conferenceseries.com

14th International Conference on EHEALTH TECHNOLOGIES

September 18, 2023 | Webinar

Artificial Intelligence based prediction of acute GvHD after reduced-intensity allogeneic Hematopoietic Stem Cell Transplantation

Vaishnavi Balaji
Chandigarh University, Punjab, India

Statement of the problem: Acute graft-versus-host disease (GvHD) is a major barrier in allogeneic hematopoietic stem-cell transplantation (HSCT) [1]. Better tools to accurately predict acute GvHD could facilitate personalized strategies to improve patient outcomes. Recently, machine learning (ML) approaches utilizing donor and recipient demographic information have proved superior to parametric methodologies for predicting acute GvHD, but still only achieve moderate accuracy and have not included late-onset acute GvHD commonly seen after widely adopted reducedintensity HSCT platforms [2]. We therefore applied a novel ML pipeline to demographic data to optimize prediction models of acute GvHD after reduced-intensity allogeneic HSCT.

Methodology & theoretical orientation: We scrutinized routinely available donor and recipient demographic data and clinical outcomes from a cohort of 453 patients who underwent reduced-intensity allogeneic HSCT for hematologic malignancies at our center between 1998 and 2020. All patients received peripheral blood stem-cells from HLA-A-, B-, C- and DR-matched related or unrelated donors after uniform fludarabine-based reduced-intensity conditioning without T-cell depletion or serotherapy. A bespoke artificial Intelligence system was developed to find patterns with pre-transplant demographic and clinical variables to identify patients who developed acute GvHD.

Findings: The algorithm performed with AUC 0.61 in predicting acute GvHD Grade 2-4 and can perform with AUC 0.81 for predicting acute GvHD Grade 3-4. Further imputing HLA Typing information significantly improved the prediction around to AUC 0.64 and AUC 0.85 respectively. The below figure shows the importance of different features in predicting acute GvHD Grade 3-4.

Conclusion: Our use of innovative ML techniques significantly improves the accuracy of models using demographic data to predict classical and late-onset acute GvHD after reduced-intensity allogeneic HSCT. These highly accurate models could better inform donor selection and underpin risk-based personalized immunosuppression strategies to improve the outcomes of patients.

Biography

Vaishnavi Balaji has been working as a Data Scientist in Curenetics. She pursued her Bachelor studies in Information Technology and master's in data science from the University of Glasgow. Under Curenetics, she worked with multiple universities and research labs across the UK to carry out various AI based research in MedTech including Stem cell transplantation, Oral Cancer, Prostrate Cancer and Immunotherapy.