Overview

Useful For
Aiding in prognosis for patients diagnosed with chronic heart failure

Method Name
Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available
Yes

Specimen

Specimen Type
Serum Red

Specimen Required
Collection Container/Tube:

Preferred: Red top

Acceptable: Serum gel

Submission Container/Tube: Plastic vial

Specimen Volume: 1 mL

Forms
If not ordering electronically, complete, print, and send a Cardiovascular Test Request Form (T724) with the specimen.

Specimen Minimum Volume
0.2 mL

Reject Due To

<table>
<thead>
<tr>
<th>Condition</th>
<th>Value</th>
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<tbody>
<tr>
<td>Hemolysis</td>
<td>NA</td>
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<tr>
<td>Lipemia</td>
<td>NA</td>
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<tr>
<td>Icterus</td>
<td>NA</td>
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<tr>
<td>Other</td>
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Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
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<tbody>
<tr>
<td>Serum Red</td>
<td>Frozen (preferred)</td>
<td>90 days</td>
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<tr>
<td></td>
<td>Refrigerated</td>
<td>7 days</td>
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<tr>
<td></td>
<td>Ambient</td>
<td>72 hours</td>
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Clinical and Interpretive

Clinical Information

Heart failure is a chronic, progressive, complex cardiovascular disorder with a variety of etiologies and heterogeneity with respect to the clinical presentation of the patient. Heart failure is significantly increasing in prevalence with an aging population and is associated with high short- and long-term mortality rate. Over 80% of patients diagnosed and treated for acute heart failure syndromes in the emergency department are readmitted within the forthcoming year, incurring costly treatments and therapies.(1)

The development and progression of heart failure is a clinically silent process until manifestation of the disorder, which typically occurs late and irreversibly into its progression. Mechanistically heart failure, whether due to systolic or diastolic dysfunction, is thought to progress primarily through adverse cardiac remodeling and fibrosis in response to cardiac injury or stress.(2) Soluble ST2 (sST2) is a biomarker that appears to be actively involved with IL-33 in modulating cardiac remodeling and ventricular function via effects in the inflammatory and apoptosis pathways.(3)

ST2 is a member of the interleukin-1 receptor family and has 2 isoforms that are directly implicated in progression of cardiac disease: soluble ST2 (sST2) and a transmembrane-bound form, ST2 ligand (ST2L). IL-33 is the hormone that interacts with ST2L, protecting against left ventricular hypertrophy and myocardial fibrosis to effectively preserve cardiac function. Therefore, when sST2 concentrations are high, IL-33 is unavailable for cardioprotective signaling, leaving the heart vulnerable to the effects of sST2. High concentrations of sST2 result in cellular death, tissue fibrosis, reduced cardiac function, and an increase in the rate of disease progression.

Reference Values

Males:

<24 months: not established
2-17 years: < or =43.0 ng/mL
> or =18 years: < or = 52.0 ng/mL

Females:

<24 months: not established
2-17 years: < or =43.0 ng/mL
> or =18 years: < or =38.7 ng/mL

Interpretation

Clinically, ST2 concentrations in the HF-ACTION heart failure study were a significant predictor of mortality, all-cause hospitalization, mortality due to cardiovascular disease, and hospitalization due to cardiovascular disease using a cutpoint of 35 ng/mL. In addition, mortality risk was significantly higher in patients with ST2 >35 ng/mL.(4) The risk appears early and persists throughout the follow-up period.

Clinical risk categories are substantiated by results from several large chronic heart failure studies:

-Low risk: < or =35.0 ng/mL
Test Definition: ST2S

**ST2, S**

- High risk: >35.0 ng/mL (high risk)

Results should be interpreted in the context of the individual patient presentation. Elevated ST2 results indicate an increased risk for adverse outcomes and signal the adverse remodeling and progression of disease.

The reference interval was derived from normal donors without a history of cardiovascular disease, stroke, diabetes, renal disease, liver disease, or autoimmune diseases. The reference range is gender dependent; however, it is the clinical cutpoint that is recognized as providing the most utility.

Knowledge of ST2 results in a heart failure patient may assist in cardiovascular risk stratification and lead to more aggressive management. There are no specific ST2 inhibitors available at this time and heart failure patients with elevated ST2 concentrations should be treated and monitored according to established guidelines. Angiotensin receptor blockers (ARBs) and aldosterone antagonists are thought to be particularly effective.

**Cautions**

ST2 has not been shown to be useful in the acute diagnosis of heart failure; natriuretic peptides (BNP or NT-proBNP) should be utilized for this purpose in the context of appropriate clinical suspicion of acute heart failure. ST2 and natriuretic peptides are measures of separate and distinct biological processes, providing independent and complimentary prognostic information.

There are no significant analytical interferences reported for ST2 from bilirubin, hemoglobin, triglycerides, cholesterol, or total protein. Forty-nine therapeutic substances were tested for analytical interference and none had significant interference with the ST2 assay. (5)

**Clinical Reference**


**Performance**

**Method Description**

The ST2 assay is an FDA 510K-cleared in vitro diagnostic device. It is a quantitative 2-site manual enzyme-linked immunosorbent assay (ELISA) validated for use in human sera. The capture monoclonal antibody (mouse antihuman ST2) is immobilized on 96-well plates, while the second mouse monoclonal antihuman capture antibody functions as the tracer antibody for detecting ST2, which is bound to the capture antibody. The tracer antibody is biotinylated and
bound with streptavidin-horseradish peroxidase during incubation and detection occurs following addition of
tetramethylbenzidine substrate. (Package insert: Presage ST2 Assay, Critical Diagnostics Inc., San Diego, CA, July
2014)

PDF Report
No

Day(s) and Time(s) Test Performed
Monday through Friday; 8 a.m.

Analytic Time
1 day

Maximum Laboratory Time
3 days

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees and Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their Regional Manager. For assistance, contact Customer Service.

Test Classification
This test has been cleared or approved by the U.S. Food and Drug Administration and is used per manufacturer's
instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA
requirements.

CPT Code Information
83006

LOINC® Information

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