspartame	
Atropine	
Benzocaine	

Compound	
Fenoprofen	
Flecainide	
Flunitrazepam	I
Flunitrazepam metabolite:	I
Desmethylflunitrazepam	
Flunitrazepam metabolite:	I
3-Hydroxyflunitrazepam	
Fluvastatin (2mg/mL)*	
Furosemide	
Gentisic acid	
Glutethimide	
Guaiacol glycerol ether	

Compound	
Naproxen	CH
Nefazadone (2mg/mL)	
Niacinamide	CH
Nicotine (1mg/mL)*	I
Nicotine Metabolite:	I
Cotinine (1.5mg/mL)*	
Nordoxepin	I
Norethindrone	
<i>l</i> -Norpseudoephedrine	
Nortriptyline	CH
Ofloxacin	I
Oxazepam	

Compound	
Benzoylcegonine	
Benzphetamine	
Bupropion HCl	CH
Buspiron metabolite: 1-(2-Pyrimidyl)piperazin dihydrochloride	CH
Butabarbital	
Caffeine	
Calcium hypochlorite	
Carbamazepine (1mg/mL)*	I
Cetylpyridinium Cl (5mg/mL)*	I
Citalopram	
Chloral hydrate (1mg/mL)*	
Chlordiazepoxide	
Chloroquine	
Chlorpheniramine	
Chlorpromazine	I
Clotrimazole (1mg/mL)*	I
Clozapine (2mg/mL)*	
Cocaine	
Codeine	I
Cyclobenzaprine	
Dextropropoxyphene	
Diazepam	
Diclofenac	
Diphenhydramine	
Dopamine	
Doxepin	I
Doxylamine	
Ecgonine	
Ecgonine methyl ester	
<i>d</i> -Ephedrine	
<i>d,l</i> -Ephedrine	
<i>l</i> -Ephedrine	
Epinephrine	
Erythromycin	
Estriol	

Compound	
Hydrochlorothiazide	
Hydrocodone (1mg/mL)*	
<i>p</i> -Hydroxyamphetamine	
Hydroxyzine	I
Ibuprofen	
Imipramine	I
Isoproterenol	
Ketamine	I
Ketoprofen (2mg/mL)*	
Labetalol (1mg/mL)*	I
Lamotrigine	I
Lamotrigine metabolite:	I
Lamotrigine-N2-glucuronide	
Lansoprazole (2mg/mL)*	
Levofloxacin (4mg/mL)*	I
Lidocaine	
LSD	
MDA	
MDMA	
Meclizine dihydrochloride	CH
Melanin	
Melatonin (2mg/mL)*	I
Meperidine	
Metformin HCl (0.5mg/mL)*	CH
Methadone	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	CH
Methaqualone	
Methylphenidate	
Methyprylon	
Minoxidil (1.5mg/mL)*	I
Morphine	
Nalbuphine (1mg/mL)*	I
Naloxone	
Naltrexone	

Compound	
Penicillin G	
Pentobarbital	
β -Phenethylamine	
Phenobarbital	
Phenothiazine	
Phentermine	
Phenylbutazone	
<i>d</i> -Phenylpropanolamine	
<i>d,l</i> -Phenylpropanolamine	
Procaine	
Promethazine	
Propranolol (2mg/mL)*	I
<i>d</i> -Pseudoephedrine	
<i>l</i> -Pseudoephedrine	
Quetiapine	I
Quinidine	
Quinine	
Secobarbital	
Sertraline (1mg/mL)*	I
Sulfamethoxazole (3mg/mL)*	I
Sulindac	
Sumatriptan (2mg/mL)*	
Tetracycline	
Δ^9 THC-9-carboxylic acid	
Tetrahydrozoline	
Tramadol	CH
Trazodone (5mg/mL)*	I
Trazodone metabolite: m-CPP (0.25mg/mL)*	CH
Trifluoperazine	
Trimethoprim (4mg/mL)*	I
Trimipramine	CH
Tyramine	
Venlafaxine (0.5mg/mL)*	
Verapamil	
Zalcitabine (2mg/mL)*	I
Zidovudine (2mg/mL)*	I
Zolpidem (1mg/mL)*	I

