Lab Dept: Chemistry

Test Name: SIROLIMUS LEVEL

General Information

Lab Order Codes: SIRC

Synonyms: Rapamune; Rapamycin

CPT Codes: 80195 - Sirolimus

Test Includes: Sirolimus is a macrolide antibiotic, isolated from Stretomyces hygroscopicus, with potent effects including suppression of T-and B-cell proliferation, and antineoplastic and antifungal activity. It inhibits the protein kinase mTOR to arrest the cell cycle; it has no effects on calcineurin and, therefore, can be used in addition to cyclosporine or tacrolimus, or as a substitute in patients intolerant to these drugs. Sirolimus is metabolized by CYP34A4, thus, blood concentrations are affected by drugs that inhibit or induce this enzyme. The pharmacokinetic interaction between sirolimus and cyclosporine or tacrolimus increases both therapeutic immunosuppression and the toxicity of these agents; lower doses are required with combined use. Adverse effects of sirolimus are generally concentration-dependent, making therapeutic drug monitoring essential.

Trough sirolimus concentrations are generally measured every 5 days. Target concentrations vary depending on concomitant therapy, time posttransplant, the desired degree of immunosuppression, and adverse effects. When given with cyclosporine or tacrolimus, the therapeutic range for sirolimus is generally between 4 ng/dL to 12 ng/dL, with minimal added benefit for concentrations >10 ng/dL. When sirolimus is given without calcineurin inhibitors, higher trough levels are needed; usually12 ng/dL to 20 ng/dL, but occasionally up to 20 ng/mL to 30 ng/mL

Logistics

Test Indications: Useful for monitoring whole blood sirolimus concentration during therapy, particularly in individuals coadministered CYP3A4 substrates, inhibitors, or inducers. Useful for adjusting dose to optimize immunosuppression while minimizing toxicity. Useful for evaluating patient compliance

Lab Testing Sections: Chemistry – (Performed on Minneapolis Campus)

Phone Numbers: MIN Lab: 612-813-6280

STP Lab: 651-220-6550

Test Availability: Daily, 24 hours

Turnaround Time:	1 - 3 days; test analysis is batched once daily
Special Instructions:	Draw blood immediately before a scheduled dose.

Specimen

Specimen Type:	Whole blood
Container:	Lavender-top (EDTA) tube
Draw Volume:	2 mL (Minimum: 0.5 mL) blood
Processed Volume:	Same as Draw Volume
Collection:	Routine blood collection
Special Processing:	Lab Staff: Do not centrifuge. Send specimen in original vacutainer. Store and ship at refrigerated temperatures.
Patient Preparation:	None
Sample Rejection:	Specimens other than whole blood, anticoagulants other than EDTA, mislabeled specimens and unlabeled specimens

Interpretive

Reference Range:	4 - 20 ng/mL **Note**: Therapeutic range applies to trough specimen drawn immediately prior to a.m. dose. Blood drawn at other times will yield higher results. Most individuals display optimal response to sirolimus with trough whole blood levels 4 ng/mL to 20 ng/mL. Preferred therapeutic ranges may vary by transplant type, protocol, and comedications.
Critical Values:	N/A
Limitations:	The recommended therapeutic range applies to trough specimens drawn immediately before a dose.
Methodology:	Chemiluminescent Microparticle Immunassay (CMIA) Blood samples are subjected to protein precipitation. The resulting supernatant is analyzed by Chemiluminescent Microparticle Immunassay The assay is specific for sirolimus; it does not cross-react with cyclosporine, cyclosporine metabolites, tacrolimus, tacrolimus metabolites, or sirolimus metabolites. Results by liquid chromatography with detection by liquid chromatography/tandem mass spectrometry are approximately 30% less than by immunoassay.

References:

Abbott Architect Sirolimus Package Insert (August 2019) Abbott Laboratories Diagnostics Division, Abbott Park, IL, 60064, USA

Abbott Architect Sirolimus Calibrator Package Insert (May 2019) Abbott Laboratories Diagnostics Division, Abbott Park, IL, 60064, USA

Bio-Rad Liquichek Whole Blood Immunosuppressant Control Product Insert (August 2018) Bio-Rad Laboratories, Irvine, CA 82618, USA

Updates:

12/8/2020: Testing moved from Mayo to in-house at Children's. Updated for Abbott Architect method.

3/7/2024: Corrected errors.