

Supporting Information for *Acta Phys. -Chim. Sin.* 2017, 33 (6), 1160–1170

doi: 10.3866/PKU.WHXB201704051

Prediction of Blood-to-Brain Barrier Partitioning of Drugs and Organic Compounds Using a QSPR Approach

GOLMOHAMMADI Hassan^{1,*}

DASHTBOZORGI Zahra²

KHOOSHECHIN Sajad²

(¹Young Researchers and Elite Club, Yadegar-e-Imam Khomeini (RAH) Shahr-e-Rey Branch, Islamic Azad University, Tehran, Iran; ²Young Researchers and Elite Club, Central Tehran Branch, Islamic Azad University, Tehran, Iran)

*Corresponding author. Email: Hassan.gol@gmail.com; Tel: +98-21-66518561; Fax: +98-21-66518561.

Table S1 Comparison of experimental and predicted values of blood–brain barrier penetration for training and prediction sets.

Number	Name	logBB	logBB ERM	logBB SVM
training set				
1	1,2-Dichloroethane	-0.14	0.28	-0.12
2	Acetone	-0.15	0.36	-0.18
3	Benzene	0.35	1.09	0.45
4	Salicylic acid	-1.11	-0.43	-1.24
5	Octane	0.69	1.42	0.77
6	Cotinine	-0.22	0.20	-0.26
7	Nornicotine	0.32	0.69	0.38
8	Ethanol	-0.16	0.30	-0.21
9	Methanol	0.02	0.53	0.03
10	1-Propanol	-0.15	0.17	-0.18
11	Toluene	0.36	0.63	0.42
12	Urea	-0.14	0.37	-0.17
13	Pervertin	0.95	1.24	1.04
14	PK 11195	0.48	0.96	0.55
15	Tacrine	-0.12	0.39	-0.14
16	Acebutolol	-0.15	0.22	-0.18
17	Salbutamo	-1.14	-0.59	-1.25
18	Alprazolam	0.02	0.49	0.03
19	Alprenolo	-0.23	0.32	-0.27
20	Theophylline	-0.32	-0.44	-0.37
21	Atenolol	-1.14	-0.78	-1.26
22	Barbital	-0.14	0.05	-0.11
23	Benzocaine	0.27	0.52	0.22
24	Betahistine	-0.34	0.13	-0.29
25	Biperiden	0.85	1.29	0.76
26	Bromocriptine	-1.10	-1.12	-1.22
27	Bromperidol	1.38	1.20	1.23
28	Bunitrolol	0.38	0.60	0.43
29	Buspirone	0.49	0.64	0.44
30	Verapamil	-0.64	-0.09	-0.54
31	Carbamazepine	-0.04	0.47	-0.03
32	Carbamazepine epoxide	-0.34	0.27	-0.29
33	Carmustine	-0.52	0.25	-0.47
34	Carteolol	0.01	0.45	0.02
35	Cetirizine	-2.15	-0.45	-2.01
36	Chlorambucil	-1.70	-0.51	-1.53
37	Chlorpromazine	1.02	1.73	1.13

38	Cimetidine	-1.06	-0.49	-0.95
39	Clonidine	0.12	0.58	0.10
40	Nordiazepam	0.52	0.74	0.46
41	Amphetamine	0.93	1.05	0.84
42	Didanosine	-1.30	-0.62	-1.17
43	Diphenhydramine	1.26	1.50	1.38
44	Domperidone	-0.85	-0.14	-0.78
45	Donepezil	0.89	0.84	0.80
46	Doxylamine	0.64	1.34	0.72
47	Enflurane	0.22	0.35	0.19
48	Enoxolone	-1.40	-1.00	-1.27
49	Ethenzamide	-0.05	0.42	-0.06
50	Ether	0.00	0.90	0.01
51	Etodolac	-1.42	-0.86	-1.27
52	Etoposide	-2.00	-1.23	-1.82
53	Fentanyl	0.59	1.02	0.66
<hr/>				
54	Flunitrazepam	0.07	0.26	0.05
55	Fluoxetine	0.72	0.66	0.65
56	Gentisic acid	0.09	0.24	0.08
57	Granisetron	-0.69	0.05	-0.61
58	Haloperidol	1.33	1.34	1.24
59	Halothane	0.32	0.73	0.37
60	Hexobarbital	0.03	0.44	0.04
61	Hydroxyzine	0.36	1.30	0.43
62	Ibuprofen	-0.18	0.34	-0.21
63	Lidocaine	0.34	0.56	0.29
64	Imipramine	0.98	1.19	0.89
65	Indomethacin	-1.26	-0.66	-1.13
66	Lamotrigine	0.29	0.55	0.24
67	Lorazepam	0.44	0.56	0.37
68	Mefloquine	0.63	1.01	0.56
69	Mesoridazine	-0.28	0.11	-0.32
70	Methotrexate	-1.51	-0.80	-1.36
71	Methoxyflurane	0.23	0.26	0.20
72	Metoprolol	1.15	1.74	1.04
73	Mianserin	0.99	1.46	0.90
74	Midazolam	0.37	0.63	0.32
75	Mirtazapine	0.53	1.33	0.60
76	Nalidixic acid	-0.66	0.07	-0.58
77	Nevirapine	0.00	0.68	0.01
78	Omeprazole	-0.82	-0.40	-0.73

