

Intra-Agency Agreement Between the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (NICHD) and the U.S. Food and Drug Administration (FDA) Oral Formulations Platform—Report 1

The objective of this work is to provide some baseline information about marketed pediatric products that have been approved for administration to pediatric patients. These products are approved either for administration to pediatric patients as-is or by reconstitution and compounding with specific instructions on the product label. A significant amount can be learned from these approved products, and the knowledge gained can be applied for the development of new formulations of new and existing active pharmaceutical ingredients (APIs).

As part of the National Institutes of Health-FDA initiative, a list of 382 products has been compiled so far. This list was compiled based on the approved products listed on the FDA Web site (<http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Reports.ReportsMenu>) or from the Sigler's Prescription Drug Card list (SFI medical publishing, P.O. Box 3578, Lawrence, KS 66046).

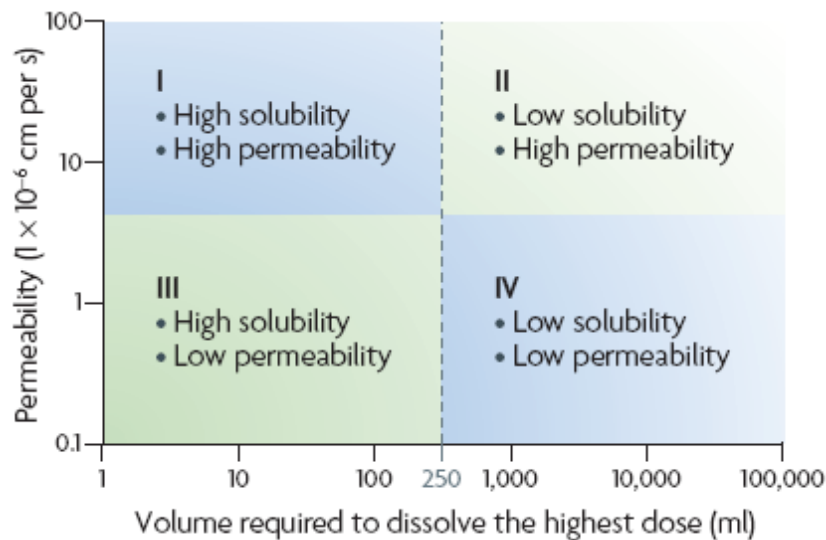
A review of the currently available products indicate that the pediatric medications are available as drops, syrups, elixirs, suspensions, sprinkles, capsules, injectables, chewable tablets, orally disintegrating tablets, coated products, metered dose inhalers (MDIs) and dry powder inhalers (DPIs), orally dissolving films, minitabs, and others (e.g., non-oral drops, creams, ointments, etc.). Application of computational methods to categorize the molecules of approved products based on their physicochemical and other properties is currently under way. In this early report, the oral liquid dosage forms, including drops, syrups, elixirs, suspensions, and modified release oral dosage forms, are being discussed.

In the development of pediatric as well as adult products, the Biopharmaceutics Classification System (BCS) represents a convenient way to look at solubility and permeability characteristics of drug substances. It is helpful to review the BCS classification here, although this system was primarily developed for adult products. Research is needed for the development of a pediatric-specific BCS system.

BCS

The BCS is a scientific framework for classifying drug substances based on their aqueous solubility and intestinal permeability.¹ When combined with the dissolution of the drug product, the BCS takes into account three major factors that govern the rate and extent of drug absorption from immediate-release (IR) solid oral dosage forms: dissolution, solubility, and intestinal permeability. According to the BCS, drug substances are classified as follows:

- Class 1: High Solubility—High Permeability
- Class 2: Low Solubility—High Permeability
- Class 3: High Solubility—Low Permeability
- Class 4: Low Solubility—Low Permeability



(Rautio J, et al. Prodrugs: design and clinical applications. *Nature Reviews Drug Discovery*. 2008;7:255–270.)

The recommended methods for determining solubility, permeability, and *in vitro* dissolution are discussed below.

