

Monitoring the therapeutic levels of certain medications is often conducted when the patient is taking medications with a narrow therapeutic range where a slight imbalance could be critical. Drug monitoring includes drawing blood samples for peak and trough levels to determine if blood serum levels of a specific drug are at a therapeutic level and not a subtherapeutic or toxic level. The **peak level** indicates the highest concentration of the drug in the blood serum while the **trough level** represents the lowest concentration. The following are the normal therapeutic serum medication levels:

Drug Name	Drug Class	Therapeutic Level (SI)	Therapeutic Level (CV)	Toxic Level (SI)	Toxic Level (CV)
Acetaminophen (Tylenol)	Analgesic	66—132 µmol/L	10—20 µg/mL	> 170 µmol/L	
Amikacin Sulfate	Aminoglycoside	26—43 µmol/L	15—25 µg/mL	> 430 µmol/L	> 250 µg/mL
Aminophylline (Norphyl)	Bronchodilator	55.50—111 µmol/L	10—20 µg/mL	> 111 µmol/L	> 20 µg/mL
Amitriptyline (Elavil)	Antidepressants	433—541 nmol/L	120—150 ng/mL	> 1800 nmol/L	> 500 ng/mL
Carbamazepine (Tegretol)	Anticonvulsants	21—51 µmol/L	5—12 µg/mL	> 50 µmol/L	> 12 µg/mL
Cyclosporine (Gengraf)	Calcineurin inhibitors	83—333 nmol/L	100—400 ng/mL	> 330 nmol/L	> 400 ng/mL
Desipramine (Norpramin)	Antidepressants	563—1126 nmol/L	150—300 ng/mL	> 1890 nmol/L	> 500 ng/mL
Digitoxin (Digibind)	Cardiac Glycoside	20—33 nmol/L	15—25 ng/mL	> 33 nmol/L	> 25 ng/mL
Digoxin (Lanoxin)	Antiarrhythmics	1—2.6 nmol/L	0.8—2 ng/mL	> 3 nmol/L	> 2.4 ng/mL
Disopyramide (Norpace)	Antiarrhythmics	6—15 µmol/L	2—5 µg/mL	> 15 µmol/L	> 5 µg/mL
Ethosuximide (Zarontin)	Anticonvulsants	283—708 µmol/L	40—100 µg/mL	> 700 µmol/L	> 100 µg/mL
Gentamicin (Garamycin)	Aminoglycosides	10—21 µmol/L	5—10 µg/mL	> 25 µmol/L	> 12 µg/mL
Imipramine (Tofranil)	Antidepressants	535—1170 nmol/L	150—300 ng/mL	> 1780 nmol/L	> 500 ng/mL
Kanamycin (Kantrex)	Aminoglycosides	41—52 µmol/L	20—25 µg/mL	> 70 µmol/L	> 35 µg/mL
Lidocaine (Xylocaine HCL)	Anesthetic	6.4—21 µmol/L	1.5—5 µg/mL	> 20 µmol/L	> 5 µg/mL
Lithium (Eskalith)	Antimanic	0.5—1.2 mmol/L	0.8—1.2 mEq/L	> 2 mmol/L	> 2 mEq/L
Magnesium Sulfate	Anticonvulsants	1.7—3 mmol/L	4—7 mg/dL	> 3 mmol/L	> 7 mg/dL
Methotrexate (Trexall)	Antimetabolites	> 0.01 µmol	> 0.01 µmol	> 10 µmol/24 hours	> 10 µmol/24 hours
Nortriptyline (Aventyl HCl)	Antidepressants	190—570 nmol/L	50—150 ng/mL	> 1900 nmol/L	> 500 ng/mL
Phenobarbital (Luminal)	Anticonvulsant	44—133 µmol/L	10—30 µg/mL	> 170 µmol/L	> 40 µg/mL
Phenytoin (Dilantin)	Antiarrhythmic	40—79 µmol/L	10—20 µg/mL	> 120 µmol/L	> 30 µg/mL
Primidone (Mysoline)	Anticonvulsants	23—55 µmol/L	5—12 µg/mL	> 69 µmol/L	> 15 µg/mL
Procainamide (Pronestyl)	Antiarrhythmics	17—43 µmol/L	4—10 µg/mL	> 68 µmol/L	> 16 µg/mL
Propranolol (Inderal)	Antiarrhythmics	193—386 nmol/L	50—100 ng/mL	> 580 nmol/L	> 150 ng/mL
Quinidine (Cardioquin)	Antiarrhythmics	6—15 µmol/L	2—5 µg/mL	> 31 µmol/L	> 10 µg/mL
Salicylate (Aspirin)	Analgesic	0.72—18 mmol/L	100—2500 µg/mL	> 2 mmol/L	> 300 µg/mL
Sirolimus (Rapamune)	Immunosuppressant	3—22 nmol/L	3—20 ng/mL	> 22 nmol/L	> 20 ng/mL
Tacrolimus (Astagraf XL)	Calcineurin inhibitors	6—19 nmol/L	5—15 ng/mL	> 25 nmol/L	> 20 ng/mL
Theophylline (Theo-24)	Methylxanthines	56—111 µmol/L	10—20 µg/mL	> 111 µmol/L	> 20 µg/mL
Tobramycin	Aminoglycosides	11—21 µmol/L	5—10 µg/mL	> 26 µmol/L	> 12 µg/mL
Valproic acid (Depakene)	Anticonvulsants	350 —700 µmol/L	50—100 µg/mL	> 700 µmol/L	> 100 µg/mL
Vancomycin (Firvanq)	Glycopeptide antibiotics	14—28 µmol/L	20—40 µg/mL	> 28 µmol/L	> 40 µg/mL

✓How to Obtain a Blood Sample