

Therapeutic drug monitoring

Quick-reference guide to commonly prescribed drugs

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	Brand Names	Therapeutic Range	When to Sample after Dose	Pharmacokinetics
Antiasthmatic Drugs				
Caffeine (oral)	VIVARIN, CAFKIT, LUCIDEX, NO-DOZ MAXIMUM STRENGTH, REVIVE, STAY AWAKE	8–20 µg/mL, >50 µg/mL (toxic)	2 hours	Half-life: 1.5–9.5 hours Steady state: 2 weeks
Theophylline (oral)	ELIXOPHYLLIN, NORPHYL, PHYLLCONTIN, QUIBRON-T, QUIBRON-T/SR, THEO-24, THEO-DUR, THEO-TIME, THEO-CAP, THEOCHRON, TRUXOPHYLLIN, UNIPHYL	10–20 µg/mL	30–90 minutes	Half-life: 3.5 hours (children), 8–9 hours (adults)
Antidepressant Drugs				
Amitriptyline (oral)	ELAVIL, VANATRIP	80–200 ng/mL	<12 hours	Half-life: 8–51 hours Steady state: 3–8 days Protein binding: 90%
Nortriptyline (oral)	AVENTYL, PAMELOR	50–150 ng/mL	N/A	Half-life: 15–90 hours Steady state: 4–20 days Protein binding: 95%
Imipramine (oral)	TOFRANIL, TOFRANIL-PM	175–300 ng/mL (+desipramine)	10–14 hours	Half-life: 6–20 hours Steady state: 2–5 days Protein binding: 85–95%
Desipramine (oral)	NORPRAMIN	100–300 ng/mL	<12 hours	Half-life: 12–54 hours Steady state: 2.5–11 days Protein binding: 75–90%
Antiepileptic Drugs				
Carbamazepine (oral, injection)	CARBATROL, EPITOL, CARNEXIV	4–12 mg/L	2–9 hours	Steady state: 2–4 days Half-life: 8–20 hours Active 10,11 epoxide metabolite contributes to clinical effects 75% serum protein binding
Ethosuximide (oral)	ZARONTIN	40–100 mg/L	1–4 hours	Steady state: 7–10 days Half-life: 40–60 hours 0% serum protein binding
Gabapentin (oral)	CONVENIENCE PAK, CYCLO/GAGA 10/300 PACK, FUSEPAQ FANATREX, GABARONE, GRALISE, GRALISE STARTER PACK, NEURONTIN, SMART RX GABA-V, SMARTRX GABA KIT	2–20 mg/L	2–3 hours	Steady state: 2–4 days Half-life: 5–9 hours 0% serum protein binding
Lamotrigine (oral)	LAMICTAL ODT PATIENT TITRATION KIT BLUE/GREEN/ ORANGE, LAMICTAL STARTER KIT BLUE/GREEN/ORANGE, LAMICTAL XR PATIENT TITRATION KIT BLUE/GREEN/ORANGE	2.5–15 mg/L	1–3 hours	Steady state: 3–6 days, 5–15 days with valproic acid comedication Half-life: 5–35 hours, 30–90 hours with valproic acid comedication 55% serum protein binding
Levetiracetam (oral, injection)	KEPPRA, KEPPRA XR, LEVETIRACETAM NOVAPLUS	12–46 mg/L	1 hour	Steady state: 1–2 days Half-life: 6–8 hours 0% serum protein binding
Oxcarbazepine (oral)	OXTELLAR XR, TRILEPT	3–35 mg/L	3–6 hours	Steady state: 2–3 days Half-life: 8–15 hours 40% serum protein binding
Phenobarbital	ARCO-LASE	10–40 mg/L	0.5–4 hours	Steady state: 12–24 days Half-life: 70–140 hours 55% serum protein binding
Phenytoin (oral, injection)	DILANTIN, DILANTIN INFATABS, PHENYTOIN SODIUM NOVAPLUS	10–20 mg/L	1–12 hours	Steady state: 5–17 days Half-life: 30–100 hours 90% serum protein binding
Primidone (oral)	MYSOLIN, PRIMIDONE	5–10 mg/L	2–5 hours	Steady state: 2–4 days Half-life: 7–22 hours Metabolically derived phenobarbital contributes largely to clinical effects 10% serum protein binding
Topiramate (oral)	QUDEXY XR, TOPAMAX, TOPIRAGEN, TROKENDI XR	5–20 mg/L	2–4 hours	Steady state: 4–5 days Half-life: 20–30 hours 15% serum protein binding
Valproic acid (oral)	ALTI-VALPROIC, DEPAKENE, DEPAKOTE, DEPAKOTE DR, DEPAKOTE ER, DEPAKOTE SPRINKLES, STAVZOR	50–100 mg/L	3–6 hours	Steady state: 2–4 days Half-life: 11–20 hours 90% serum protein binding
Zonisamide	ZONEGRAN	10–40 mg/L	2–5 hours	Steady state: 9–12 days Half-life: 50–70 hours 50% serum protein binding
Antifungal Drugs				
Voriconazole (oral, injection)	VFEND, AMERINET CHOICE VFEND, VFEND I.V.	1.0–5.5 mcg/mL	N/A	N/A
Antimicrobial Drugs				
Amikacin (injection)	AMIKIN, AMIKIN PEDIATRIC, Amikacin Sulfate NOVAPLUS	25–35 mcg/mL	30–60 minutes	Half-life: 0.5–2.5 hours (children), 0.5–15 hours (adults)
Chloramphenicol (injection, oral, otic, ocular)	AK-CHLOR, CHLOROMYCETIN, CHLOROMYCETIN Sodium Succinate, SOPAMYCETIN	10–25 µg/mL	2–3 hours (adults), 6–12 hrs (neonates)	Half-life: 2–7 hours, 8–30 hours (neonats), Protein binding: 70%