A. Solubility

The solubility class boundary is based on the highest dose strength of an IR product that is the subject of a biowaiver request. A drug substance is considered *highly soluble* when the highest dose strength is soluble in 250 ml or less of aqueous media over the pH range of 1–7.5. The volume estimate of 250 ml is derived from typical bioequivalence study protocols that prescribe administration of a drug product to fasting human volunteers with a glass (about 8 ounces) of water.

B. Permeability

The permeability class boundary is based indirectly on the extent of absorption (fraction of dose absorbed, not systemic bioavailability) of a drug substance in humans and directly on measurements of the rate of mass transfer across human intestinal membrane. Alternatively, nonhuman systems capable of predicting the extent of drug absorption in humans can be used (e.g., *in vitro* epithelial cell culture methods). In the absence of evidence suggesting instability in the gastrointestinal tract, a drug substance is considered to be *highly permeable* when the extent of absorption in humans is determined to be 90 percent or more of an administered dose based on a mass balance determination or in comparison to an intravenous reference dose.

C. Dissolution

In this guidance, an IR drug product is considered *rapidly dissolving* when no less than 85 percent of the labeled amount of the drug substance dissolves within 30 minutes, using U.S. Pharmacopeia (USP) Apparatus I at 100 rpm (or Apparatus II at 50 rpm) in a volume of 900 ml or less in each of the following media: (1) 0.1 N HCl or Simulated Gastric Fluid USP without

enzymes, (2) a pH 4.5 buffer, and (3) a pH 6.8 buffer or Simulated Intestinal Fluid USP without enzymes.

A review of the approved products indicate that most of the oral solutions and syrups are developed for BCS Class 1 and BCS Class 3 APIs. This is to be expected because the compounds are highly soluble in water or gastrointestinal pH media. However, it is noted that there are a few BCS class 2 and class 4 compounds that are formulated as oral solutions or syrups. These products utilize special techniques such as salt formation, micronization, complexation with resins, cosolvents, or surfactants for solubilization in order to formulate as homogeneous oral liquid dosage forms. Table 1 shows the list of all 382 products and their BCS classification based on the values obtained from literature. This table will be updated as more information becomes available.

#	Generic Name	Trade Name	BCS Class	References
1	abacavir sulfate	Ziagen	3	1,2,5
2	acetaminophen	Children's Tylenol	3,4	1
3	acetaminophen/codeine	acetaminophen/codeine	4/3	1/1
4	acetazolamide	Diamox	4	1,2,5
5	acyclovir	Zovirax	4,3	1,2,3,5
6	albuterol	Proventil (Discontinued)	3	1
7	albuterol	Ventolin HFA	3	1
8	alendronate sodium	Fosamax	3	1
9	allopurinol	Zyloprim	3,1	1,2,5
10	alprazolam	Xanax	1	1
11	amitriptyline HCl	Elavil	1	1,2,4
12	amlodipine besylate	Norvasc	1 (CLogP) 3 (LogP)	1
13	amlodipine/atorvastatin	Caduet	1/2	1,2,3
14	amlodipine/benazepril	Lotrel	1/1	1,2
15	amoxicillin	Amoxil/ Trimox	1,3	1,2,3,5
16	amoxicillin/clavulanate potassium	Augmentin	3,1/3	1,2
17	amphetamine mixed salts	Adderall XR	3	1
18	amphetamine mixed salts	Adderall	3	1
19	amprenavir	Agenerase (Discontinued)	2	7
20	anastrozole	Arimidex	1 (LogP), 3 (CLogP)	1
21	aripiprazole	Abilify	2	8
22	aspirin	Halfprin	3	
23	atenolol	Tenormin	3	1,2,4,5
24	atenolol/chlorthalidone	Tenoretic	3/4	1,3
25	atomoxetine HCl	Strattera	1?	
26	atorvastatin calcium	Lipitor	2	1
27	atovaquone/proguanil	Malarone	2/1	2,9
28	azathioprine	Imuran	4	1,2,5

