LETTER TO THE EDITOR

Novel tripartite *CPSF7*::*RARG*::*CPSF7* fusion confers primary ATRA resistance in atypical acute promyelocytic leukemia

Authors

Xiaosu Zhou,[1*] Zhanglin Zhang,[2*] Fang Xu,[3*] Mei Jiang,[4] Yang Zhang,[1,5] Panxiang Cao,[5] Jiancheng Fang,[5] Xiaoli Ma,[5] Fang Wang,[5] Jiaqi Chen,[1,5] Xue Chen,[1,5] Ping Wu,[5] Tong Wang,[5] Yue Lu[3#] and Hongxing Liu[1,5,6#]

[1]Precision Medicine Center, Beijing Lu Daopei Institute of Hematology, Beijing; [2]Department of Blood Transfusion, The First Affiliated Hospital of Nanchang University, Nanchang; [3]Department of Transplantation, Hebei Yanda Lu Daopei Hospital, Langfang; [4]Department of Clinical Laboratory, the First Affiliated Hospital, Jiangxi Medical College, Nanchang University, Nanchang; [5]Division of Pathology & Laboratory Medicine, Hebei Yanda Lu Daopei Hospital, Langfang and [6]Division of Pathology & Laboratory Medicine, Beijing Lu Daopei Hospital, Beijing, China

*XZ, ZZ, and FX contributed equally as first authors.

Correspondence:
H. LIU - starliu@pku.edu.cn
Y. LU - dpluyue@sina.com

https://doi.org/10.3324/haematol.2026.300904

Received: March 15, 2026.
Accepted: May 18, 2026.
Early view: May 28, 2026.

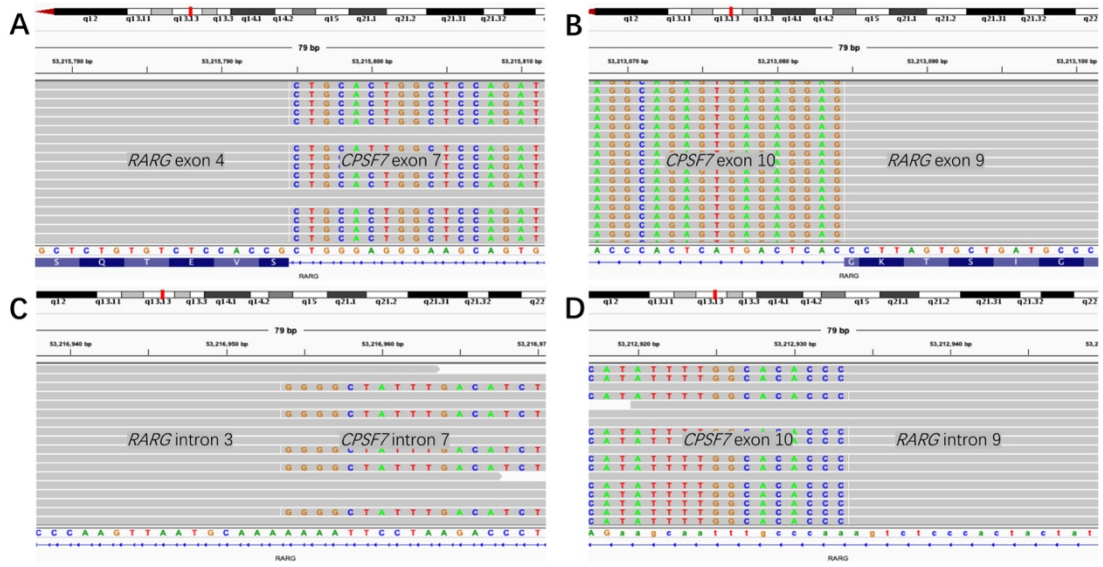
©2026 Ferrata Storti Foundation
Published under a CC BY-NC license

Supplementary Table S1. 36 fusion genes included in our screening panel [1].

1.BCR-ABL1	2.BCR-FGFR1	3.CBFB-MYH11	4.DEK-NUP214
5.ETV6-ABL1	6.ETV6-PDGFRB	7.ETV6-RUNX1	8.FIP1L1-PDGFRA
9.FUS-ERG	10.KMT2A-AFF1	11.KMT2A-ELL	12.KMT2A-EPS15
13.KMT2A-MLLT1	14.KMT2A-MLLT3	15.KMT2A-MLLT4	16.KMT2A-MLLT6
17.KMT2A-MLLT7	18.KMT2A-MLLT10	19.KMT2A-MLLT11	20.KMT2A-PTD
21.NPM1-ALK	22.NPM1-MLF1	23.NPM1-RARA	24.NUP98-HOXA9
25.NUP98-HOXD13	26.PML-RARA	27.RPN1-MECOM	28.RUNX1-EAP
29.RUNX1-RUNX1T1	30.RUNX1-MECOM	31.SET-NUP214	32.STIL-TAL1
33.TCF3-HLF	34.TCF3-PBX1	35.ZBTB16-RARA	36.ZMYM2-FGFR1

[1] Chen, X., Wang, F., Zhang, et al. Panoramic view of common fusion genes in a large cohort of Chinese de novo acute myeloid leukemia patients. Leukemia & lymphoma. 2019;60(4):1071–1078.

Supplementary Figure S1



Supplementary Figure S1. IGV validation of the tripartite *CPSF7*::*RARG*::*CPSF7* fusion breakpoints. **A** IGV view of the *CPSF7* exon 7::*RARG* exon 4 splicing detected in WTS. **B** IGV view of the *RARG* exon 9::*CPSF7* exon 10@c.*1143 splicing detected in WTS. **C** IGV view of the *CPSF7* intron 7::*RARG* intron 3 splicing detected in WGS; **D** IGV view of the *RARG* intron 9 and *CPSF7* exon 10 splicing detected in WGS.

IGV, integrative genomics viewer; UMAP, Uniform Manifold Approximation and Projection; WGS, whole-genome sequencing; WTS, whole-transcriptome sequencing.