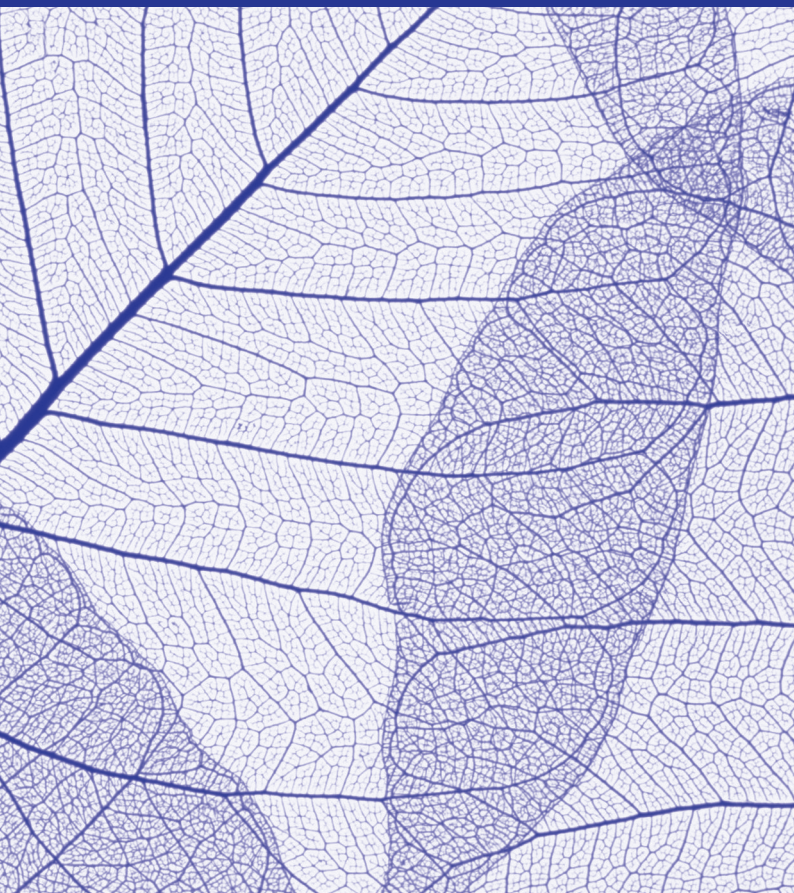


2011

ENVIRONMENTALLY CLASSIFIED PHARMACEUTICALS



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The Environmental Assessment of Pharmaceuticals Continues

Reducing the residues of medicinal products in the ground, water and air is one of Stockholm County Council's five most important environmental issues. Our vision is that County Council operations should not add any environmentally hazardous remains of medicinal products to the natural surroundings. The aim is for the levels of the most environmentally hazardous medicinal products in effluent from wastewater plants or in surface water to be lower in 2011 than in 2005. One aspect of this work is the assessment and classification of medications according to their impact on the environment.

The results of the environmental assessment of a selected sample of drug compounds are shown here. The classification is being gradually extended and around 62 substances have been added to this year's edition, and data on 74 substances have been updated. The medications are classified both in terms of their inherent capacity to affect the environment (environmental hazard), and as regarding the environmental risk posed by the pharmaceutical substances when used at present amounts.

The environmental hazard assessment was initiated in 2003 by Environmental Department of the Stockholm County Council. During 2005 the classification was extended to also cover an environmental risk assessment carried out by The Swedish Association of the Pharmaceutical Industry. Starting in 2006, all data i.e. – environmental hazard assessments, persistence, bioaccumulation and toxicity – are obtained from the environmental information published by The Swedish Association of the Pharmaceutical Industry on www.fass.se.

The classification is also available at the website janusinfo.se/environment where the substances printed in **extra bold type** are linked to “Kloka Listan” (Stockholm County Council's “Wise List” of recommended drugs for common diseases).

Impact of Medications on the Environment

The majority of all medications that patients take are excreted in the urine, in unchanged condition or as metabolites, and reach wastewater plants and sometimes even waterways and ground water. Medications are often adapted to resist biodegradation and can therefore remain in the environment for a long time. Some medications have been found in drinking water, which is a warning sign that the current handling of pharmaceuticals may lead to health and environmental problems in the future.

Access to healthy water is a prerequisite for good health. Since society's use of chemicals, including pharmaceuticals, is continuously growing, the risk is also increasing that these chemicals will return to us in our food and water supply through nature's ecocycle. We have little knowledge of the effects that continuously supplied trace quantities of pharmaceuticals and other chemicals could have on our development, our ability to resist disease and our wellness in general. Therefore caution is advisable. In other words, even if we today do not have scientific proof that pharmaceuticals in nature can cause health problems we should reduce our unintentional exposure to them as much as possible i.e. adhere to the Precautionary Principle, see p.29.

How the Classification is Made

Pharmaceutical substances are assessed with respect to environmental risk and environmental hazard.

Environmental risk refers to the risk of toxicity to the aquatic environment. Environmental risk is based on the ratio between predicted environmental concentration of the substance (PEC) and the highest concentration of the substance that does not have a harmful effect in the environment (PNEC).

Risk is specified as:

INSIGNIFICANT	if PEC/PNEC	<0,1
LOW	if PEC/PNEC	0,1–1
MODERATE	if PEC/PNEC	1–10
HIGH	if PEC/PNEC	>10

The Swedish Association of the Pharmaceutical Industry began to conduct environmental risk assessments of pharmaceuticals in 2005. In 2011 these assessments include most medications on the Swedish market. The drug groups that have been added to this year's edition are to be found under the heading of

C Cardiovascular System

D Dermatologicals

N Nervous System

S Sensory Organs

V Various

Environmental hazard expresses the inherent environmentally damaging characteristics of the substance in the following terms:

PERSISTENCE – ability to resist degradation in the aquatic environment

BIOACCUMULATION – accumulation in adipose tissue of aquatic organisms

TOXICITY – the potential to poison aquatic organisms

Each of these characteristics is assigned a numerical value (0–3). The total of these values constitutes the PBT Index for the substance. The PBT Index can assume values in the interval 0–9. The hazard model was formulated by Stockholm County Council and Apoteket AB. Since 2006, all information about persistence, bioaccumulation and toxicity is obtained from www.fass.se.

More information is available at the non-commercial website Janusinfo, produced by the Stockholm County Council:
www.janusinfo.se/environment

How to Read the Table

THE SUBSTANCE can be found under several different drug groups. For example, metronidazole can be found under “A alimentary tract and metabolism” as well as “J anti-infectives”. Substances indicated in bold are included in “Kloka Listan” (Stockholm County Council’s “Wise List” of recommended drugs for common diseases) and are presented in the beginning of each section.

THE PBT INDEX is a measure of environmental hazard and can assume all values from 0–9 (the total of P, B and the T-value). The higher the value of a substance, the greater its danger to the environment.

***) AFTER THE PBT INDEX** indicates that the assessment is uncertain due to lack of data.

Two substances may have the same risk values but different PBT values, but the risk assessment can also be different even if the PBT values are the same.