Propoxyphene/Propoxyphene Plus

*Cross-reactivity with structurally related compounds/
Analytical specificity*

Propoxyphene on COBAS INTEGRA

Compound	Approximate ng/mL equivalent to 300 ng/mL PPX	Approximate % cross-reactivity
<i>p</i> -Hydroxypropoxyphene	836	36
Methadone	890 208	0.03
Norpropoxyphene	436	69

Propoxyphene Plus on Roche/Hitachi and cobas c

Compound	Approximate ng/mL equivalent to 300 ng/mL PPX	Approximate % cross-reactivity
<i>p</i> -Hydroxypropoxyphene	933	32
Methadone	> 100 000	0.1
Norpropoxyphene	424	71

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H), or **cobas c** (C) systems.

The following compounds were tested at a concentration of 100 000 ng/mL.

Propoxyphene on COBAS INTEGRA systems: None of these compounds gave values greater than 0.1 % (100 ng/mL) cross-reactivity.

Propoxyphene Plus on Roche/Hitachi systems: None of the compounds gave values greater than 0.133 % (133 ng/mL) cross-reactivity.

Compound	Compound	Compound
Acetaminophen	<i>d</i> -Ephedrine	Nordiazepam
Acetylsalicylic acid	<i>d,l</i> -Ephedrine	Norethindrone
Aminopyrine	<i>l</i> -Ephedrine	<i>l</i> -Norpseudoephedrine
Amitriptyline	Epinephrine	Nortriptyline
Amobarbital	Erythromycin	Oxazepam
<i>d</i> -Amphetamine	Estriol	Penicillin G
<i>l</i> -Amphetamine	17-Ethynylestradiol	Pentobarbital
Ampicillin	Fenoprofen	Phencyclidine
Ascorbic acid	Flecainide	β -Phenethylamine
Aspartame	Furosemide	Phenobarbital
Atropine	Gentisic acid	Phenothiazine
Benzocaine	Glutethimide	Phentermine
Benzoylcegonine	Guaiacol glycerol ether	Phenylbutazone
Benzphetamine	Hydrochlorothiazide	<i>d</i> -Phenylpropanolamine
<i>d,l</i> -Brompheniramine	<i>p</i> -Hydroxyamphetamine	<i>d,l</i> -Phenylpropanolamine

Propoxyphene/Propoxyphene Plus

Compound	
Butabarbital	
Caffeine	
Calcium hypochlorite	
Chlordiazepoxide	
Chloroquine	
<i>d,l</i> -Chlorpheniramine	
<i>d</i> -Chlorpheniramine	I
Chlorpromazine	
Clemastine	
Cocaine	
Codeine	
Cyclizine	I
Desipramine	
Dextromethorphan	
Diazepam	
Diphenhydramine	
Diphenylhydantoin	
Dopamine	
Doxepin	CH
Doxylamine	I
Ecgonine	
Ecgonine methyl ester	

Compound	
Ibuprofen	
Imipramine	
Isoproterenol	
Ketamine	
Lidocaine	
LSD	
MDA	
MDMA	
Melanin	
Meperidine	
<i>d</i> -Methamphetamine	
<i>l</i> -Methamphetamine	
Methapyrilene	
Methaqualone	
Methylphenidate	
Methypylon	
Morphine	CH
Morphine Sulfate	I
Naloxone	
Naltrexone	
Naproxen	
Niacinamide	