29	azelastine	Astelín	1?	
30	azithromycin	Zithromax	4	2
31	azithromycin	Zmax	2	3
32	benazepril	Lotensin	1	1
33	benazepril/hydrochlorothiazide	Lotensin HCT	1/4	1
34	benzonatate	Tessalon	3?	
35	benztropine	Cogentin	?	
36	bethanechol	Duvoid/Urecholine	?	
37	bimatoprost	Lumigan	3	
38	bisoprolol fumarate/hydrochlorothiazide	Ziac	1/4	1
39	brimonidine	Alphagan P	?	
40	budesonide	Pulmicort	2	10
41	bumetanide	Bumex	?	
42	buprenorphine/naloxone	Suboxone	3/3	11
43	bupropion	Wellbutrin	1	1
44	buspirone	BuSpar	1	3,4
45	busulfan	Myleran	?	
46	butalbital/acetaminophen/caffeine	Fioricet	?/3/3	1,2,3
47	caffeine citrate	Cafcit	1,3	3
48	calcitriol	Rocaltrol	2,4	1,2
49	candesartan cilexetil	Atacand	2	1
50	captopril	Capoten	3	1,3,5
51	carbamazepine	Tegretol	2	1,3,4,5
52	carbidopa/levodopa	Sinemet	1/3	2
53	carisoprodol	Soma	2/4	?
54	cefaclor	Ceclor	3	12
55	cefadroxil	Duricef	3	13
56	cefdinir	Omnicef	4	4
57	cefixime	Suprax (Discontinued)	4	2
58	cefprozil	Cefzil	3	13
59	ceftibuten	Cedax	?	?
60	cefuroxime axetil	Ceftin	4	1
61	celecoxib	Celebrex	2	1
62	cephalexin	Keflex	4	13
63	cetirizine HCl	Zyrtec	1,3	1,3
64	cetirizine/pseudoephedrine	Cetiri-D	1/3	1
65	chlorhexidine	Peridex	?	
66	chloroquine phosphate	Aralen	1	1,2,5
67	chlorothiazide	Diuril	4	3
68	chlorpheniramine/hydrocodone	Tussionex	1/?	3,4
69	ciprofloxacin HCl	Cipro	3	1,2,3
70	ciprofloxacin/dexamethasone	Ciprodex	3/1,3	1,3

71	clarithromycin	Biaxin	4	4
72	clindamycin	Cleocin	1	2
73	clobetasol	Temovate	?	
74	clonazepam	Klonopin	?	
75	clonidine hcl	Catapres	1 (LogP), 3 (CLogP)	1,4
76	clopidogrel bisulfate	Plavix	2	1
77	clorazepate dipotassium	Tranxene	?	
78	clotrimazole/betamethasone	Lotrisone	2/2	6
79	codeine phosphate	Tylenol w/Codeine	3	1,2,5
80	codeine phosphate/guaifenesin	Mytussin AC	3/?	1,5/?
81	colchicine	Colcrys	3	1,4,5
82	colesevelam HCl	Welchol	?	
83	cortisone acetate	Cortone	?	
84	cyclobenzaprine	Amrix	1	4
85	cyclophosphamide	Cytoxan	1,3	1,2,5
86	cyclosporine	Neoral/Sandimmune	2,3,4	2,3,4,
87	dantrolene	Dantrium	?	
88	dapsone	Daspone	4,2	1,2,3,5
89	desloratadine	Clarinx	1	1
90	desmopressin	Desmopressin	?	
91	desogestrel/ethinyl estradiol	Mircette	?/1	1
92	dexamethasone	Decadron	1 (CLogP), 3 (LogP)	1,5
93	dexmethylphenidate	Focalin	?	
94	dexmethylphenidate	Focalin XR	?	
95	diazepam	Valium	1	1,2,3,5
96	diazoxide	Proglycem	?	?
97	diclofenac sodium	Voltaren	2	14
98	dicyclomine hcl	Bentyl	2/4	15
99	didanosine	Videx	3	1,2,5
100	digoxin	Lanoxin	1 (LogP), 3 (CLogP)	1,2,5
101	diphenhydramine	Benadryl Allergy	1	4
102	diphenoxylate/atropine	Lomotil	?/1	1
103	divalproex sodium	Depakote	?	
104	docusate sodium	Colace	?	
105	donepezil HCl	Aricept	1	1
106	dorzolamide/timolol	Cosopt	?/?	
107	doxazosin mesylate	Cardura	1	1
108	doxepin	Sinequan	1	3,4
109	doxycycline	Vibramycin	3,1	1,2,3,5
110	dronabinol	Marinol	2/4	15
111	drospirenone/ethinyl estradiol	Yaz	?/3	2