When assessing a medication’s environmental impact, consideration should be given to both environmental risk and environmental hazard since bioaccumulation and persistence are not included in the risk assessment.

RISK refers to toxic risk to the aquatic environment, the calculation based on Swedish conditions and is given as insignificant, low, moderate or high. “Cannot be excl” means that the manufacturer has stated that the documentary basis for assessment of risk is insufficient. Information about environmental risks can be obtained from www.fass.se. For risk “none”, see p.27

P (Persistence) can assume the value 0 or 3

B (Bioaccumulation) can assume the value 0 or 3

T (Toxicity) can assume the value 0–3

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
J Anti-infectives						
Antibacterials for systemic use						
trimetoprim	insignificant	4	3	0	1	225 422
erythromycin	insignificant	6	3	0	3	C 238 288
amoxicillin	moderate	6	3	0	3	270 428
ofloxacin	insignificant	9*	3	3*	3	1 075 471
						C 249 551
						4 645

VOLUME IN DDD, total sales in DDD (Defined Daily Doses) of the substance in Stockholm County Council during one year. (Oct 2009 – Sep 2010)

Indicates DDD for
C (combination drugs, 1 tablet = 1 DDD)
E (drugs for external use, 1 gram = 1 DDD)
 DDD indicated for pharmaceuticals for external use and combined products is not based on the amount of an active substance and can therefore not be compared to the DDD for other drugs.

Reading tips

- **A Healthy Future**

This book provides, in an accessible way, a summary of our current knowledge of the problems that surround pharmaceuticals and sustainable development. Published in collaboration between Apoteket AB (The National Corporation of Swedish Pharmacies), MistraPharma and Stockholm County Council.

- **Environment and Pharmaceuticals**

A publication containing facts and reflections about how pharmaceutical products and pharmaceutical residues can affect our environment and, as a result, our health. Published in 2005 in collaboration between Apoteket AB, Stockholm County Council and Stockholm University.

- **Environmental Impact of Pharmaceuticals as well as Cosmetics and Hygiene Products**

The Swedish Medical Products Agency: report 2004 (Summary in English).

- **Fass.se**

The Swedish Association of the Pharmaceutical Industry's website.

More reading tips are available at the non-commercial website
www.janusinfo.se/environment

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
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A Alimentary Tract and Metabolism

Stomatological preparations

metronidazole	insignificant	4	3	0	1	227 399 E 359 205
chlorhexidine	low	9	3	3	3	E 130 062
triamcinolone	cannot be excl	4*	3	0	1*	181 568 E 2 709 040
amphotericin B	cannot be excl	-	-	-	-	20 915

Drugs for acid-related disorders

ranitidine	insignificant	3	3	0	0	713 333
omeprazole	insignificant	4	3	0	1	21 885 241
cimetidine	insignificant	3	3	0	0	-
esomeprazole	insignificant	4	3	0	1	3 573 660 C 17 472
pantoprazole	insignificant	4	3	0	1	1 006 666
misoprostol	insignificant	4*	3*0	1		28 287 C 562 340
lansoprazole	cannot be excl	4	3	0	1	1 247 709
rabeprazole	cannot be excl	5*	3*0	2		4 658

Antiemetics and anti-nauseants

ondansetron	insignificant	6	3	0	3	83 067
granisetron	insignificant	4	3	0	1	14 192
aprepitant	insignificant	9*	3	3	3*	3 152
scopolamine	cannot be excl	-	-	0	-	20 310 C 43 129
palonosetron	cannot be excl	-	-	-	-	1 522
tropisetron		9*	3	3*3		5 533

Laxatives

psyllium	none					1 270 959 C 170
lactulose	none					6 276 901
karaya gum	none					2 585 761
sodium picosulfate	cannot be excl	5*	3	0	2*	820 015
bisacodyl	cannot be excl	5*	3	0	2*	147 657
docusate sodium	cannot be excl	8*	3*3	2*		C 90 114

Antidiarrhoeals, intestinal anti-inflammatory/anti-infective agents

mesalamine	cannot be excl	6*	3	0	3*	1 543 040
loperamide	cannot be excl	8*	3*3	2*		726 044 C 867
nystatin	cannot be excl	-	-	-	-	142 905
prednisolone	cannot be excl	-	-	-	-	4 732 223

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
budesonide	insignificant	8	3	3	2	9 181 927 C 6 805 080
sodium cromoglycate	cannot be excl	3*	3*0	0*		123 026
olsalazine	cannot be excl	3*	3*0	0		87 780
dimethicone	cannot be excl	-	-	-		1 603 766 C, E 65 467
sulfasalazine	cannot be excl	-	-	-		791 511
Antioesity preparations						
orlistat		8	3	3	2	707 196
Drugs used in diabetes						
metformin	insignificant	5	3	0	2	9 841 831 C 201 566
glibenclamide	insignificant	5*	3	0	2*	2 655 804
glimepiride	insignificant	6*	3	3*0		899 526
glipizide	cannot be excl	4*	3*0	1*		273 725
repaglinide	cannot be excl	4*	3	0	1*	398 565
pioglitazone	cannot be excl	-	-	-		144 312 C 1 400
Anabolic agents for systemic use						
nandrolone	cannot be excl	-	-	-		2 750

B Blood and Blood-Forming Organs

Antithrombotic agents

tinzaparin sodium	none					144 965
clopidogrel	insignificant	5	3	0	2	2 207 114
warfarin	low	4	3	0	1	5 570 579
acetylsalicylic acid	moderate	1	0	0	1	40 338 419 C 6 446 122
fondaparinux	cannot be excl	6*	3*0	3*		14 166
tirofiban	insignificant	3	3	0	0	73
dipyridamole	insignificant	5	3	0	2	1 553 075 C 405 500
argatroban	insignificant	7*	3	3*1		216
ticlopidine	cannot be excl	6*	3*0	3		3 850
eptifibatide	cannot be excl	-	-	0	-	19

Antihemorrhagics

phytomenadione	none					
tranexamic acid	none					

Antianemic preparations

cyanocobalamin	none					19 255 163 C 6 422 248
darbepoetin alfa	none					583 199

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
Blood substitutes and perfusion solutions						
dextran 70	none					C 8 539
sodium chloride	none					1 865

C Cardiovascular System

Cardiac therapy

glyceryl trinitrate	insignificant	-	-	-	3	1 410 475
isosorbide-mononitrate	cannot be excl	4*	3*0	1*		7 502 114
amiodarone	cannot be excl	7*	3	3	1*	169 271
epinephrine	cannot be excl	-	-	-	-	135 685
digoxin	cannot be excl	-	-	-	-	1 883 974
lidocaine	insignificant	3	3	0	0	69 C, E 532 449
disopyramide	cannot be excl	4*	3*0	1*		207 901
milrinone	cannot be excl	4*	3	0	1*	402
etilefrine	cannot be excl	8*	3	3*2*		49 477
alprostadil	cannot be excl	-	-	-	-	156 062
dopamine	cannot be excl	-	-	-	-	568

