

## Cleaved Leukemic Blast Cells, Vacuolation and Pseudopodia-like Cytoplasmic Projections in Acute Myeloid Leukemia with *TLS::ERG*

Huang X. et al.: Cleaved leukemic blast cells in AML with *TLS::ERG*

Xingqin Huang<sup>1</sup>, Linglin Jiang<sup>1</sup>, Ting Li<sup>2</sup>, Mei Yang<sup>3</sup>

<sup>1</sup>Department of Hematology, Southwest Hospital, Third Military Medical University (Army Medical University), Chongqing, China

<sup>2</sup>Department of Laboratory Medicine, Beijing Ludaopei Hospital, Beijing, China

<sup>3</sup>Medical Genetics Center, Jiangmen Maternity and Child Health Care Hospital, Jiangmen, Guangdong, China

Xingqin Huang and Linglin Jiang contributed equally to this work.

Mei Yang, Medical Genetics Center, Jiangmen Maternity and Child Health Care Hospital, Jiangmen, Guangdong, China  
yangmeisysu@163.com

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### Abstract

Generally, clefted lymphocytes can mainly occur in patients with *Bordetella pertussis* infection, follicular lymphoma, or less commonly in chronic lymphocytic leukemias. The presence of cleaved leukemic blast cells in cases with AML is quite rare. Additionally, in the absence of typical morphological findings (including blasts with hemophagocytosis, eosinophilia and micromegakaryocytes) in AML with *TLS::ERG*, the occurrence of cleaved blast cells, as well as vacuolation and cytoplasmic pseudopod formation in the present case is extremely uncommon. Moreover, CD56 expression in AML with *t(16;21)* has been suggested to connect with a poor prognosis, and may influence the CR duration and overall survival. Our present case presented partial expression of CD56 and bone marrow reexamination showed continuous CR for three months, but due to economic reasons, he did not continue follow-up examination, and the efficacy could not be evaluated. In brief, this case reminds us to recognize atypical morphologic features of clefted leukemic blasts and pseudopodia-like cytoplasmic projections in some subtypes of leukemias.

A 28-year-old man was admitted due to swelling of both lower limbs for more than 1 month, worsening with headache and intermittent fever for 4 days. Peripheral blood smear showed approximately 20% blasts with clefted nuclei, accompanied with occasional Auer bodies in cytoplasm (Fig. 1a-b). Bone marrow aspiration revealed 94.5% blasts, showing markedly malformed nuclei of various sizes, and agranular basophilic cytoplasm with pseudopod formation. Strikingly cleaved blast cells (consisting of 40% blasts), as well as multiple large vacuoles, were observed (Fig. 1c-d). Immunophenotyping of flow cytometric analysis demonstrated the blasts were positive for CD33, CD34, CD117, CD38, partially positive for HLA-DR, CD7, CD56 and CD15, and negative for CD4, cCD3, CD8, CD2, CD10, CD14, CD20, CD64, CD19, CD123, CD36, CD61 and MPO. Cytogenetic analysis showed 46,XY,add(2)(q37),t(16;21)(p12;q22)[20]. Next generation sequencing detected the *TLS::ERG* fusion gene. Other somatic mutations, including *ABL1*, *ABL2*, *CBL*, *CEBPA*, *CRLF2*, *DNMT3A*, *EP300*, *EPOR*, *ETV6*, *IDH1*, *IDH2*, *KIT*, *KMT2A*, *KRAS*, *NF1*, *NOTCH1*, *NPM1*, *NRAS*, *RUNX1*, *PAX5*, *TET2*, *TP53* and *WT1*, were not detected. All these results collectively confirmed the diagnosis of acute myeloid leukemia (AML) with *TLS::ERG*.