79	Oxazepam	0.60	1.36	0.68
80	Pentazocine	0.51	0.81	0.43
81	Phenylbutazone	-0.52	0.10	-0.46
82	Pindolol	-0.14	0.28	-0.16
83	Primidone	-0.07	0.40	-0.10
84	Procaine	0.05	0.24	0.04
85	Pyrilamine	0.49	1.01	0.55
86	Ranitidine	-1.23	-0.37	-1.36
87	Ribavirin	-0.67	-0.75	-0.74
88	Stavudine	-0.48	-0.41	-0.53
89	Scopolamine	0.23	0.60	0.20
90	Secobarbita	0.20	0.60	0.17
91	Sevoflurane	0.30	0.89	0.35
92	Sotalol	-0.28	-0.18	-0.33
93	Theobromine	-0.29	-0.47	-0.34
94	Tretinoin	-0.49	0.19	-0.44
95	Trifluoperazine	1.43	1.46	1.28
96	Triflupromazine	1.44	1.61	1.29
97	Zolpidem	-0.48	0.25	-0.43
98	Scopolamine	0.23	0.38	0.20
99	Pentylentetrazo	-0.03	0.24	-0.02
100	Quinidine	-0.21	0.12	-0.18
101	Physostigmine	0.08	0.34	0.07
102	Aminophenazone	0.00	0.35	-0.01
103	D-Mannitol	-1.60	-0.94	-1.45
104	1-Pentanol	0.20	0.64	0.24
105	Methylchloroform	0.24	1.11	0.29
106	Trimethylene	0.03	0.90	0.04
107	Oxirane	0.01	0.67	0.00
108	Ethylidene chloride	-0.28	0.35	-0.24
109	tert-Butylalcohol	0.11	0.41	0.09
110	Phencyclidine	0.58	1.70	0.65
111	Butethal	0.19	0.59	0.23
112	Isobutanol	-0.17	0.40	-0.14
113	Trichloroethene	0.30	0.64	0.25
114	3-Methylpentane	1.01	1.20	0.94
115	Methylcyclopentane	0.93	1.02	0.84
116	4-Chlorobenzotrifluoride	0.17	0.26	0.15
117	Vinylbenzene	0.45	0.83	0.50
118	<i>p</i> -Xylene	0.33	0.89	0.38
119	N-Propylbromide	0.27	1.09	0.32

120	Isopropyl acetate	0.40	0.68	0.32
121	<i>m</i> -Xylene	0.28	0.65	0.23
122	Cyclohexylmethane	0.96	1.07	0.88
123	Propyl acetate	0.12	0.52	0.14
124	n-Pentane	0.75	1.42	0.67
125	Isobutyl acetate	0.45	0.78	0.53
126	Cyclohexane	0.96	1.36	0.89
127	Propene	-0.06	0.70	-0.07
128	Iodophenazone	-0.10	0.77	-0.09
129	Ethyl acetate	0.00	0.39	0.01
130	Heptane	0.76	1.46	0.69
131	Methohexitone	-0.07	0.00	-0.08
132	Galanthamine	0.32	0.71	0.27
133	1,1-Difluorochloroethylene	-0.02	0.58	-0.03
134	Salicylurate	-0.44	0.05	-0.37
135	Hexahydro- <i>o</i> -xylene	1.07	1.64	0.98
136	2-Ethylpentane	0.90	1.16	0.82
137	Pentyl acetate	0.40	0.80	0.45
138	1,1,1,2-Tetrachloroethane	0.33	1.02	0.38
139	tert-Butylethylether	0.22	0.80	0.27
140	Butaperazine	0.83	0.93	0.75
141	Vinblastine	-0.07	0.59	-0.06
142	2-methylnonane	1.05	1.32	0.96
143	tert-Butylmethylether	0.36	0.79	0.41
144	Decane	0.67	1.33	0.75
145	Isononane	0.98	1.31	0.85
146	Cytisine	-1.09	-0.92	-1.24
147	Zalcitabine	-1.18	-0.69	-1.33
148	Desmonomethylpromazine	0.59	1.18	0.67
149	Digoxin	-1.23	-0.55	-1.12
150	Isopentyl acetate	0.55	0.80	0.62
151	1-Nonene	0.86	1.29	0.94
152	Tefluranum	0.27	0.80	0.32
153	Perchloroethylene	0.37	1.08	0.32
154	Pyrene	0.23	0.98	0.26
155	Doxorubicin	-0.83	-0.28	-0.75
156	5-Ethyl-5-heptyl-1,3-	0.02	0.65	0.03
157	5-ethyl-5-propyl-1,3-	0.09	0.31	0.08
158	Tiotidine	-0.82	-0.74	-0.89
159	Lupitidinum	-1.06	-0.69	-1.21
160	Temelastine	-1.88	-0.99	-1.98