Antihypertensives

doxazosin	cannot be excl	6*	3	0	3*	1 092 287
moxonidine	insignificant	4	3	0	1	82 921
hydralazine	insignificant	5*	3	0	2*	13 650
clonidine	cannot be excl	6*	3	0	3*	29 730
methyldopa	cannot be excl	-	-	-	-	-

Diuretics

furosemide	insignificant	4	3	0	1	23 504 175
hydrochlorthiazide	insignificant	4*	3	0	1*	2 923 802 C 24 226 432

bendroflumethiazide	cannot be excl	4*	3*0	1*		6 380 579 C 188 863
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amiloride	cannot be excl	-	-	-	-	361 649 C 9 737 215
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spironolactone	cannot be excl	-	-	-	-	2 264 096
torasemide	insignificant	4	3	0	1	59 743
eplerenone	insignificant	6	3	0	3	75 785
bumetanide	cannot be excl	4*	3	0	1*	57 568

Vasoprotectives

lidocaine	insignificant	3	3	0	0	69 C, E 532 449
hydrocortisone	cannot be excl	1*	0	0	1*	429 014 C, E 9 858 435

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
esculoside	cannot be excl	-	-	0	-	C -
framycetin	cannot be excl	-	-	0	-	C, E -
cincocaine	cannot be excl	-	-	3	-	-
heparinoid	cannot be excl	-	-	-	-	E -
prednisolone	cannot be excl	-	-	-	-	4 732 223

Beta-blocking agents

metoprolol	insignificant	4	3	0	1	17 709 170 C 658 929
labetalol	cannot be excl	6*	3*0	3*		46 585
pindolol	insignificant	4	3	0	1	129 065
carvedilol	insignificant	9	3	3	3	804 107
propranolol	moderate	3	0	0	3	1 196 408
atenolol	cannot be excl	4*	3*0	1*		5 117 184
sotalol	cannot be excl	6*	3	0	3*	981 631
esmolol	cannot be excl	-	-	-	-	-

Calcium-channel blockers

amlodipine	insignificant	6	3	0	3	20 533 219 C 97 048
isradipine	insignificant	9	3	3	3	218 417
felodipine	low	9	3	3	3	15 568 303 C 658 929
nifedipine	cannot be excl	5*	3	0	2*	313 133
diltiazem	cannot be excl	6*	3	0	3*	806 225

Agents acting on the renin-angiotensin system

losartan	insignificant	3	3	0	0	6 940 342 C 4 197 058
enalapril	insignificant	3*	3	0	0*	27 659 645 C 3 940 500
ramipril	insignificant	6	3	3	0	17 245 486 C 326 098
candesartan	cannot be excl	4*	3	0	1*	15 986 346 C 3 248 652
eprosartan	insignificant	3	3	0	0	86 114 C 62 720
cilazapril	insignificant	4	3	0	1	C 3 430
irbesartan	insignificant	4	3	0	1	2 076 646 C 994 672
valsartan	insignificant	4	3	0	1	1 677 732 C 1 359 093
fosinopril	insignificant	4*	3	0	1*	7 333
telmisartan	insignificant	5	3	0	2	469 672 C 171 626

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
trandolapril	insignificant	6*	3	0	3*	C -
lisinopril	cannot be excl	3*	3	0	0*	980 981 C 180 088
captopril	cannot be excl	4*	3	0	1*	507 694
quinapril	cannot be excl	-	-	-	-	57 312 C 102 328

Lipid-modifying agents

simvastatin	insignificant	4	3	0	1	31 587 765
atorvastatin	insignificant	4	3	0	1	6 252 461
fluvastatin	insignificant	4	3	0	1	30 279
pravastatin	insignificant	4	3	0	1	1 157 254
rosuvastatin	insignificant	4	3	0	1	2 693 219
bezafibrate	insignificant	5	3	0	2	116 673
ezetimibe	insignificant	6*	3	0	3*	1 422 200
gemfibrozil	low	5	3	0	2	280 345
cholestyramine	cannot be excl	6*	3	0	3*	112 434
fenofibrate	cannot be excl	-	-	-	-	143 350
colestipol	cannot be excl	-	-	-	-	28 891

D Dermatologicals

Antifungals

ketoconazole	moderate	9	3	3	3	4 540 E 2 400 900
miconazole		9	3	3	3	78 166 E 2 708 590
terbinafine		9*	3*3	3		491 166 E 242 315
econazole	cannot be excl	-	-	-	-	E 3 455 350
bifonazole	cannot be excl	-	-	-	-	E 2 660
clotrimazole	cannot be excl	-	-	-	-	E 130 992
nystatin	cannot be excl	-	-	-	-	142 905

Emollients and protectives

glycerin	none					C, E 78 806 124
urea	cannot be excl	6*	3*0	3*		E 50 917 585

Antipruritics

lidocaine	insignificant	3	3	0	0	69 C, E 532 449
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Antipsoriasis

acitretin		9	3	3	3	54 685
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SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
Antibiotics and chemotherapeutics						
metronidazole	insignificant	4	3	0	1	227 399 E 359 205
retapamulin	cannot be excl	5*	3	0	2*	E 19 355
penciclovir	insignificant	3*	3	0	0*	E 10 808
acyclovir	insignificant	4	3	0	1	123 079 E 1 952
fusidic acid	insignificant	5	3	0	2	8 164 E 375 860
mupirocin	cannot be excl	3*	3*0	0*		E 19 635
podophyllotoxin	cannot be excl	-	-	-	-	E 18 536
gentamicin		6*	3*0	3		10 414 E 30
oxytetracycline		6*	3*0	3*		12 620 C, E 198 260
Corticosteroids, dermatological preparations						
hydrocortisone	cannot be excl	1*	0	0	1*	429 014 C, E 9 858 435
clobetasone	cannot be excl	4*	3*3	1*		E 481 325
betamethasone	cannot be excl	9*	3	3	3*	2 298 149 E 7 609 925
mometasone	cannot be excl	9*	3*3	3*		7 919 135 E 6 014 275
fusidic acid	insignificant	5	3	0	2	8 164 E 375 860
clobetasol	insignificant	9	3	3	3	E 1 790 150
salicylic acid	cannot be excl	4*	3*0	1*		E 2 634 590
triamcinolone	cannot be excl	4*	3	0	1*	181 568 E 2 709 040
fluticasone	cannot be excl	6*	3	0	3*	1 768 857 C, E 3 372 380
fluocinolone	cannot be excl	-	-	-	-	E 28 110
Antiseptics and disinfectants						
chlorhexidine	low	9	3	3	3	E 130 062
Medical bandages						
fusidic acid	insignificant	5	3	0	2	8 164 E 375 860
Anti-acne preparations						
benzoyl peroxide	insignificant	6	0	3	3	E 641 468
azelaic acid	cannot be excl	-	-	-	-	E 626 490
clindamycin	cannot be excl	6*	3	0	3*	232 401 E 715 981
tretinoin	cannot be excl	-	-	-	-	E 156 720

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
Other dermatological preparations						
finasteride	insignificant	7	3	3	1	2 722 475
salicylic acid	cannot be excl	4*	3*0	1*		E 2 634 590
pimekrolimus	cannot be excl	7*	3	3*1*		E 17 955
minoxidil	cannot be excl	-	-	-	-	E 71 340
selenium sulfide	cannot be excl	-	-	-	-	E 205 920

