

## Therapeutic (“normal”), toxic, and comatose-fatal blood-plasma concentrations (mg/L) in man

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Abacavir (ABC)	0.9-3.9 <sup>308</sup>			appr. 1.5	[1,2]
Acamprosate	appr. 0.25-0.7 <sup>231</sup>	1 <sup>311</sup>		13-20 <sup>232</sup>	[3], [4], [5]
Acebutolol <sup>1</sup>	0.2-2 (0.5-1.26) <sup>1</sup>		15-20	3-11	[6], [7], [8]
Acecaïnide	see (N-Acetyl-) Procainamide				
Acecarbromal(um)	10-20 (sum)	25-30			
Acemetacin	see Indomet(h)acin				
Acenocoumarol	0.03-0.1 <sup>197</sup>	0.1-0.15		3-11	[9], [3], [10], [11]
Acetaldehyde	0-30	100-125			[10], [11]
Acetaminophen	see Paracetamol				
Acetazolamide	(4-) 10-20 <sup>267</sup>	25-30		2-6 (-13)	[3], [12], [13], [14], [11]
Acetohexamide	20-70	500		1.3	[15]
Acetone	(2-) 5-20	100-400; 2000 <sup>8</sup>	550	(6-)8-31	[11], [16], [17]
Acetonitrile			0.77	32	[11]
Acetyldigoxin	0.0005-0.0008 <sup>3</sup>	0.0025-0.003	0.005	40-70	[18], [19], [20], [21], [22], [23], [24], [25], [26], [27]
Acetylsalicylic acid (ASS, ASA)	20-200 <sup>2</sup>	300-350 <sup>2</sup>	(400-) 500 <sup>2</sup>	3-20 <sup>2, 37</sup>	[28], [29], [30],

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					[31], [32], [33], [34]
Acitretin	appr. 0.01-0.05 <sup>112</sup>			2-4 <sup>6</sup>	[35], [36]
Acrivastine	-0.07			1-2	[8]
Acyclovir	0.4-1.5 <sup>203</sup>			2-5 <sup>83</sup>	[37], [3], [38], [39], [10]
Adalimumab (TNF-antibody)	appr. 5-9			14 <sup>6</sup>	[40]
Adipiodone(-meglumine)	850-1200			0.5	[41]
Äthanol	see Ethanol			_139	
Agomelatine	0.007-0.3 <sup>310</sup>	0.6 <sup>311</sup>		1-2	[4]
Ajmaline	(0.1-) 0.53-2.21 (?)		5.5 <sup>8</sup>	1.3-1.6, 5-6	[3], [42]
Albendazole	0.5-1.5 <sup>92</sup>			8-9 <sup>92</sup>	[43], [44], [45], [46]
Albuterol	see Salbutamol				
Alcuronium	0.3-3 <sup>353</sup>			3.3±1.3	[47]
Aldrin	-0.0015	0.0035		50-167 <sup>6</sup> (as dieldrin)	[11], [48]
Alendronate (Alendronic acid)	< 0.005 <sup>322</sup>			_6	[49], [50], [51]
Alfentanil	0.03-0.6 <sup>4</sup>			0.6-2.3 <sup>96</sup>	[52], [53], [54], [55]
Alfuzosine	0.003-0.06			3-9	[8]
Alimemazine (Trimeprazine)	0.05-0.4	0.5	1-3.2	8	[56], [57]

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	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Alizapride	0.1-2			2-3	[15]
Allobarbital	2-5	10	20	40-48	[47], [11], [58]
Allopurinol <sup>354</sup>	2-19			0.5-3	[11]
Almotriptan	0.05-0.07			3-4	[47]
Alphaprodine	0.87-1			1.6-2.6	[11]
Alprazolam	0.005-0.05 (-0.08) <sup>65</sup>	0.1-0.4	<sup>252</sup>	6-20	[56], [3], [59], [60], [61], [62], [63]
Alprenolol <sup>48</sup>	0.025-0.14	1-2	40-48	2-7	[7]
4-Hydroxyalprenolol	0.04-0.06				[8]
Aluminium	< 0.005 <sup>234</sup>	0.05-0.15	4.4 <sup>8</sup>	appr. 0.5	[64], [65], [66], [11]
Amantadine	(0.06-) 0.2-0.6 (-1)	1; 2.4 <sup>8</sup>	2.1-4.8; 21 <sup>8</sup>	9-15	[48]
Amfebutamone	see Bupropion				
Amikacin	10-25 <sup>76</sup>	30		2-3	[67]
Aminobenzoic acid	300-600	600			[66]
Aminoglutethimide	(0.05-) 7.5-25			10-15	[3], [8], [11]
Aminophenazone	10-20			appr. 2-4	[15]
4-Aminopyridine (Fampridine)	0.025-0.075	0.14 <sup>8</sup> ; 0.2		3-3.5	[68], [10], [11]

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	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
5-Aminosalicylic acid (5-AS, 5-ASA)	see Mesalazine				
Amiodarone <sup>261</sup>	(0.5-) 1-2 (-2.5)	2.5-3		30-120 <sup>6</sup>	[69], [64], [3], [70], [71]
Amisulpride	0.1-0.4	0.64 <sup>311</sup>	9.3 <sup>8</sup> ; 41.7 <sup>8</sup>	12-20	[4], [72], [15], [8]
Amitriptyline <sup>7; 48</sup>	0.05-0.3	0.5-0.6	1.5-2	30-50	[73], [74], [56], [75], [76], [77], [78], [79], [80], [81], [82], [83]
Amlodipine	0.003-0.015	0.088 <sup>8; 165</sup>	0.1-0.2 <sup>8; 166</sup>	34-50	[84], [85], [86]
Ammonia	0.5-1.7				[11]
Amobarbital	1-5	(5-6) 10-30	13-96	15-30	[87], [48]
Amodiaquine	-0.05 <sup>270</sup>			_270	[88]
Amoxapine	0.18-0.6 <sup>151</sup>	3	5	8	[9]
Amoxicillin	0.5-1 (5-15)			1-2	[15]
Amphetamine	0.02-0.1	0.2	0.5-1	4-8 (7-34) <sup>344</sup>	[89], [66]
Amphotericin B	(0.1-) 0.2-3	(3-) 5-10		24-48 <sup>110</sup>	[47], [90], [91], [92], [93]
Ampicillin	0.02-2 (2-20)			1	[67]
Amrinone	1-2 (-4)			3-12	[3], [94], [95]
Amsacrine	(0.1-) 1-5.5			5-7	[96]

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	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Anileridine	< 0.5		0.9 <sup>8</sup>		[11], [48]
Aniline	-0.02 <sup>328</sup> (urine)	0.13 <sup>8; 355</sup>	6	(2-) 3-4 (-7)	[11], [48], [97], [47], [98], [99]
Antimony	-0.01 <sup>329</sup>	0.2			[64], [100]
Antipyrine	see Phenazone				
Apomorphine	0.002-0.02 <sup>204</sup>			appr. 0.75	[3], [10]
Aprindine <sup>48</sup>	1-2	2-3		13-50	
Aprobarbital	4-20	30-40	50	14-34	[47], [11], [58]
Aripiprazole	0.15-0.5	1 <sup>311; 345</sup>		60-80	[101], [4], [102]
Arsenic	0.002-0.07 <sup>283</sup>	0.05-0.25	9-15		[103], [64], [87], [11], [100]
Asenapine	0.002-0.005	0.01 <sup>311</sup>		24	[4]
Articaine	< 1.5-2 (?)			0.3 (-1)	[104]
Ascorbic acid (Vitamin C)	4-15			- <sup>6</sup>	[105], [3], [106], [107], [108]
Astemizole	0.002-0.05 <sup>43</sup>	14 <sup>8</sup>		appr. 20 <sup>6; 42; 43</sup>	[47], [3], [109]
Atazanavir (ATV)	> 0.15 <sup>293</sup>			6.5-8.6	[110], [2], [111]
Atenolol	0.1-1 (-2) <sup>77</sup>	2-3	27 <sup>8</sup>	4-14 <sup>9</sup>	[3], [42], [7],

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					[112], [64]
Atomoxetine	0.2-1 <sup>317</sup>	2 <sup>311</sup>		appr. 4 <sup>356</sup>	[4]
Atovaquone	13.9 ± 6.9 (> 15)			2-3 <sup>6</sup>	[113]
Atracurium(besylate)	0.1-0.5 (-5)			appr. 0.5	
Atropine	0.002-0.025 <sup>155</sup>	0.03-0.1	0.2	2-6.5, 13-38	[66], [114], [11]
Azapropazone (Apazone)	40-90			8-24	
Azathioprine <sup>10</sup>	0.05-2			1-4 <sup>11</sup>	
Azelastine	0.002-0.003(-0.01)			22-25	[15]
Azithromycin	appr. 0.04-1			50-60 (2-4 <sup>6</sup> )	[115], [116], [117], [118], [119]
Aztreonam	1-10 (50-250)			1.5-2	[11]
Baclofen	0.08-0.4 (-0.6)	1.1-3.5	6-9.6	6.8±0.7	[47], [9], [11]
Bambuterol	see Terbutaline				
Barbexalone	active metabolite = phenobarbital (see Table)				[12]
Barbital	2-20	20-50	50	57-120	
Barium	-0.001			10-18	[47]
Bendrofluazide	0.05-0.1			appr. 3	[42]

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	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Benoxaprofen	-50			19-39	[3]
Benperidol	0.001-0.01	0.02 <sup>311</sup>		4-8	[4], [15], [8]
Benzbromarone	2-10			2-4	
Benzene	-0.0002 <sup>271</sup>		0.95	9-24	[47], [58]
Benzonatate		2.5		appr. 1-3	[8]
Benzoyllecgonine <sup>357</sup>	-0.1		1	4-5	[8]
Benzphetamine	0.025-0.5	0.5	14 <sup>8</sup>		[47], [8], [11]
Benztropine	0.01-0.18	0.05	0.2-0.7		[15], [8], [11]
Benzyl alcohol		18 <sup>8, 194</sup>		_195	[3], [120], [121]
Benzylpenicillin	1.2-12			1	[67], [41]
Bepridil	0.6-2.5			33-42 (30-130)	[122], [8]
Beryllium	-0.0003				[58]
Betacarotene	4-6 <sup>196</sup>				[123], [124]
Betaxolol	0.005-0.05		36 <sup>8</sup>	14-22	[47], [125], [7]
Bethanidine	0.02-0.5			9-10	[3], [58]
Bevantolol	0.2-2			2	[15], [8]
Bezafibrate	-15			2	[3]
Bicalutamide	1.5-17.5 (-25) <sup>163</sup>			(3-) 7-10 <sup>6</sup>	[126]

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	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Biperiden	0.05-0.1?		0.25 <sup>8</sup>	18-24	[56]
Bismut(h)	< 0.05 (-0.1)	0.05-0.1		- <sup>6</sup>	[47], [64]
Bisoprolol	0.01-0.1			10-12	[7]
Bopindolol	0.001-0.015 <sup>54</sup>			4-8 <sup>54</sup>	[7]
Borate	0-7	20	200	12-27	[47], [66]
Boron	0.8-6	20-50	50-150		[58]
Bornaprine	0.0007-0.0072 <sup>313</sup>	0.014 <sup>311</sup>		appr. 30	[4]
Brallobarbital (Brallobarbitone)	4-8	8-10	15	20-40	
Bretylum	0.8-2.4			6-11	[3]
Brodifacoum		0.02	0.03-0.17; acute: 3.9 <sup>8</sup>	20-60 <sup>6</sup>	[58], [127]
Bromadiolon		0.02		3-6 <sup>6</sup> (early), 10-24 <sup>6</sup> (late phase)	[11], [58]
Bromazepam	(0.05-) 0.08-0.2	0.3-0.4	(1-) 2	8-22	[59]
Bromide	75-100 (-300)	500-1500; 3000 <sup>8, 242</sup>	2000	12-13 <sup>6</sup>	[58], [128], [129], [130]
Bromisoval	10-20	30-40		appr. 4 <sup>28, 105</sup>	
Bromocriptine	0.0001-0.0003 (-0.004) <sup>314</sup>	0.008 <sup>311</sup>		appr. 38	[4]
Bromoxynil		20			[58]
Bromperidol	0.012-0.02	0.03 <sup>311</sup>		20-36	



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	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Brompheniramine	0.005-0.015	0.2 <sup>8</sup>		2-10 (-20)	[15]
Brotizolam	0.001-0.01 (-0.02)	0.02 <sup>311</sup>	0.01-0.03 <sup>8</sup>	4-10	[47], [131]
Budipine	appr. 0.1-0.3			30	[15]
Buflomedil	appr. 0.2-0.5 (-1.0)	15-25	25-50; 275 <sup>8</sup>	2-4	[42], [11], [58]
Bunitrolol	0.001-0.015			2-6	[7]
Bupivacaine	(0.25-) 0.5-1.5 (-2)	2-4		0.5-3	[123], [132], [133], [134]
Bupranolol	_44			2-4	[7]
Buprenorphine <sup>340</sup>	0.0005-0.005 (-0.01) <sup>285</sup>	0.03-0.1 <sup>339</sup>	0.008-0.029	3-5 (i.v.); 18-49 (sublingual); appr. 19 (buccal)	[47], [135], [123], [136], [137], [138], [139], [140], [141]
Bupropion (Amfebutamone)	0.01-0.02; 0.05-0.1 <sup>152</sup>	1.2-2 <sup>246</sup>	4 <sup>8</sup> ; 4.2 <sup>8</sup> ; 7.3 <sup>8</sup>	(4-) 10-20	[47], [142], [143], [4], [144], [145], [146], [80], [147], [148]
Buspirone <sup>312</sup>	0.001-0.004	0.008 <sup>311</sup>		2-3	[4]
Busulfan	> 0.9 <sup>291</sup>			2-4	[149], [150], [151], [152], [153], [154]
Butabarbital	see Secbutabarbital				
Butalbital	1-5	10-15	15-30	30-40	[58]

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	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Butanone	-10	500			
Butaperazine	0.02-0.3 (-0.7)			12	[15]
Butorphanol	0.0006-0.002			4-9	[15], [8]
Butriptyline	0.07-0.15	0.4-0.5			[15]
Butylscopolamine	-0.7			4-5	[8]
Cabergoline	58-144 pg/mL <sup>315</sup>	390 pg/mL <sup>311</sup>		63-68	[4]
Cadmium	<0.0003-0.0065	0.015-0.05		appr. 16 years	[47], [58], [100]
Caffeine (Coffein)	(2-) 4-10	15-20	80-180	2-10	[47], [123], [155], [156], [157], [64]
Calcifediol	0.01-0.05				[66]
Camazepam	0.1-0.6	2		20-24	[59]
Camphor		0.3-0.4	1.7	2-8	[47], [15], [8], [158]
Candesartan	0.08-0.18			5-7	[15]
Canrenone	see Spironolactone				
Captopril	0.05-0.5 (-1)	5-6	60	1-2	[159], [84], [42]
Carazolol <sup>23</sup>	-0.015			9	[7]
Carbachol	appr. 0.01?		3.6 <sup>8; 287</sup>		[3], [160]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Carbamazepine <sup>12</sup>	2-8 (4-12)	10	20	12-60 (7-35) <sup>140</sup>	[161], [162], [56], [163], [164], [165], [166], [12]
Carbaryl		5	6-27		[47], [167]
Carbenoxolone	appr. 5-30			8-20	[66]
Carbidopa	0.02-0.2 <sup>316</sup>	0.4 <sup>311; 316</sup>		2	[4]
Carbimazole	0.5-3.4 <sup>95</sup>			3-6 <sup>95</sup>	
Carbinoxamine	appr. 0.02-0.04			appr. 10-15	[168]
Carboc(h)romene	0.8-2.4 (-3)			0.2-1.5	
Carbon monoxide	_200	25-30 %	50-60 %		[123], [10], [58]
Carbon tetrachloride	-0.07	0.12 <sup>8</sup> ; 7.1 <sup>8; 269</sup> ; 11 <sup>8</sup> ; 10-50	100-200	Appr. 24 ; 42.6 <sup>8</sup>	[169], [58], [170], [171], [172], [173]
Carboplatin	max. 10-25			2.5-6 <sup>106</sup>	
Carbromal(um) <sup>13</sup>	2-10	15-20	40	7-15	
Carisoprodol	10-30	40; 30-50 <sup>104</sup>	50 <sup>8</sup> ; 110 <sup>104</sup>	8	[56], [58]
β-Carotine	see Betacarotene				
Carteolol	0.01-0.1			3-7	[7]
Carvedilol	appr. 0.02-0.15 (-0.3)			6-10	[3], [95], [8]

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Cathine	appr. 0.71 <sup>370</sup>			3-8	[47]
Cefaclor	13-35 (i.v. -900)			0.5-1 (-2)	[3], [8], [11]
Cefadroxil	-30			1-2	[8]
Cefalexin	-65			1-1.5	[41]
Cefaloridine	20-80			1.5	[41]
Cefalotin	See Cephalotin				
Cefamandole	1-5 (10-40-150)			0.5-1.2	[41], [58]
Cefazolin	-150			1.5-2	[67], [41]
Cefdinir	-4			16	[8]
Cefepime	-160			2	[8]
Cefetamet	-7			2-3	[8]
Cefixime	-7			3-4	[8]
Cefmenoxime	-200			1-2	[8]
Cefodizime	-400			2-4	[8]
Cefoperazone	-250			1-2 (-5)	[174]
Cefotaxime	0.5-2 (10-50; i.v. -225)			1-1.5	[67]
Cefotetan	65-90			3.5	[41]
Cefotiam	-150 <sup>71</sup>			0.7-1.5 (-2)	[41], [175]