112	duloxetine	Cymbalta	2	16
113	dutasteride	Avodart	2/4	
114	emtricitabine	Emtriva	1	17
115	enalapril maleate	Vasotec	1 (LogP), 3 (CLogP)	1,2,3
116	ergocalciferol	Calciferol	3	1,2
117	erythromycin succinate	EryPed	1,3	1,2,3,5
118	escitalopram oxalate	Lexapro	1	1
119	esomeprazole magnesium	Nexium	3	18
120	estradiol	Alora	1	1
121	estrogen	Premarin	?	
122	estrogen/medroxyprogesterone	Prempro	?/?	
123	eszopiclone	Lunesta	?	
124	ethacrynic acid	Edecrin	?	
125	ethosuximide	Zarontin	1,3	1,2,5
126	etodolac	Lodine	2	19
127	etonogestrel/ethinyl estradiol	NuvaRing	?/1	3
128	etoposide	VePesid	4	2
129	exenatide	Byetta	?	
130	ezetimibe	Zetia	2	1
131	ezetimibe/simvastatin	Vytorin	2/2	1/?
132	famotidine	Pepcid	3	1,3
133	felbamate	Felbatol	2	20
134	felodipine	Plendil	2	21
135	fenofibrate	Tricor	2	1
136	fentanyl	Duragesic	?	
137	fexofenadine	Allegra	1,3	1,3
138	fexofenadine/pseudoephedrine	Allegra-D	1/3	
139	finasteride	Proscar	1	1
140	flecainide	Tambocor	1 or 2?	
141	fluconazole	Diflucan	1,3	1,2,5
142	flucytosine	Ancobon	1	2
143	fludrocortisone acetate	Florinef	?	
144	fluocinonide	Lidex	?	
145	fluoxetine HCl	Prozac	1	1,3,4
146	fluticasone	Flonase	?	
147	fluticasone/salmeterol	Advair	?/?	
148	fluvoxamine maleate	Luvox	1	1,4
149	folic acid	Folvite	3	1,2
150	fosamprenavir	Lexiva	2	22
151	fosinopril	Monopril	1 or 3?	
152	furosemide	Furosemide	2 (CLogP), 4 (LogP)	1,2,5
153	gabapentin	Neurontin	3	1