G Genito-Urinary System and Sex Hormones

Gynecological anti-infectives and antiseptics

metronidazole	insignificant	4	3	0	1	227 399 E 359 205
clindamycin	cannot be excl	6*	3	0	3*	232 401 E 715 981
clotrimazole	cannot be excl	-	-	-	-	E 130 992
econazole	cannot be excl	-	-	-	-	E 3 455 350

Other gynecologicals

etonogestrel	insignificant	8*	3	3	2*	3 946 000 E 2 229 696
ethinyl estradiol	high	9	3	3	3	C 21 625 612 E 2 229 696
methyleergometrine	cannot be excl	7*	3	3*1*		15 109
atosiban	cannot be excl	-	-	-	-	390
dinoprostone	cannot be excl	-	-	-	-	9 814
cabergoline	cannot be excl	-	-	-	-	21 092
bromocriptine		9	3	3	3	148 534
gemeprost	cannot be excl	-	-	-	-	-
carboprost	cannot be excl	-	-	-	-	67
quinagolide	cannot be excl	-	-	-	-	56 481

Sex hormones and modulators of the genital system

desogestrel	insignificant	8	3	3	2	9 527 868 C 1 210 216
etonogestrel	insignificant	8*	3	3	2*	3 946 000 E 2 229 696
ethinyl estradiol	high	9	3	3	3	C 21 625 612 E 2 229 696
estradiol	high	9	3	3	3	6 109 337 C 3 209 075
estriol	cannot be excl	6*	3*0	3*		1 845 840
drospirenone	cannot be excl	8*	3	3*2		C 4 837 672
norethisterone	cannot be excl	9	3	3	3	1 025 962 C 3 423 390

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
levonorgestrel	cannot be excl	9*	3	3	3*	6 514 C 10 545 360
ulipristal	cannot be excl	-	-	3	-	-
clomiphene	cannot be excl	-	-	-	-	198 766
medroxy-progesterone	cannot be excl	-	-	-	-	1 778 387 C 1 018 136
mifepristone	cannot be excl	-	-	-	-	2 708
progesterone	cannot be excl	-	-	-	-	E 1 232 277
dienogest	insignificant	4	3	0	1	C 4 301
dydrogesterone	insignificant	8	3	3	2	12 960
raloxifene	moderate	8	3	3	2	232 145
testosterone	cannot be excl	3	0	0	3	899 594
cyproterone	cannot be excl	9*	3	3	3*	27 809 C 661 332
lynestrenol	cannot be excl	-	-	-	-	1 185 700 C 76 188
norgestimate	cannot be excl	-	-	-	-	C 2 638 216
tibolone	cannot be excl	-	-	-	-	979 356
Urologicals						
sildenafil	insignificant	2	0	0	2	499 936
alfuzosin	insignificant	4*	3*	0	1	4 985 895
talafafil	insignificant	5	3	0	2	494 094
finasteride	insignificant	7	3	3	1	2 722 475
tolterodine	cannot be excl	6*	3*	0	3*	1 313 877
solifenacin	cannot be excl	-	-	0	-	1 621 875
alprostadi	cannot be excl	-	-	-	-	156 062
darifenacin	insignificant	6	3	0	3	277 396
terazosin	cannot be excl	6*	3	0	3*	556 219
dutasteride	cannot be excl	8*	3	3	2*	1 043 850
oxybutynin	cannot be excl	-	-	-	-	146 825
vardeafil	cannot be excl	-	-	-	-	55 932

H Hormones Excluding Sex Hormones

Corticosteroids for systemic use

hydrocortisone	cannot be excl	1*	0	0	1*	429 014 C, E 9 858 435
triamcinolone	cannot be excl	4*	3	0	1*	181 568 E 2 709 040
betamethasone	cannot be excl	9*	3	3	3*	2 298 149 E 7 609 925
fludrocortisone	cannot be excl	-	-	-	-	211 200
methylprednisolone	cannot be excl	-	-	-	-	324 274

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
prednisolone	cannot be excl	-	-	-	-	4 732 223
dexamethasone	cannot be excl	-	-	-	-	37 397
Thyroid therapy						
levothyroxine	cannot be excl	-	-	-	-	17 762 255
liothyronine	cannot be excl	-	-	-	-	72 859

J Anti-Infectives

Antibacterials for systemic use

vancomycin	none					12 635
cefotaxime	insignificant	3*	3	0	0*	46 978
metronidazole	insignificant	4	3	0	1	227 399 E 359 205
trimetoprim	insignificant	4	3	0	1	225 422 C 238 288
nitrofurantoin	insignificant	5	3	0	2	233 745
piperacillin	insignificant	5	3	0	2	26 250
erythromycin	insignificant	6	3	0	3	270 428
clarithromycin	insignificant	6	3	0	3	53 166 C 17 472
sulfamethoxazole	insignificant	6	3	0	3	C 238 288
pivmecillinam	insignificant	6	3	3	0	435 308
ceftazidime	low	6	3	0	3	8 624
amoxicillin	moderate	6	3	0	3	1 075 471 C 249 551
imipenem	cannot be excl	1*	0	0	1*	9 930
cilastatin (enzyme inhibitor)	cannot be excl	3*	3	0	0*	
ampicillin	cannot be excl	3*	3	0	0*	12 800
meropenem	cannot be excl	3*	3	0	0*	25 358
benzylpenicillin	cannot be excl	4*	3	0	1*	35 625
ciprofloxacin	cannot be excl	5	3	0	2	567 890
clindamycin	cannot be excl	6*	3	0	3*	232 401 E 715 981
cloxacillin	cannot be excl	6*	3	0	3*	107 751
phenoxymethylpenicillin	cannot be excl	-	-	0	-	3 178 227
flucloxacillin	cannot be excl	-	-	0	-	1 237 954
cefadroxil	cannot be excl	-	-	-	-	123 295
lymecycline	cannot be excl	-	-	-	-	1 049 590
gentamicin		6*	3*	0	3	10 414 E 30
cefepime	insignificant	3	3	0	0	-
ceftriaxone	insignificant	3	3	0	0	10 616

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
cefuroxime	insignificant	3	3	0	0	54 044
ertapenem	insignificant	3	3	0	0	1 488
moxifloxacin	insignificant	4	3	0	1	9 266
fusidic acid	insignificant	5	3	0	2	8 164
						E 375 860
levofloxacin	insignificant	8*	3	3*	2	19 941
telitromycin	insignificant	9	3	3	3	45
ofloxacin	insignificant	9*	3	3*	3	4 645
tetracycline	low	5	3	0	2	200 046
azitromycin	low	6	3	0	3	50 112
norfloxacin	cannot be excl	5*	3*	0	2	42 516
aztreonam	cannot be excl	6*	3*	0	3	222
amikacin	cannot be excl	-	-	-	-	1 218
dicloxacillin	cannot be excl	-	-	-	-	65
metenamine	cannot be excl	-	-	-	-	1 193 606
oxytetracycline		6*	3*	0	3*	12 620
						C, E 198 260