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Cefoxitin	-150			0.7-1	[41]
Cefpodoxime	-7			2-3	[8]
Cefsulodin	20-100			1.6-1.9	[3], [8], [11]
Ceftazidime	20-40 (50-200)			1-4	[3], [8], [11]
Ceftibuten	appr. 3-20			2-4	
Ceftizoxime	40-160			6-9	[41]
Ceftriaxone	15-75			6.5-8.5	[67]
Cefuroxime	0.5-1 (10-60 ; i.v. -180) <sup>243</sup>			1.1-1.3	[3], [176], [177], [10], [58]
Celecoxib <sup>48</sup>	0.36-0.8 <sup>371</sup>			11-16	[47]
Celiprolol	0.05-0.5 (-1)			3-6	[58]
Cephalothin (Cefalotin)	-30			0.5-0.6	[3], [41]
Cerivastatin	0.002-0.04			1.5-3	[15], [8]
Cetirizine	appr. 0.02-0.3	2-5		7-9	[47], [15], [8]
Chinidine	see Quinidine				
Chinine	see Quinine				
Chloralhydrate <sup>14</sup>	1.5-15	40-50	60-100	8-30	
Chlorambucil	0.15-0.3 (-1.0)			1.5-3	[15]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Chloramphenicol	5-10 (-15) <sup>59</sup>	25		2-6	[178], [11], [58]
Chlordane	-0.001	0.0025	1-7	88 <sup>6</sup>	[11], [58]
Chlordecone		0.5		63-148 <sup>6</sup>	[47]
Chlordiazepoxide <sup>15</sup>	0.4-3	3.5-10 (-15); 20.5 <sup>8</sup>	20 <sup>8</sup> ; 26 <sup>8</sup>	6-27	[179], [47], [56], [180], [11], [58]
Chlormethiazole	see Clomethiazole				
Chlormezanone	(3-) 5-9 (-14)	appr. 20	18 <sup>8</sup> ; 53 <sup>8</sup>	20-30	[43], [56], [181]
Chlorobutanol		75			[66]
Chloroform	20-50	appr. 70	33 <sup>8</sup> ; 64 <sup>8</sup> ; 69 <sup>8</sup> ; 91 <sup>8</sup>	1.5	[47], [11], [58], [182]
Chlorophacinone		0.1		6-23 <sup>6</sup>	
Chloroquine	0.02-0.5	1	3	dose-dependent <sup>6</sup>	[183], [56], [30]
Chlorothiazide	appr. 6			0.5-2	[3], [11], [58]
Chlorphen(ir)amine	0.003-0.017		1.1 <sup>8</sup>	(12-) 15-25 (-43) <sup>358</sup>	[47], [3], [11], [58]
Chlorpromazine <sup>66</sup>	0.03-0.1 (-0.5)	1-2	3-4	10-30	[56], [3], [184], [185]
Chlorpropamide	30-150	200-750		25-60	[66], [58]
Chlorprothixene	0.02-0.3	0.4	0.8	8-12	[47], [4]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Chlorpyrifos		0.2	1.3 (0.4-3.5) <sup>276</sup>	27	[47], [186]
Chlortalidone	0.15-0.3 (-1.4)	appr. 2		44-48 (35-70)	[47]
Chlortetracycline	1-5 (-10)	30		5-6	[9], [13], [14]
Chromium	-0.00035		32 <sup>8</sup>	3-4 years	[47]
Cibenzoline	0.2-0.4 (-0.9)	(0.5-) 1		7-8 <sup>83</sup>	[3], [187]
Cicletanine	appr. 1-2			5-23	[3], [8]
Ciclosporine A (CsA)	< 0.1-0.15-0.25	0.3-0.4 <sup>16</sup>		10-27 <sup>169</sup>	[188], [189], [190], [191], [192], [193]
Cidofovir	appr. 7-43			2.5	[8], [3]
Cilazapril(-)at	0.003-0.09			30-50	[8]
Cimetidine	0.25-3 (0.75-4)	30-50	110 <sup>8</sup>	1.5-4	[194], [195]
Cinnarizine	0.04-0.33	7.4 <sup>8</sup>		12-34	[47]
Cinoxacin	appr. 15			1.5-4	
Ciprofloxacin	2.5-4	11.5 <sup>8</sup>		3-6	[196], [197], [198], [199]
Cisaprid	0.04-0.08			6-12	[8]
Citalopram	0.05- 0.11	0.22 <sup>311</sup>	5-6 <sup>160</sup>	appr. 33 <sup>170</sup>	[8], [200], [201], [202], [4], [203],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
					[204], [205], [206], [207]
Cladribine	appr. 0.006			0.1-0.2 (6.4-19.7)	[208], [209], [210]
Clarithromycin	appr. 0.2-2			3-7 <sup>217</sup>	[115], [211], [8], [118], [212], [213]
Clemastine	appr. 0.001-0.002 (?)			appr. 8	[8], [214]
Clenbuterol	0.0003-0.0006	0.003 <sup>8</sup>		30-35	[47]
Clindamycin	appr. 0.5			2-3	
Clobazam <sup>17</sup>	0.03-0.3	0.5 <sup>311</sup>		18-42	[47], [4], [59], [215]
Clobutinol	appr. 0.05-0.2			23-34	[3], [8]
Clodronate (Clodronic acid)				- <sup>6</sup>	[49]
Clofibrate	50-250			10-18	
Clomethiazole (Chlormethiazole)	0.1-5	(2.8-) 4-15	50	3-7	[3], [4], [216], [9], [13],[217]
Clomipramine <sup>48, 85</sup>	(0.02-) 0.09-0.25 (-0.4) <sup>226</sup>	0.4-0.6	1-2	20-26 <sup>86</sup>	[218], [219], [220], [76], [221], [222], [80], [223]
Clonazepam	(0.004-) 0.02-0.08 <sup>150</sup>	0.1		20-60	[161], [60], [224]
Clonidine	0.001-0.002 (-0.004)	0.025-0.05 (0.009 <sup>8</sup> )	0.23 <sup>8</sup>	5-20	[47], [225],



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
					[226], [227]
Clopentixol	0.002-0.015	0.1-0.3		15-25	[8], [11]
Clopidogrel	0.001-0.006			1.4-3.6	[47]
Clorazepate <sup>15</sup>	see Nordazepam			1-2	[164]
Clotiazepam	0.1-0.7			3-15	
Cloxacillin	5-30 (-85)			0.5-1 (0.3-2)	
Clozapine <sup>136</sup>	(0.1-) 0.35-0.6 (>0.35 ?)	0.6-1 (9.5 <sup>8</sup> )	1.2 <sup>8</sup> ; 2 <sup>8</sup> ; 5.2 <sup>8</sup>	6-14	[101], [228], [229], [230], [231], [232], [233], [234], [72], [235], [236], [237], [238], [239], [240]
Cobalt	0.0001-0.0022			2 (early); 38 (late phase)	[47], [11], [58]
Cocaine	0.05-0.3	(0.25-) 0.5-1	0.9-2.1	0.5-1 <sup>18</sup>	[47], [241], [242], [13], [14], [58]
Codeine <sup>48</sup>	0.03-0.25	0.5-1 <sup>339</sup>	1.8	3-4	[3], [243], [244]
Coffein(e)	see Caffeine				
Colchicine	0.0003-0.0025	0.005 (0.019 <sup>8</sup> )	0.009 <sup>8</sup> ; 0.024 <sup>8</sup>	11-32 <sup>143</sup>	[245], [246], [247], [248], [10]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Colistin	1-5			2-5	
Copper	0.6-1.5	2	5	26 <sup>6</sup>	[66]
Cotrimoxazole	see Sulfamethoxazole and Trimethoprim				
Coumatetralyl		0.12 <sup>8</sup>			[249]
Cresol (Methylphenols)		appr. 50	120		[58]
Cromolyn (Cromoglycate)	appr. -0.01			1-1.5	[3]
Cyanide	<sub>-177</sub>	0.5	1-3	appr. 19 <sup>184</sup>	[3], [250], [251], [252], [253], [254], [255], [130], [256]
Cyclizine	0.1-0.25	0.75-1	15	24	[11], [58]
Cyclobarbital	2-6	10	20	8-17	
Cyclobenzaprine	appr. 0.003-0.04	0.4		18 (9-40) <sup>253</sup>	[11], [58], [257]
Cyclohexane	-0.4				
Cyclophosphamide	10-25			4-8 (1.3-16)	[3], [8]
Cyclopropane	80-180				[11], [58]
Cyclosporine	see Ciclosporine				
Cyproheptadine	appr. -0.05		0.47 <sup>8</sup>	8-9	[47], [3]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Cyproterone acetate				30-40	[126]
Cysteamine	appr. > 20 µmol/L <sup>282</sup>			appr. 1	[258], [3]
Cytarabine	0.05-0.5			0.1-0.2 (1.9-2.5)	[209], [9]
2,4-D	see 2,4-Dichloro- phenoxyacetic acid				
Danazol	appr. -0.2			4.5	[3]
Dantrolene	(0.1-) 0.4-1.5 (-3)			4-12	[9], [3], [259]
Dapsone <sup>48</sup>	0.5-2	10	18 <sup>8</sup>	25-31	[260], [261]
Darunavir (DRV)	> 3.3 (1.255-7.368) <sup>301</sup>			appr. 15	[262], [110], [2]
DEET	see N,N-Diethyl-3- methylbenzamide				
Deferoxamine (Desferrioxamine)	3-15			4-6	
Demoxepam	0.5-0.74	1	2.7		[66]
Desipramine <sup>48, 69</sup>	0.01-0.5 (0.12-0.25)	0.5-1	3	15-25 <sup>70</sup>	[74], [263], [78], [79], [80], [264]
Desloratadine <sup>372</sup>	0.002-0.006 <sup>373</sup>			17-27	[47]
Desmethyldiazepam (N-Desmethyldiazepam)	see Nordazepam				[59]
Desvenlafaxine	0.1-0.4	0.6 <sup>311</sup>		11	[4]
Detajmium	0.01-0.7		1.8 <sup>8</sup>	13-14	[8]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Dexamethasone	appr. 0.05-0.265 <sup>247</sup>			2.5-9.5	[3], [265]
Dexfenfluramine <sup>351</sup>	appr. 0.03-0.06	0.15-0.25		appr. 18	[66], [11], [58]
Dexketoprofen <sup>374</sup>	appr. 3.7			0.5-2	[47]
Dexmethylphenidate <sup>342</sup>	0.013-0.023 <sup>318</sup>	0.044 <sup>311; 318</sup>		appr. 2	[4]
Dextromethorphan <sup>48</sup>	0.01-0.04	0.1	3	2-4	[266], [267], [268], [269] [270]
Dextromoramide <sup>350</sup>	0.075-0.15	0.2 <sup>339</sup>	0.9	1.5-4-7	[47], [271], [8], [272], [58]
Dextropropoxyphene <sup>305</sup>	0.05-0.3 (-0.5)	0.6-1	1-2	10-30	[30], [48]
Diacetylmorphine or Diamorphine (DAM)	see Heroin (and Morphine)			2-5 min	[273], [274], [275], [276], [277], [278], [279], [280], [281]
3,4-Diaminopyridin (DAP)	< 0.04 <sup>213</sup>	0.1 (?)		0.3-2 <sup>214</sup>	[282]
Diazepam <sup>19</sup>	0.1-2 (-2.5)	3-5		24-48	[241], [283], [284], [3], [285], [59], [224], [13], [14], [286]
Diazinon		0.05-0.1 (-0.5)			[58]
Diazoxide	10-20 (-50)	50 (-100)		20-36 (-48)	[3], [84], [42], [10], [58]
Dibenzepine	0.025-0.15 (0.1-0.5)	3 <sup>359</sup>	18 <sup>359</sup>	3.5-5	[11], [58]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Dichloromethane		200	280	0.6 (early); 4-8 (late phase)	[47]
2,4-Dichlorophenoxyacetic acid (2,4-D)	-	appr. 100	200; 392 <sup>8</sup> ; 720 <sup>8</sup>	appr. 18 <sup>182</sup>	[3], [11], [58]
Dichlorvos			29	0.16	[47]
Diciclomine	see Dicyclomine				[8]
Diclofenac	0.5-3	50; 60 <sup>8</sup>		1-2	[287], [288], [289]
Dicoumarol	8-30	40-50		1-4 <sup>6</sup>	[8], [11]
Dicyclomine (Dicycloverin)	-0.1	appr. 0.2	0.5	1.8-2	[8]
Didanosine (DDI)	appr. 1-30 µmol/L			appr. 1.4	[290], [291], [38], [2], [3]
Dieldrin	-0.0015	0.15-0.3		2-12 months	[47], [11], [58]
Diethylcarbamazine	> 0.8-1.0			4-15	[292]
Diethylene glycol	-	200-500	2000	3-4	[47]
N,N-Diethyl-3-methylbenzamide (N,N-Diethyl-m-toluamide; DEET)	-	>1 mmol/L		appr. 2.5	
Diethylpentenamide (Valdetamide)	2-10	20	45	6-7	
Diethylpropion	0.003-0.007 (-0.2)	2	5.4 <sup>8</sup>	4-8 <sup>23</sup>	[3], [8], [58]
Difenacoum		0.5		11-42 <sup>6</sup>	[47]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Diflunisal	40-100 (-200)	300-500	600	5-12 <sup>83</sup>	[3], [9], [58], [293]
Digitoxin	0.01-0.025	0.03	0.04	140-200	[294], [295]
Digoxin	0.0005-0.0008 (-0.002)	0.0025-0.003	0.005	40-70	[18], [19], [20], [21], [22], [23], [24], [25], [26], [27]
Dihydralazine	see Hydralazine				
Dihydrocodeine	0.03-0.25	0.5-1 <sup>339</sup>	2	3-4	[14], [58]
Dihydroergotamine	0.001-0.01			7-9 (> 30?)	[3], [8]
Diltiazem	0.03-0.13 (-0.25) <sup>157</sup>	0.8-1	2-6; 7 <sup>8</sup> ; 8 <sup>8</sup>	2-6 (4-9)	[3], [84], [58]
Dimenhydrinate	see Diphenhydramine				
Dimethadione <sup>360</sup>	(350-) 700-1000	1000		5-10 <sup>6</sup>	[3], [8], [12], [11]
Dimethindene	0.01-0.05			appr. 6	[3], [15], [8]
Dimethoate			355.5 (160-674) <sup>277</sup>		[186]
N,N-Dimethyltryptamine	0.001-0.1				[58]
4,6-Dinitro-2-methylphenol		40			
Dinitro-O-cresol (DNOC)	1-5	30-60	75		[58]
Diphenhydramine	0.05-0.1 (-1)	1-2(-4)	5-10	4-10, 20-60	[296], [297], [114], [58]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Diphenoxylate	appr. 0.01			2-3	
Dipipanone	appr. -0.05	0.2			
Diprophylline	see Dyphylline				
Dipyridamole	0.1-1.5	4		11-13	[9], [13], [14]
Dipyrrone	see Metamizole				
Diquat		0.1-0.4			[11]
Disopyramide	2-7 <sup>78</sup>	8		5-8	[70], [11], [58], [64]
Disulfiram	0.05-0.4	0.5 <sup>311</sup> ; 5	8	appr. 5-7	
Dixyrazine	appr. 0.3 <sup>249</sup>		5.5 <sup>8</sup> ; 9.4 <sup>8</sup>		[4], [298]
Domperidone	appr. 0.01-0.1			12-16	[3], [299], [300], [301], [302]
Donepezil <sup>207</sup>	appr. 0.03-0.075	0.075 <sup>311</sup>		70-100	[4], [303], [304]
Dothiepin (Dosulepin) <sup>20</sup>	0.02-0.1	(0.3-) 0.8	1	11-40	[305], [306]
Doxacurium	0.01-0.3			1-2 <sup>83</sup>	
Doxapram	(1.5-) 2-5	9 <sup>268</sup>		2.4-9.9	[307], [3], [11], [58]
Doxazosin	0.01-0.15			10-22	[95]
Doxepin <sup>21</sup>	0.01-0.2 (0.03-0.1)	0.5-1	2-4	8-25	[308], [73], [309], [77],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
					[310], [80], [264]
Doxorubicin (Adriamycin)	0.006-0.02			20-48	[3], [8], [58]
Doxycycline	1-5 (-10)	30		7-20	
Doxylamine <sup>289</sup>	0.05-0.2	1-2	5	9-11	[47], [311], [87]
Dronabinol (Delta-9-tetrahydrocannabinol, THC)	0.005-0.01 (-0.05) <sup>137</sup>			50-100	[241], [312], [313]
Droperidol	appr. -0.05			1.5-2.5 <sup>237</sup>	[3], [314]
Drotrecogin alfa	mean 0.072			1.6	[315]
Duloxetine	0.03-0.12	0.24 <sup>311</sup>		9-19	[4], [223]
Dyphylline	6.5-14 (-20)	40		2	[11], [58]
Edrophonium	0.15-0.2	appr. 0.15		1.3-2.4	[3], [316], [58]
Efavirenz (EFV)	> 1.0 <sup>297</sup>			40-55	[110], [2], [111]
Eletriptan	0.06-0.23			3-7	[47]
Enfuvirtide	2.6-3.4			3-4	
Emetine	0.005-0.075	0.5	2.4 <sup>8</sup>	24-48	[8]
Enalapril <sup>52</sup>	0.01-0.05 (-0.1)			8-11	[159], [84]
Encainide <sup>48</sup>	_ <sup>175</sup>			1.5-3.5 <sup>176</sup>	[3]