154	gatifloxacin	Zymar	?	
155	gemfibrozil	Lopid	2	23
156	glimepiride	Amaryl	2	1
157	glipizide	Glucotrol	2 (CLogP), 4 (LogP)	1,2
158	glyburide	Micronase	2	1
159	glyburide/metformin	Glucovance	2/3	1,3/?
160	glycopyrrolate	Robinul	?	
161	griseofulvin	Grifulvin	2 (CLogP), 4 (LogP)	1,2,3,5
162	guanfacine	Intuniv	1	4
163	hydralazine	Apresoline	3	2,5
164	hydrochlorothiazide	Hydrochlorothiazide	3,4	1,2,3,5
165	hydrocodone/APAP	Hydrocodone + APAP	?	
166	hydrocodone biatartrate/acetaminophen	Lortab	?/3	1
167	hydrocodone biatartrate/ibuprofen	Vicoprofen	?/2	1
168	hydromorphone hcl	Dilaudid	?	
169	hydroxychloroquine	Plaquenil	2	
170	hydroxyurea	Hydrea	?	
171	hydroxyzine	Hydroxyzine	2	24
172	ibandronate	Boniva	?	
173	ibuprofen	Children's Motrin	2	1,2,3,5
174	imipramine	Tofranil	1	3,4
175	indapamide	Lozol	1	1
176	indinavir sulfate	Crixivan	2,4	1,2,3,5
177	indomethacin	Indocin	2	3,4
178	insulin susp isophane recombinant human	Humulin N	3?	
179	ipratropium/albuterol	Combivent	?/3	2
180	irbesartan	Avapro	2	1
181	irbesartan/hydrochlorothiazide	Avalide	2/3	1, 2,3,5
182	isoniazid	Isoniazid	1,3	1,2,5
183	isosorbide dinitrate	Ismo	3	1,2,5
184	isradipine	DynaCirc CR	2/4	
185	ketoconazole	Nizoral Tablets	2	3,4
186	lactulose	Duphalac	2?	
187	lamivudine	Epivir	1,3	1,2,5
188	lamotrigine	Lamictal	2	1
189	lansoprazole	Prevacid	2	3
190	latanoprost	Xalatan	2	
191	leucovorin	Leucovorin Calcium		
192	levalbuterol	Xopenex	?	
193	levetiracetam	Keppra	3	1
194	levocarnitine	Carnitor	?	

195	levocetirizine	Xyzal	3	
196	levofloxacin	Levaquin	3,1	1,2,3
197	levonorgestrel/ethinyl estradiol	Jolessa	1/1	1,2,5
198	levothyroxine sodium	Synthroid	1,3	1,2,5
199	levothyroxine sodium	Tirosint	1,3	1,2,5
200	lidocaine	Lidoderm	1	3
201	linezolid	Zyvox	4	1
202	lisdexamfetamine	Vyvanse	?	
203	lisinopril	Prinivil/Zestril	3	1,3
204	lisinopril/hydrochlorothiazide	Zestoretic	3/3	1,2,3
205	loperamide	Imodium	4	24
206	lopinavir/ritonavir	Kaletra	2/2	1,5
207	loracarbef	Lorabid	2	
208	loratadine	Claritin	2	1
209	lorazepam	Lorazepam	1	1
210	losartan potassium	Cozaar	1	1
211	losartan potassium/hydrochlorothiazide	Hyzaar	1/3	1
212	lovastatin	Mevacor	2	3
213	mebendazole	Vermox	2,4	1,2,3,4,5
214	meclizine	Antivert	2	2
215	medroxyprogesterone acetate	Provera	2,3,1	1,2
216	meloxicam	Mobic	2(CLogP), 4 (LogP)	1
217	memantine	Namenda	1?	
218	meperidine	Demerol	1	3
219	mercaptopurine	Purinethol	4	2
220	mesalamine	Asacol	4	
221	metaxalone	Skelaxin	2	1
222	metformin	Glucophage	3	1,2,3,5
223	methadone	Methadone	?	
224	methimazole	Tapazole	?	
225	methotrexate	Mexate	3	1,2,3,4,5
226	methylidopa	Methylidopa/Aldomet (125mg dose discontinued)	3	1,2,5
227	methylphenidate HCl	Concerta	2	1
228	methylphenidate HCl	Methylin	2	1
229	methylphenidate HCl	Ritalin	2	1
230	methylprednisolone	Medrol	2 or 4?	
231	metolazone	Zaroxolyn	?	
232	metoprolol tartrate	Lopressor	1	1,3,4
233	metronidazole	Flagyl	1,3	1,2,3,5
234	mexiletine	Mexitol	1	1,4
235	midazolam	Midazolam	1	3,4

