Imatinib Therapeutic Drug Monitoring

Imatinib (Gleevec, Glivec) is a tyrosine kinase inhibitor (TKI) used in the treatment of different types of cancers, including chronic myelogenous leukemia (CML), some gastrointestinal stromal tumors (GIST), and myelodysplastic/myeloproliferative diseases. Imatinib may also be used in the treatment of other diseases. Testing patients using imatinib evaluates individual pharmacokinetics for dosing decisions, monitors treatment effectiveness, and identifies resistance to therapy.

**TESTS TO CONSIDER**

**Imatinib 3000539**
Method: Immunoturbidimetry
Optimize dose, detect variable pharmacokinetics, and monitor therapy effectiveness
For more information, see https://www.aruplab.com/topics/imatinib

**Related Tests**

- **BCR-ABL1, Major (p210), Quantitative 2005017**
  Method: Quantitative Reverse Transcription Polymerase Chain Reaction
  Aid in diagnosis and therapeutic monitoring for CML or acute lymphoblastic leukemia (ALL)

- **BCR-ABL1 Mutation Analysis for Tyrosine Kinase Inhibitor Resistance by Next Generation Sequencing 2008420**
  Method: Massively Parallel Sequencing
  Order only for patients with an established diagnosis of a BCR-ABL1-positive leukemia

- **Cytochrome P450 Genotyping Panel 3001524**
  Method: Polymerase Chain Reaction/Fluorescence Monitoring
  Assess risk of abnormal drug metabolism affected by genetic variants in CYP2C19, CYP2C8, CYP2C9, CYP2D6, CYP3A4, and CYP3A5

**DRUG OVERVIEW**

Drug-gene and drug-drug interactions can be identified and managed with therapeutic drug monitoring of imatinib
- May exhibit variability in blood concentrations due to drug metabolism
- Metabolism mediated by several isozymes of the cytochrome P450 system, including CYP3A4 and, to a lesser extent, CYP1A2, CYP2D6, CYP2C9, and CYP2C19

Resistance to imatinib therapy may be explained by
- Subtherapeutic dosing
- Poor adherence to therapy
- Pharmacokinetic variability leading to subtherapeutic blood concentrations
- Change in pathophysiology of the disease

In CML patients, optimization of imatinib dose with timed blood concentrations has been shown to yield a similar response as second-generation TKIs.

**TEST INTERPRETATION**

**Results**
Concentrations above 1000 ng/mL in CML patients and above 1100 ng/mL in GIST patients are statistically associated with an improved response.

**Limitations**
Therapeutic range based on plasma predose (trough) blood collection at steady-state concentration
- May require at least 29 days of imatinib therapy to achieve steady state
- Once steady state achieved, no change in dose or dosing should be made for at least 8 days prior to blood collection
- Blood should be collected at least 21 hours after last dose for once-daily dosing and at least 9 hours after last dose for twice-daily dosing

**REFERENCES**

