Lab Dept: Chemistry

Test Name: THEOPHYLLINE LEVEL

General Information

Lab Order Codes:	THEM
Synonyms:	Aminophylline, Theo-Dur, Slo-Bid
CPT Codes:	80198 - Theophylline
Test Includes:	Theophylline concentration reported in mcg/mL.

Logistics

Test indications:	Assessing and adjusting theophylline dosage for optimal therapeutic level. Assessing theophylline toxicity Theophylline is used to relax smooth muscles of the bronchial airways and pulmonary blood vessels to relieve and prevent symptoms of asthma and bronchospasm. Caffeine is a minor metabolite and is often seen in neonates taking theophylline. Peak levels are achieved in 30–90 minutes depending on the compound and type of preparation. Theophylline has a half-life of approximately 4 hours in children and adult smokers, and 8.7 hours in nonsmoking adults.
Lab Testing Sections:	Chemistry
Referred to:	Mayo Clinic Laboratories (MML Test: THEO)
Phone Numbers:	MIN Lab: 612-813-6280 STP Lab: 651-220-6550
Test Availability:	Monday - Saturday
Turnaround Time:	1 day
Special Instructions:	N/A

Specimen

Specimen Type:	Blood
Container:	Preferred: Serum Gel (SST) Alternate: Red Top

Draw Volume:	1.5 mL blood
Processed Volume:	0.5 mL (Minimum: 0.25 mL) serum
Collection:	Routine blood collection
Special Processing:	Lab Staff: Centrifuge specimen within 2 hours of collection. Store and ship at refrigerated temperature.
Patient Preparation:	None
Sample Rejection:	Mislabeled or unlabeled specimen; gross hemolysis

Interpretive

Reference Range:	Therapeutic: Bronchodilation: 8.0-20.0 mcg/mL Neonatal apnea (< or =4 weeks old): 6.0-13.0 mcg/mL Interpretation: Response to theophylline is directly proportional to the serum level. Patients usually receive the best response when the serum level is above 8.0 mcg/mL, with minimal toxicity experienced as long as the level is less than or equal to 20.0 mcg/mL
Critical Values:	>20.0 mcg/mL
Limitations:	Coadministration of cimetidine and erythromycin will significantly inhibit theophylline clearance, requiring dosagereduction. Other drugs such as allopurinol, ciprofloxacin, oral contraceptives, and propranolol inhibit theophyllineclearance to a lesser degree. Smoking induces the synthesis of cytochrome P448, the antipyrine-dependent cytochrome, which significantlyincreases the rate of metabolism of theophylline. Drugs such as phenobarbital, phenytoin, carbamazepine, andrifampin slightly increase the rate at which the drug is cleared. Theophylline exhibits rather severe toxicity that is proportional to blood level
Methodology:	Kinetic Interaction of Microparticles in a Solution (KIMS)
References:	Jacobs and DeMott Laboratory Test Handbook (2001) Lexi-comp, Inc, Hudson, OH, 5th ed Mayo Clinic Laboratories June 2021
Updates:	6/17/2021: Testing moved from inhouse test at Children's to Mayo.