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Endrin	-0.003	0.01-0.03			[58]
Enoxacin	1-4			3-6	[93]
Enoximone	≥ 0.2 (3-4 ?)			4-7	[3], [95], [8]
Enprofylline	1-5	10		appr. 2	[8]
Entacapone	0.4-1.0 (-7.0)			(0.5-) 1.5-3.5	[3], [15], [8]
Ephedrine	0.02-0.2	1	5 <sup>8</sup>	3-11	[269], [87], [8], [57], [58]
Epirubicin	0.01-0.05			24-52	
Eprosartan	0.4-1.0 (-1.85)			5-9	[3], [15], [8]
Eptastigmine	0.0002-0.006			appr. 1	[8]
Ergotamine	0.00036-0.00042 <sup>375</sup>	0.00082 <sup>376</sup>		1.5-2.5	[47]
Erythromycin	0.5-6 (peak 4-12)	12-15		1-3	[11], [58]
Escitalopram <sup>343</sup>	0.015-0.08	0.16 <sup>311</sup>		26.3±10.8	[4], [223]
Esmolol	0.15-2			4-16 min	[7]
Estazolam	0.055-0.2			10-24	[3], [58]
Eszopiclone <sup>341</sup>	appr. 0.087			4-9	[47]
Et(h)amsylate	15-20			2.5-4	
Ethacrynic acid	0.05-0.1			1-4	[3], [9]
Ethadione	500-1000	1000			[8]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Ethambutol	0.5-6.5	6-10		2.5-3.5	[317], [58]
Ethanol		1000-2000	3500-4000	_139	
Ethchlorvynol	0.5-8	20	50	10-25 (-35)	[3], [58]
Ethinamate	1.5-10	50-100	200 <sup>8</sup>	appr. 2	
Ethosuximide	30-100 (40-60)	150-200	250	30-60	[161], [164], [12], [64]
Ethyl chloride		200-300			[87]
Ethylene glycol		200-500	2000	11-19 (31 <sup>8</sup> :27 <sup>8</sup> )	[318], [319], [320], [321], [322], [323], [324], [325], [66], [326]
Ethylmorphine <sup>48</sup>	0.3-0.6 <sup>377</sup>		0.3-2.9	2-3	[47]
Etidocaine	0.5-1.5	1.6-2		2-3	[327]
Etidronat (Etidronic acid)				_6	[49]
Etilefrine	appr. 0.06			2-3.5	
Etizolam <sup>48</sup>	appr. 0.008-0.02	0.03 <sup>8</sup>		7-15	[47]
Etodolac	10-20 (> 14 <sup>229</sup> )			6-8	[328], [3], [15], [8]
Etomidate	0.1-0.5 (-1)			3.9±1.1 (2-11)	[3], [9]
Etoposide	2-6 (peak 8-14)			4-11	[3], [11]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Etoricoxib	1.3-3.6			20-36	[47]
Etravirine (ETR)	0.275 (0.081-2.98) <sup>302</sup>			appr. 41	[47], [110], [2]
Everolimus	0.003-0.008 (-0.014) <sup>275</sup>			28±7	[329], [330], [331], [332]
Ezetimibe	>0.015			appr. 30	[333], [334]
Famotidine	0.02-0.2	0.42 <sup>8</sup>		2-4.5	[3], [335]. [336]
Fampridine	see 4-Aminopyridine				
Felbamate	(30-) 50-110 <sup>164</sup>	150-200		15-23	[337], [4], [12], [338], [339]
Felbinac	appr. 0.4-1 <sup>326</sup>			10-17	[3], [340]
Felodipine	0.001-0.012	0.01		22-27 <sup>88</sup>	[341], [84], [8]
Fenbufen	appr. -60			10-12	[3]
Fendiline	0.02-0.15			appr. 20	[47]
Fenfluramine	0.04-0.3	0.5 – 0.7	6	18-25	[47]
Fenitrothion			1.1	33-64	[47]
Fenofibrate	5-30 <sup>241</sup>			20-22	[3], [342]
Fenoldopam	0.003-0.06			0.1	[15], [8]
Fenoprofen	(25-) 30-60			2-3	[343]
Fenoterol	(0.001-) 0.01-0.04			appr. 7	

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Fentanyl	0.003-0.3 <sup>4</sup>	_339	0.003-0.02 <sup>8; 103</sup>	1-3.5 (transdermal patch: appr. 17)	[335], [47], [344], [345], [52], [346], [54], [347], [348], [349], [350], [351]
Fenthion			4.9 (0.6-16.6 <sup>279</sup> )	12	[47], [186]
Fexofenadine	appr. -0.3 <sup>191</sup>			14-18	[8], [352]
Finasteride	0.008-0.01			5-7	[353]
Flecainide <sup>48</sup>	(0.2-) 0.4-0.8	1-2	2.6 <sup>8</sup> ; 13 <sup>8</sup>	10-20	[354], [70]
Fleroxacin	1-4			8-13	
Flucloxacillin	3-30			1-2	[11], [58]
Fluconazole	appr. 1-5 (-15)	20; 95 <sup>8</sup>		22-31 <sup>83</sup>	[355],[356], [357], [358], [11]
Flucytosine	35-70 (20-50)	100		3-5	[91]
Flumazenil <sup>22</sup>	(0.01-) 0.02-0.1	0.5		1-2	
Flunarizine	0.025-0.2	0.3		- <sup>6</sup>	[42]
Flunitrazepam <sup>23</sup>	0.005-0.015	0.05		10-20 (-30)	[359], [56], [59]
Fluoride	0.095-0.190 (-0.285) <sup>39</sup>	0.5-2	3	2-9	[47], [123], [360], [361], [130], [10], [58], [362]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
5-Fluorouracil	0.05-0.3	0.4-0.6		<0.5	[3], [11], [58]
Fluoxetine	0.12-0.5 <sup>130</sup>	1	6 <sup>8</sup>	2-6 <sup>6; 130</sup>	[263], [75], [202], [363], [4], [264], [364]
Flupenthixol	0.001-0.01	0.015 <sup>311</sup>		20-40	[4]
Fluphenazine	0.001-0.01	0.015 <sup>311</sup>		10-18 <sup>45</sup>	[4]
Flupirtine	0.5-1.5	appr. 3-4		7-11	[365]
Flurazepam <sup>24</sup>	0.02-0.1	0.2-0.5	0.8 ; 24 <sup>8</sup>	appr. 2 <sup>24</sup>	
Flurbiprofen	5-15			3-4	[366]
Fluspirilen	0.0001-0.0022	0.0044 <sup>311</sup>		7-14 <sup>6</sup>	[4]
Flutamide <sup>60</sup>	0.4-1.5 <sup>60</sup>			7-20 <sup>60</sup>	[43], [367]
Fluvastatin	0.05-0.4			1-3	[47]
Fluvoxamine	0.06-0.23	0.5 <sup>311</sup> -0.65; 1.97 <sup>8</sup>	2.8 <sup>8</sup>	(8-) 15-22 (-28)	[47], [368], [202], [4], [369]
Fosamprenavir (FPV)	> 0.4 <sup>292</sup>			7.7 <sup>319</sup>	[110], [2], [111]
Fosphenytoin <sup>336</sup>	see Phenytoin	30		0.13-0.25	[12]
Frovatriptan	0.004-0.008			20-30	[47]
Furosemide (Frusemide)	2-5 (-10)	25-30		1-3	[3], [58]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Fusidinic acid	30-200			4-6	
Gabapentin	appr. 0.5-6 (-20-30) <sup>185</sup>	25 <sup>311</sup> ; 45 <sup>8</sup> ; 85 <sup>8</sup> ; 105 <sup>8</sup>		5-9	[47], [370], [371], [372], [373], [374], [375], [12], [376], [377], [378], [379], [380], [381], [382], [48]
Galant(h)amine	appr. 0.03-0.06	0.09 <sup>311</sup>		6-8	[383], [4], [384]
Gallopamil	0.02-0.1		8 <sup>8</sup>	3-8	[385], [84]
Gamma-hydroxybutyricacid (gamma-hydroxybutyrate, gamma-butyrolactone, GHB, liquid ecstasy) <sup>48</sup>	see 4-Hydroxybutyrate				[386], [387]
Ganciclovir	(0.29-0.51) 0.5-5 <sup>107</sup>	3-5		2-4 <sup>83</sup>	[388], [38], [39]
Gemcitabine	15-20 µmol/L <sup>146</sup>	_ <sup>192</sup>		0.05 (0.18-0.43)	[209]
Gemfibrozil	appr. -25			1.5	[3]
Gentamicin	(2-) 4-10 <sup>233</sup>	12		1.5-6	[389], [67], [390], [20], [391], [392], [393], [394]
Glibenclamide (Glyburide)	0.05-0.2	0.6		10	[47]
Glicazide	1-3.7			6-14	[47]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Glimepiride	0.09-0.5			4-15	[47]
Glipizide	0.1-1 (-1.5)	2		3-7	[66]
Glutethimide	0.2-5	10-30	20-50	5-20	[30]
Glyburide	see Glibenclamide				
Glyceryl trinitrate (GTN)	see Nitroglycerin				
Gold	3-8	10-15		21-31 <sup>6</sup> (oral)	[47], [58], [48]
Granisetron	0.009-0.017 (?)			3-14	[3], [15], [8]
Griseofulvin	0.3-1.3			22	[8]
Guaifenesin	0.3-1.4			appr. 1	[3], [15], [8]
Guanethidine	0.01			5-10 <sup>6</sup>	[3], [58]
Halazepam <sup>15</sup>	see Nordazepam			30-40	
Haloperidol	0.005-0.017 (0.001-0.02)	0.05-0.5	0.5; 0.18 <sup>8, 74</sup>	10-35 <sup>153</sup>	[43], [395], [185], [396], [193], [397], [398], [240]
Halothan	22-260		3.4 <sup>8</sup> ; 8.3 <sup>8</sup>	43	[87], [48]
Hematin	50-100				
Hemin	see Hematin				
Heptabarb(ital)	0.5-4	8-15	20	6-11	
Heptaminol	appr. 0.2-1 (-1.5)			2-3	

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Heroin (Diacetylmorphine or Diamorphine, [DAM]) <sup>337</sup>	_338	_339		2-5 min	[273], [274], [275], [276], [277], [278], [279], [280], [281]
Hexachlorobenzene (HCB)	-0.0001 <sup>332</sup>			appr. 2 years	[100]
β-Hexachlorocyclohexane (β-HCH, β-lindane)	-0.0001 <sup>332</sup>			appr. 7 years	[100]
Hexachlorophene	0.003-0.65 (-1)		35	6-44	[11], [58]
n-Hexane	-0.01			1.5-2	[47]
Hexapropymate	2-5	10-20			[8], [11]
Hexobarbital	1-5	10-20	50	4-6	
Hirudin-rec	_171	_171		(1-) 2.5-3	[399], [43], [3]
Hydralazine <sup>5</sup>	0.05-0.5 (-1.5)			2-6	[84]
Hydrochlorothiazide	appr. 0.04-2			10-12	[3], [42]
Hydrocodone	0.01-0.05	0.1 <sup>339</sup>	0.2	appr. 4	[8], [244]
Hydromorphone	appr. 0.005-0.015	0.1 <sup>339</sup>	0.2	2-3	[400], [9], [8], [270]
4-Hydroxybutyrate (GHB) <sup>48</sup>	appr. 50-120 <sup>4</sup>	80 (abuse)	250-280 (abuse)	0.3-0.5 (-1)	[47], [3], [8], [244], [401], [402]
Hydroxychloroquine	-0.1 (-0.4)	0.5-0.8	4	dose-dependent <sup>6</sup>	[3], [403], [13], [14]



Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
4-Hydroxy-3-methoxymethamphetamine (HMMA)	_333			11.5-13.5	[404], [405], [406]
Hydroxyzine	0.05-0.1	0.1	39 <sup>8</sup>	7-20	[56], [11], [58]
Ibandronat (Ibandronic acid)	_321				[49]
Ibuprofen	15-30	200	352 <sup>8, 346</sup>	2-3	[47], [407], [343], [293], [408]
Idebenone	0.05-0.2			16-22	[3], [409]
Iloperidone	0.005-0.01	0.02 <sup>311</sup>		18-33	[4]
Iloprost	appr. 0.0001			appr. 0.5	
Imatinib	0.72 <sup>258</sup>			appr. 18	[410], [411]
Imipenem	0.5-5 (20-75)			1	[8], [412]
Imipramine <sup>48, 125</sup>	0.05-0.35	0.5-1	1.5-2	6-20 <sup>26</sup>	[308], [74], [309], [76], [77], [413], [78], [79], [80]
Indinavir (IDV)	> 0.1 <sup>260</sup>	appr. 0.5		1.5-2	[211], [3], [110], [2], [414], [111]
Indomet(h)acin	0.3-1 (-3)	4-5		3-11	[415]
Indoramin	appr. 0.025-0.1			12 (3.5-15)	[95]
Iproniazid	appr. -5 ?				

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Irbesartan	1.9-3.3			11-15	[47]
Iridium	-0.02				
Iron	0.5-2	6	17		[42], [58], [64]
Isoniazid (INH)	5-10	20	(30-) 100	1-3	[3], [317], [8]
Isopropanol <sup>361</sup>		200-400	1000	2.5-3	[47], [58]
Isosorbid mononitrate (ISMN)	0.1-1			2-5	[95]
Isotretinoin	appr. 0.001-0.002 (topical) <sup>224</sup>			10-20	[3], [416], [417]
Isoxicam	5-15			20-50	
Isradipine	0.0005-0.002 (-0.01)	0.01	0.26 <sup>8</sup> , 259	5-10	[418], [3], [84], [419], [420]
Itraconazole	appr. 0.4-2 <sup>111</sup>			24-36	[421], [422], [423], [424]
Ivermectin	appr. 0.05 <sup>51</sup>			16-28	[3], [425]
Kanamycin	1-4 (10-25)	25-30		0.5-3	
Kavain	appr. 0.05			2.8-6.7	[47]
Ketamine	1-6	7 (abuse)	3.8 <sup>8</sup> ; 6.9 <sup>8</sup>	1-3 (-4)	[47], [426], [56], [427], [428]
Ketanserin	0.05-0.5			10-22	
Ketazolam <sup>15</sup>	0.001-0.02			1-3	[59]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Ketobemidone	0.01-0.05		0.2-3.2	1.8-4.2	[47], [426], [3], [428]
Ketoconazole	1-3 (-6)			6-10	[8]
Ketoprofen	1-6 (-20)		1100 <sup>8</sup>	1,1-2 (-4.2)	[429], [47], [430], [343], [431], [432], [433]
Ketorolac	0.5-3	5		4-10	[3], [8]
Ketotifen	0.001-0.004	0.02	1.2 <sup>8</sup>	21	[57]
Labetalol	0.03-0.18 (-0.65) <sup>50</sup>	1		3-10	[3], [95], [7]
Lacidipine	0.003-0.006			12-19	[8]
Lacosamide	1-10	20 <sup>311</sup>		13	[4]
Lamivudine	_230			5-7	[123], [434],[2]
Lamotrigine	(1-5) 3-14	20-30	35.7 <sup>8</sup> ; 347 <sup>7</sup> ; 50 <sup>8</sup>	23-37 <sup>109</sup>	[47], [374], [435], [436], [381], [437]
Lead	-0.09 <sup>324</sup>	0.4-0.6	3	_180	[47], [64], [123], [438], [439], [100]
Leflunomide <sup>255</sup>	8.8 ± 2.9, 18 ± 9.6, 63 ± 36 <sup>256</sup>			11 (4-28) <sup>6</sup>	[440], [123], [441], [442]
Levacetylmethadol (LAAM)	appr. 0.02-0.06			35-60	[8]
Levamisole	appr. 0.1-0.7			3-6	[8]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Levetiracetam	(3-) 10-40	400 <sup>8; 264</sup>		4-10	[8], [443]
Levocabastine	< 0.001-0.01 <sup>147</sup>			33-40	[444]
Levocetiricine <sup>378</sup>	0.3-0.5			6-10	[47]
Levodopa (L-Dopa)	0.3-2	5 <sup>311</sup>	650 <sup>8</sup>	1-3 <sup>215</sup>	[445], [446], [447], [448], [4], [449]
Levomepromazine <sup>27</sup>	0.005-0.025 (-0.2)	0.4	0.5	15-30 <sup>28</sup>	
Levomethadone <sup>352</sup>	0.04-0.4	(0.4-) 1 <sup>339</sup>	0.1-0.2 <sup>362</sup>	10-40	[123], [4], [450]
Levorphanol	0.007-0.02	0.1	2.7 <sup>8</sup>	11-30	[8]
Levothyroxine	0.045-0.14 <sup>47</sup>			6-8 <sup>6</sup>	[451]
Lidocaine (Lignocaine)	(1-) 1.5-5 <sup>113</sup>	6-7	10	1-4 <sup>113</sup>	[452], [453], [391], [70], [327], [454]
Linezolid	appr. 0.5-4			appr. 5	[8]
Lisinopril	(0.005-) 0.02-0.07	0.5		12	[84]
Lithium	4-8 <sup>79</sup>	13	14	8-50 <sup>28</sup>	[455], [456], [457], [80], [264], [458]
Lofepramine	0.003-0.01			10-20	
Loperamide	_84			7-15	[459]
Lopinavir (LPV)	> 1.0 <sup>294</sup>			5-6	[110], [2],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
					[111]
Loprazolam	0.003-0.01			11-20	[59]
Loratadine	0.001-0.02 <sup>138</sup>			8-14	[460], [461]
Lorazepam	(0.02-) 0.08-0.25	0.3-0.5		10-40	[462], [59], [463], [224]
Lorcainide	0.1-0.4 (-0.9)			5-10	[8], [464], [465], [466]
Lormetazepam	0.002-0.01 (-0.025)	0.1		10-15	[4], [59]
Lornoxicam	0.1-0.8			2-6	[8]
Losartan	< 0.2 (-0.65) <sup>227</sup>			1.5-2	[3], [8]
Loxapine	0.01-0.03 (-0.1)	1	7.7	4 (1-14)	[8], [11]
Lysergide (lysergic acid diethyl amide, LSD)	0.0005-0.005	0.001	0.002-0.005	appr. 2-5	[467], [15], [8], [11]
Magnesium	55-75 <sup>121</sup>	120-140	150-180	2.1-2.9	[47], [3], [468]
Malathione		0.35 <sup>8</sup> ; 0.5	1.8 <sup>8</sup> ; 175 <sup>8</sup> ; 517 <sup>8</sup>	3-6	[47]
Manganese	0.0005-0.0015			12-36 <sup>6</sup>	[47]
Maprotiline	0.075-0.13	(0.22-) 0.5-1	1-5	20-60	[4]
Maraviroc (MVC)	> 0.05 <sup>300</sup>				[110]
MCPA	see 2-Methyl-4-chlorophenoxyacetic acid				

