The Best Tool For Heart Failure Patient Management

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Do we need another heart failure biomarker: focus on soluble suppression of tumorigenicity 2 (sST2)

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sST2 as a decoy receptor → when elevated binds IL-33, effectively reducing the concentration of IL-33 that is available to ST2L, thus diminishing the cardioprotective effect of IL-33.

**Figure 1** sST2 and the HbA1c of heart failure.
Outlines

- Heart Failure
- What is ST2
- Heart Failure Management Mode
- Presage® ST2 Assay Kit
Heart Failure
What is Heart Failure?

• Heart failure occurs when the heart is unable to pump sufficiently to maintain blood flow to meet the needs of the body

http://www.heartfailurematters.org/
# Heart Failure Classification

<table>
<thead>
<tr>
<th>ACC/AHA Classification</th>
<th>NYHA Functional Classification</th>
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<tbody>
<tr>
<td>It introduces four stages of heart failure</td>
<td>This score documents severity of symptoms, and can be used to assess response to treatment.</td>
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<tr>
<td><strong>Stage A</strong></td>
<td><strong>Stage B</strong></td>
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<tr>
<td>Patients at high risk for developing HF in the future but no functional or structural heart disorder</td>
<td>A structural heart disorder but no symptoms at any stage</td>
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<tr>
<td>Class I</td>
<td>Class II</td>
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<td>No limitation is experienced in any activities; there are no symptoms from ordinary activities</td>
<td>Slight, mild limitation of activity; the patient is comfortable at rest or with mild exertion</td>
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Heart Failure Development

Fibrosis:
The formation of excess fibrous connective tissue in an organ or tissue in a reparative or reactive process

Remodeling:
Changes of the gene expression resulting in pattern reconstruction in the structure, metabolism and function of the heart
HF Epidemiology Worldwide

- There are 22.5 million HF patients with the annual rate of increase of 2 million patients, and its 5-year survival rate is similar to that of cancer.
  — World Health Statistics, World Health Organization 2010

- Among all diseases, the rehospitalization rate of patients older than 65 is highest in heart failure; 3-6 month readmission rate is 27%-47%.
  — Hospital Compare: US Department of Health & Human Services (accessed April, 2013)
Defects of Current HF Management

• Early diagnosis is not popular
• How to identify the high-risk patients that need aggressive treatment most
• How to adjust or determine drug dose
• No guidelines for hospital discharge
• Hard to monitor discharged patients
• How to know the risk of readmission
What is ST2
Transmembrane ST2L and Soluble ST2

ST2 (growth STimulation expressed gene 2/ Suppression of Tumorigenicity 2)

Cell Membrane ST2L

IL-33

In serum/plasma ST2

Slide from James Januzzi, MD
ST2: A DECOY RECEPTOR

Pro-IL-33
Fibroblast
Caspase-1

IL-33

ST2

ST2L
MyD88

Myocyte
IRAK
ERK
NFkB

Anti remodeling
Anti hypertrophy
Anti fibrosis

IL-33 Eliminates Cardiomyocyte Hypertrophy and Fibrosis in vivo

Heart Failure Development

Clotting Scarring → Fibrosis → Hypertrophy Remodeling → Heart Failure

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ST2
ST2

First reported: 1989

ST2 expression in response to myocardial stress and injury: 2002

FDA/CE: 2011, 2013

2013 ACCF/AHA Guideline for the Management of Heart Failure

新增為健保支付品項

2017
Biomarkers of myocardial fibrosis are predictive of hospitalization and death in patients with HF and also are additive to natriuretic peptide biomarker levels in their prognostic value. A combination of biomarkers may ultimately prove to be more informative than single biomarkers.
When ST2 > 35 ng/mL
ST2

- Is
  - a marker of fibrosis and worsening HF
  - prognostic of 30-day rehospitalization
  - NOT adversely impacted by impaired renal function or elevated BMI
  - Provides clinically actionable information about response to therapy
ST2

New generation HF biomarker