161	Flesinoxan	-0.45	0.01	-0.51
162	tert-Amylmethylether	0.17	0.79	0.21
163	Norchlorpromazine	1.38	1.47	1.26
164	Nelfinavir	-0.93	-0.35	-0.85
165	Amprenavir	-0.56	-0.05	-0.49
166	4-Carboxybiphenyl	-1.26	-0.91	-1.14
167	Sertraline	1.60	2.21	1.45
168	Kusol	0.67	1.18	0.58
169	Icotidine	-2.00	-1.09	-1.85
170	Didemethylchlorpromazine	0.97	1.29	0.89
171	Thiazole-22-aminoethyl	-0.42	-0.09	-0.37
172	Tripropylphosphine	1.02	1.69	0.93
173	Fluoromisonidazole	-0.01	0.43	0.00
174	4-Fluoroantipyrene	-0.05	0.37	-0.04
175	Norverapamil	-0.64	-0.19	-0.55
176	1-Hydroxymidazolam	-0.08	0.25	-0.10
177	Bretazenil	-0.09	0.16	-0.11
178	Paliperidone	-0.67	0.12	-0.59
179	N-Methylspiroperido	0.46	0.81	0.54
180	4-Hydroxymidazolam	-0.22	0.17	-0.19
181	RO 19-4603	-0.25	0.33	-0.20
182	CHEBI 218555	-0.30	-0.05	-0.35
183	<i>p</i> -Bromospiperone	0.07	0.54	0.08
184	Atropine	-0.06	0.53	-0.05
185	4-Hydroxyalprazolam	-1.48	-0.97	-1.36
186	MP 005-942-485	0.68	1.15	0.76
187	Tibolone	0.40	0.60	0.45
188	Darifenacin	-0.62	0.20	-0.53
189	9-Hydroxyrisperidone	-0.67	-0.28	-0.60
190	Dioform	0.04	0.50	0.03
191	Tamoxifen	0.92	1.03	1.03
192	Thiopental	-0.19	0.25	-0.22
193	Thioperamide	-0.17	0.07	-0.14
194	Phenylpropyl-quinoline-4-	0.30	0.83	0.35
195	Daidzein	-0.15	0.05	-0.18
196	Codeine	0.45	1.24	0.52
197	Levorphanol	0.00	0.49	0.01
198	3-Methylhexane	0.90	1.23	0.81
199	5-Octyl-5-ethyl barbituric acid	0.24	0.63	0.21
200	3-Bromocytisine	-0.05	-0.06	-0.07

Prediction set

201	1-Butanol	-0.02	0.09	-0.03
202	Methane	0.03	0.57	0.04
203	Bupropion	1.40	1.52	1.55
204	Nicotine	0.38	0.67	0.31
205	Phenytoin	-0.05	0.53	-0.04
206	Acetaminophen	-0.37	-0.10	-0.32
207	Acyclovir	-0.84	-0.53	-0.93
208	Amobarbital	0.11	0.61	0.13
209	Antipyrine	-0.11	0.29	-0.09
210	Aspirin	-0.61	-0.16	-0.54
211	Betaxolol	0.39	0.40	0.34
212	Caffeine	-0.04	0.12	-0.03
213	Clobazam	0.36	0.85	0.44
214	Desipramine	1.08	1.13	0.96
215	Diazepam	0.47	0.95	0.41
216	Fexofenadine	-0.98	-0.45	-0.89
217	Triflumethazine	1.51	1.82	1.35
218	Flumazenil	-0.29	-0.09	-0.34
219	Isoflurane	0.37	0.68	0.43
220	Isopropanol	-0.15	0.28	-0.16
221	Operamide	0.77	1.34	0.68
222	Olanzapine	0.78	0.98	0.70
223	Paraxanthine	0.07	0.39	0.09
224	Promazine	1.08	1.38	0.94
225	Propofol	0.63	0.64	0.57
226	Propranolol	0.84	0.77	0.76
227	Risperidone	-0.02	0.25	-0.03
228	Rolipram	0.61	0.72	0.55
229	Ropinirole	0.08	0.70	0.10
230	S-Methyl-isothiourea	-0.60	-0.33	-0.51
231	Sipiperone	0.26	0.53	0.22
232	Terbinafine	0.08	0.87	0.10
233	Terfenadine	0.64	0.86	0.53
234	Thioridazine	0.26	0.95	0.31
235	Vincristine	-1.03	-0.93	-0.93
236	Levodopa	-0.78	-0.54	-0.65
237	Trichloromethane	0.26	1.10	0.35
238	Methylenechloride	-0.17	0.55	-0.20
239	2-Bromopropane	0.56	1.19	0.64
240	Hexane	1.03	1.14	0.90
241	Amylene hydrate	0.07	0.26	0.06