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
MCPP	see 2-Methyl-4-chlorophenoxypropionic acid				
MDA	see Methylenedioxyamphetamine				
MDEA	see Methylenedioxyethylamphetamine				
MDMA	see Methylenedioxymethylamphetamine				
Mebendazole	≥ 0.1 <sup>67</sup>	appr. 0.6		2.8-9	[43]
Medazepam <sup>30</sup>	0.1-0.5 (-1)	0.6		2-5	[59], [8]
Mefenamic acid	2-10 (-20)	25		2-4	[9], [13], [14]
Mefloquine	0.4-1 <sup>108</sup>	1.5-2 <sup>8</sup>		appr. 21 <sup>6</sup>	[469], [470]
Melatonin	0.0005-0.1 <sup>379</sup>			40-50 min	[47]
Melitracen	0.01-0.1			12-23	[8]
Meloxicam	0.4-2			17-22	[471], [15], [8]
Melperone	0.03-0.1 <sup>219</sup>	0.2 <sup>311</sup>	17.1 <sup>8</sup>	4-8	[4], [472], [15], [8], [473]
Melphalan	-1.5			1.5-2	[8]
Memantine	0.09-0.15	0.3 <sup>311</sup>		60-100	[4]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Meperidine	see Pethidine				
Mephenesin	3-10 (?)			appr. 2-4	[15], [8]
Mepindolol	0.007-0.07			3-6	[7]
Mepivacaine	appr. 0.4 (-4)	5-6 (-10)	50	1-3	[15]
Meprobamate	5-10	10-25	30	6-17	[56]
Meptazinol	0.025-0.25			2-3	[8]
Mercaptopurin <sup>364</sup>	0.03-0.08	1-2			[8]
Mercury	appr. 0.0015-0.002 ( $< 0.005$ ) <sup>178</sup>	0.05-0.2	0.5	appr. 3 <sup>6</sup>	[123], [64], [474], [66], [475], [100], [476], [477], [478]
Mescaline	1.5-3.8			6	[47]
(Mesalazine (Mesalamine))	appr. -1 <sup>119</sup>			0.5-2.4 <sup>120</sup>	[479]
Mesoridazine	0.15-1	3-5	3 <sup>8</sup> ; 4 <sup>8</sup> ; 16 <sup>8</sup>	20	[15]
Mesuximide	see Methsuximide				
Metaclazepam	0.05-0.2			7-23	[59]
Metamizole (Dipyrone) <sup>5</sup>	10 <sup>32</sup>	20 <sup>32</sup>		6-8	[15]
Metformin	0.1-1 (0.6-1.3)	5-10	64 <sup>8</sup> ; 85 <sup>8</sup> ; 91 <sup>8</sup> ; 166 <sup>8</sup>	2-4 (-10)	[480], [481]
Methadone	(0.05-) 0.1-0.5 (-0.75) <sup>135</sup>	0.2 <sup>339</sup>	0.4 <sup>362</sup>	23-25 (13-55)	[482], [483], [484], [485], [486], [487],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[488], [489]
Methamphetamine (Methylamphetamine)	-0.1	0.15	1-18; 40 <sup>8</sup>	6-15 <sup>344</sup>	[47], [8]
Methanol	appr. -2	200	900	10-12 (-24) <sup>325</sup>	[47], [325], [15], [8], [58], [490]
Methapyrilene	appr. 0.1	4			
Methaqualone	1-3	3-5	5-10	10-40	[8]
Methemoglobin (Met-Hb)	<sub>-199</sub>	25-30 %	60-70 %		[3], [10], [11]
Methimazole	0.5-2.5			2-28	[467], [15], [8]
Methocarbamol	25-40 (-50)	250		0.9-2	[3], [11],[58]
Methohexital	1-6 (-11) <sup>55</sup>	2-20		1-3	[8]
Methomyl		0.63 <sup>8</sup> ; 1.6 <sup>8</sup>	1.6 <sup>8</sup> ; 28 (8-57)		[47]
Methotrexate	0.04-?	0.4		5-9 (low dose); 16-29 (high dose)	[47]
Methotrimeprazine	see Levomepromazine				
Methoxsalen (8-Methoxypsoralene)	0.025-0.1 (-0.2)	1			[3], [10]
Methsuximide (Mesuximide)	10-40 <sup>223</sup>	40-50		20-40 (-45)	[3], [491], [8], [11], [58]
2-Methyl-4-chlorophenoxyacetic acid (MCPA)	-	appr. 100	appr. 180	<sub>-187</sub>	[3], [492]
2-Methyl-4-chlorophenoxypropionic acid (MCPPE)	-	appr. 100	669 <sup>8</sup> ; 715 <sup>8,181</sup>	17 <sup>183</sup>	[3]



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Methyl dopa	1-5	9 <sup>8</sup>		1.5-3	[9], [13], [14]
3,4-Methylenedioxyamphetamine (MDA)	-0.4	1.5	1.8-2; 26 <sup>8</sup>	10.5-12.5	[15], [8], [58], [467], [404], [405], [406], [493], [494]
3,4-Methylenedioxyethylamphetamine (MDEA, MDE; Eve)	-0.2		1; 4.2 <sup>8</sup> ; 12 <sup>8</sup>	4-8 <sup>334</sup>	[47], [493], [495], [496], [497]
3,4-Methylenedioxymethylamphetamine (MDMA; Ecstasy, XTC; Adam)	0.1-0.35 <sup>236</sup>	0.35-0.5	0.4-0.8	7-8 (-10)	[498], [467], [15], [8], [58], [404], [405], [499], [406], [493], [494]
Methylphenidate	0.01-0.06	0.1-0.5; 1 <sup>8</sup>	2.3	2-7	[270]
Methylphenobarbital	see Phenobarbital				[12]
4-Methylthioamphetamine (4-MTA, p-MTA)			2 <sup>8</sup> ; 4.2 <sup>8</sup> ; 7.4 <sup>8</sup>		[500], [501], [502], [503], [504]
Methyprylon(e)	< 10-20	25-75	50 (-100)	3-6, 9-11	[8]
Metiamide	0.01-0.06				[58]
Metildigoxin <sup>3</sup>	0.0005-0.0008	0.0025-0.003	0.005	40-70	[18], [19], [20], [21], [22], [23], [24], [25], [26], [27]
Metipranolol <sup>33</sup>	0.02-0.08			2-3.5	
Metoclopramide	0.05-0.15	0.2	4.4 <sup>8</sup>	3-6	[66]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Metocurine	appr. -0.4				
Metoprolol <sup>48</sup>	0.035-0.5	0.65 <sup>8</sup> ; 12-18	4.7 <sup>8</sup> ; 12 <sup>8</sup> ; 18 <sup>8</sup> ; 63 <sup>8</sup>	2.5-7.5	[47], [3], [7]
Metrifonate	appr. 1.4-3.6			2-5	[8]
Metronidazole	3-10 (-20)	200 <sup>8</sup>		6-10 (-14)	[8]
Mexiletine	0.7-2	2	35 <sup>8</sup>	5-26	[70], [505]
Mianserin	0.015-0.07	0.14 <sup>311</sup> ; 0.25-0.5		14-33	[4], [223]
Mibefradil	appr. 0.2-0.3			17-25	[8]
Miconazole	appr. 1			24	[8]
Midazolam	0.04-0.1 (-0.25) <sup>134</sup>	1-1.5		1.5-3 <sup>46</sup>	[506], [507], [508], [61], [224]
Mifepristone	<sup>216</sup>			24-48 (20-54)	[509]
Milnacipran	0.05-0.11	0.22 <sup>311</sup>		5-8	[4]
Milrinone	0.15-0.25	0.3		1-2	[3], [95], [42]
Minaprine	appr. -0.1				
Minoxidil	appr. 0.02-0.2 <sup>149</sup>	1.4 <sup>8</sup> ; 3.1 <sup>8</sup>	2.7 <sup>8</sup>	1.3-4.2	[47], [3], [84]
Mirtazapine	0.03-0.08 (-0.3)	1-2; 2.3 <sup>8</sup>		20-40 <sup>188</sup>	[3], [4], [510]
Misoprostol	<sub>-286</sub>			0.5±0.4	[3], [511], [512]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Mitotane	14-20	20		18-159 <sup>6</sup>	[513]
Mizolastine	appr. 0.2-0.8			8-17	[3], [8]
Moclobemide <sup>141</sup>	0.3-1.0 (-3)	2 <sup>311</sup> ; 11 <sup>162</sup> ; 25-60		1-7	[514], [515], [516], [517], [518], [519]
Modafinil	1-1.7 (-3) <sup>257</sup>	3.4 <sup>311</sup>		10-15	[89], [4], [8], [520]
Moexiprilat	0.005-0.04			2-10	[8]
Molindone	0.04-0.5	0.15 <sup>8</sup>	6 <sup>8</sup> ; 9.3 <sup>8</sup>	1.2-2.8	[47]
Molsidomine	0.002-0.01			1-2.5	[95]
Molybdenum	-0.005				
Montelukast	appr. 0.05-0.3			3-6	[3], [15], [8], [521]
Moricicine	0.12-1.27			(3-) 6-13	[467], [15], [8]
Morphine <sup>288</sup>	0.01-0.1	0.1 <sup>339</sup>	0.1-4	1-4	[522], [241], [523], [524], [87], [525]
Moxonidine	0.001-0.002 (-0.004)			2-4	[3], [95], [8]
Muromonab-CD3 (OKT 3)	appr. 0.7-1.3			appr. 18	
Mycophenolate mofetil	_211			16-18 <sup>212</sup>	[526], [527], [528], [529]
Nabumetone	_206			_206	[3], [530]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Nadolol	0.01-0.25		1.3 <sup>8</sup>	(14-) 20-24	[8], [7]
Naftidrofuryl (Nafronyl)	<0.5			1-2	
Nalbuphine	0.02-0.2			2.5-7	[8]
Nalidixic acid	10-30	40-50		1-2 (-7)	[3], [9], [15], [8]
Nalmefene	-0.1			8.5-11	[3]
Naloxone	0.01-0.03			1-2	[8]
Naltrexone	0.003-0.05 <sup>99</sup>			4-10	
Naphyrone (Naphthylpyrovalerone)		0.03 <sup>334</sup>			[531]
Naproxen	20-50 (-100)	200-400; 414 <sup>8</sup>		10-20	[532], [343], [533], [293]
Naratriptan	appr. 0.01-0.05			5-6	[3], [15], [8]
Nebivolol	< 0.02 (-0.2)	0.48 <sup>8</sup>		10 (8-27)	[3], [8], [534], [535], [536]
Nedocromil	< 0.025			1.5-3.3	[3]
Nefazodone	appr. 0.01-0.3 (?) <sup>220</sup>	5.5 <sup>8, 221</sup>		2-7 <sup>222</sup>	[8], [3], [537], [538], [539], [540], [541], [542]
Nefopam	0.01-0.1	4 <sup>8</sup>	12 <sup>8</sup>	3-8	[8]
Nelfinavir (NFV)	> 0.8 <sup>295</sup>			3.5-5	[110], [87], [2], [111]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Neostigmine	appr. 0.001-0.01 <sup>127</sup>			0.4-1.3	[316], [543]
Netilmicin	1-12			2-3 <sup>80</sup>	[8]
Nevirapine (NVP)	> 3.0 <sup>298</sup>			25-30	[110], [2], [111]
Nicardipine	0.07-0.1			7-12	[84]
Nickel	-0.003 <sup>330</sup>	0.005			[58], [100]
Nicotine <sup>123</sup>	0.005-0.02 (-0.03)	0.4 (-1)	5; 13.6 <sup>8</sup>	1-4 <sup>124</sup>	[3], [544], [42], [545]
Nicotinic acid	4-18			0.3-1	[8]
Nifedipine	0.025-0.15	appr. 0.15-0.2	0.15 <sup>8</sup> ; 1.2 <sup>8</sup> ; 5.4 <sup>8</sup>	2-5	[47], [84]
Niflumic acid	2-35			2-3	[15]
Nilvadipine	< 0.01			11-20	[84]
Nimesulide <sup>235</sup>	0.1-6.5			2-7 (11-20)	[546], [3], [15], [8]
Nimodipine	0.01-0.05			1-2 (8-9)	[84]
Nimustine	0.0002-0.0005				[58]
Nisoldipine	0.0003-0.001			7-12	[3], [84]
Nitrazepam	0.03-0.1	0.2-3	5	20-30	[8], [59]
Nitrendipine	0.01-0.05			8-12	[84]
p-Nitroaniline			4.2 <sup>8</sup>		[547]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Nitrofurantoin	(0.5-) 1-3 (-5)	3-4		0.7-1.5	[8]
Nitroglycerin (Glyceryl trinitrate)	appr. -0.015			20-30 min	[548]
Nitroprusside	see Thiocyanate	see also Cyanide			
Nizatidine	0.05-0.5 (-1.0)			0.7-2.1	[8]
Nomifensine	0.01-0.1	8	17 <sup>8</sup>	2-5	[87], [8]
Nordazepam	(0.02 <sup>273</sup> -) 0.2 -0.8	1.5-2		40-80	[284], [285], [467], [8], [15]
Nordiazepam	see Nordazepam				
Norephedrine	see Phenylpropanolamine				
Norfenefrine	-0.4			2-3	[8]
Norfloxacin	0.5-5			3-4	[3], [58]
Normesuximide <sup>31</sup>	10-30	40		38	
Nortriptyline <sup>48</sup>	0.02-0.2 (0.05-0.15)	0.3 <sup>311</sup> ; 0.5	1-3	18-56 <sup>68</sup>	[76], [80], [81], [82], [223]
Noscapine	0.02-0.4			1.5-4	[47]
Obidoxime	1-10 (appr. 10-15 µmol/L)				[549], [58]
Ofloxacin	appr. 2.5-5.5	(30-) 40 <sup>8</sup>		(3-) 5-8	[3], [550]
OKT 3	see Muromonab-CD3				
Olanzapine	0.02-0.08	0.15-0.2	0.25 <sup>8</sup> ; 1 <sup>8</sup> ; 2.5 <sup>8</sup> ; 4.9 <sup>8</sup>	30-60	[47], [551], [101], [552], [553], [4], [72],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[554], [15], [555], [58]
Olpadronat (Olpadronic acid)				<sup>6</sup>	[49]
Omeprazole <sup>48</sup>	0.05-4 <sup>98</sup>			0.5-1 (-1.5)	
Ondansetron	0.03-0.3			3-5.5	[8], [66]
Opi Pramol	0.05-0.5	1 <sup>311</sup> ; 2-3	7-10	6-12 <sup>262</sup>	[43], [556], [4]
Orphenadrine	0.1-0.2 (-0.6)	1.7	3.6 <sup>8</sup> ; 5-7	(10-) 14-18	[296], [56], [9], [557]
Oxatomide	0.02-0.1			14-30	[3]
Oxazepam	0.2-1.5	2	3-5	6-20	[283], [3], [59], [13]
Oxazolam	see Nordazepam				
Oxcarbazepine	10-35 <sup>172</sup>	45		1-2.5 (-5) <sup>172</sup>	[3], [558], [12], [559], [560], [381]
Oxibutynin	0.001-0.02				[8]
N-Desethyloxibutynin	0.01-0.08				[8]
Oxpentifylline	see Pentoxyfylline				
Oxprenolol	0.05-0.3 (-1.0)	2-3	10	1-4	[7], [8]
Oxycodone <sup>48</sup>	0.005-0.1	0.2 <sup>339</sup>	0.6; 5 <sup>8</sup>	2-5 <sup>53</sup>	[9], [42], [11], [58], [244]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Oxyfedrine	appr. 0.06			4.2	[95]
Oxyphenbutazone	25-100	200		48-72	[47], [8]
Oxypurinol <sup>61</sup>	5-15	20		18-30	[11], [58]
Oxytocin	appr. -0.0002			3-5 min	[3]
Paclitaxel	0.1-1 <sup>122</sup>			4-8 (-20)	[8]
Paliperidone	0.02-0.06	0.12 <sup>311</sup>		23	[4]
Pamidronate (Pamidronic acid)	< 0.02 <sup>323</sup>			- <sup>6</sup>	[49], [561]
Pancuronium	0.1-0.6	0.4 <sup>8; 198</sup>	1.6	1.5-2.5	[562]
Pantoprazole	appr. -4.6 <sup>98</sup>			1-2	[8], [3]
Papaverine	0.2--2			1-2 (6-7)	[57]
Paracetamol	(5-)10-25	100-150	200-300	2-4	[563], [564], [565], [566], [567], [568], [569], [243], [570], [571]
Paraldehyde	10-100	200	400-500	4-10	[87], [48]
Paraoxon	-	0.005			[11]
Paraquat	-	0.05	0.12 <sup>8; 348</sup> ; 1-2 <sup>201</sup>	8-12 <sup>349</sup>	[123], [572], [11], [573], [574], [575], [576], [577], [578], [579], [580]