Antimycotics for systemic use

fluconazole	cannot be excl	4*	3*	0	1	149 770
caspofungin	insignificant	6	3	0	3	3 631
ketoconazole	moderate	9	3	3	3	4 540
						E 2 400 900
amphotericin B	cannot be excl	-	-	-	-	20 915

Antimycobacterials

isoniazid	insignificant	4	3	0	1	131 200
						C 627

Antivirals for systemic use

acyclovir	insignificant	4	3	0	1	123 079
						E 1 952
stavudine	insignificant	0	0	0	0	364
foscarnet	insignificant	3	3	0	0	-
valganciclovir	insignificant	3	3	0	0	15 716
didanosine	insignificant	3*	3	0	0*	5 449
ribavirin	insignificant	4	3	0	1	57 117
abacavir	insignificant	4	3	0	1	9 418
						C 307 770
lamivudine	insignificant	4	3	0	1	45 773
						C 320 010
oseltamivir	insignificant	4	3	0	1	31 439
nevirapine	insignificant	4	3	0	1	60 054
famciclovir	insignificant	4*	3	0	1*	3 827
valaciclovir	insignificant	4*	3	0	1*	199 534

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
zidovudine	insignificant	4*	3	0	1*	4 177
						C 23 190
atazanavir	insignificant	5	3	0	2	219 910
indinavir	insignificant	5	3	0	2	300
fosamprenavir	insignificant	6	3	3	0	690
nelfinavir	insignificant	6	3	3	0	-
saquinavir	insignificant	7	3	3	1	580
efavirenz	insignificant	9	3	3	3	124 510
						C 118 680
zanamivir	cannot be excl	3*	3	0	0*	350
amprenavir	cannot be excl	4*	3	0	1*	-

L Antineoplastic and Immunomodulating Agents

Antineoplastic agents

temozolomide	insignificant	1	0	0	1	-
hydroxycarbamide	insignificant	3	3	0	0	-
pemetrexed	insignificant	3*	3*	0	0	-
gemcitabine	insignificant	5	3	0	2	-
imatinib	insignificant	5	3	0	2	-
cladribine	insignificant	5*	3*	0	2	-
capecitabine	insignificant	6	3	0	3	-
erlotinib	insignificant	6*	3	0	3*	-
sunitinib	insignificant	6*	3*	0	3	-
dasatinib	insignificant	9*	3	3	3*	-
doxorubicin	insignificant	-	-	-	2*	-
bortezomib	insignificant	-	-	-	3	-
topotecan	cannot be excl	1*	0	0	1*	-
busulfan	cannot be excl	2*	0	0	2*	-
chlorambucil	cannot be excl	2*	0	0	2*	-
melphalan	cannot be excl	2*	0	0	2*	-
etoposide	cannot be excl	3*	3*	0	0*	-
carboplatin	cannot be excl	4*	3*	0	1*	-
mercaptopurine	cannot be excl	4*	3	0	1*	-
cyclophosphamide	cannot be excl	5	3	0	2	-
tioguanine	cannot be excl	6	3	0	3	-
ifosfamide	cannot be excl	6*	3	0	3*	-
methyl aminolevulinate	cannot be excl	6*	3	0	3*	-
oxaliplatin	cannot be excl	6*	3	0	3*	-
paclitaxel	cannot be excl	6*	0	3	3*	-
docetaxel	cannot be excl	9*	3	3*	3	-
amsacrine	cannot be excl	-	-	-	-	-
anagrelide	cannot be excl	-	-	-	-	-

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
bleomycin	cannot be excl	-	-	-	-	-
clofarabine	cannot be excl	-	-	-	-	-
cytarabine	cannot be excl	-	-	-	-	-
daunorubicin	cannot be excl	-	-	-	-	-
epirubicin	cannot be excl	-	-	-	-	-
estramustine	cannot be excl	-	-	-	-	-
idarubicin	cannot be excl	-	-	-	-	-
miltefosine	cannot be excl	-	-	-	-	-
mitomycin		6	3	0	3	-
cisplatin		6*	3*	0	3	-

Endocrine therapy

leuprorelin	none					629 271
anastrozole	insignificant	5	3	0	2	797 520
tamoxifen	insignificant	9	3	3	3	1 013 477
estradiol	high	9	3	3	3	6 109 337
						C 3 209 075
bicalutamide	cannot be excl	-	-	-	-	1 167 048
letrozole	insignificant	4	3	0	1	288 440
flutamide	cannot be excl	-	-	3	-	35 679
medroxyprogesterone	cannot be excl	-	-	-	-	1 778 387
						C 1 018 136
megestrol		9	3	3	3	90

Immunosuppressants

azathioprine	cannot be excl	-	-	-	-	690 687
methotrexate	cannot be excl	-	-	-	-	2 052 530
ciclosporine	insignificant	4	0	3	1	133 208
everolimus	insignificant	8	3	3	2	6 748
leflunomide	insignificant	8	3	3	2	60 150
mycophenolate mofetil	moderate	6	3	0	3	144 043

M Musculo-Skeletal System

Antiinflammatory and antirheumatic products

ibuprofen	insignificant	2	0	0	2	2 030 736
						C, E 1 205 170
ketorolac	insignificant	4	3	0	1	23 425
diclofenac	insignificant	4*	3	0	1*	7 360 965
						C, E 10 024 615
naproxen	low	4	3	0	1	2 666 723
nabumetone	cannot be excl	-	-	-	-	419 592
meloxicam	insignificant	4	3	0	1	79 995
etoricoxib	insignificant	5	3	0	2	1 754 655
glucosamine	low	1	0	0	1	2 547 816

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
indometacin	cannot be excl	5*	3	0	2*	18 740
ketoprofen	cannot be excl	7*	3*	3	1	2 124 686
						E 7 932 035
sodium aurothiomalate	cannot be excl	-	-	-	-	4 208
sulindac	cannot be excl	-	-	-	-	-
tenoxicam		4	3	0	1	97 530

Topical products for joint and muscular pain

ibuprofen	insignificant	2	0	0	2	2 030 736
						C, E 1 205 170
diethylaminosalicylate	cannot be excl	1*	0	0	1*	E 905 100
ketoprofen	cannot be excl	7*	3*	3	1	2 124 686
						E 7 932 035

Muscle-relaxing drugs

atracurium	cannot be excl	2*	0	0	2*	-
cisatracurium	cannot be excl	2*	0	0	2*	-
baclofen	cannot be excl	3*	3	0	0*	365 376
mivacurium chloride	cannot be excl	3*	3	0	0*	-
chlorzoxazone	cannot be excl	-	-	-	-	282 540
suxamethonium	cannot be excl	-	-	-	-	-

Antigout preparations

allopurinol	moderate	6	3	0	3	1 634 787
probenecid	cannot be excl	-	-	-	-	102 413

Drugs for treatment of bone diseases

pamidronic acid	insignificant	4*	3*	0	1*	3 014
zoledronic acid	insignificant	5*	3	0	2*	2 423
alendronic acid	insignificant	6	3	0	3	3 922 480
						C 198 576
ibandronic acid	insignificant	2	0	0	2	698 923
clodronic acid	insignificant	4	3	0	1	9 605
etidronic acid	insignificant	5	3	0	2	3 612
						C 9 044
risedronic acid	insignificant	6*	3*	0	3	1 182 517
						C 13 748