Compound	
Phenyltoloxamine	
Procaine	
Procyclidine	
Promethazine	
<i>d</i> -Pseudoephedrine	
<i>l</i> -Pseudoephedrine	
Quinidine	
Quinine	
Secobarbital	
Sulindac	
Tetracycline	
Δ^9 THC-9-carboxylic acid	
Tetrahydrozoline	
Thioridazine	
Trifluoperazine	
<i>d,l</i> -Trihexyphenidyl	
Trimipramine	
Tripelennamine	
Tyramine	
Verapamil	

THC II

Cross-reactivity with structurally related compounds/ Analytical specificity

COBAS INTEGRA

Compound	20 ng Cutoff		50 ng Cutoff		100 ng Cutoff	
	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity
Cannabinol	898	2	2 031	3	3 810	3
Δ^9 THC	1 146	2	2 574	2	5 078	2
8- β -11-dihydroxy- Δ^9 THC	24	84	58	86	142	71
9-carboxy-11-nor- Δ^8 THC	41	49	89	56	196	51
9-carboxy-11-nor- Δ^9 THC glucuronide	29	70	62	81	132	76
11-hydroxy- Δ^9 THC	48	42	115	44	230	43
8- α -hydroxy- Δ^9 THC	90	22	152	33	402	25
Niflumic Acid	171	12	678	7	1 607	6

Roche/Hitachi and cobas c

Compound	20 ng Cutoff		50 ng Cutoff		100 ng Cutoff	
	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity	~ ng/mL equivalent to Δ^9 COOH-THC	~ % Cross-reactivity
Cannabinol	3 333	0.6	8 333	0.6	25 000	0.4
Δ^9 THC	3 333	0.6	25 000	0.2	33 333	0.3
8- β -11-dihydroxy- Δ^9 THC	60	34	162	31	283	35
9-carboxy-11-nor- Δ^8 THC	28	72	73	69	145	69
9-carboxy-11-nor- Δ^9 THC glucuronide	45	44	93	54	174	58
11-hydroxy- Δ^9 THC	172	12	376	13	581	17
8- α -hydroxy- Δ^9 THC	154	13	338	15	485	21
Niflumic Acid	1 250	2	4 750	1	10 897	1

**Cocamidopropyl betaine could cause interference at concentrations above 460000ng/mL. It is used as surfactant e.g. in shampoos and hand soaps.

Cross-reactivity with structurally unrelated compounds

The data applies to all systems unless noted. If noted, it applies only to the COBAS INTEGRA (I), Roche/Hitachi (H) or **cobas c** (C) systems.

Unless otherwise noted in brackets, the following compounds were tested at a concentration of 100 000 ng/mL.

COBAS INTEGRA systems: None of these compounds gave values in the assay that were equal to or greater than the cut-off concentrations (20ng/mL, 50ng/mL and 100ng/mL)

Roche/Hitachi and **cobas c** system: None of these compounds gave values greater than 0.015 % cross-reactivity.

*None of the compounds tested at the higher concentrations marked in brackets caused interference.