Generally, clefted lymphocytes can mainly occur in patients with *Bordetella pertussis* infection,<sup>1</sup> follicular lymphoma,<sup>2</sup> or less commonly in chronic lymphocytic leukemias.<sup>3</sup> Additionally, in the absence of typical morphological findings (including blasts with hemophagocytosis, basophilia and micromegakaryocytes) in AML with *TLS::ERG*,<sup>4</sup> the occurrence of cleaved blast cells, as well as vacuolation and cytoplasmic pseudopod formation in the present case is extremely uncommon.

### Compliance with ethical standards

**Conflict of Interest** The authors declare that they have no conflicts of interest.

**Informed consent** Informed consent was obtained from this patient.

**Ethical approval** All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional and national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

#### CONFLICTS OF INTEREST

Authors of this manuscript declare that no one has conflict of interest to disclose.

#### AUTHOR CONTRIBUTIONS

All authors contributed to the paper conception and design. Clinical and histological data were collected by Xingqin Huang and Linglin Jiang. The draft of the manuscript was written by Ting Li and Mei Yang, and all authors read and approved the final manuscript.

#### ETHICAL APPROVAL

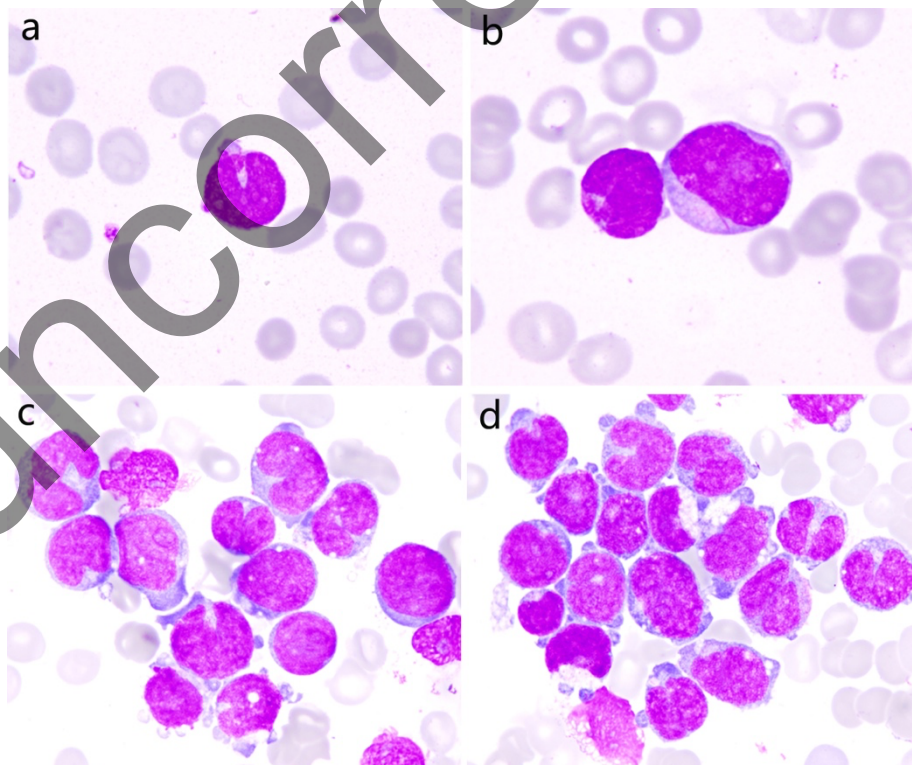
This article does not contain any studies with human participants or animals performed by any of the authors.

#### DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

#### References

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**Figure 1.** Peripheral blood smear showed approximately 20% blasts with clefted nuclei, accompanied with occasional Auer bodies in cytoplasm (a-b, Wright-Giemsa stain,  $\times 1000$ ). Bone marrow aspiration revealed 94.5% blasts, showing markedly malformed nuclei of various sizes and agranular basophilic cytoplasm with pseudopod formation. Cleaved blast cells (consisting of 40% blasts) and multiple large vacuoles were observed (c-d, Wright-Giemsa stain,  $\times 1000$ ).

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