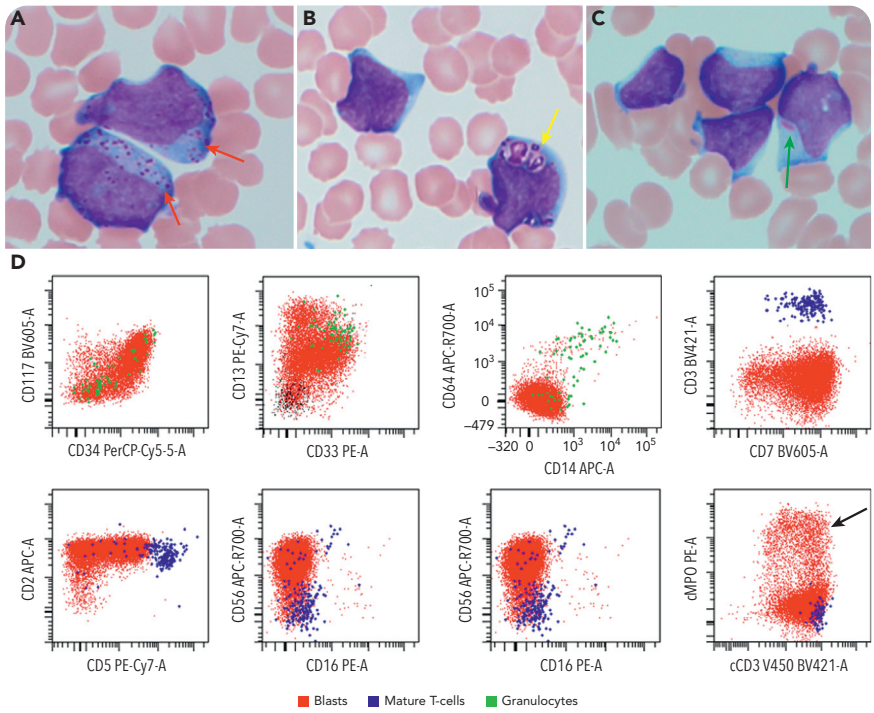
blood work
images in hematology

Pediatric mixed phenotype acute leukemia, T/myeloid, with isolated *FLT3* mutation

Hamza Tariq and Adam Davis, Sanford Medical Center



A 16-year-old boy presented with marked leukocytosis (117.1 × 10^3/μL) and thrombocytopenia (47 × 10^3/μL). Peripheral smear showed 90% blasts (panels A-C; 100× objective, total magnification ×1000; Wright-Giemsa stain) that showed frequent azurophilic granules (red arrows), occasional pseudo-Chédiak-Higashi granules (yellow arrow), and rare Auer rods (green arrow). Flow cytometry revealed a mixed T/myeloid phenotype (panel D), ie, positivity for CD45 (dim), CD34, CD117, CD13, CD33 (dim), HLA-DR, cytoplasmic-myeloperoxidase (MPO) (subset, black arrow), cytoplasmic-CD3, CD2, CD5 (dim/partial), CD7, and CD56; and negativity for CD14, CD64, surface-CD3, CD16, CD4, CD8, and TDT. Bone marrow biopsy showed sheets of blasts positive for CD3, MPO (focal), and CD34 by immunohistochemistry. Cytogenetics showed a normal male karyotype. Comprehensive fluorescence in situ hybridization panels for pediatric acute myeloid leukemia and T-acute lymphoblastic leukemia were negative for all probes tested, including *BCR::ABL1* and *PML/RARA* fusions, and *KMT2A* rearrangement. A 47-gene next-generation sequencing panel detected an isolated *FLT3*-ITD mutation. A diagnosis of mixed phenotypic acute leukemia (MPAL) T/myeloid, not otherwise specified was rendered, and induction therapy per AALL1732 protocol (mBFM$^+$ inotuzumab ozogamicin) and gilteritinib were administered. Postinduction marrow biopsy showed no evidence of residual disease by minimal residual disease flow cytometric evaluation and *FLT3*-ITD reverse transcription-polymerase chain reaction mutational analysis was negative.

Pathogenic *FLT3* mutations have been reported in a subset of MPALs and present a potentially beneficial therapeutic target as well as a viable option for residual disease monitoring.

https://doi.org/10.1182/blood.2023019752