236	minoxidil	Loniten	3	
237	mirtazapine	Remeron	1	1
238	modafinil	Provigil	4	1
239	mometasone	Elocon	?	
240	montelukast sodium	Singulair	1	1
241	morphine	Roxanol	1,3	2,5
242	moxifloxacin	Avelox	?	
243	mupirocin	Bactroban	?	
244	mycophenolate mofetil	CellCept	2	1
245	mycophenolic acid	Myfortic	2?	
246	nabumetone	Relafen	2/4	26
247	nadolol	Corgard	3	3
248	naproxen	Naprosyn	2	3
249	nelfinavir mesylate	Viracept	2,4	1,2,3,5
250	nevirapine	Viramune	2	1,2,5
251	niacin	Niaspan	3	1
252	nifedipine	Procardia XL	2	1,2,4,5
253	nitroglycerin	Nitrostat	1	26
254	norelgestromin/ethinyl estradiol	Ortho Evra	4?/1	1
255	norethindrone/ethinyl estradiol	Necon 1/35	1/1	1,5
256	norethindrone/ethinyl estradiol/ferrous fumarate	Loestrin 24 FE	1/1/?	1
257	norgestimate/ethinyl estradiol	Sprintec	1/1	1
258	norgestrel/ethinyl estradiol	Ovral	1/1	1
259	nortriptyline	Pamelor	1	4
260	nystatin	Nystain	3	1,5
261	nystatin/triamcinolone	Mycolog II	4/2	1,5
262	olanzapine	Zyprexa	2	1
263	olmesartan medoxomil	Benicar	?	
264	olmesartan medoxomil/hydrochlorothiazide	Benicar-HCT	?/3	1
265	olopatadine HCl	Patanol	3(CLogP), 1 (LogP)	1
266	omega-3-acid ethyl esters	Lovaza	?	
267	omeprazole	Prilosec	2	
268	ondansetron HCl	Zofran	1 (CLogP), 3 (LogP)	1
269	oseltamivir phosphate	Tamiflu	1 (CLogP), 3 (LogP)	1
270	oxaprozin	Daypro	2	
271	oxcarbazepine	Trileptal	4	1
272	oxycodone HCl/acetaminophen	Percocet	4/4	1
273	pancrelipase	Creon	?	
274	pancrelipase	Zenpep	?	
275	pantoprazole	Protonix	3	

276	penicillin vk	Betapen-VK	1 (CLogP), 3 (LogP)	1,3
277	penicillin vk	Pen-Vee K	1 (CLogP), 3 (LogP)	1,3
278	phenazopyridine	Urobiotic/Pyridium	2	3
279	phentermine HCl	Adipex-P		
280	phenytoin sodium	Dilantin	2	1,2,3
281	pioglitazone HCl	Actos	2	1
282	piroxicam	Feldene	2	3
283	polyethylene glycol 3350	Miralax	?	
284	potassium chloride	Klor-Con powder	1	2
285	potassium phosphate	K-PHOS	1	
286	pramipexole	Mirapex	1	
287	pravastatin sodium	Pravachol	1 (CLogP), 3 (LogP)	1,3
288	prednisolone	Prelone	1	1,2,3,5
289	prednisone	Deltasone	1?	
290	pregabalin	Lyrica	1	
291	primaquine phosphate	Primaquine	1 (CLogP), 3 (LogP)	1,2,3,5
292	primidone	Mysoline	2	
293	procainamide HCl	Pronestyl	1	
294	prochlorperazine	Compazine	2	
295	progesterone	Prometrium	4	
296	promethazine HCl	Phenergan	1,3	1,2,4,5
297	promethazine/codeine	Phenergan	1/3	1,2,4
298	propranolol hydrochloride	Inderal	1	1,2,3,4,5
299	propylthiouracil	PTU	3	1,5
300	pyrazinamide	Pyrazinamide	1,3	1,2,5
301	pyridoxine HCL	Pyri500/Rodex	1,3	1,2,5
302	pyrimethamine	Daraprim	2 (CLogP), 4 (LogP),3	1,2,5
303	quetiapine fumarate	Seroquel	2	1
304	quinapril HCl	Accupril	1	1
305	quinidine	Quinaglute	1	1,2,3
306	quinine sulfate	Qualaquin	1	1,2,5
307	rabeprazole	Aciphex	1,3	26
308	raloxifene HCl	Evista	2	1,3
309	ramipril	Altace	1	1
310	ranitidine HCl	Zantac	3	1,2,3,4
311	ribavirin	Rebetol	3	1
312	rifabutin	Mycobutin	2	
313	rifampin	Rifadin/Rifamate	2	2,5
314	rimantadine	Flumadine		
315	risedronate sodium	Actonel	3	1