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Parathion	-	0.01-0.05	0.05-0.08		[3], [10], [58]
Paroxetine <sup>48</sup>	< 0.01-0.05 (-0.12)	0.35-0.4	3.7 <sup>8</sup> ; 4 <sup>8,306</sup>	16-24 <sup>93</sup>	[263], [368], [202], [581], [582], [583]
Pefloxacin	1-10 (3-6)	25		8-15	[8]
Pemoline	appr. 1-7			7-13	[8]
Penbutolol	0.01-0.3 (-1.0)			20-26	[7]
Penfluridol	0.004-0.025			70	[3], [11]
(D-)Penicillamine	1.7-5.6 (-11)			1-3	[8]
Pentachlorophenol	-0.2	30	45		[11]
Pentamidine	0.3-0.5	appr. 0.8		6-9	[3], [15], [8]
Pentazocine	0.01-0.2	1-2	3	2-5	[8]
Pentobarbital	1-5 (-10)	10-19	15-25	20-40	[87], [48], [8]
Pentoxifylline <sup>72</sup>	appr. 0.5-2			0.5-2 (4-6)	[8]
Pentoxyverine	-0.18			2-3	[8]
Perazine	0.02-0.35 (-0.44)	0.5 (6.1 <sup>8</sup> )		8-16 (-35)	[584], [8]
Perhexiline	0.11-0.6 <sup>309</sup>	0.6-1.2		(7-) 12-18 (-23)	[585], [586], [3]
Perici(y)azine	0.005-0.03	0.1			[9]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Perindopril	0.08-0.15			0.8-1.5 <sup>265</sup>	[15], [8], [3]
Perphenazine	0.001-0.02 (0.0006-0.0024) <sup>161</sup>	0.005 <sup>311</sup> ; 0.05		8-12 (-21)	[587]
Pethidine	0.1-0.8 <sup>115</sup>	1-2	2 (-3)	3-6 (-10)	[588], [589], [590], [591], [592]
Phenacetin <sup>62</sup>	5-10 (-20)	50		appr. 1	[9], [13]
Phenazepam	0.02-0.04			60	[47]
Phenazone (Antipyrine)	5-25	50-100		10-12	[8]
Phencyclidine (PCP)	0.01-0.2	0.007-0.24 (-0.8)	(0.3-) 1-5	1-12 (-50)	[467], [15], [8], [11], [58]
Phendimetrazine	0.02-0.1		0.3-0.7	2-4	[8]
Phenelzine	0.001-0.002 (-0.04)	0.5	1.5	6-8	[3], [11], [58]
Pheneturide		5-20		30-90	[12]
Phenformin	0.03-0.1	0.6	3	4-13	[15], [8], [3]
Pheniramine	0.01-0.27		appr. 2	16-19	[15], [8], [3]
Phenmetrazine	0.02-0.25	0.5	4	appr. 8	[8]
Phenobarbital	10-30 (15-40)	30-40	50-60	60-130	[161], [164], [415]
Phenol		50	90		[11]
Phenprocoumon	0.16-3.6 (1-5)	5		100-160 <sup>35</sup>	[11], [58]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Phensuximide	4-10 (-20)	80		4-12	[8], [11], [58]
Phentermine	0.03-0.1	0.9	1	appr. 20	[15], [8], [11], [58]
Phenylbutazone <sup>36</sup>	50-100	120-200	400	30-175 <sup>37</sup>	[9], [13]
Phenylephrine	0.04-0.1			2-3	[8]
Phenylpropanolamine (Norephedrine)	0.1-0.5	2	48	3-7	[3], [9]
Phenytoin	5-15 (10-20) <sup>81</sup>	20-25	43 <sup>8</sup> ; 50	10-60 <sup>37</sup>	[164], [593], [594], [595], [596], [597], [598], [599], [600]
Pholcodine	appr. 0.07-0.2			35-75	[47]
Physostigmine	< 0.001-0.005			0.4-1	[316], [601], [303]
Pimozide	0.004-0.01 (-0.02)	0.02 <sup>311</sup>		24-55	[4]
Pinazepam <sup>15</sup>	0.01-0.05			16	[59]
Pindolol	0.02-0.15	0.7-1.5		2-5	[7]
Pipamperone	0.1-0.4	0.5-0.6		17-22	[4]
Piperacilline	1-5 (20-70)			1-2	[15], [8], [11], [58]
Piperazine	0.02-0.1	0.5			[42], [66], [58]
Pipotiazine	0.001-0.06	0.1		8-11	[3], [9], [8],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
					[11], [58]
Piracetam	appr. 20-50			4.5-7	[8]
Pirenzepine	0.03-0.45			8-20	[8]
Piritramide	0.0035- 0.014 <sup>128</sup>	_128		4-10	[602], [8]
Pirmenol	1-4			6-18	[3], [8], [11]
Piroxicam	2-6	14 <sup>8</sup>		30-70	[8]
Pizotifen	0.007-0.009			26	
Posaconazol	> 0.7 (for invasive aspergillosis)			20-66	[47], [603], [604], [605]
Practolol	1.5-5			appr. 6-8	[8]
Prajmalium <sup>48</sup>	0.06-0.44			5-7	[8]
Pramipexole	appr. 0.0002-0.007	0.015 <sup>311</sup>		8-14	[4], [467], [15], [8]
Pranlukast	appr. 0.2-1.2			appr. 2-9	[15], [8], [3]
Prazepam <sup>15</sup>	0.2-0.7	1		1-3	[8], [59]
Praziquantel	appr. 0.2			1-2.5	[8]
Prazosin	0.001-0.02	0.9		2.9±0.8	[95], [42]
Prednisolone	0.5-1			2-6	[8]
Pregabalin	2-5 (-8)	10 <sup>311</sup> ; 13 <sup>8</sup> ; 60 <sup>8</sup> ; 67 <sup>8</sup>		appr. 6	[373], [4], [606], [607]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Prilocaine	0.5-1.5 (-2) <sup>126</sup>	5-6	appr. 20	1-2	[608], [327]
Primaquine	appr. 0.1-0.2			4-7	[8]
Primidone <sup>63</sup>	4-12 (8-15)	20-50	65	4-12, 9-22	[161], [164]
Probenecid	100-200 (20-150)			3-17 <sup>37</sup>	[8]
Procaine	0.2-2.5 (-15)	15-20	20	-0.5	[15], [11], [58]
Procainamide <sup>5</sup>	(2.5-) 4-10 (-12)	10-15	20	2-5 (-8)	[70], [609], [8]
N-Acetylprocainamide <sup>38</sup>	(5-) 10-35 (-40)			3-7	[8]
Prochlorperazine	0.01-0.05	0.2-0.3	5	7-9 (-18)	[3], [9], [58]
Procyclidine	0.08-0.63	1-2	7.8 <sup>8</sup>	7-16	[15], [8], [11]
Proguanil <sup>48</sup>	appr. 0.04-0.15 <sup>114</sup>			13-24 <sup>114</sup>	[610], [58]
Promazine	0.01-0.05 (-0.4)	1	5	5-41 (8±7)	[8]
Promethazine	0.05-0.2 (-0.4)	1-2	2.4 <sup>8</sup> ; 1.8-5.4 <sup>250</sup>	8-15 (-20)	[56], [611], [612]
Propafenone <sup>48</sup>	(0.04-) 0.3-2	(1.1-) 2-3	7.7 <sup>8</sup> ; 9 <sup>8</sup>	5-8, 2-32 <sup>48</sup>	[613], [70], [42]
Propallylonal	0.3-10	appr. 10		appr. 3	[8]
2-Propanol	see Isopropanol				[64]
Propantheline	appr. -0.02			1-3	[3]
Propiomazine	< 0.3 (?)			8-10	[56], [614]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Propofol <sup>48</sup>	appr. 2-8			3-8 <sup>91</sup>	[244], [615], [52], [616]
Propoxyphene	see Dextropropoxyphen				
Propoxur			0.3 <sup>8</sup>		[87]
Propranolol	0.02-0.3	(0.5-) 1-3	4-10	2-6	[7], [112]
Propylene glycol	0.05-0.5	1000; 4700 <sup>8</sup>		2-5	[47], [11], [58], [617]
Propylhexedrine	0.01	0.5	2-3		[58]
Propyphenazone	3-12			1-1.5 (-3)	[9], [13], [14]
Prothipendyl	0.005-0.01	0.02 <sup>311</sup> ; 0.1-0.5		2-3	[4]
Protriptyline	0.05-0.3	0.5	1; 20.7 <sup>8</sup>	50-200	[87], [58]
Pseudoephedrine	(0.05-) 0.5-0.8		19-20 <sup>280</sup>	9-16	[618], [266], [267], [269], [15], [11], [58], [619]
Psilocin <sup>380</sup>	appr. 0.008	0.018 <sup>8</sup>		1.8-4.5	[47]
Psilocybin	see Psilocin				
Pyrazinamide	30-75			9-10(-25)	[620], [3], [9]
Pyridostigmine	< 0.05-0.2			1-2.5	[316], [621], [622]
Pyridoxine	0.003-0.018			3-6	[66]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Pyrilamine			11 <sup>8</sup>		[87]
Pyrimethamine	appr. -1.5			80-96	[3]
Pyrithyldione	1-10			11-20	[9], [13], [14]
Quazepam	0.01-0.05 (-0.15) <sup>131</sup>			39 (25-41)	[59], [8], [11], [58]
Quetiapine	0.1-0.5 <sup>239</sup>	1 <sup>311</sup> ; 1.8 <sup>8</sup>	1.9 <sup>8</sup> ; 5.1 <sup>8</sup> ; 12.7 <sup>8</sup>	appr. 5-7 <sup>240</sup>	[623], [624], [625], [626], [87], [627], [628]
Quinidine <sup>48</sup>	1-5	6-10	10-15	4-12	[70], [23]
Quinine	1-7	10		4-15	[629], [630]
Rabeprazole	appr. -0.6			1-2	[15], [8]
Ramipril	appr. 0.001-0.04 <sup>228</sup>			1-5	[3], [8]
Ranitidine	0.05-1			2-4	[631]
Raltegravir (RAL)	0.072 (0.029-0.118) <sup>303</sup>				[110]
Reboxetine	0.06-0.35 <sup>281</sup>	0.7 <sup>311</sup>		12-14 (-30)	[632], [3], [633], [4]
Recainam	1.3-5.7			5-7	[634]
Remacemide	appr. 0.1-1			4	[8]
Remifentanil	-0.02			0.15	[8]
Remoxipride	2.15±0.59 <sup>132</sup>		41-150	5-10	[56], [635],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[636]
Retinol (Vitamin A)	0.2-0.8 (0.7-2.8 µmol/L)				[66], [637]
Ricin		0.0005			[638]
Rifabutin	0.05-0.15			24-58	[47], [3]
Rifampicin (Rifampin)	0.1-10 <sup>101</sup>	204 <sup>8</sup>	55 <sup>8</sup>	1-6 <sup>37</sup>	[47], [620], [317], [639]
Rifapentine				13.2	[620]
Riluzole	appr. 0.05-0.5 (-1.5)			9-15	[467], [15], [8]
Risedronat (Risedronic acid)				- <sup>6</sup>	[49]
Risperidone <sup>48</sup>	appr. 0.006 <sup>158</sup> (0.002-0.02 <sup>272</sup> )	0.12 <sup>311</sup>	1.8 <sup>8</sup>	2-4 <sup>159</sup>	[47], [457], [4], [640], [641]
Ritonavir	appr. 5-11 (-20)			3-5	[3], [642],[2]
Rivastigmine	0.008-0.02	0.04 <sup>311</sup>		1-2 (oral); appr. 3 (transdermal patch)	[4], [303], [15], [8], [643], [644]
Rizatriptan	appr. -0.1			2-3	[3], [15], [8]
Rocuronium	appr. -17			appr. 1.5	[8]
Ropinirole	0.0004 – 0.006 <sup>254</sup>	0.012 <sup>311</sup>		3-10	[4], [8], [645]
Ropivacaine		(1-) 2 <sup>173</sup>		2 <sup>168</sup>	[646], [647], [648]
Rosiglitazone	appr. 0.1-0.3			4	[8]



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Roxatidine	0.1-0.8			5-6	[8]
Roxithromycin	4-12			12	[115], [3]
Rufinamid	5-30	40 <sup>311</sup>		7	[4]
Salbutamol (Albuterol)	0.004-0.02	(0.03-) 0.1-0.15 <sup>116</sup>	0.16	3-6	[11], [58], [649]
Salicylamide	5-40			appr. 1	[8]
Salicylic acid	20-200	300-350	(400-) 500	3-20	[28], [3], [29], [30], [31], [32], [33]
Salvinorin A				40-80 min	[47]
Saquinavir (SQV)	> 0.1-0.25 <sup>296</sup>			(1-) 3-7 (-12)	[47], [110], [2], [111]
Scopolamine	0.0001-0.0003 (-0.001)			appr. 3	[15], [8], [11]
Secbutabarbital	5-10 (-15)	20	30	34-42	[8]
Secobarbital	1.5-5	7-10	10-15	15-30	[87], [8]
Selegiline	see Amphetamine and Methamphetamine				
Selenium	0.045-0.13 (-0.19)	0.4-1	2; (2.6 <sup>8</sup> ; 2.8 <sup>8; 304</sup> ; 18.4 <sup>8</sup> ; 38 <sup>8</sup> )	69-77 <sup>6</sup>	[47], [3], [650], [87], [651], [652]
Seratrodast	appr. 3-25				[8]
Sertindole	0.05-0.1	0.2 <sup>311</sup>		55-90	[8], [101], [4]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Sertraline	(0.01-) 0.05-0.25	0.29 <sup>8</sup>	1.6 <sup>8</sup> ; 3 <sup>8</sup>	24-28 (22-34)	[47], [467], [653], [15], [8], [11], [58], [223]
Sevoflurane	appr. 134 <sup>381</sup>		8, 26 <sup>8</sup>	1.8-3.8	[47]
Sibutramine <sup>366</sup>	appr. 0.001-0.01			4-8	[47], [8]
Sildenafil	appr. 0.05-0.5			3-5	[3], [15], [8]
Silver	-0.005 <sup>367</sup>				[58]
Simvastatin	0.0027-0.0056			appr. 2 <sup>290</sup>	[48]
Sirolimus	0.005-0.015 <sup>244</sup>	0.015(-0.06)		57-63	[123], [654], [655], [656], [657]
Sisomicin	0.5-10			appr. 1	[8]
Sitagliptin	0.05-0.38			8-14	[47]
Sodium aurothiomalate (gold)	see Gold				
Sodium nitroprusside	see Thiocyanate			0.1	
Sodium oxybate (GHB)	see 4-Hydroxybutyrate				
Sodium valproate	see Valproic acid				
Sotalol <sup>167</sup>	0.5-3 (-4)	7.5-16 <sup>8</sup>	40 <sup>8</sup> ; 43 <sup>8</sup>	5-13 (-17)	[658], [70], [7], [659]
Sparteine <sup>48</sup>	0.5-1			2.5	[8]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Spiramycin	appr. -3			5-8	[3], [660]
Spiraprilate	0.006-0.045			33-41	[8]
Spirolactone	(0.05-) 0.1-0.25 (-0.5) <sup>73</sup>			13-24 <sup>73</sup>	[8], [11], [58]
Stiripentol	1-10	15(-20)		4-13	[4], [3], [8]
Streptomycin	1-5 (15-40)	40-50		2-4	[467], [8], [11], [58]
Strontium	-0.03			30-60	[47]
Strychnine		0.075-0.1	0.2-2	10-15	[661], [662], [663], [664], [15], [8], [665], [11], [666], [667]
Sufentanil	0.0005-0.01 <sup>4</sup>	_339	0.001-0.007 <sup>8</sup>	1.6-5.7 (7-49)	[47], [668], [669], [670], [344], [346], [671], [54]
Sulbactam	-80			1-2 <sup>70</sup>	[174], [3]
Sulfamethoxazole	30-60 <sup>56</sup>	200-400		9-12	[3], [672]
Sulfasalazine <sup>34</sup>	5-30 (-70)		130 <sup>8;304</sup>	4-10	[8]
Sulfisoxazole	90-100				[48]
Sulfinpyrazone	6-17			3-5	[8]
Sulindac	1-5 <sup>102</sup>			appr. 7	[673], [87]
Sulpiride	0.05-0.4 (-1) <sup>225</sup>	1; 5 <sup>8</sup>	3.8 <sup>8</sup> ; 38 <sup>8</sup>	4-11 (-14)	[47], [43], [3],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[4], [11], [58]
Sultiam (Sulthiame)	0.5-12.5 (2-8)	12-15	20-25	3-30	[491], [8]
Sumatriptan	0.018-0.06			2	[15], [8]
Suramin	> 100 <sup>117</sup>	300 <sup>118</sup>		44-54	[674]
2,4,5-T	see 2,4,5-Trichloro-phenoxyacetic acid				
Tacrine	appr. 0.01			2-4	[303]
Tacrolimus (FK-506)	0.005-0.015 (-0.02)	(0.015-) 0.02-0.025		9-16	[11], [675], [676], [191], [677], [678], [679], [680], [681], [682], [683], [684]]
Tadalafil	0.09-0.48			16-19	[47]
Talinolol	0.04-0.15		5 <sup>8</sup> ; 12 <sup>9</sup> ; 20 <sup>8</sup>	10-14	[7], [685], [686]
Talipexole	appr. 0.0001-0.001			5-9	[15], [8]
Tamoxifen	0.05-0.5			5-7 <sup>6</sup>	[3]
Tapentadol	0.05-0.13		0.3 <sup>8</sup> ; 2 <sup>8</sup>	3-5	[47]
Taxol	see Paclitaxel				
Teicoplanin	(10-) 15-20 (-40)	200		10-15; 83-168 <sup>83</sup>	[687], [688]
Temazepam	0.02-0.15 (-0.9)	1	8.2 <sup>8</sup> ; 14 <sup>8</sup>	6-25	[689], [59], [8],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[11], [58]
Tenoxicam <sup>174</sup>	appr. 5-10			(50-) 70-90	[690], [691]
Terazosin	appr. 0.02-0.08			8-12	[15], [8]
Terbinafine	0.01-0.03 <sup>205</sup>			22-26	[3], [10], [11], [58]
Terbutaline	0.001-0.006 (-0.01)		0.04	16-20 <sup>89</sup>	[8], [11], [58]
Terfenadine <sup>368</sup>	< 0.01	0.04-0.06 <sup>148</sup>	0.4 <sup>8</sup>	15-22 <sup>64</sup>	[47], [3], [692]
Tetrachloroethylene			4-5; 44 <sup>8</sup> ; 66 <sup>8</sup>	33-72	[87], [58]
Tetracycline	1-5 (5-10)	30		6-10	[3], [8], [11]
Tetrazepam <sup>40</sup>	0.05-0.6 (-1)			(10-) 16-44	[47], [59]
Thalidomide	0.5-1.5 (-8)			5-9	[3], [15], [8]
Thallium	-0.002 (-0.0006 <sup>331</sup> )	0.1-0.5 <sup>179</sup> ; 5.6 <sup>8</sup>	0.5-11	_6	[693], [3], [11], [694], [100]
Theobromine	10-15	20		6-10	[11], [58]
Theophylline	(5-) 8-15 (-20) <sup>82</sup>	20	50	6-9 <sup>41</sup>	[695], [696], [20], [697], [415], [698], [699], [21], [700], [701], [702], [703], [704], [705]
Thiamphenicol	0.5-3-10 (-15)	20		2-7	[15], [8]