Gentamicin (injection, ocular, topical)	GARAMYCIN, GENTAMICIN NOVAPLUS, GENOPTIC	4–8 µg/mL (peak), <2 µg/mL (trough), >10 µg/mL (toxic), >2 µg/mL for >10 days (toxic)	30–60 minutes	Half-life: 1.5–15 hours (adults >30 years), 0.5–3 hours (adults <30 years), 0.5–2.5 hours (children), 2–9 hours (neonates)
Netilmicin	NETROMYCIN	5–12 µg/mL (peak), 2.0 µg/mL (trough)	30–60 minutes	Half-life: 0.5–3 hours (adults), 0.5–2.5 hours (children >6 weeks), 2–9 hours (neonats)
Tobramycin (inhalation, injection, ocular)	BETHKIS, KITABIS PAK, NEBCIN, PREMIERPRO RX Tobramycin Sulfate, AKTOB, APO-Tobramycin	4–10 µg/mL (peak), 2 µg/mL (trough, toxic)	30–60 minutes	Half-life: 1.5–15 hours (adults >30 years), 0.5–3 hours (adults <30 years), 0.5–2.5 hours (children), 2–9 hours (neonates)
Vancomycin (oral, injection)	FIRST-Vancomycin 25, FIRST-Vancomycin 50, PREMIERPRO RX Vancomycin HCl, VANCOCIN HCl	18–26 µg/mL (2 hours drawn), 25–40 µg/mL (1 hour drawn), 30–40 µg/mL (30 minutes drawn), 5–10 µg/mL (trough)	15–30 minutes	Half-life: 4–10 hours Protein binding: 55%
Antineoplastic Drugs				
Methotrexate (oral, injection)	RHEMATREX Dose Pack, TREXALL, Methotraxate NOVAPLUS, OTREXUP	5.0 µmol/L (toxic @ 24 hours), 0.5 µmol/L (toxic @ 48 hours), 0.05 µmol/L (toxic @ 72 hours)	Dose-dependent	Half-life: 2–4 hours (initial), 8–15 hours (terminal) Elimination: renal excretion of 70–90% unchanged drug Metabolite: 7-hydroxymethotrexate Protein binding: 50–60% @ 1–1000 µmol/L
Cardioactive Drugs				
Digitoxin	N/A	14–26 ng/mL, >45 ng/mL (toxic)	2 hours	Half-life: 5–7 days
Digoxin (oral, injection)	DIGITALINE NATIVELLE, DIGITEK, Digoxin NOVAPLUS, LANOXIN	0.9–2.0 ng/mL, >2.0 ng/mL (toxic)	30 minutes	Half-life: 35 hours
Disopyramide (oral)	NORPACE, NORPACE CR	2–5 µg/mL, 7 µg/mL (toxic)	2–3 hours	Half-life: 4.5–9 hours
Lidocaine (oral, injection, ocular, topical)	ACCUCAINE, Active Injection Kit BLM-1, AKTEN, ZINGO, ANASTIA, ANECREAM, ASPERCREME, DERMACINRX PHN PAK, Advanced DNA Medicated Collection Kit IIII	1.2–6.0 mcg/mL	12 hours initially, every 24 hours thereafter	Half-life: 70–200 minutes Steady state: 5–10 hours
Procainamide (injection, oral)	Procainamide HCl NOVAPLUS, PRONESTYL	4–12 µg/mL, 10–30 µg/mL (+NAPA), >30 µg/mL (+NAPA, toxic)	IV: 2 hours after start of infusion Oral: before next dose/>24 hours after initial dose	Half-life: 3–5 hours
N-acetylprocainamide (NAPA)				Half-life: 6–10 hours (kidney disease prolongs half-life)
Quinidine (oral, injection)	QUINAGLUTE, CARDIOQUIN, QUINIDEX	2–5 µg/mL	Quinidine sulfate: 1 hour Quinidine gluconate salt: 5 hours	Half-life: 6–7 hours Steady state: 2 days Protein binding: 80–90%
Immunosuppressive Drugs				
Cyclosporine (CsA) (oral, injection, ocular)	GENGRAF, NEORAL, RESTASIS, RESTASIS Multidose	100–500 ng/mL (trough), highly variable	3–5 hours after oral	Half-life: 1.2 hours (alpha), 27 hours (beta) Protein binding: 90%
Tacrolimus (oral, injection, topical)	ASTAGRAF XL, ENVARSUS XR, PROFRAF, PROTOPIC	Highly variable	Immediately prior to next dose	Half-life: 3.5 hours (alpha), 11.7 hours (beta) Protein binding: 75–99%
Mycophenolate acid (MPA) (oral, injection)	CELLCEPT, MYFORTIC	>1.3 µg/mL (trough), >1.9 µg/mL (+CsA)	1–2 hours, 6–12 hours	Binding to albumin: 97-98% Peak: 1–2 hours Peak #2: 6 or 1–12 hours
Sirolimus (oral)	RAPAMUNE, Sirolimus AVPAK	Highly variable, 9 ng/mL (trough 2 mg/day dose), 17 ng/mL (trough 5 mg/day dose)	Immediately prior to next dose	Half-life: 35–95 hours Steady state: 1 day
Everolimus (oral)	AFINITOR, AFINIOTR DISPERZ, ZORTRESS	Highly variable, 3–8 ng/mL (trough)	Immediately prior to next dose	Half-life: 28 ±7 hours Steady state: 4 days Peak: 2 hours after initial dose

Sources:
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