Compound		Compound		Compound	
Acetaminophen		Fenoprofen		Pantoprazole	CH
Acetylsalicylic acid		Flecainide	CH	Pantoprazole (50 000 ng/mL)	I
Aminopyrine		Fluoxetine		Paroxetine	I
Amitriptyline		Flurbiprofen		Peg 80 Mix (5 mg/mL)*	CH
Amobarbital		Furosemide		Penicillin G	
Amoxicillin		Gabapentin (2 mg/mL)*	I	Pentazocine	
d-Amphetamine		Gentisic acid		Pentobarbital	
Ampicillin		Glutethimide		Phencyclidine	
Ascorbic acid		Guaiacol glycerol ether		Phenobarbital	
Aspartame		Hydrochlorothiazide		Phenothiazine	
Atropine		5-Hydroxyindole-3-acetic acid		Phenylbutazone	
Benzocaine		5-Hydroxyindole-2-		Phenylpropanolamine	
Benzylecgonine		carboxylic acid		Phenyltoloxamine	CH
Benzphetamine		Ibuprofen		Phenyltoloxamine metabolite:	CH
Buprenorphine		Imipramine		Benzylphenole	
Butobarbital		Isoproterenol		Polyquaternium (5mg/mL)*	CH
Caffeine		JWH-018 (10 000 ng/mL)	CH	Procaine	
Calcium hypochlorite		JWH-073 (10 000 ng/mL)	CH	Promethazine	
Cannabicyclohexanol (10 000 ng/mL)	CH	JWH-200 (10 000 ng/mL)	CH	d-Pseudoephedrine	
Captopril				l-Pseudoephedrine	
Chlordiazepoxide		Ketamine		Quinidine	
Chloroquine		Lansoprazole		Quinine	
Chlorpheniramine		Lidocaine		Rabeprazole	
Chlorpromazine		LSD		Ranitidine	
Citalopram		Mefloquine		Secobarbital	
CP-47,497 (10 000 ng/mL)	CH	Melanin		Span 20 (5 mg/mL)*	CH
Dextromethorphan		Meperidine		Sulindac	
Dextropropoxyphene		Methadone		Terbinafine	
Diazepam		d-Methamphetamine		Tetracycline	
Digoxin		Methaqualone		Tetrahydrozoline	
Diphenhydramine		Methypylon		Tolmetin	
Diphenylhydantoin		Morphine		Tramadol	I
Dopamine		Nabilone	I	Tramadol metabolite:	
Ecgonine		Naloxone		N-Desmethyl-tramadol	
		Naltrexone			

Compound	
Ecgonine methyl ester	
Enalapril	
Ephedrine	
Epinephrine	
Erythromycin	
Estriol	

Compound	
Naproxen	
Natriumdodecylsulfat	CH
Niacinamide	
Nifedipine	
Norethindrone	
Norpseudoephedrine	
Omeprazole	
Oxazepam	

Compound	
Trifluoperazine	I
Venlafaxine metabolite:	CH
O-Desmethylvenlafaxine	
Verapamil	
Zomepirac	

Serum Barbiturates SBARB

SBARB is only available on the COBAS INTEGRA system.

Cross-reactivity with structurally related compounds/ Analytical specificit

Compound	Concentration tested in µg/mL	% Cross-reactivity in serum	% Cross-reactivity in urine
Allobarbital	0.05	96	102
Amobarbital	1	27	N/A
Amobarbital	10	18	16
Aprobarbital	1	85	113
Barbital	1	31	45
Barbituric Acid	1	ND	ND
Butabarbital	1	55	N/A
Butabarbital	10	25	26
Butalbital	1	89	125
Butethal	1	61	77
Cyclopentobarbital	1	89	111
Diallylbarbituric Acid	1	118	161
1,3-Dimethyl Barbituric acid	1	< 0.1	2
Diphenylhydantoin	1	ND	ND
<i>d,l</i> -Glutethimide	1	ND	ND
Hexobarbital	1	0.5	2
<i>p</i> -Hydroxyphenobarbital	1	14	26
<i>p</i> -Hydroxyphenytoin	220	ND	ND
Mephobarbital	1	0.9	1
Pentobarbital	10	18	21
Phenobarbital	1	26	N/A
Phenobarbital	10	11	13
Thiopental	1	21	N/A
Thiopental	10	10	10

ND: Cross-reactivity was designated as 'not detectable' (ND) if the obtained value was less than the sensitivity of the assay.

Cross-reactivity with structurally unrelated compounds

The following compounds were added to normal human serum at a concentration of 10 µg/mL.

None of these compounds gave values in the assay that were equal to or greater than 0.2 % cross-reactivity.

