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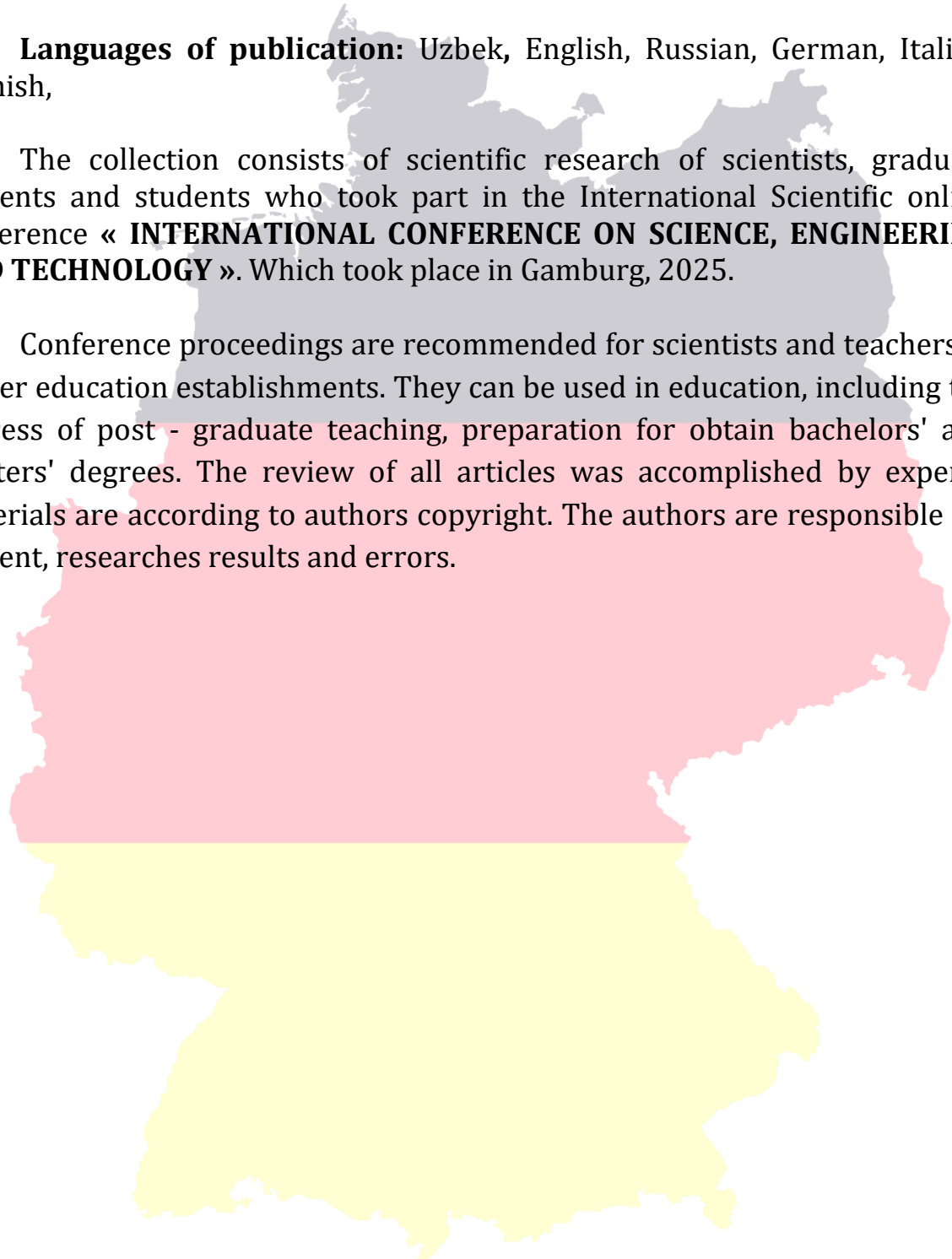


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MORPHOLOGIC AND IMMUNOLOGIC CLASSIFICATION OF ACUTE MYELOID LEUKEMIA IN CHILDREN AND ITS CLINICAL SIGNIFICANCE

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Introduction

Among pediatric oncohematological diseases, acute myeloblastic leukemia (AML) occupies a particularly significant place. It arises as a result of clonal genetic alterations in hematopoietic stem cells, leading to abnormal proliferation and impaired differentiation of myeloid precursors. AML accounts for approximately 15–20% of all childhood leukemias and is clinically characterized by rapid progression, high relapse rates, and severe hematopoietic suppression.

Morphological and immunophenotypic methods play a crucial role in identifying AML subtypes, confirming diagnosis, and assessing prognosis. Current scientific advances focus on studying the differentiation level and biological activity of myeloid stem cells in children, helping to reveal the disease's individual characteristics and refine diagnostic accuracy.

Relevance of the Problem

Although AML is relatively rare in children, its aggressive course and variable response to therapy necessitate a comprehensive investigation of its biological nature. Morphological analysis provides essential data about blast cell shape, nuclear morphology, and cytoplasmic structure, but in some cases, such parameters are not sufficient for definitive diagnosis. Therefore, the integration of morphological and immunophenotypic analyses has become recognized as the “gold standard” in AML diagnostics.

Immunophenotyping enables the determination of cell lineage and maturation stage through identification of cluster of differentiation (CD) surface markers. The positivity of CD13, CD33, CD117, and MPO markers indicates a myeloid lineage, while CD34 and HLA-DR expression reflects stem-cell-like properties. Such data are essential not only for diagnosis but also for prognostic assessment and evaluation of therapeutic effectiveness.

Aim of the study

To analyze the morphological and immunophenotypic characteristics of acute myeloblastic leukemia in children, evaluate the correlation between them, and determine their diagnostic value.



Materials and methods

The study included 28 pediatric patients aged 5–14 years diagnosed with AML and treated between 2021 and 2024 in the oncohematology department. Bone marrow aspirates and peripheral blood samples were collected from each patient.

Morphological examination was carried out using Romanowsky–Giemsa staining under light microscopy. Immunophenotyping was performed by flow cytometry, targeting CD13, CD33, CD34, CD117, HLA-DR, and MPO markers. Statistical analysis was conducted using a significance threshold of $p < 0.05$.

Results

Morphological evaluation revealed Auer rods in 71% of cases, while 83% of patients displayed a high nucleus-to-cytoplasm ratio and large nuclei with fine chromatin. The presence of cytoplasmic granules confirmed the myeloid origin of the blasts.

According to immunophenotyping results, CD33 and CD13 showed high expression in 85% of patients. CD117 positivity was observed in 62%, while CD34 and HLA-DR were detected in 48% and 53%, respectively. MPO enzyme activity was positive in 70% of cases. The concordance between morphological and immunophenotypic data was recorded in 82% of patients.

Such a close correlation between morphological findings and immunophenotypic profiles substantially improved diagnostic accuracy and facilitated more precise prognostic stratification.

Conclusion

In pediatric acute myeloblastic leukemia, morphological characteristics demonstrate intense proliferation of myeloid-lineage blast cells, with frequent detection of Auer rods and cytoplasmic granularity.

Immunophenotypic analysis confirms the myeloid origin of leukemic blasts through expression of CD13, CD33, and MPO markers. Integrating morphological and immunophenotypic approaches increases diagnostic accuracy to approximately 80–85%. A combined morpho-immunophenotypic evaluation represents an effective and reliable method for early diagnosis and individualized therapeutic planning in childhood AML.

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