316	risperidone	Risperdal	2	1
317	ritonavir	Norvir	2,4	1,2,3,4,5
318	ropinirole	Requip	?	
319	rosiglitazone maleate	Avandia	1	1
320	rosuvastatin	Crestor	3	
321	sertraline HCl	Zoloft	1	1
322	sildenafil citrate	Viagra	1	1
323	simvastatin	Zocor	2	1
324	sitagliptin	Januvia		
325	sodium bicarbonate	Sodium Bicarbonate	1	
326	sodium chloride	Sodium Chloride	1	
327	sodium hypochlorite	Dakins full	1	
328	solifenacin	Vesicare	3	
329	sotalol	Betapace	1	
330	spironolactone	Aldactone	2,4,3	1,2,3,5
331	spironolactone/hydrochlorothiazide	Aldactazide	2/4	1,3,5
332	stavudine	Zerit	1,3	1,5
333	sucralfate	Carafate		
334	sulfamethoxazole	Gantanol (Discontinued)	2,4	1,5
335	sulfamethoxazole/trimethoprim	Bactrim, Septra	4/4	1
336	sulfasalazine	Azulfidine	2,4	1,2,4,6
337	sulfisoxazole	Gantrisin		
338	sumatriptan succinate	Imitrex	3	1,4
339	tacrolimus	Prograf	2	3
340	tacrolimus	Protopic	2	3
341	tadalafil	Cialis	4	
342	tamsulosin HCl	Flomax		
343	telmisartan	Micardis	2	1
344	telmisartan/hydrochlorothiazide	Micardis HCT	2/4	1
345	temazepam	Restoril	2	
346	terazosin	Hytrin	1/3	
347	terbinafine HCl	Lamisil	1	1
348	tetracycline	Sumycin	3	3
349	theophylline	Elixophyllin	3,1	1,3,5
350	thiamine		3	1,2,5
351	thioguanine	Tabloid Tablets		
352	thyroid	Armour	3	
353	tiotropium	Spiriva		
354	tipranavir	Aptivus	2	
355	tizanidine	Zanaflex		
356	tobramycin/dexamethasone	TobraDex	?/4	26
357	tolterodine tartrate	Detrol	1	1
358	topiramate	Topamax	3	1

359	torseimide	Demadex	1	
360	tramadol HCl	Ultram	1	1
361	tramadol/acetaminophen	Ultracet	1/4	1
362	travoprost	Travatan	2	
363	trazodone	Desyrel	1	4
364	triamcinolone acetonide	Nasacort AQ	4	
365	triamterene/hydrochlorothiazide	Dyazide	2/4	1,2,3,4,
366	ursodiol, aka ursodeoxycholic acid	Actigall/Urso	2	1
367	valacyclovir HCl	Valtrex	3	1
368	valganciclovir	Valcyte	3	
369	valproic acid	Depakene	1,2	1,3,5
370	valsartan	Diovan	2	1
371	valsartan/hydrochlorothiazide	Diovan HCT	2/4	1
372	ildenafil	Levitra	2	
373	varenicline	Chantix	1	
374	venlafaxine HCl	Effexor XR	1	1
375	verapamil HCl	Covera-HS	1,2	1,2,3,4,5
376	vitamin d, ergocalciferol	Drisdol	2	
377	warfarin sodium	Coumadin	1,2	1,2,3,4,5
378	zafirlukast	Accolate		
379	zidovudine	Retrovir Tablets	1,3	1,2,3,5
380	zinc acetate	Galzin	?	
381	ziprasidone HCl	Geodon	2?	
382	zolpidem tartrate	Ambien	1	1,4

Notes: 1. Information about BCS was mainly collected from peer reviewed publications.

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