N Nervous System

Anaesthetics

lidocaine	insignificant	3	3	0	0	69
						C, E 532 449
prilocaine	insignificant	4	3	0	1	-
propofol	low	6	3	0	3	-
mepivacaine	cannot be excl	4*	3*	0	1*	C 111 409
bupivacaine	cannot be excl	5*	3*	0	2*	-

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
epinephrine	cannot be excl	-	-	-	-	135 685
droperidol	cannot be excl	-	-	-	-	-
ropivacaine	insignificant	4	3	0	1	-
fentanyl	cannot be excl	7	3	3	1	600 030
						excl inj liquid
alfentanil	cannot be excl	-	-	-	-	-
capsaicin	cannot be excl	-	-	-	-	-
desflurane	cannot be excl	-	-	-	-	-
isoflurane	cannot be excl	-	-	-	-	-
ketamine	cannot be excl	-	-	-	-	-
sufentanil	cannot be excl	-	-	-	-	-
thiopental	cannot be excl	-	-	-	-	-
Analgesics						
buprenorphine	insignificant	3	3	0	0	557 550
						C 184 748
codeine	insignificant	4	3	0	1	77 315
						C 6 169 528
sumatriptan	insignificant	4	3	0	1	797 405
paracetamol	low	5	3	0	2	15 739 144
						C 6 144 584
acetylsalicylic acid	moderate	1	0	0	1	40 338 419
						C 6 446 122
fentanyl	cannot be excl	7	3	3	1	600 030
						excl inj liquid
morphine	cannot be excl	-	-	-	-	553 410
						C 43 129
phenazone	insignificant	3	3	0	0	C 1 694
naratriptan	insignificant	3	3	0	0	7 074
rizatriptan	insignificant	4	3	0	1	254 392
pizotifen	insignificant	6*	3	0	3*	31 830
ergotamine	low	7	3	3	1	C 41 790
zolmitriptan	cannot be excl	4*	3	0	1*	375 767
dextropropoxyphene	cannot be excl	8*	3	3	2*	990 404
eletriptan	cannot be excl	8*	3*	3	2*	21 436
pethidine	cannot be excl	-	-	-	-	1 548
tramadol	cannot be excl	-	-	-	-	2 558 915
Antiepileptics						
carbamazepine	insignificant	4	3	0	1	1 169 410
lamotrigine	insignificant	4	3	0	1	1 101 691
oxcarbazepine	cannot be excl	4*	3	0	1*	93 666
valproic acid	cannot be excl	4*	3	0	1*	1 116 733
fosphenytoin	cannot be excl	-	-	-	-	6 951
gabapentin	cannot be excl	-	-	-	-	625 544

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
zonisamide	insignificant	1	0	0	1	48 570
clonazepam	insignificant	4	3	0	1	146 790
vigabatrin	cannot be excl	4*	3*	0	1*	11 038
ethosuximide	cannot be excl	-	-	-	-	12 648
felbamate	cannot be excl	-	-	-	-	421
phenytoin	cannot be excl	-	-	-	-	478 981
Anti-Parkinson drugs						
levodopa	insignificant	2	0	0	2	C 1 117 306
benserazide	insignificant	5	3	0	2	C 888 729
carbidopa	cannot be excl	5*	3*	0	2*	C 1 117 306
pramipexole	insignificant	4	3	0	1	326 281
entacapone	low	5*	3	0	2*	95 464
						C 228 577
selegiline	cannot be excl	-	-	0	-	118 630
rasagiline	cannot be excl	-	-	-	3*	127 792
cabergoline	cannot be excl	-	-	-	-	21 092
tolcapone	cannot be excl	-	-	-	-	5 215
trihexyphenidyl	cannot be excl	-	-	-	-	259 018
bromocriptine		9	3	3	3	148 534
Psycholeptics						
lithium	none					1 344 555
olanzapin	insignificant	6	3	0	3	1 557 875
risperidone	insignificant	8	3	3	2	639 765
clozapine	insignificant	9	3	3	3	407 494
zopiclone	cannot be excl	8*	3	3*	2*	15 421 822
hydroxyzine	cannot be excl	-	-	0	-	2 083 042
oxazepam	cannot be excl	-	-	0	-	2 299 028
perphenazine	cannot be excl	-	-	3	-	476 106
zuclopenthixol	cannot be excl	-	-	-	3*	540 919
propiomazine	cannot be excl	-	-	-	-	10 189 391
diazepam		6*	3*	0	3*	2 679 564
clomethiazole	insignificant	4	3	0	1	150 196
nitrazepam	insignificant	4	3	0	1	1 329 491
paliperidone	insignificant	4	3	0	1	27 216
midazolam	insignificant	5	3	0	2	111 808
zolpidem	insignificant	5	3	0	2	8 811 294
ariprazole	insignificant	6	3	0	3	329 283
haloperidol	insignificant	8*	3*	3	2	667 126
flunitrazepam	cannot be excl	4	3	0	1	1 080 191
buspirone	cannot be excl	4*	3	0	1*	236 565
levomepromazine	cannot be excl	6	3	0	3	183 777
fluphenazine	cannot be excl	6*	3	0	3*	28 100
prochlorperazine	cannot be excl	8*	3	3*	2*	4 457

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
flupentixol	cannot be excl	-	-	3*		175 281
chlorprothixene	cannot be excl	-	-	3*		23 418
sertindole	cannot be excl	-	-	3*		1 688
alprazolam	cannot be excl	-	-	-		1 778 356
lorazepam	cannot be excl	-	-	-		139 632
melperone	cannot be excl	-	-	-		14 803
triazolam	cannot be excl	-	-	-		81 432
zaleplon	cannot be excl	-	-	-		130 550
ziprasidone	cannot be excl	-	-	-		105 378

Psychoanaleptics

methylphenidate	insignificant	5	3	0	2	3 719 505
rivastigmine	insignificant	5	3	0	2	270 061
venlafaxine	insignificant	5*	3*	0	2	4 076 210
atomoxetine	insignificant	6	3	0	3	258 268
amitriptyline	insignificant	6*	3	0	3*	1 290 254
mirtazapine	insignificant	8*	3	3	2*	4 108 674
citalopram	insignificant	9*	3	3	3*	13 616 513
fluoxetine	low	6	3	0	3	3 384 181
galantamine	low	6	3	0	3	935 035
sertraline	moderate	6	3	0	3	10 648 565
donepezil	cannot be excl	6*	3	0	3*	743 188
clomipramine		6	3	0	3	572 703
moclobemide	insignificant	4	3	0	1	93 105
fluvoxamine	insignificant	6	3	0	3	18 843
duloxetine	insignificant	6*	3*	0	3	2 111 617
paroxetine	insignificant	6*	3	0	3*	1 685 057
escitalopram	insignificant	9*	3	3	3*	3 716 062
mianserin	low	9	3	3	3	198 063
trimipramine	cannot be excl	6	3	0	3	11 487
nortriptyline	cannot be excl	9*	3	3	3*	71 586
memantine	cannot be excl	-	-	3	-	495 939
modafinil	cannot be excl	-	-	-	-	115 310
reboxetin	cannot be excl	-	-	-	-	107 552
maprotiline		6	3	0	3	15 117
imipramine		9	3	3	3	800

