iScore: A Novel Method for Improved Risk Stratification of AML Patients

Robust and innovative method for accurate classification of AML patients to enable personalized treatment approaches

Technology

[The Aifantis laboratory](#) at NYU Langone Health, along with colleagues at St. Jude Children's Research Hospital, Ohio State University, and Stanford University developed an innovative scoring system based on inflammation-associated gene expression that provides a means to determine survival risk for patients diagnosed with acute myeloid leukemia (AML). The scoring method, named "iScore", is comprised of three inflammation signatures (adult OS iScore, pediatric OS iScore, and pediatric EFS iScore) and is derived from calculating the weighted gene expression sum of a carefully curated list of genes found to predict overall survival in adult and pediatric AML patients, as well as event-free survival in pediatric AML patients. In proof-of-concept studies (Lasry et al. Nature Cancer 2023), the inventors demonstrated iScore's ability to accurately correlate the quantitative score with survival rates using patient data from the Alliance and BeatAML study cohorts for adult AML patients and the TARGET-AML study cohort for pediatric AML patients. Patients with the lowest iScores typically survived the longest, whereas those with high iScores died at least four years earlier relative to those with lower iScores. Therefore, iScore is an improved method for accurately stratifying AML patients based on disease severity and enables more personalized treatment approaches.

Background

AML is the most prevalent type of acute leukemia in adults and accounts for about 15% of all acute leukemias in children. Despite the approval of numerous targeted therapies, treatment options are limited and survival rates are dismal. Inflammation is a known hallmark of cancer and is prevalent in many types of solid tumors. Additionally, inflammation has been linked to disease progression in liquid tumors and drives the progression of myelodysplastic syndrome to AML. It has been previously shown that changes in the bone marrow (BM) mesenchymal niche accompany AML progression; however, the immune response to AML establishment and progression in the BM has not been fully characterized. As a result, inflammation is a frequently ignored factor when determining treatment regimens for AML patients, which consequently might lead to prescribed therapies that are either too aggressive or too weak. Hence, there is an urgent unmet need to (1) characterize inflammation in the BM microenvironment in AML and (2) develop robust and innovative scoring methods, based on inflammatory signatures and patient survival outcomes, to stratify patients with AML as a means to enable more appropriate and personalized treatment regimens.

Application

Risk stratification tool for patients with AML

Advantages

Technology ID

AIF01-12

Category

Life Sciences/Diagnostics
Life Sciences/Therapeutics/Oncology
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- **Novel risk stratification methodology:** iScore classifies AML patients based on their immune BM microenvironment and not other classical oncogenic drivers.
- **Enables personalized AML treatment and increased consideration for immunotherapy**
- **Ease of use:** The iScore system can be quickly and conveniently implemented in clinical settings by physicians with access to RNA sequencing facilities.
- **Risk assessment accuracy:** iScore can accurately predict an AML patient's survival risk.

Development Status

The iScore method has been conceptualized, engineered, and utilized by the inventors to acquire proof-of-concept data.

Intellectual Property

A provisional U.S. patent application has been filed covering (1) the iScore method, (2) the composition of kits for obtaining iScore data, and (3) the design of a software tool for computing the iScore.

References

1. Lasry, et al. , https://www.nature.com/articles/s43018-022-00480-0

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