Substance	Blood-plasma concentration (mg/L)			t <sub>½</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Thiamylal	appr. 5		29 <sup>8</sup> ; 30 <sup>4</sup>	0.6-0.8 (initial); 12-34 (terminal)	[47], [87]
Thiazinamium	0.05-0.15	0.3			[467], [15], [8], [11]
Thiocyanate from Nitroprusside	1-12 <sup>144</sup> 5-30	35-50 50-100	200	3-4 <sup>6</sup>	[706], [3], [255], [11]
Thiopental <sup>57</sup>	1-5	7	10-15 <sup>58</sup>	3-8	[707], [48]
Thiopropazine	appr. 0.001-0.02	0.1			[15], [8]
Thioridazine	0.1-2 (0.2-0.8-1.25) <sup>133</sup>	2.5-5	3-10	7-13 (-36)	[56], [4]
Thiothixene	see Tiotixene				
Thyroxine	see Levothyroxine				
Tiagabine	0.01-0.1 (-0.2)	0.5-0.6; 3.1 <sup>8</sup> ; 2 <sup>45</sup>		7-9 (4-13)	[708], [3], [709], [710], [711], [12], [712], [15], [8], [381], [4]
Tiapride	C <sub>max</sub> 1-2	4 <sup>311</sup>		appr. 3-4	[4], [8]
Tiaprofenic acid	appr. 15-40 <sup>193</sup>			1.5-3 (-6)	[3], [713], [714]
Ticlopidine	< 1-2 (?)			70-130 <sup>100</sup>	[47], [8]
Tiletamine			0.85 <sup>8</sup> ; 30 <sup>4</sup>		[87]
Tilidine <sup>25</sup>	0.05-0.12	_339	1.7 <sup>8</sup>	appr. 3	[715], [716], [15]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Tiludronate (Tiludronic acid)	0.2-1.5			65-78 (-150)	[49], [717]
Timolol	0.005-0.05 (-0.1)			2-6	[8]
Tin	0.03-0.14				[58]
Tinidazol	max. -60			11-15	[3]
Tiopronin	appr. 2-5			23 ± 11	[718]
Tiotixene	0.001-0.03 (0.002-0.014)	0.1		34-36	[185], [48]
Tiotropium	0.000016 <sup>307</sup>			5-6 <sup>6</sup>	[719]
Tipranavir (TPV)	> 20.5 <sup>299</sup>			5.5-6	[110], [2], [111]
Tizanidine	appr. 0.015			appr. 2.5	[3], [8]
Tobramycin	4-10 <sup>154</sup>	12-15		2-3	[67], [3], [198], [41]
Tocainide	4-12 (6-10)	13-15; 20 <sup>8</sup>	74 <sup>8</sup> ; 78 <sup>8</sup> ; 140 <sup>8</sup>	8-25	[47], [3], [720], [721]
Tofenacine	0.025-0.1	0.5-1			[9], [58]
Tolbutamide	45-100	400-500	640 <sup>8</sup>	4-12	[722], [11], [58]
Tolcapone	C <sub>max</sub> 3-6	12 <sup>311</sup>		2	[4]
Tolmetin	10-80			2-4	[11], [58]
Tolperisone	0.09-0.3	0.7 <sup>8</sup> ; 382	7-14	1.8-2.9	[47]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Toluene			10 (-48 <sup>8</sup> )	13-68	[47], [58]
Topiramate	2-10 <sup>218</sup>	16 <sup>311</sup>		20-30	[712], [15], [8], [381]
Topotecan	appr. 0.001-0.01 <sup>190</sup>			2-3	[3], [723], [724]
Tramadol <sup>48</sup>	0.1-1 (>0.3) <sup>87</sup>	1	2 <sup>8; 49</sup> ; 13 <sup>8</sup> ; 38.3 <sup>8; 252</sup>	5-10	[11], [244], [725], [726], [63]
Tranexamic acid	10-50			10	[8]
Tranylcypromine	< 0.05	0.1 <sup>311</sup> ; 0.5 <sup>8; 202</sup>	0.7 <sup>8</sup> ; 5 <sup>8</sup>	1-3.5	[4], [727]
Trapidil	(4-) 6-10			2-6, 12	[3], [95], [728]
Trazodone <sup>145</sup>	0.7-1	1.2 <sup>311</sup> ; 3-4	12-15 <sup>8</sup>	4-11 (-13)	[43], [4], [729], [64]
Triamterene	0.01-0.1			1.5-4	[3], [42]
Triazolam	0.002-0.02	0.04		2-5	[730], [59], [423]
2,2,2-Tribromoethanol		50	90		[58]
1,1,1-Trichloroethane			(15 <sup>8</sup> ); 100-1000	appr. 53	[11], [58]
2,2,2-Trichloroethanol <sup>369</sup>	5-15	40-70	60-100	6-10 <sup>327</sup>	[47], [11], [58]
Trichloroethylene			9.7 <sup>8</sup> ; 16 <sup>8</sup> ; 21 <sup>8</sup>	30-38	[87]
2,4,5-Trichlorophenoxyacetic acid (2,4,5-T)	-	appr. 100	200	23-33	[3], [11]
Trifluoperazine	0.001-0.01 (-0.05)	0.1-0.2	0.4 <sup>8</sup>	7-18	[87], [8]



Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Triflupromazine	0.03-0.1	0.3-0.5		appr. 6	[8]
Trihexyphenidyl	0.05-0.2 <sup>75</sup>	0.5		3-5	[9], [114]
Trimeprazine	see Alimemazine				
Trimethadione <sup>274</sup>	20-40			16	[11], [58]
Trimethobenzamide	1-2		184 <sup>8</sup>	7-9	[47], [11], [58]
Trimethoprim	1.5-2.5 <sup>56</sup>	20		8-11	[3], [672]
Trimipramine	0.01-0.3	0.6 <sup>311</sup>	1.7-8.2 <sup>251</sup>	10-20 (-40)	[56], [4], [223]
Tripelenamine	0.02-0.06		10 <sup>8</sup>	5-8	[87], [15], [8], [57], [11]
Tripolidine	0.004-0.045			2-5	[57]
Tropisetron	0.02-0.05			7-9 (-30)	[66], [8]
Tubocurarine	0.04-6			2-4	[48], [8], [58]
Tungsten	-0.035				
Uranium	0.00004 <sup>331</sup>				
Urapidil	appr. 0.1-0.2			2.7-7	[3], [95]
Valdetamide	see Diethylpentenamide				
Valnoctamide	5-25	40			[58]
Valproic acid	40-100 (50-150)	150-200	556 <sup>8</sup> ; 720 <sup>8</sup>	8-20	[47], [161],

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
					[164], [64]
Valsartan	appr. 0.8-6			6-9	[8]
Vanadium	-0.05			4-12 <sup>6</sup>	[47]
Vancomycin	≤ 5-10 (-12) <sup>142</sup>	30		2.6-11 <sup>83</sup>	[47], [67], 1994), [390], [731], [732], [733], [734], [735], [736], [64]
Varenicline	0.004-0.005	0.01 <sup>311</sup>		24	[4]
Vecuronium	appr. 0.2-0.37 (-0.5)			1-1.5	[3], [9]
Venlafaxine	0.1-0.4 <sup>189</sup>	1-1.5 <sup>266</sup>	6.1-24 <sup>8</sup>	3-7	[47], [101], [4], [737], [11], [58], [223]
Verapamil <sup>90</sup>	(0.01-) 0.02-0.25 (-0.4)	1	2.5 ; 3.9 <sup>8</sup>	6-14 <sup>42</sup>	[56], [84], [721], [738], [739], [64]
Vigabatrin	2-10 (-15) <sup>94</sup>	20 <sup>311</sup>		5-8	[47], [381], [64]
Viloxazine	-6.0-8.0 (?)		45 <sup>8</sup>	2-5	[43], [3], [15], [8]
Vincamine	< 0.25 (?)			1-2 (8-17)	[8]
Vinylbital	1-3	5	8	18-33	[8]
Viquidil	0.15-0.25			6-12	[11], [58]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic ("normal")	toxic (from)	comatose-fatal (from)		
Vitamin A	see Retinol				
Vitamin C	see Ascorbic acid				
Vitamin D	(0.02-) 0.03-0.09 <sup>263</sup>	0.2		appr. 30 <sup>6</sup>	[740], [741], [742], [743]
Voriconazole	2-6	3.5 (-6.0) <sup>284</sup>		4-10 <sup>37</sup>	[47], [603], [744], [745]
Warfarin	1-3 (-7)	10-12	100	37-50 <sup>97</sup>	[3], [42], [14], [746]
Wismut	see Bismut(h)				
Xamoterol	appr. 0.02-0.04 (-0.1)			7-8	[3]
Xipamide	-20			5-8	[3]
Xylene	1.5 (BAT		3-40	20-30	[47], [11], [58]
Yohimbine	appr. 0.05-0.3			1-3	[64], [15], [8]
Zafirlukast	0.005-0.03			10	[3], [15], [8]
Zalcitabine	appr. 0.1 (0.5 µmol/L)			1-3 <sup>83</sup>	[290], [38]
Zaleplon	appr. 0.001-0.1			1	[8]
Zanoterone	0.1-0.5				[747]
Zidovudine	0.1-0.3 (-1) <sup>51</sup>	2-3		1-1.5	[290], [748], [749], [3] [750], [38],[2]
Zinc	0.6-1.3	2	42 <sup>8</sup>	5-16 months	[47], [66]

Substance	Blood-plasma concentration (mg/L)			t <sub>1/2</sub> (h)	Ref.
	therapeutic (“normal”)	toxic (from)	comatose-fatal (from)		
Zipeprol	0.1-0.7		5.8 <sup>8</sup> ; 10.6 <sup>8</sup> ; 31 <sup>8</sup>	1.2	[47], [57]
Ziprasidone	0.05-0.2	0.4 <sup>311</sup>		2-7	[4], [3], [15], [8]
Zoledronat (Zoledronic acid)				(1-2) 40-385 (-189 <sup>6</sup> )	[49], [751], [752], [753]
Zolmitriptan	appr. 0.007-0.01			2.5-3	[15], [8]
Zolpidem	0.08-0.15 (-0.2)	0.5	2-4	2-3	[754], ([56], [755], [3], [310], [15], [11]. [756]
Zomepirac	0.1-4		152 <sup>8</sup>	4-10	[8], [87]
Zonisamide	10--40	40-70	100 <sup>208</sup>	50-70 <sup>209</sup>	[8], [757], [758],[712], [381]
Zopiclone	0.01-0.05	0.15	0.6-1.8	3.5-8	[56], ([3], [4], [15], [11]
Zotepine	0.01-0.15	0.3 <sup>311</sup>		13-16	[3], [4]
Zuclopenthixol <sup>148; 365</sup>	0.004-0.05 (-0.1)	0.1-0.3		15-25	[4], [15], [14]

Clinical categories used for grouping analytical data:

Therapeutic: blood-plasma/serum concentrations (in general, trough at steady state) observed following therapeutically effective doses; no or only minimal side effects (drugs); “normal”: concentrations associated with no or only minimal toxic effects (other xenobiotics).

Toxic: blood-plasma/serum concentrations which produce toxicity/clinically relevant side effects/symptoms.

Comatose-fatal: blood-plasma/serum (comatose) concentrations and whole blood (fatal) concentrations reported to have caused coma and

death, respectively. Whether published data for deaths refer to levels measured ante-mortem or post-mortem (femoral or heart blood ) is often unknown.

In addition to specific references provided in the table, data were compared and contrasted against published review articles and textbooks [3,4,7-15,41-43,47,48,56-59,64,66,74,87,88,259,270,294,467,759-779] but not specifically indicated for every drug/substance, as well as supplemented with our experiences in clinical and forensic toxicology.

Abbreviations: BAT, biological tolerance value (in the work area); rec, recombinant; Ref., references;  $t_{1/2}$ , in general, terminal elimination half-life (if not stated otherwise, see annotations)

## Annotations to Table 1

- 1 active metabolites of acebutolol: N-acetylacebutolol ( $t_{1/2}$ : 9-14 h): therapeutic concentration 1-2.5 mg/L, comatose-fatal from appr. 90 mg/L, and diacetolol ( $t_{1/2}$ : 8-13 h): therapeutic 0.65-4.5 mg/L, comatose-fatal from appr. 100 mg/L
- 2 as salicylic acid (for analgesic and antipyretic effect)
- 3 as digoxin
- 4 during mechanical ventilation
- 5 slow (poor) and rapid (extensive) acetylators (metabolisers)
- 6 days
- 7 active metabolites nortriptyline (see Table) and amitriptyline oxide ( $t_{1/2}$ : 1.5-3 h)
- 8 case report
- 9 in patients with impaired renal function in some cases up to 100 h
- 10 active metabolite 6-mercaptopurine ( $t_{1/2}$ : 1-1.5 h)
- 11 appr. 0.2 h for azathioprine
- 12 active metabolite carbamazepine-10,11-epoxide ( $t_{1/2}$ : 5-16 h; usual plasma concentration range 0.2-2 mg/L) should be considered in case of intoxication
- 13 each sum carbromal(um) + carbromide ( $t_{1/2}$ : 12-15 days)
- 14 each as trichloroethanol
- 15 active metabolite desmethyldiazepam = nordazepam (see Table)
- 16 nephrotoxic
- 17 active metabolite N-desmethyldiazepam (therapeutic reference range: 0.3-3 mg/L; laboratory alert level<sup>311</sup> 5 mg/L)
- 18 duration of pharmacological effects: 0.3-0.4 h; major metabolite: benzoylecgonine ( $t_{1/2}$ : 5-6 h)
- 19 active metabolites nordazepam and oxazepam (see Table)
- 20 active metabolite nordothiepin ( $t_{1/2}$ : 20-60 h)
- 21 active metabolite desmethyldoxepin (synonym nordoxepin,  $t_{1/2}$ : 33-80 h)

- should be considered in case of intoxication
- 22 benzodiazepine antagonist
  - 23 active metabolites
  - 24 active metabolite desalkylflurazepam ( $t_{1/2}$ : 74 ± 24 h)
  - 25 active metabolite nortilidine ( $t_{1/2}$ : 6 h), comatose-fatal plasma concentration: 4.4 mg/L<sup>8</sup>
  - 26 in some cases up to 80 h
  - 27 active metabolite levomepromazine sulfoxide ( $t_{1/2}$ : 5-10 h)
  - 28  $t_{1/2}$  for biological effects; terminal  $t_{1/2}$ : 16-78 h
  - 29 active metabolite desipramine (see Table)
  - 30 active metabolites diazepam, nordazepam plus oxazepam (see Table)
  - 31 active metabolite of mesuximide
  - 32 sum of active metabolites
  - 33 each as desacetylmepiranolol
  - 34 active metabolite 5-aminosalicylic acid (mesalazine, see Table); rapid/slow acetylators of the primary metabolite sulfapyridine
  - 35 in some cases longer
  - 36 active metabolite oxyphenbutazone ( $t_{1/2}$ : 27-64 h)
  - 37 dose dependent
  - 38 active metabolite of procainamide
  - 39 for the management of osteoporosis
  - 40 active metabolites diazepam (see Table), nordiazepam (see Table), and nortetrazepam ( $t_{1/2}$ : 25-51 h)
  - 41 smokers:  $t_{1/2}$ : 3-6 h
  - 42 during steady state
  - 43 astemizole plus desmethylastemizole
  - 44 blood drug concentrations following therapeutically effective doses below detection limit

- 45 as decanoate ( $t_{1/2}$ : 5-12 days)
- 46 in intensive care patients in some cases  $t_{1/2}$  8-22 h
- 47 physiologic
- 48 rapid (extensive, EM) and slow (poor) metabolisers (PM; genetic polymorphism)
- 49 6 month-old-child, appr. 15 h after 100 mg tramadol rectally
- 50 total labetalol: 0.7-5.0 mg/L
- 51  $C_{max}$   $0.038 \pm 0.006$  mg/L after a single oral dose of 150  $\mu$ g/kg in nine persons with onchocerciasis ( $t_{1/2}$ :  $56 \pm 7$  h)
- 52 as enalaprilat
- 53 duration of clinical effect: 3-5 h
- 54 product after hydrolysis
- 55 narcotic; analyzed during distribution phase
- 56 for pneumocystis carinii pneumonia (PcP) treatment: sulfamethoxazole 100-200 mg/L, trimethoprim 5-10 mg/L
- 57 metabolite: pentobarbital (see Table)
- 58 "narcotic"
- 59 higher with meningism (-25 mg/L); decreased protein binding in neonates results in increased unbound drug
- 60 each as 2-hydroxyflutamide (active and major metabolite)
- 61 active metabolite of allopurinol
- 62 active metabolite paracetamol (synonym acetaminophen, see Table)
- 63 active metabolites phenobarbital (see Table) and phenylethylmalonide (7-10 mg/L;  $t_{1/2}$ : 16-50 h)
- 64 as active carboxylic acid metabolite = fexofenadine ( $t_{1/2}$ : mean 15 h)
- 65 1 mg oral alprazolam/day equals appr. a plasma concentration of 0.01 mg alprazolam/L during steady state. Usually higher doses/plasma concentrations are recommended for the treatment of phobias when compared to panic disorder/attacks
- 66 highly inter- and intraindividual variable kinetics; for children



- (therapeutically): 0.04-0.1 mg/L; active metabolite desmethylchlorpromazine
- 67  $\geq 0.25 \mu\text{mol/L}$  desirable for echinococcosis
- 68 mean: 27 h; for geriatric patients (> 65 years) in some cases increased to more than 90 h
- 69 active metabolite 2-hydroxydesipramine ( $t_{1/2}$ : mean 18 h; in patients with impaired renal function several fold increased)
- 70 in patients with impaired renal function several fold increased
- 71 in colon tissue 0.8-1.8 h after 1 x 2 g i.v.: 94.0-7.4  $\mu\text{g/g}$
- 72 active metabolites 1-(5-hydroxyhexyl)-3,7-dimethylxanthine and 1-(3-carboxypropyl)-3,7-dimethylxanthine ( $t_{1/2}$ : 1-1.6 h), among others, with 5 and 8 times, respectively, higher plasma levels than pentoxifylline
- 73 as canrenone (one of the active metabolites of spironolactone,  $t_{1/2}$ : 1.3-1.4 h)
- 74 appr. 8 h after ingestion of probably 210 mg haloperidol and 1400 mg orphenadrine-HCl with life-threatening arrhythmias
- 75 data on effective plasma concentrations for Parkinson's disease not proven
- 76 peak: 20-30 mg/L, trough: < 7 mg/L
- 77 for hypertension: 0.2-0.45 mg/L; for angina/coronary heart disease or arrhythmias: 0.3-0.8 mg/L
- 78 therapeutic concentration of the unbound fraction: 0.5-2 mg/L; therapeutic concentration of the metabolite desalkylisopyramide < 5 mg/L (ratio of metabolite to the parent compound isopyramide guide to duration of therapy and possibly to the likelihood of toxicity)
- 79 in mmol/L (mEq/L, mval/L): 0.4-1.2 (0.6-1.4), toxic from 1.5 mmol/L
- 80 terminal elimination  $t_{1/2}$ :  $37 \pm 6$  h, increased in case of renal dysfunction
- 81 therapeutic concentration of the unbound fraction: 1-2.2 mg/L
- 82 for (sleep) apnea: 5-10 mg/L
- 83 increased in patients with impaired renal function
- 84  $C_{\text{max}}$  3-5 h after 4 mg loperamide hydrochloride orally: 1-3 ng/mL
- 85 active metabolite N-desmethylclomipramine ( $t_{1/2}$ : 21-65 h, mean: 40 h)