Other nervous system drugs

acamprosate	insignificant	3	3	0	0	193 594
buprenorphine	insignificant	3	3	0	0	557 550
						C 184 748
nicotine	insignificant	3	0	0	3	124 335
varenicline	insignificant	6	3	0	3	323 625
naloxone	cannot be excl	4	3	0	1	-
						C 191 173

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
riluzole	cannot be excl	8*	3	3*	2*	34 916
amбенonium	cannot be excl	-	-	-	-	9 219
disulfiramum	cannot be excl	-	-	-	-	481 130
methadone	cannot be excl	-	-	-	-	1 042 132
neostigmine	cannot be excl	-	-	-	-	3 725
						C 22 420
pilocarpine	cannot be excl	-	-	-	-	828 647
						C 2 306 205
bupropion		6	3	0	3	422 375
pyridostigmine		6*	3*	0	3	92 593

P Antiparasitic Products, Insecticides and Repellents

Antiprotozoals

metronidazole	insignificant	4	3	0	1	227 399
						E 359 205
mefloquine	insignificant	6	3	0	3	12 406
proguanil	insignificant	6	3	0	3	C 70 634
hydroxychloroquine	cannot be excl	8*	3*	3	2*	114 005
atovaquone	cannot be excl	9	3	3	3	316
						C 70 634
pentamidine	cannot be excl	-	-	0	-	412
tinidazole	cannot be excl	-	-	-	-	4 558
artemether		7*	3	3*	1	C -

Anthelmintics

mebendazole	cannot be excl	9*	3*	3	3	15 051
niclosamide	cannot be excl	-	-	-	-	132

Ectoparasiticides, including scabicides, insecticides, and repellents

benzyl benzoate	cannot be excl	-	-	-	-	C -
disulfiram	cannot be excl	-	-	-	-	481 130
permethrin		9*	3*	3	3	-

R Respiratory System

Nasal preparations

ipratropium	insignificant	5*	3	0	2*	1 146 678
						C 539 615
oxymetazoline	cannot be excl	5*	3*	0	2*	114 226
mometasone	cannot be excl	9*	3*	3	3*	7 919 135
						E 6 014 275
levocabastine	insignificant	5	3	0	2	53 688

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
budesonide	insignificant	8	3	3	2	9 181 927 C 6 805 080
sodium cromoglycate	cannot be excl	3*	3*0	0*		123 026
triamcinolone	cannot be excl	4*	3	0	1*	181 568 E 2 709 040
fluticasone	cannot be excl	6*	3	0	3*	1 768 857 C, E 3 372 380
beclomethasone	cannot be excl	9*	3	3	3*	176 785 C 6 805 080
dexbrompheniramine	cannot be excl	-	-	-	-	C 34 000
Throat preparations						
gramicidin	cannot be excl	-	-	-	-	4 636
Drugs for obstructive airway diseases						
terbutaline	insignificant	3	3	0	0	4 893 706
formoterol	insignificant	4	3	0	1	1 050 874 C 6 805 080
tiotropium bromide	insignificant	4*	3	0	1*	3 666 550
salmeterol	insignificant	5	3	0	2	469 350 C 3 091 620
ipratropium	insignificant	5*	3	0	2*	1 146 678 C 539 615
budesonide	insignificant	8	3	3	2	9 181 927 C 6 805 080
theophylline	cannot be excl	1*	0	0	1*	228 041
salbutamol	cannot be excl	4*	3	0	1*	2 999 538 C 537 540
fluticasone	cannot be excl	6*	3	0	3*	1 768 857 C, E 3 372 380
bambuterol	insignificant	4	3	0	1	12 020
ephedrine	cannot be excl	0*	0	0	0*	63 689 C 1 089 306
montelukast	cannot be excl	3*	0	0	3*	2 212 787
sodium cromoglycate	cannot be excl	3*	3*0	0*		123 026
beclometasone	cannot be excl	9*	3	3	3*	176 785 C 6 805 080
mometasone	cannot be excl	9*	3*3	3*		7 919 135 E 6 014 275
choline theophyllinate	cannot be excl	-	-	0	-	9 680
Cough and cold preparations						
ethylmorphine	cannot be excl	-	-	-	-	C 3 273 760
codeine	insignificant	4	3	0	1	77 315 C 6 169 528

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
bromhexine	insignificant	4*	3	0	1*	108 628 C 912 680
ambroxol	insignificant	5	3	0	2	300
chlorcyclizine	insignificant	5	3	0	2	C 54 110
guaifenesin	cannot be excl	-	-	0	-	484 C 27 620
diphenhydramine	cannot be excl	-	-	-	-	C 27 620
quillaia	cannot be excl	-	-	-	-	C 27 620
noscapiene	cannot be excl	-	-	-	-	13 727 C 43 129
pentoxyverine	cannot be excl	-	-	-	-	-
Antihistamines for systemic use						
loratadine	cannot be excl	6	3	0	3	2 786 542
alimemazine	cannot be excl	-	-	-	3*	2 551 387
cetirizine	cannot be excl	-	-	0	-	3 566 852
meclozine	cannot be excl	-	-	-	-	133 850
thiethylperazine	insignificant	6	3	0	3	13 585
fexofenadine	insignificant	6*	3	3*0		490 765
ebastine	insignificant	8	3	3	2	927 500
desloratadine	cannot be excl	5*	3	0	2*	5 655 204
cyproheptadine	cannot be excl	9*	3	3	3*	3 410
clemastine	cannot be excl	9*	3*3	3		869 870
acrivastine	cannot be excl	-	-	0	-	-
dexchlorfeniramine	cannot be excl	-	-	-	-	5 699
dimenhydrinate	cannot be excl	-	-	-	-	30 007
mizolastine	cannot be excl	-	-	-	-	100

S Sensory Organs

Ophthalmologicals

fusidic acid	insignificant	5	3	0	2	8 164 E 375 860
sodium cromoglycate	cannot be excl	3*	3*0	0*		123 026
chloramphenicol	cannot be excl	-	-	-	-	-
acyclovir	insignificant	4	3	0	1	123 079 E 1 952
diclofenac	insignificant	4*	3	0	1*	7 360 965 C, E 10 024 615
hydrocortisone	cannot be excl	1*	0	0	1*	429 014 C, E 9 858 435
carbomer	cannot be excl	7*	3	3*1*		-
naphazoline	cannot be excl	7*	3	3*1*		-
antazoline	cannot be excl	8*	3	3*2*		C -
ketotifen	cannot be excl	9*	3	3*3		-