242	Chlorotrifluoroethane	-0.08	0.32	-0.10
243	2-Butanone	-0.07	0.41	-0.09
244	Vinyltrichloride	-0.10	0.33	-0.12
245	Bisphenol A	-0.12	0.29	-0.10
246	Risocaine	0.55	0.73	0.48
247	<i>o</i> -Xylene	0.39	0.70	0.47
248	Pseudocumene	0.16	0.74	0.18
249	tert-Butylbenzene	0.43	0.82	0.51
250	Ethylbenzene	0.22	0.79	0.27
251	Propylhexedrine	1.08	1.43	0.95
252	Divinyl	-0.17	0.56	-0.14
253	Acrylonitrile	-0.40	0.17	-0.34
254	2-Propyn-1-ol	-0.23	0.03	-0.20
255	Isohexane	0.98	0.94	0.85
256	2-Pentanone	-0.01	0.09	-0.02
257	n-Hexane	0.78	1.14	0.70
258	1-Octene	0.74	1.11	0.82
259	n-Nonane	0.52	1.20	0.61
260	sec-Butylcarbinol	0.04	0.45	0.05
261	Ortal	0.36	0.46	0.31
262	Fluoromar	0.13	0.11	0.11
263	Metamphetamine	0.93	1.01	0.84
264	2-Methylheptane	0.86	1.18	0.78
265	1-Decene	0.96	1.09	0.86
266	Toliprolol	0.34	0.46	0.39
267	t-Butylcyclohexane	0.61	0.95	0.52
268	Butyl acetate	0.28	0.64	0.34
269	Sulforidazine	0.18	0.80	0.22
270	Alovudine	-0.59	-0.57	-0.68
271	Miloxacin	-0.92	-0.45	-0.79
272	Suprane	0.11	0.53	0.13
273	Pergolide	0.30	0.74	0.34
274	Lupitidinum	-1.06	-0.83	-1.19
275	Yamatetan	-1.89	-1.57	-1.99
276	Cefotetan	-1.89	-1.68	-1.98
277	Indinavir	-0.74	-0.23	-0.67
278	Apaxifylline	-1.40	-1.10	-1.51
279	Nelfinavir mesylate	-0.93	-0.30	-0.99
280	1,4-Divinylxybutane	0.12	0.28	0.13
281	Rivastigmine	0.88	1.23	0.96
282	N,N-Dimethylpyridine-2- thylamine	-0.27	0.29	-0.29

283	Chlorambucil-t-butylester	1.00	1.28	1.13
284	Norclobazam	0.35	0.67	0.29
285	ST 363	0.16	0.80	0.20
286	Zolantidine	0.14	0.31	0.12
287	alpha-4-pyridyl-1-oxide-	-0.38	0.32	-0.45
288	NSC 30403	-0.22	-0.17	-0.27
289	Northioridazine	0.76	0.86	0.68
290	Fluoroethylflumazenil	-0.14	0.11	-0.17
291	7-Hydroxy ropinirole	-0.43	0.28	-0.38
292	Alpha-hydroxyalprazolam	-1.28	-0.41	-1.12
293	Beloxepin	0.82	0.92	0.75
294	Zanapexil	1.14	1.79	0.96
295	Phenothiazine	-0.48	0.24	-0.42
296	cis-Dichloroethylene	-0.13	0.76	-0.15
297	N-4-Phenylthiazol-2-yl-guanidine	-0.18	-0.15	-0.21
298	Morphine	-0.26	0.22	-0.22
299	Fluvoxamine	0.79	1.27	0.87
300	Tyrylen	0.83	0.87	0.74
301	2-2-Fluoro-ethyl-isothiourea	-0.27	-0.51	-0.33
302	16a-Fluoroestradiol	-0.30	0.00	-0.24
303	MP 001-772-915	0.35	0.49	0.30
304	Butamben	0.42	0.57	0.36
305	Pentobarbital	0.08	0.47	0.10
306	Cocaine	0.60	0.93	0.51
307	CHEBI 218555	-0.30	-0.15	-0.35
308	Alaptide	-0.26	-0.11	-0.32
309	Valproic acid	-0.41	0.07	-0.35
310	Triazolam	0.67	1.24	0.74
