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Test predicts response to treatment for complication of leukemia stem cell treatment

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A new test may reveal which patients will respond to treatment for graft versus host disease (GVHD), an often life-threatening complication of stem cell transplants (SCT) used to treat leukemia and other blood disorders, according to a study led by researchers at the Icahn School of Medicine at Mount Sinai and published online today in the journal *Lancet Haematology* and in print in the January issue.

Patients with fatal blood cancers like leukemia often require allogenic stem cell SCT to survive. Donor stem cells are transplanted to a recipient, but not without the risk of developing GVHD, a life-threatening complication and major cause of death after SCT. The disease, which can be mild to severe, occurs when the transplanted donor cells (known as the graft) attack the patient (referred to as the host). Symptom severity, however, does not accurately define how patients will respond to treatment and patients are often treated alike with high-dose steroids. Although SCT cures cancer in 50 percent of the patients, 25 percent die from relapsed cancer and there remaining go into remission but later succumb to effects of GVHD.

"High dose steroids is the only proven treatment for GVHD," said James L. M. Ferrara, MD, DSc, Ward-Coleman Chair in Cancer Medicine Professor at the Icahn School of Medicine at Mount Sinai, Director of Hematologic Malignancies Translational Research Center at Tisch Cancer Institute at Mount Sinai. "Those with low-risk GVHD are often over-treated and face significant side-effects from treatment. Patients with high risk GVHD are undertreated and the GVHD progresses, often

with fatal consequences. Our goal is to provide the right treatment for each patient. We hope to identify those patients at higher risk and design an aggressive intervention while tailoring a less-aggressive approach for those with low-risk."

Dr. Ferrara, along with a multi-center team of researchers, developed and tested this new scoring system using almost 500 patient blood samples with newly diagnosed GVHD in varying grades from two different centers. They used three validated biomarkers TNFR1, ST2 and Reg3α to create an algorithm that calculated the probability of non-relapse mortality (usually caused by GVHD) that provided three distinct risk scores to predict the patient's response to GVHD treatment.

The acid test was to evaluate the algorithm in a validation set of 300 additional patients from twenty different SCT centers throughout the US. The algorithm worked perfectly, and the cumulative incidence of non-relapse mortality significantly increased as the GVHD score increased, and so the response rate to primary GVHD treatment decreased.

"This new scoring system will help identify patient who may not respond to standard treatments, and may require an experimental and more aggressive approach," said Dr. Ferrara. "And it will also help guide treatment for patients with lower-risk GVHD who may be over-treated. This will allow us to personalize treatment at the onset of the disease. Future algorithms will prove increasingly useful to develop precision medicine for all SCT patients."

In order to capitalize on this discovery, Dr. Ferrara has created the Mount Sinai Acute GVHD International Consortium (MAGIC) which consists of a group of ten SCT centers in the US and Europe who will collaborate to use this new scoring system to test new treatments for acute GVHD. Dr. Ferrara and colleagues have also written a protocol to

treat high-risk GVHD that has been approved by the FDA.

Provided by The Mount Sinai Hospital