SUBSTANCE	RISK	PBT	P	B	T	VOLUME IN DDD
cincocaine	cannot be excl	-	-	3	-	-
povidone	cannot be excl	-	3	-	-	-
acetazolamide	cannot be excl	-	-	-	-	56 866
pilocarpine	cannot be excl	-	-	-	-	828 647
						C 2 305 605
prednisolone	cannot be excl	-	-	-	-	4 732 223
verteporfin	cannot be excl	-	-	-	-	-
Otologicals						
hydrocortisone	cannot be excl	1*	0	0	1*	429 014
						C, E 9 858 435
betamethasone	cannot be excl	9*	3	3	3*	2 298 149
						E 7 609 925
oxytetracycline		6*	3*	0	3*	12 620
						C, E 198 260
chloramphenicol	cannot be excl	-	-	-	-	-

V Various

Antidotes for poisoning, overdoses, etc

deferoxamine	insignificant	1*	0	0	1*	-
flumazenil	insignificant	4	3	0	1	-
sugammadex	insignificant	4	3	0	1	-
deferasirox	insignificant	6	3	0	3	-
naloxone	cannot be excl	4	3	0	1	C 191 173
calcium polystyrene sulfonate	cannot be excl	-	-	-	-	-

Contrast media

jopromide	insignificant	3	3	0	0	-
gadopentetic acid	insignificant	4	3	0	1	-
gadoteric acid	insignificant	4	3	0	1	-
gadobutrol	insignificant	4*	3	0	1*	-
amidotrizoic acid	cannot be excl	-	-	-	-	-
ferumoxsil	cannot be excl	-	-	-	-	-
gadodiamide	cannot be excl	-	-	-	-	-
gadoteric acid	cannot be excl	-	-	-	-	-
iobitridol	cannot be excl	-	-	-	-	-
iodixanol	cannot be excl	-	-	-	-	-
iohexol	cannot be excl	-	-	-	-	-
ioxaglic acid	cannot be excl	-	-	-	-	-
mangafodipir		4	3	0	1	-

Substances Posing No Environmental Risk

The use of vitamins, electrolytes, amino acids, peptides, proteins, carbohydrates, lipids, vaccines and drugs based on herbs are not considered as a risk to the environment. That is the reason why these substances have not been provided with environmental information even though they are listed on the website janusinfo.se/environment. In this folder these substances are only presented if they are recommended in "Kloka Listan" (the Wise List).

Example

B Blood and Blood-Forming Organs

Antithrombotic agents

tinzaparin

Antihemorrhagics

phytomenadione

tranexamic acid

aprotinin

eptacog

moroctocog

nonacog

Antianemic preparations

cyanocobalamin

darbepoetin alfa

epoetin alfa

Blood substitutes and perfusion solutions

sodium chloride

L Antineoplastic and Immunomodulating Agents

Endocrine therapy

leuprorelin

triptorelin

buserelin

N Nervous system

Psycholeptics

lithium

Vocabulary

ATC: (Anatomic Therapeutic Chemical classification system) a classification system for drugs i.a used by WHO. The drugs are divided into fourteen main groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties. The same substance may have several different ATC classifications if the substance is a part of several groups and is being sold in combinations with other substances.

Bioaccumulation: accumulation in adipose tissue of aquatic organisms, according to the OECD based on the partition coefficient n -octanol/water, P_{ow} , in which substances with $\log P_{ow} > 3$ are judged to be potentially bioaccumulating (OECD test 107 or 117).

DDD: (Defined Daily Doses), the DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. DDDs are not established for all preparations. In Sweden, DDDs are also used for estimating pharmaceuticals for external use (1 gram = 1 DDD). The estimate is not based on the amount of an active substance and can therefore not be compared to the DDD for other drugs.

Environmental hazard: the inherent environmentally damaging characteristics of the substance in the following terms: Persistence, Bioaccumulation and Toxicity (PBT). The Stockholm County Council makes use of the information from the producer about PBT in order to create a PBT Index (please find further information on next page).

Environmental risk: refers to toxic risk to the aquatic environment and is based on PEC/PNEC.

PBT Index: the total of the values for Persistence, Bioaccumulation and Toxicity comprises the PBT Index of the substance.

PEC: (Predicted Environmental Concentration), predicted environmental concentration of the substance.

Persistence: ability to resist degradation in the aquatic environment. The biodegradability is assessed based on criteria for ready biodegradation according to the test guidelines (test 301) of OECD or another equivalent test of biodegradability.

PNEC: (Predicted No Effect Concentration) the highest concentration of the substance that does not have a harmful effect in the environment.

Toxicity: the potential to poison aquatic organisms. Toxicity for aquatic organisms is assessed based on the results of toxicity tests including three trophic levels; fish, *Daphnia* and algae (OECD test guidelines 203, 202 and 201, or equivalent). Data for the most sensitive organisms are used in the assessment.

Wise List: A list of recommended drugs for common diseases in Stockholm County Council. The Wise List takes cost-effectiveness and environmental impact into account when comparing medications that are equally safe and suitable for the purpose, based on scientific documentation.

Precautionary Principle

According to the Precautionary Principle, measures can be taken if there is reason to believe that a product or a method of production involves unacceptable risks to the health of human beings, animals, plants and the environment – even if there is no definitive scientific proof of such an effect. The precautionary principle is a part of EU law and is valid in all member countries.

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What You Can Do

- Follow “Kloka Listan” (Stockholm County Council’s “Wise List” of recommended drugs for common diseases). Always take cost-effectiveness and environmental impact into account when comparing medications that are equally safe and suitable for the purpose.
- Prescribe starter packs.
- Do not prescribe more medications than can be used; if in doubt, repeating the prescription is preferable.
- Review and regularly reassess the patient’s total consumption of medication in order to reduce waste.
- Prescribe refill packs if available.
- Ask the representatives of the pharmaceutical manufacturers for data on environmental impact.
- Learn more about which of “your” drugs have the largest environmental impact. If they are not recommended in the Wise List, can they be replaced?

Advice For Your Patient

- Return unused medications to the pharmacy. This is also important for used estrogen patches since most of the estrogen remains in the patch after use. Avoid flushing them down the toilet. Even inhalers can still contain active substance after being used.
- Ask for refill packs.
- Follow the enclosed instruction for using the medication carefully.
- Return empty packages to the waste recycle station.
- Use a refill whenever possible.

This folder presents the environmental risk and environmental hazard assessments for a selected sample of pharmaceutical substances. In this year's edition these assessments include most medications on the Swedish market.

The Swedish Association of the Pharmaceutical Industry conducted the environmental risk assessment, beginning in 2005.

The environmental hazard model was formulated in 2003 by Stockholm County Council and Apoteket AB (The National Corporation of Swedish Pharmacies). The assessment is made by Stockholm County Council and based on data from the manufacturers.

The folder also provides concrete advice on what you can do in your daily work to reduce the risk of negative environmental impact from medications.

For more information

More information is available at the non-commercial website Janusinfo, produced by the Stockholm County Council:

www.janusinfo.se/environment

This information is continuously updated.

You can also contact

Janusinfo's editorial office for questions about PBT Index and the account of environmental impact in the Wise List:

e-mail: janusredaktionen@sll.se



The flower is the symbol of the County Council's environmental initiative. The five petals represent the County Council's top five environmental priorities, one of which is to prevent the release of medications into nature.