Compound
Acetaminophen
Acetylsalicylic acid
Aminopyrine
Amitriptyline
<i>d</i> -Amphetamine
<i>d,l</i> -Amphetamine
<i>l</i> -Amphetamine
Ampicillin
Ascorbic acid
Aspartame
Atropine
Benzocaine
Benzoylcegonine
Benzphetamine
Brompheniramine
Caffeine
Calcium hypochlorite
Chlordiazepoxide
Chloroquine
<i>d</i> -Chlorpheniramine
<i>d,l</i> -Chlorpheniramine
Chlorpromazine
Clemastine
Cocaine
Codeine
Cyclizine
Desipramine
Dextromethorphan
Dextropropoxyphene
Diazepam
Diphenylhydantion
Diphenhydramine
Dipyron
Dopamine
Doxylamine
Ecgonine
Ecgonine methyl ester

Compound
<i>d</i> -Ephedrine
<i>d,l</i> -Ephedrine
<i>l</i> -Ephedrine
Epinephrine
Erythromycin
Estriol
17- <i>a</i> -Ethinylestradiol
Fenoprofen
Furosemide
Gentisic acid
Gluthetimide
Guaiacol glycerol ether
Hydrochlorothiazide
<i>p</i> -Hydroxyamphetamine
Ibuprofen
Imipramine
Isoproterenol
Ketamine
Lidocaine
LSD
MDA
MDMA
Melanin
Meperidine
Methadone
<i>d</i> -Methamphetamine
<i>l</i> -Methamphetamine
Methapyrilene
Methaqualone
Methylphenidate
Methyprylon
Morphine sulfate
Naloxone
Naltrexone
Naproxen
Niacinamide

Compound
Nordiazepam
Norethindrone
<i>l</i> -Norpseudoephedrine
Nortriptyline
Oxazepam
Penicillin G
Phencyclidine
β-Phenethylamine
Phenothiazine
Phentermine
Phenylbutazone
Phenylpropanolamine
<i>d</i> -Phenylpropanolamine
<i>d,l</i> -Phenylpropanolamine
Phenyltoloxamine
Procaine
Procyclidine
Promethazine
<i>d</i> -Pseudoephedrine
<i>l</i> -Pseudoephedrine
Quinidine
Quinine
Sulindac
Tetracycline
Δ ⁹ THC-9-carboxylic acid
Tetrahydrozoline
Thioridazine
Trifluoperazin
<i>d,l</i> -Trihexyphenidyl
Trimipramine
Tripelenamine
Tyramine
Verapamil
Zomepirac

Serum Benzodiazepines SBENZ

SBENZ is only available on the COBAS INTEGRA system.

Cross-reactivity with structurally related compounds/ Analytical specificity

Compound	Concentration tested in ng/mL	% Cross-reactivity in serum	% Cross-reactivity in urine
7-Acetamido-flunitrazepam	1 000	0.5	N/A
7-Acetamido-flunitrazepam	10 000	0.2	0.3
7-Acetamido-3OH-desmethylflunitrazepam	10 000	ND	N/A
7-Acetamido-3OH-flunitrazepam	100 000	0.1	0.1
Alprazolam	100	96	90
7-Amino-desmethylflunitrazepam	100	38	N/A
7-Amino-desmethylflunitrazepam	1 000	17	17
7-Amino-3OH-desmethylflunitrazepam	10 000	2	N/A
7-Amino-3OH-desmethylflunitrazepam	1 000	6	5
7-Amino-3OH-flunitrazepam	1 000	12	12
7-Aminoflunitrazepam	100	61	53
7-Amino-nitrazepam	100	54	56
Bromazepam	100	64	64
Clorazepate	100	49	49
Chlordiazepoxide	1 000	4	7
Clonazepam	100	52	49
Demoxepam	1 000	7	7
Desalkylflurazepam	100	57	67
Desmethylchlordiazepoxide	1 000	5	3
Desmethylflunitrazepam	100	48	42
Desmethylmedazepam	1 000	18	19
Diazepam	100	104	89
Didesethylflurazepam	100	80	73
Flumazenil	100 000	N/A	ND
Flunitrazepam	100	67	58
Flurazepam	100	97	63
3-Hydroxydesmethylflunitrazepam	1 000	6	N/A
3-Hydroxydesmethylflunitrazepam	10 000	2	2
4-Hydroxyalprazolam	100	50	48
α -Hydroxyalprazolam	100	84	84
Hydroxyethylflurazepam	100	89	80
3-Hydroxyflunitrazepam	1 000	14	13
4-Hydroxytriazolam	100	62	60
α -Hydroxytriazolam	100	80	78
Lorazepam	1 000	17	18
Lormetazepam	97	40	N/A
Medazepam HCl	100	47	40