- 86 12-36 h
- 87 post-operative (on-demand; i.v.): 0.02-1-2 mg/L (median: 0.29-0.92 mg/L)  
as minimal (analgesic) effective concentration; O-desmethyltramadol:  
0.03-0.04 mg/L (median: 0.036 mg/L)
- 88 10-36 h
- 89 11-26 h
- 90 stereoselective metabolism (therapeutic concentration after oral  
application higher than after intravenous administration)
- 91  $t_{1/2}$  for  $\beta$ -phase of the elimination: 0.5-1 h
- 92 as al bendazole sulfoxide (active metabolite)
- 93  $t_{1/2}$  in slow (poor) metabolisers appr. 40 h
- 94 trough plasma concentration at steady state during 2 g twice daily orally  
(p.o.) appr. 9 mg/L;  $C_{max}$  (0.8 h after 1 g orally): appr. 45 mg/L
- 95 as active metabolite methimazole (thiamazole)
- 96 mean 80 min
- 97 15-85 h
- 98 plasma concentrations do not correspond with pharmacological effects
- 99 naltrexone plus 6- $\beta$ -naltrexone: 0.025-0.1 mg/L; plasma concentrations of  
the less potent major metabolite 6- $\beta$ -naltrexol ( $t_{1/2}$ : 11-13 h) are usually  
1.5-10 times higher
- 100 at steady state; 4-15 h after a single dose
- 101 sum rifampicin plus metabolites
- 102 sum sulindac plus metabolites (sulindac sulfide,  $t_{1/2}$ : 15-18 h;  $t_{1/2}$  sulindac  
sulfone: 17-20 h)
- 103 abuse
- 104 sum carisoprodol plus meprobamate
- 105 12-15 days for the metabolites
- 106  $t_{1/2}$  for total platinum plasma concentrations: 20-40 h (up to 6-7 days)
- 107 2-20  $\mu$ mol/L

- 108 carboxylic acid metabolite ( $t_{1/2}$ : appr. 20 days): 1.5-5.5 mg/L
- 109 during concomitant therapy with carbamazepine or phenytoin 13.5 -15 (8-33) h, during concomitant therapy with valproic acid 48-59 (31-89) h
- 110 in infants and after intoxications in some cases dramatically increased
- 111 during steady state 3-4 h after oral doses of 100-400 mg; prophylaxis of candidiasis: > 0.2 mg/L and of aspergillosis: > 1.0 mg/L in patients with acute myeloid leukemia (AML)
- 112 plasma concentrations of the major metabolite 13-cis-acitretin are usually higher
- 113 higher and increased, respectively, in patients with impaired hepatic function; for tinnitus aurium: therapeutic plasma concentration appr. 1-2 mg/L
- 114 biologically active/major metabolite cycloguanil ( $t_{1/2}$ : 8-17 h): plasma concentration after daily oral doses of 100-200 mg proguanil appr. 0.02-0.06 mg/L
- 115 active metabolite norpethidine ( $t_{1/2}$ : 14-24 (-48) h): toxic from appr. 0.5 mg/L
- 116 tremor, hypokalemia
- 117 as cytostatic drug: >200 mg/L
- 118 neurotoxic
- 119 in terminal renal insufficiency appr. 0.5-2 mg/L, cumulation of the inactive metabolite N-acetyl-5-aminosalicylic acid (Ac-5-ASA) up to 20 mg/L without adverse effects
- 120  $t_{1/2}$  of the inactive major metabolite N-acetyl-5-aminosalicylic acid (Ac-5-ASA) appr. 6-9 h
- 121 tocolytic (4.5-6.25 mval(mEq)/L, 2.25-3.125 mmol/L). Approximate normal range: 18-25  $\mu\text{g Mg}^{2+}/\text{mL}$  (0.74-1.03 mmol/L); conversion factor: mg/dL x 0.4113 = mmol/L
- 122  $C_{\text{max}}$  appr. 2-8  $\mu\text{mol/L}$  (i.e. 1.7-6.8 mg/L, after 170-275 mg/m<sup>2</sup> intravenously for 6 h); much lower after intraperitoneal injection
- 123 as transdermal system (patch); plasma concentrations of the major metabolite cotinine ( $t_{1/2}$ : mean 16-20 h) appr. 10 times higher
- 124 mean 2 h; after application of the transdermal system possibly longer

- 125 active metabolites desipramine (see Table), 2-hydroxyimipramine ( $t_{1/2}$ : 6-18 h), and 2-hydroxydesipramine<sup>69</sup>
- 126 3-7 min after retrobulbar blockade: 0.5-1.1 mg/L
- 127 for myasthenia gravis
- 128 half maximal effective concentration ( $EC_{50}$ ) for analgesia:  $0.0088 \pm 0.0053$  mg/L;  $EC_{50}$  for respiratory depression:  $0.035 \pm 0.022$  mg/L
- 129 appr. 14 h after oral ingestion of 1.5 g
- 130 fluoxetine plus norfluoxetine;  $t_{1/2}$  of the active metabolite norfluoxetine: 4-16, mean 7-9 days
- 131 active metabolites 2-oxoquazepam ( $t_{1/2}$ : 39 (28-43) h) and N-desalkyl-2-oxoquazepam (N-desalkylflurazepam,  $t_{1/2}$ :  $74 \pm 24$  h)
- 132 peak plasma concentration during steady state
- 133 range of plasma concentrations after therapeutically effective doses of thioridazine for the active metabolites mesoridazine (thioridazine-2-sulfoxide): 0.2-1.6 mg/L ( $t_{1/2}$ : 10-14 h) and sulforidazine (thioridazine-2-sulfone): up to 0.6 mg/L ( $t_{1/2}$ : 10-16 h) and for the inactive metabolite thioridazine-5(ring)-sulfoxide: 0.06-4 mg/L; probably, the best correlation exists between the plasma concentration of mesoridazine and the clinical response
- 134 usually sleep occurred with  $\geq 0.1$  mg/L; in infants and children (< 13 years): in some cases during mechanical ventilation up to 3 mg/L;  $\alpha$ -hydroxymidazolam-glucuronide likely contributes in case of impaired renal function to prolonged sedation
- 135 plasma concentration range of the primary metabolite 1,5-dimethyl-3,3-diphenyl-2-ethylidene-pyrrolidine (EDDP) during steady state: 0.005-0.055 mg/L (daily oral methadone dose: 10-225 mg, mean 60 mg)
- 136 ratio clozapine/active metabolite N-desmethylclozapine (= norclozapine,  $t_{1/2}$ :  $19.2 \pm 10.2$  h ) usually 1.0-2.5
- 137 maximum antiemetic effect at  $> 0.01$  mg/L
- 138 active metabolite descarboethoxyloratadine ( $t_{1/2}$ : 17-24 h): appr. 0.005-0.02 mg/L
- 139  $0.15 \pm 0.05$  ‰ per h
- 140 during chronic administration appr. 10-20 h (induction of own metabolism)

- 141 caution is warranted in case of concomitant use or intoxication with serotonin reuptake inhibitors (SSRI) such as citalopram, clomipramine (fluoxetine, paroxetine): possible serotonin syndrome
- 142 trough concentration; peak concentration: < 40 mg/L
- 143 distribution half-life: 0.3-0.5 (-1) h
- 144 non-smoker: 1-4 mg/L (17-69  $\mu\text{mol/L}$ ); smoker: 3-12 mg/L (52-206  $\mu\text{mol/L}$ )
- 145 major active metabolite 1-m-chlorophenylpiperazine; plasma concentration appr. 1/10 compared to trazodone
- 146 plasma concentration for maximal cellular accumulation of the active form gemcitabine-5'-triphosphate
- 147 after topical nasal or ocular administration
- 148 Torsade de pointes, usually due to cytochrome P450 3A4 inhibition (e.g., ketoconazole, erythromycin) and/or impaired hepatic function
- 149 after oral administration; after topical application: plasma concentration < 0.03 mg/L and  $t_{1/2}$  appr. 22 h
- 150 for each added 1 mg/day dose of clonazepam, there is appr. an increase of 12 ng/mL in the plasma (patients with panic disorder)
- 151 Sum of amoxapine and his major metabolite 8-hydroxyamoxapine ( $t_{1/2}$ : appr. 30 h;  $t_{1/2}$  7-hydroxyamoxapine: 4-6.5 h)
- 152 sum bupropion (amfebutamone) and morpholinole metabolite ( $t_{1/2}$ : 19-22 h)
- 153 after i.m.-application as decanoate appr. 3 weeks
- 154  $C_{\text{min}}$  < 1-2 mg/L at best (especially in patients with renal dysfunction)
- 155 appr. 0.02 mg/L in organophosphorous ester poisoning depending on clinical symptoms
- 156 in case of organophosphorous ester (e.g. parathione) intoxication; 250 mg intravenously as bolus followed by an infusion of 750 mg/24 h
- 157 if used as an antiarrhythmic appr. 0.1-0.4 mg/L
- 158 using daily oral doses of  $\leq 25$  mg 0.00046 mg risperidone/L per mg dose and 0.0064 mg/L per mg dose for risperidone plus 9-hydroxyrisperidone (the clinical effects likely results from the combined concentrations)
- 159 extensive metabolisers;  $t_{1/2}$  for poor metabolisers: 20 h;  $t_{1/2}$  for risperidone plus 9-hydroxyrisperidone: 22-24 h

- 160 6 case reports: post mortem 5.2-49 µg citalopram/g blood and 0.3-1.4 µg desmethylcitalopram/g blood
- 161 concentration/dose-values for extensive metabolisers: 0.025-0.688 (median 0.098) nmol/L per mg oral perphenazine, and 0.096-0.750 (median 0.195) nmol/L per mg oral perphenazine (mol wt 506.07) for poor metabolisers, respectively
- 162 two cases after ingestion of appr. 4 g moclobemide in combination with clomipramine (plasma concentration: 0.3-0.5 mg/L, i.e. toxic)
- 163 as R-enantiomer, mean: 9 mg/L
- 164 dosage: 50-55 mg/kg per day
- 165 appr. 2.5 h after ingestion of 50-100 mg amlodipine besylate with alcohol (263 mmol ethanol/L)
- 166 0.101 mg/L 4 h after ingestion of 70 mg and 0.185 mg/L at 10.5 h, complicated by oxazepam ingestion
- 167 data for d,l-sotalol
- 168 after i.v.-application;  $t_{1/2}$ : 4-7 h following epidural administration (appr. 4-5 h following intercostal block and appr. 8 h following brachial plexus blockade, respectively)
- 169 mean 19 h;  $t_{1/2}$  of oral ciclosporine microemulsion is appr. 8 h
- 170 a longer  $t_{1/2}$ , up to 3.8 days, has been reported in elderly patients, up to 3.8 days
- 171 target range of activated partial thromboplastin time (aPTT) is prolongation of 50-70 sec; aPTT prolongation of more than 100 seconds has been associated with an increased risk of hemorrhagic events
- 172 as 10-hydroxycarbamazepine for seizures (0.4-2 mg/L for oxcarbazepine) ; in patients with trigeminal neuralgia, therapeutic target range of the active metabolite 10-hydroxycarbamazepine ( $t_{1/2}$ : 7-14 (-20) h): 50-110 µmol/L (appr. 13-28 mg/L)
- 173 mild CNS symptoms (limited data)
- 174 pharmacologically inactive metabolites 5' and 6'-hydroxytenoxicam
- 175 effective plasma concentrations for the 2 active metabolites: O-desmethylencaïnide (0.05-0.3; toxic from 0.3 mg/L,  $t_{1/2}$ : 11 h) and 3-methoxy-o-desmethylencaïnide (0.06-0.28 mg/L;  $t_{1/2}$ : > 24 h) during long-term therapy
- 176 in poor metabolisers 9-11 h

- 177 "normal": 0.001-0.006; smoker: 0.005-0.012 (-0.15) mg/L;  $\mu\text{mol/L} \times 0.026 = \text{mg/L}$
- 178 reference value; 0.001  $\mu\text{g/g}$  creatinine or 0.0014 mg/L urine; < 30  $\mu\text{g}/24 \text{ h}$  urine ("normal"); "toxic" from appr. 0.05-0.3 mg/L urine. Reference value for children in Germany: 0.0008 mg/L blood and 0.0004 mg/L urine
- 179 > 0.04 mg/L urine
- 180 up to years in chronically exposed workers
- 181 combination with 2,4-D and chlorpyrifos
- 182 in case of intoxication/overdose: 70-90 h
- 183 overdose
- 184 one case of toxicokinetic estimation in acute potassium cyanide (KCN) poisoning
- 185 dependent on indication; > 2.0 mg/L for partiell seizures; tentative target range according to Neels HM et al. 2004: 12-20 mg/L; peak concentration at steady state appr. 4.6 mg/L (300 mg three times daily (tid)) and appr. 8.4 mg/L (600 mg tid)
- 186 prolonged in case of impaired renal function to 16-43 h; > 100 h in dialysis dependent patients
- 187 dependent on urine pH, if alkaline appr. 8-10 h
- 188 females showed significantly longer elimination half-lives ( $35.4 \pm 13.7 \text{ h}$ ) than males (mean 21-26 h); the  $t_{1/2}$  of the R(-)-enantiomer is twice that of the S(+)-enantiomer
- 189 venlafaxine plus O-desmethylvenlafaxine. After doses of 25, 75, and 150 mg every 8 h for 3 days, mean peak serum levels were 0.053, 0.167, and 0.393 mg/L; corresponding levels of the major active metabolite O-desmethylvenlafaxine ( $t_{1/2}$ : 10-11 h) were 0.148, 0.397, and 0.686 mg/L
- 190 at least 10 nmol of the lactone (mol wt 421.46)/L; decreases in absolute neutrophil counts of 50-90 % were observed with steady state plasma concentrations of total topotecan (lactone + hydroxy acid) of 20-60 nmol/L, respectively
- 191 a mean steady state peak plasma concentration of 0.286 mg/L was observed in healthy volunteers after 60 mg (oral solution) every 12 hours for 10 doses
- 192 the metabolite 2',2'-difluorodeoxyuridine (dFdU) has minimal antitumor

- activity but may contribute to the toxicity of gemcitabine
- 193  $C_{max}$  after 200 mg three times daily (tid)
  - 194 serum concentration of benzoic acid following high dose diazepam i.v.-infusion and severe metabolic acidosis (5-year-old girl; urine concentration: 1,200 mg/L)
  - 195 1.5 h in dogs after i.v.-administration
  - 196 for erythropoietic protoporphyria (EPP)
  - 197 trough; peak: 0.1-0.5 mg/L
  - 198 + 0.4 mg of its metabolite 3-deacetylpancuronium/L
  - 199 "normal":  $\leq$  2-3 % of total Hb; from 15-20 %: cyanosis, headache, dizziness
  - 200 "normal":  $\leq$  5 % hemoglobin as carboxyhemoglobin (elderly: -15 %); smoker: 8-10 %
  - 201 2 h after ingestion
  - 202 3 h after ingestion of 400 mg with no severe symptoms
  - 203 mean steady state trough concentration; peak concentration: 5-15 mg/L
  - 204 for Parkinson's disease (appr. 15-50 pmol/mL)
  - 205 peak: 0.5-3 mg/L
  - 206 plasma concentrations below detection limit; plasma concentrations of the active metabolite 6-methoxy-2-naphthylacetic acid ( $t_{1/2}$ : appr. 24 h), which appears to be responsible for the effects, were 10-37 mg/L 3-6 h after single oral doses of 250, 500, and 1000 mg, respectively
  - 207 active metabolite 6-O-desmethyldonepezil
  - 208 coma in a patient overdosing zonisamide, carbamazepine, and clonazepam
  - 209 25-30 h in patients co-medicated with enzyme-inducing anticonvulsants (e.g. phenobarbital)
  - 210 2-4 h in patients co-medicated with enzyme-inducing anticonvulsants (e.g. phenobarbital)
  - 211 renal-transplant patients treated long-term (2-3 years) with mycophenolate mofetil had significantly lower trough plasma concentrations of the active metabolite mycophenolic acid ( $1.94 \pm 0.24$  mg/L) when compared to patients taking mycophenolate mofetil (1 g twice daily) short-term (2-10



