表 1 | Therapeutic ranges of blood levels and pharmacokinetics of major antiepileptic drugs

Generic name (abbreviation)		Maintenance dose[a]		Dose increase range		Blood conc. reference range[b] (μg/mL)	$T_{1/2}$: elimination half-life[c] (h)			T_{max} : peak time[c] (h)	
		Adult (mg)	Child (mg/kg)	Adult (mg)	Child (mg/kg)		Adult		Child	Adult	Child
							mono-therapy	with enzyme inducer[d]			
Phenobarbital	PB	30～200	2～10	30	1～2	15～40	70～130	almost unchanged	30～75	0.5～4	0.5～2
Primidone	PRM	750～2,000	10～25	250	3～5	5～12	10～20	3～10	4.5～11	2～4	4～6
Carbamazepine	CBZ	400～1,200	5～25	100～200	3～5	4～12	10～26[e]	5～12	8～20	4～8	3～6
Phenytoin[f]	PHT	200～300	3～12	25～50	1～3	7～20	L：7～42 H：20～70	almost unchanged	L：2～16 H：8～30	4～8	2～6
Valproate	VPA	400～1,200	15～50	100～200	5～10	50～100	11～20	6～12	6～15	2～4	1～3
sustained release	VPA-R	400～1,200	15～40				12～26		6～12	7.5～16[g]	
Ethosuximide	ESM	450～1,000	15～40	150～200	5～7	40～100	40～60	20～40	30～40	1～7	1～4
Clonazepam	CZP	2～6	0.025～0.2	0.5～1	0.015～0.03	0.02～(0.07)	17～56	12～46	22～33	1～4	1～3
Nitrazepam	NZP	5～15	0.2～0.5	2～5	0.1～0.2	0.02～0.1	21～40			1.3～2.5	
Clobazam	CLB	10～40	0.2～1.0	5～10	0.1～0.2	0.03～0.3	17～49	＜30	～16	0.5～2	
N-desmethyl	CLB[h]						36～46				
Acetazolamide	AZM	250～750	10～20	125～250	3～5	10～14	10～15			2～4	
Potassium bromide	KBr	1,500～3,000	40～70	200～400	5～10	750～1,250	10～13 days		5～8 days	2	
Gabapentin	GBP	600～2,400	5～45	200～400	5～10	2～20	5～9	5～9		2～3	1～3
Topiramate	TPM	200～600	4～10	25～50	1～2.5	5～20	20～30	12～15	13～20	1～4	1～3
Lamotrigine[i]	LTG	150～400	1～5	50～100	≦0.3	2.5～15	15～35		13～27	1～3.5	4～5
(1) combined with VPA		100～200	1～3	25～50	≦0.3		30～90		30～70	4.8	3～4.5
(2) combined with enzyme inducer[d]		200～400	5～15	50～100	≦1.2		8～23		4～11	1～2	1.5～3
(3) combined with (1) and (2)		150～400	1～5	25～50	≦0.3		11～50		7～31	3.8	3.3
Levetiracetam[j]	LEV	1,000～3,000	20～60	250～500	5～10	12～46	6～8	5～8	5～6	0.5～2	
Rufinamide	RFN[k]	depend on weight	depend on weight	200～400		30～40	8～12	4～7		4～6	4
Stiripentol	STP	1,000～2,500	20～50	500	10	4～22	4～13			1～2	
Vigabatrin	VGB		50～150		≦50	2～36	5～8	4～6		0.5～2	
Perampanel	PER[l]	4～12	4～12[l]	2	2	0.05～0.4	53～136	25		0.25～2	
Lacosamide[m]	LCM	200～400	200～400[m]	≦100		10～20	12～16			0.5～4	

a：In children, the younger the age, the higher the dose per kg body weight is required to obtain a given blood concentration, the maintenance dose is higher, and half-life and peak time are shorter. In adolescents, pharmacokinetics are almost the same as adults.
b：If effective, blood concentration can stay low, or can be increased to higher than the therapeutic range as long as there is no adverse effect.
c：This is the time for the concentration to decrease by half from the peak. The time until blood concentration decreases by one-half after administration is peak time + half-life. Half-life and peak time are in principle determined for monotherapy with drug taking after meal. In combination therapy, half-life is shortened when the combination lowers blood level through interaction, and is prolonged when the combination increases blood concentration (see "Interaction" in CQ12-4 on page 128). Peak time is greatly shortened when drug is taken in fasting state, and is about 1.1-1.3 times delayed for VPA sustained release preparation alone.
d：Enzyme-inducing drugs：PB, PRM, CBZ and PHT. Increase drug metabolism in the liver, concomitant use shortens half-life of original drug.
e：Value at the time when self-induction is completed (about 3-4 weeks after starting).
f：For PHT, the higher the blood level, the longer is the half-life. L：low dose (blood level around 5 μg/mL), H：high dose (blood level 10 μg/mL or above)
g：Peak time of VPA sustained release preparation varies depending on the dosage form：5-10 h for Selenica® R fine granule, 7.5-10 h for Depakene® R tablet, and 13-16 h for Selenica® R tablet.
h：N-DMCLB is a metabolite of CLB. N-DMCLB has anticonvulsive action of approximately 1/4 strength of that of CLB. When classified by CLB：N-DMCLB concentration ratio into three groups of approximately 1：2-3 (10% of the subjects), around 1：10 (80%), and around 1：50-100 (10%), drowsiness occurs at a higher rate as the CLB：NDMCLB concentration ratio increases.
i：In Japan, monotherapy use is approved only for partial seizure (including secondarily generalized seizures) and tonic clonic seizure in 16 year-old and above. To prevent rash (especially Stevens-Johnson syndrome), follow the instructions in the package insert concerning the initial dose, the dose increase range and the maximum dose of LTG.
j：Monotherapy use only for 4 year-old and above with partial seizure.
k：Covered by insurance for 4 year-old and above. Starting dose-maximum dose is as follows：15 to <30 kg in weight：200-1,000 mg, 30 to <50 kg：400-1,800 mg, 50 to <70 kg：400-2,400 mg, ≥70 kg：400-3,200 mg. Dose increase range is：15 to <30 kg：≤200 mg, and ≥30 kg：≤400 mg. Official abbreviation is undecided and RUF is also commonly used.
l：Covered by insurance for 4 year-old and above. Official abbreviation is undecided and PRP is also commonly used.
m：Covered by insurance for 16 year-old and above.
(Compiled from：Shorvon S, Perucca E, Engel J Jr, eds. The treatment of epilepsy, 4th edition. Chichester：Wiley Blackwell, 2015, p.376-700. / Wyllie E, Gidal BE, Goodkin HP, et al eds.：Wyllie's Treatment of Epilepsy：Principles and Practice, 6th edition. Philadelphia：Wolters Kluwer, 2015, p.593-768. / Patsalos PN, Bourgeois BFD：The Epilepsy Prescriber's Guide to Antiepileptic Drugs. Cambridge：Cambridge University Press, 2010. / Drugs in Japan Forum, ed. Drugs in Japan：Ethical Drugs 2016 edition. Tokyo：Jiho Inc., 2015.)