Compound	Concentration tested in ng/mL	% Cross-reactivity in serum	% Cross-reactivity in urine
N-Methyloxazepam	100	63	46
Midazolam	100	82	68
Nitrazepam	100	58	56
Oxaprozolam	10 000	< 0.01	N/A
Oxazepam	100	46	39
Pinazepam	100	102	79
Prazepam	100	90	63
Temazepam	1 000	63	46
Tetraepam	100	58	53
Triazolam	100	80	76

ND: Cross-reactivity was designated as 'not detectable' (ND) if the obtained value was less than the sensitivity of the assay.

Cross-reactivity with structurally unrelated compounds

The following compounds were added to normal human serum at a concentration of 10 µg/mL.

None of these compounds gave values in the assay that were equal to or greater than 0.3 % cross-reactivity.

Compound
Acetaminophen
Acetylsalicylic acid
Aminopyrine
Amitriptyline
Amobarbital
<i>d</i> -Amphetamine
<i>d,l</i> -Amphetamine
<i>l</i> -Amphetamine
Ampicillin
Ascorbic acid
Aspartame
Atropine
Benzocaine
Benzoylcegonine
Benzphetamine
Brompheniramine
Butabarbital
Caffeine
Calcium hypochlorite
Chloroquine
Chlorpheniramine
Chlorpromazine
Clemastine
Cocaine
Codeine
Cyclizine
Desipramine
Dextromethorphan

Compound
<i>l</i> -Ephedrine
Epinephrine
Erythromycin
Estriol
17- α -Ethinylestradiol
Fenoprofen
Furosemide
Gentisic acid
Glutethimide
Guaiacol glycerol ether
Hydrochlorothiazide
<i>p</i> -Hydroxyamphetamine
Ibuprofen
Imipramine
Isoproterenol
Ketamine
Lidocaine
LSD
MDA
MDMA
Melanin
Meperidine
<i>d,l</i> -Methadone
<i>d</i> -Methamphetamine
<i>l</i> -Methamphetamine
Methapyrilene
Methaqualone
Methylphenidate

Compound
<i>l</i> -Norpseudoephedrine
Nortriptyline
Penicillin G
Pentobarbital
Phencyclidine
β -Phenethylamine
Phenobarbital
Phenothiazide
Phentermine
Phenylbutazone
Phenylpropanolamine
<i>d</i> -Phenylpropanolamine
<i>d,l</i> -Phenylpropanolamine
Phenyltoloxamine
Procaine
Procyclidine
Promethazine
<i>d</i> -Pseudoephedrine
<i>l</i> -Pseudoephedrine
Quinidine
Quinine
Secobarbital
Sulindac
Tetracycline
Δ^9 THC-9-carboxylic acid
Tetrahydrozoline
Thioridazine
Trifluoperazine

Serum Benzodiazepines SBENZ

Compound
Dextropropoxyphene
Diphenhydramine
Diphenylhydantoin
Dopamine
Doxylamine
Ecgonine
Ecgonine methyl ester
<i>d</i> -Ephedrine
<i>d,l</i> -Ephedrine

Compound
Methyprylon
Morphine sulfate
Naloxone
Naltrexone
Naproxen
Niacinamide
Norethindrone

Compound
<i>d,l</i> -Trihexyphenidyl
Trimipramine
Tripelenamine
Tyramine
Verapamil
Zomepirac

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