Clinical

Immunological predictors of chronicity in pediatric immune thrombocytopenia (ITP) patients: A flow cytometry approach.

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Background: Immune thrombocytopenia (ITP) is an autoimmune disorder causing platelet destruction due to antiplatelet antibodies or T cell-mediated targeting. While many pediatric cases resolve within a year, some progress to chronic ITP. Identifying predictive markers for chronicity is essential to optimize treatment, minimize unnecessary interventions, and enhance patient outcomes.

Methodology: This study employed flow cytometry immunophenotyping to analyze 79 immune cell subsets in 93 patients. At presentation 41 acute ITP patients (going to complete remission) and 52 patients with chronic ITP were included in the study. The analysis focused on parameters such as absolute lymphocyte count (ALC), NK cells, and various T (naive, effector, TEMRA, memory) and B cell subsets (naive, class switch memory). Mann-Whitney U test and chi square test were performed to find differences in immune parameters between acute and chronic ITP patients followed by logistic regression to determine the best predictive markers for chronic ITP.

Results: The variable significant at 20% were included in the final analysis. Stepwise logistic regression identified three significant predictors of chronicity: increased class switch memory B cells (OR 1.101, 95% CI 1.006-1.206) (sensitivity=71.4% , specificity=61.5%), elevated TEMRA Tc-cells (OR 1.114, 95% CI 1.050-1.181) (sensitivity=75.5% , specificity=71.8%), and decreased ALC (OR 0.999, 95% CI 0.999-1) (sensitivity=74.4% , specificity=61.2%). Cut-off values for clinical utility were established: ALC below 3165 cells/µL (AUC: 0.681), class switch memory B cells above 8.12% (AUC: 0.652), and TEMRA Tc- cells above 11.76% (AUC: 0.744) to enhance clinical utility. Combining all 3 parameters improved the model AUC to 0.837 and sensitivity and specificity to 74.5% and 85.4% respectively.

Discussion: The findings suggest that increased class switch memory B cells and effector Tc cells, alongside lower ALC, are associated with chronic ITP. These markers reflect sustained immune activation and cytotoxic activity. The cut-off values provide practical thresholds for predicting chronicity, offering clinicians a tool for better risk stratification and management.

Conclusion: Integrating these immune markers into clinical practice can improve the prediction of chronic ITP in pediatric patients. This allows for more personalized treatment strategies, including earlier intervention with second-line therapies, potentially reducing unnecessary treatments in acute ITP and enhancing overall patient care and outcomes.