Therapeutic Drug Monitoring Unit

Title: Guideline for Therapeutic Drug Monitoring of Antiepileptic Drugs

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Authors: Sharon Allen-Phillips

Authorised By: Cerian Dance and Sharon Allen-Phillips

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Antiepileptic Drug	Ideal Sampling Time	Sample Volume (mL)	Time To Steady-state (Days)	Reference Range (mg/L)
Brivaracetam	Immediately before oral dose	0.2	1 to 2	0.2 to 2.0
Carbamazepine	Immediately before oral dose	0.2	2 to 4[A]	4 to 12
Carbamazepine epoxide (pharmacologically active metabolite of carbamazepine)	Immediately before oral dose	0.2	7[A]	Up to 2.3
Clobazam	Immediately before oral dose	0.2	7 to 10	30 to 300 (µg/L)
Desmethyl Clobazam (Pharmacologically active metabolite of clobazam)	Immediately before oral dose	0.2	7 to 10	300 to 3000 (µg/L)
Clonazepam	Immediately before oral dose	0.2	3 to 10	20 to 70 (µg/L)
Eslicarbazepine	Immediately before oral dose	0.2	3 to 4	3 to 5
Ethosuximide	Immediately before oral dose	0.2	8 to 12	40 to 100
Felbamate	Immediately before oral dose	0.2	3 to 5	30 to 60
Free Carbamazepine	Immediately before oral dose	0.5	2 to 4[A]	1 to 3
Free Lamotrigine	Immediately before oral dose	0.5	3 to 8	1 to 7
Free Phenobarbital	Immediately before oral dose	0.5	15 to 30	5 to 18
Free Phenytoin	Immediately before oral dose	0.5	6 to 21	1 to 2
Free Valproic Acid	Immediately before oral dose	0.5	2 to 4	5 to 10
Gabapentin	Immediately before oral dose	0.2	1 to 2	2 to 20
Lacosamide	Immediately before oral dose	0.2	2 to 3	10 to 20
Lamotrigine	Immediately before oral dose	0.2	3 to 8	2.5 to 15
Levetiracetam	Immediately before oral dose	0.2	1 to 2	12 to 46
10-Hydroxycarbazepine (pharmacologically active oxcarbazepine)	Immediately before oral dose	0.2	2 to 3	3 to 35
Phenobarbital	Immediately before oral dose	0.2	15 to 30	10 to 40
Perampanel	Immediately before oral dose	0.2	10 to 19	200 to 1000 (µg/L)
Phenytoin	Immediately before oral dose	0.2	6 to 21	10 to 20
Pregabalin	Immediately before oral dose	0.2	1 to 2	2 to 8
Primidone	Immediately before oral dose	0.2	2 to 5	5 to 10
Rufinamide	Immediately before oral dose	0.2	1 to 2	30 to 40

Antiepileptic Drug	Ideal Sampling Time	Sample Volume (mL)	Time To Steady-state (Days)	Reference Range (mg/L)
Stiripentol	Immediately before oral dose	0.2	1 to 3	4 to 22
Tiagabine	Immediately before oral dose	0.2	1 to 2	20 to 200 (µg/L)
Topiramate	Immediately before oral dose	0.2	4 to 7	5 to 20
Valproic Acid	Immediately before oral dose	0.2	2 to 4	50 to 100
Vigabatrin	Immediately before oral dose	0.2	1 to 2	0.8 to 36
Zonisamide	Immediately before oral dose	0.2	9 to 12	10 to 40

[A] If carbamazepine is being introduced for the first time, steady-state is only achieved after 20 days of treatment due to autoinduction.

• Carbamazepine, eslicarbazepine, gabapentin, lacosamide, levetiracetam, pregabalin, rufinamide, tiagabine, valproic acid and vigabatrin exhibit significant diurnal variation, sampling time in relation to dose is critical.

• During therapy with primidone, monitoring of only the active metabolite phenobarbital is recommended in most circumstances.

All tests are available for blood (plasma or serum) and saliva. All antiepileptic drug assays are available as total plasma or serum concentrations or as free non-protein-bound concentrations.