- months;  $3.53 \pm 0.45$  mg/L). Proposed mycophenolic acid pre-dose target concentration: 1-3.5 mg/L
- 212 as mycophenolic acid (active metabolite)
- 213 ten men with multiple sclerosis, 10-20 mg p.o. every 6 h and analyzed 30 min before the next dose; peak levels < 0.1 mg/L 30 min after a dose
- 214 nine patients, maximum tolerated oral dose 50-100 mg
- 215  $t_{1/2}$  of the metabolite 3-O-methyldopa: 15 h
- 216 appr. 2.5  $\mu\text{mol/l}$  (1 mg/L) 24 h after single doses of 100-800 mg and during daily treatment with 200 mg
- 217 active metabolite 14-hydroxyclearithomycin ( $t_{1/2}$ : 5-7 h)
- 218  $C_{\text{max}}$  following oral administration of 200, 400, 800, and 1200 mg, respectively: 3.7, 8, 18, and 29 mg/L; tentative target range according to Neels et al., 2004: 5-25 mg/L
- 219 at a daily dosage of 60, 120, and 240 mg the mean  $\pm$  SD concentration in patients with symptomatic ventricular tachyarrhythmias (n = 9-18) was  $75 \pm 46$ ,  $144 \pm 105$ , and  $324 \pm 180$  nmol/L, respectively
- 220 nonlinear kinetics
- 221 appr. 5 h after ingestion of 3 g, not associated with severe toxicity to a 27-year-old woman
- 222 slightly increased (8-12 h) in patients with impaired hepatic function; active metabolites hydroxynefazodone ( $t_{1/2}$ : 2-5 h), m-chlorophenyl-piperazine ( $t_{1/2}$ : 4-10 h), and triazoledione ( $t_{1/2}$ : 10-12 h)
- 223 each as N-desmethysuximide; methsuximide ( $t_{1/2}$ : 1-2 h) steady state concentration: appr. 0.04-0.08 mg/L
- 224 mean steady state trough concentration in 15 young adults receiving a daily dose of 0.47-1.71 mg isotretinoin/kg: 0.05-0.34 mg/L ( $t_{1/2}$ :  $29 \pm 40$  h), and for the 4-oxo metabolite ( $t_{1/2}$ :  $22 \pm 10$  h): 0.16-0.68 mg/L
- 225 for depression; higher in case of schizophrenia (0.2-1 mg/L)
- 226 suggested threshold for the sum of clomipramine (0.05-0.06 mg/L) and N-desmethylclomipramine (0.16-0.18 mg/L): 0.2-0.24 mg/L
- 227 for the active metabolite E-3174 ( $t_{1/2}$ : 4-9 h); plasma concentration of losartan producing 50 % of maximal blood pressure response to exogenous angiotensin-II: 0.032 mg/L
- 228 as ramiprilat ( $t_{1/2}$ : 13-17 (50-110) h)

- 229 half maximal inhibitory concentration ( $IC_{50}$ ) for analgesic effect after oral surgery
- 230 the inhibitory concentration to reduce the level of extracellular hepatitis B DNA by 50 % varied from 2.3  $\mu$ g/L to 1.3 mg/L;  $C_{max}$  after 150 – 300 mg *per os* (p.o.): 1.2-2.0 mg/L
- 231  $C_{max}$  at steady state (666 mg three times daily (tid) *per os* (p.o.))
- 232 after oral administration of the enteric-coated tablet
- 233 trough < 2 plus peak 6-10 (5-12) mg/L
- 234 reference value; < 0.015 mg/L urine
- 235 active metabolite 4'-hydroxynimesulide ( $t_{1/2}$ : 3-9 h)
- 236 mean  $C_{max}$  126.5 and 226.3 ng/mL 2 h after 75 and 125 mg p.o. and 162.9 and 291.8 ng/mL after oral administration of 1.0 and 1.6 mg MDMA/kg body weight, respectively, to young adults; mean  $C_{max}$  for the metabolites 4-hydroxy-3-methoxymethamphetamine (HMMA) 171.9 and 173.5 ng/mL, 3,4-methylenedioxymethamphetamine (MDA) 8.4 and 13.8 ng/mL, and 4-hydroxy-3-methoxyamphetamine (HMA) 3.5 and 3.9 ng/mL, respectively
- 237 in patients > 60 years prolonged up to 10 h
- 238 adjuvant in methadone maintenance therapy
- 239 means of the 'average' steady state plasma concentration for the relatively high dose of 250 mg q8h (every 8 hours) appr. 0.4-0.6 mg/L
- 240 combination of distribution and elimination processes
- 241 as active metabolite fenofibric acid
- 242 appr. 37.5 mmol/L (=mval/L, mEq/L)
- 243 steady state concentration  $21.6 \pm 14.2$  mg/L (mean  $\pm$  SD) during continuous infusion of 3 g (1.1-2.2 mg/kg h) every 24 hours in 44 patients undergoing coronary artery bypass graft surgery
- 244 target trough concentration if ciclosporine is being used at trough concentrations of 0.075-0.15 mg/L; without ciclosporine: appr. 0.03 mg/L (LC/UV assay)
- 245 4 hours after ingestion of 30-40 tiagabine HCl 8 mg tablets (coma)
- 246 bupropion plus 10-hydroxybupropion ( $t_{1/2}$ : 17-47 h)
- 247 calculated steady state concentration in children (4 months to 16 years) receiving 0.3 mg/kg body weight i.v.

- 248 femoral blood concentration of the metabolite desmethylalimemazine after fatal intoxication: 0.2-1.3 µg/g
- 249 40-50 min after 0.15 mg/kg i.v.
- 250 femoral blood concentration of the metabolite desmethylpromethazine after fatal intoxication (n=3): 0.3-1.8 µg/g
- 251 femoral blood concentration of the metabolite desmethyltrimipramine after fatal intoxication (n=10): 0.3-2.5 µg/g
- 252 fatal overdose with tramadol, alprazolam (0.21 mg/L), and alcohol (1.29 g/kg) in a 30-year-old woman
- 253 enterohepatic circulation; prolonged in elderly subjects to 33.4 hours (range: 20.0-53.4 h)
- 254  $C_{min}/D$  [(ng/mL)/mg], i.e. dose-normalized trough plasma drug concentration, dosage interval 8 h
- 255 all data refer to the active metabolite A771726
- 256 steady state concentrations at 5, 10, and 25 mg/d, respectively
- 257 steady state trough concentrations after 400 mg/d orally; two major metabolites modafinil acid (appr. 0.5-0.8 mg/L,  $t_{1/2}$ :  $7.3 \pm 1.1$  h) and modafinil sulfone (appr. 4.5-5.3 mg/L), but neither appears to contribute to the wake-promoting properties of modafinil
- 258 mean plasma trough concentration at steady state obtained from 400 mg imatinib/day in 83 adult patients with chronic phase CML; peak: 2.3 mg/L
- 259 in a 5-year-old girl
- 260 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 800 mg two times daily (bid))
- 261 active metabolite N-desethylamiodarone ( $t_{1/2}$ : 57-64 days), which achieves plasma concentrations similar to the parent compound
- 262 inactive metabolites deshydroxyethyl opipramol ( $t_{1/2}$ :  $97 \pm 24$  h) and opipramol N-oxide ( $t_{1/2}$ :  $10.7 \pm 3.2$  h)
- 263 as 25-hydroxyvitamin D (25(OH)D, calcidiol); vitamin D deficient: < 0.01 mg/L (< 10 ng/mL = 25 nmol/L); vitamin D insufficient: < 0.02 – 0.03 mg/L (50-75 nmol/L); conversion factor: mg/L x 2,500 = nmol/L (ng/mL x 2.5 = nmol/L)
- 264 6 h after reportedly ingestion of 30 g in a 38-year-old woman
- 265 metabolite perindoprilat, 3 to 10 hours, with a prolonged terminal half-life

- between 25 to 120 h
- 266 sum venlafaxine and O-desmethylvenlafaxine
- 267 for glaucoma 4-5 mg/L
- 268 doxapram + keto-doxapram
- 269 24 h after ingestion of appr. 20 mL
- 270 active metabolite desethylamodiaquine ( $t_{1/2}$ : 1-10 days)
- 271 smokers: -0.0006 mg/L
- 272 0.01-0.1 mg/L for 9-hydroxyrisperidone
- 273 as active metabolite after administration of therapeutic doses of diazepam
- 274 active metabolite dimethadione (see Table)
- 275 HPLC-MS/MS (or FPIA) blood, in combination with ciclosporine micro-emulsion
- 276 n=439; median in  $\mu\text{mol/L}$  (interquartile range)
- 277 n=264; median in  $\mu\text{mol/L}$  (interquartile range)
- 278 in the presence of ethanol or during ethanol treatment ;  $t_{1/2}$  longer in patients with a serum creatinine concentration  $\geq 130 \mu\text{mol/L}$
- 279 n=99; median in  $\mu\text{mol/L}$  (interquartile range)
- 280 3 dead infants aged  $\leq 6$  months with post mortem blood levels of pseudoephedrine ranging from 4.7 to 7.1 mg/L
- 281 daily dose 2-8 mg *per os* (p.o.)
- 282 treatment goal: cystine levels  $< 1 \text{ nmol cystine/mg protein}$
- 283 according to other sources:  $< 0.005 \text{ mg/L}$ ; urine:  $< 0.05 \text{ mg/L}$ ; reference value for children in Germany:  $0.015 \text{ mg/L}$  urine. Case report:  $0.13\text{-}0.16 \text{ mg/L}$  (urine:  $67.5 \text{ mg/L}$ ) on the first day after ingestion of appr. 54 g arsenic trioxide
- 284 potentially increased risk for visual adverse effects ( $> 3.5 \text{ mg/L}$ ) and abnormal liver function, respectively
- 285 trough plasma buprenorphine and norbuprenorphine concentrations in excess of  $0.0007 \text{ mg/L}$  were associated with minimal withdrawal symptoms in 11 heroin-dependent subjects
- 286 serum peak concentration of misoprostol acid (MPA)  $574.8 \pm 250.7$ ,  $287.6 \pm 144.3$ , and  $125.2 \pm 53.8 \text{ pg/mL}$  after sublingual, oral, and vaginal

- application, respectively, of 0.4 mg misoprostol to 40 women undergoing termination of pregnancy
- 287 on the first day of hospital admission after unintentional ingestion of appr. 400-500 mg carbachol (corresponding urine concentration: 374 mg/L).
- 288 main (probably inactive) metabolite: morphine-3-glucuronide (M3G); active metabolite: morphine-6-glucuronide (M6G)
- 289 metabolite: nordoxylamine
- 290 active  $\beta$ -hydroxy-metabolite
- 291 targeted range between AUC of 9-12 mg/L/h
- 292 as amprenavir; suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 700 mg bid (twice daily))
- 293 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 300 mg qd (once daily))
- 294 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 400 mg bid (twice daily))
- 295 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 1,250 mg bid (twice daily))
- 296 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 1,000 mg bid (twice daily))
- 297 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 600 mg qd (once daily))
- 298 suggested minimum target trough concentration in patients with HIV-1 susceptible to the antiretroviral (ARV) drug (dose of 200 mg bid (twice daily))
- 299 suggested minimum target trough concentration for antiretroviral therapy-experienced patients who have resistant HIV-1 strains (dose of 500 mg bid (twice daily))
- 300 suggested minimum target trough concentration for antiretroviral therapy-experienced patients who have resistant HIV-1 strains
- 301 median (range) trough concentration from clinical trials (dose 600 mg bid

- (twice daily)); suggested threshold: > 0.55 mg/L
- 302 median (range) trough concentration from clinical trials
- 303 median (range) trough concentration from clinical trials
- 304 post-mortem heart blood level (death by hanging?)
- 305 active enantiomer of propoxyphene,; active metabolite norpropoxyphene
- 306 heart blood
- 307  $C_{max}$  at steady state achieved after 2-3 weeks of once-daily inhalation of 18  $\mu$ g tiotropium;  $t_{max}$  after inhalation of 18  $\mu$ g: 5 min
- 308 steady state peak concentration following a 300 mg twice-daily or a 600 mg once-daily regimen
- 309 active metabolite cis-monohydroxyperhexiline ( $t_{1/2}$ : 10-29 h)
- 310 1-2 h after 50 mg
- 311 “laboratory alert level” according to AGNP Consensus Guidelines for therapeutic drug monitoring (TDM) in psychiatry: update 2011 i.e., drug concentrations above the recommended reference range, based on reports on intolerance or intoxications. In most cases, however, arbitrarily defined as plasma concentration that is 2-fold higher than the upper limit of the therapeutic reference range
- 312 active metabolite 6-hydroxybuspirone
- 313  $C_{max}$  1-2 h after 4 mg
- 314 at low dose therapy (2.5 mg); at maximum dose (25 mg): 0.001-0.004 mg/L
- 315  $C_{max}$  0.5-4 h after drug intake for 4 weeks
- 316  $C_{max}$  after 2 h
- 317 60-90 min after intake of 1.2 mg/kg per day
- 318 4 h after 20 mg
- 319  $t_{1/2}$  with ritonavir 15-23 h
- 320 active metabolite 8-hydroxyloxapine ( $t_{1/2}$ : 20-60 h)
- 321  $C_{max}$  after 2h-infusion of 6 mg: 0.328 mg/L, after infusion of 2 mg: 0.246 mg/L
- 322 mean  $C_{max}$  after 2h-infusion of 10 mg: 0.265 mg/L

- 323 mean  $C_{\max}$  after 4h-infusion of 15 mg: appr. 0.25 mg/L
- 324 male; female: -0.07 mg/L, children: -0.06 mg/L (reference value for children in Germany: 0.035 mg/L (whole) blood)
- 325 shorter in case of hemodialysis or continuous venovenous hemodiafiltration (CVVHDF); in a, fatal, case with 4,400 mg methanol/L blood and in the presence of adequate ethanol level (1,000 mg/L or 1 ‰) appr. 3.5 h
- 326 after topical (dermal) application
- 327 prolonged in newborns ( $27.8 \pm 21.3$  h)
- 328 reference value for Germany: 0.014 mg/L urine
- 329 reference value for children in Germany: 0.0003 mg/L urine
- 330 reference value for children in Germany: 0.0045 mg/L urine
- 331 reference value in urine for children in Germany
- 332 reference value in whole blood in Germany
- 333 metabolite of 3,4 methylenedioxyamfetamine (MDMA)
- 334  $t_{1/2}$  (R)-MDE: 7.9 (6-11) h;  $t_{1/2}$  (S)-MDE: 4.0 (3-6) h
- 335 40 h after oral ingestion of appr. 100 mg (0.03 mg/L 60 h after drug intake)
- 336 active metabolite phenytoin
- 337 prodrug; main active metabolites are morphine and morphine-6-glucuronide (M6G); main (probably) inactive metabolite = morphine-3-glucuronide (M3G)
- 338 in maintenance therapy e.g., for heavily dependent opioid addicts. 30 min after i.v.- application of 150-300 mg diacetylmorphine: 0.1-0.24 mg/L morphine ( $t_{1/2}$ : 1-4 h), 2.6-5.9 mg/L morphine-3-glucuronide (M3G;  $t_{1/2}$ : (2-) 3-5 h), 0.5-1.0 mg/L morphine-6-glucuronide (M6G;  $t_{1/2}$ : (1-) 2-3 h), and 0.08-0.29 mg/L 6-monoacetylmorphine (6-MAM;  $t_{1/2}$ : appr. 2-5 min; N = 4); in another study 30 min after i.v.- application of 260-300 mg diacetylmorphine: 0.39-0.75 mg/L morphine, 3.2-5.2 mg/L M3G, 0.5-0.7 mg/L M6G, and 0.08-0.19 mg/L 6-MAM (N = 4)
- 339 depending on tolerance and state/severity of pain
- 340 metabolites: norbuprenorphine (active;  $t_{1/2}$ : 35.6 (1.1-66.8) h after i.v., 73.6 (13.4-143) h after buccal, and 83 (10-243) h after sublingual application), buprenorphine-glucuronide, and norbuprenorphine-glucuronide
- 341 active enantiomer of zopiclone

- 342 active enantiomer of methylphenidate
- 343 active enantiomer of citalopram
- 344 strongly dependent on pH of urine
- 345 symptomatic poisoning in adults is more likely with doses above 90 mg
- 346 on hospital day #2
- 347 19 h post-ingestion of appr. 4 g
- 348 5 h post-ingestion; all patients with a plasma paraquat level above 3.44 mg/L died
- 349 prolonged in (paraquat-induced) renal failure to appr. 80-120 (-150) h
- 350 active enantiomer of moramide
- 351 active enantiomer of fenfluramine
- 352 active enantiomer of methadone
- 353 after a bolus dose of 0.25 mg/kg body weight (N=10): 2.3 mg/L at 3 min, 0.84 mg/L at 30 min, 0.61 mg/L at 1 h, and 0.44 mg/L at 2 h
- 354 active metabolite oxypurinol
- 355 11 h after ingestion
- 356  $t_{1/2}$  in poor metabolisers of cytochrome P450 (CYP) 2D6 is appr. 21 h
- 357 metabolite of cocaine
- 358 dependent on pH of urine
- 359 sum of dibenzepine and desmethyldibenzepine
- 360 active metabolite of trimethadione
- 361 metabolite: acetone
- 362 in non-users of opioids/opiates
- 363 active metabolite norlorcainide ( $t_{1/2}$ : 28-32 h), therapeutic plasma concentration: 0.1-1.5 mg/L
- 364 metabolite of azathioprin
- 365 (cis-) isomer of clopenthixol
- 366 active metabolites norsibutramine ( $t_{1/2}$ : 12-22 h) and dinorsibutramine ( $t_{1/2}$ :



14-23 h)

- 367 with silver sulphadiazine ointment for burns: 0.06-0.6 mg/L (non-toxic)
- 368 active metabolite fexofenadine
- 369 as metabolite of chloralhydrate
- 370 peak plasma concentration ( $C_{max}$ ) after 1 h chewing khat leaves that supplied 32 mg cathine
- 371 higher for poor metabolisers (PM) of cytochrome P450 (CYP) 2C9
- 372 enantiomer of loratadine
- 373 0.001-0.0035 mg/L for the active metabolite 3-hydroxydesloratadine ;  $t_{1/2}$ : 17-27 h)
- 374 enantiomer of ketoprofen
- 375 after a single oral dose of 2 mg
- 376 average of 12 victims
- 377 serum morphine (active metabolite) levels were appr. 0.013 (extensive metabolisers, EM) and 0.003 (poor metabolisers, PM)
- 378 enantiomer of cetiricine
- 379 endogenous: -0.00001-0.00009 mg/L
- 380 active metabolite of psilocybin
- 381 during anaesthesia
- 382 measured 14 h post-ingestion

#### List of abbreviations:

appr., approximately;  $t_{1/2}$ , in general, terminal elimination half-life (if not stated otherwise);  $C_{min}$ , minimum (trough) plasma/serum concentration (usually at steady state);  $C_{max}$ , maximum (peak) plasma/serum concentration;  $t_{max}$ , time to peak concentration ( $C_{max}$ ); SD, standard deviation; mol wt, molecular weight; AUC, area under the (plasma concentration-time) curve

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