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Genetic imprints in blast morphology: A visual signature of hidden recurrent genetic abnormalities in acute leukemia

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Morphological recognition is an inherent cognitive skill in all higher species of living beings. In human life, the skill starts right from the early infancy. It is well presumed that even in distant future; human beings will recognize each other by the facial morphology and would call each other by their names. So it happens in the recognition of blood cell morphology as well in the initial diagnosis of a hematological disorder. The value of morphological evaluation is crucial in the diagnostic work-up of leukemia. Even after so much of advancement in the immunophenotypic and molecular characterization of hemopoietic cells in the present era, the WHO consensus on blast cell count in the bone marrow sample strictly remains a visual recognition of the blasts by their morphology [1]. It is reported well in literatures that a specific morphology of blast often coincides with a specific recurrent genetic abnormality. The reason being unknown and performance of morphological skill being subjective to the level of expertise on the part of the morphologist; recognition of these specific morphological features of a blast still uphold its clinical significance for an early diagnosis and timely intervention. Finding of multiple Auer rods in a blast is almost always consistent with t(15;17)(q22;q12); PML-RARA; a consistent morphological signature of a recurrent genetic abnormality in acute promyelocytic leukemia, the recognition of which leads to a timely intervention to prevent complications arising from disseminate intravascular coagulation (DIC) and severe thrombocytopenia. Likewise, a long slender Auer rod with tapering ends facing a nuclear indentation might suggest the molecular event, t(8;21)(q22;q22); RUNX1-RUNX1T1 which bears a good prognosis; presence of a few dysplastic eosinophils in the bone marrow of an acute myeloblastic leukemia is frequently associated with the genetic event, t(9;11)(q22;q23); *MLLT3-MLL* that has a poor prognosis; etc. This study reveals the consistency of such well recognized morphological features with recurrent genetic abnormalities in acute leukemia as defined by the World Health Organization Classification of leukemia/lymphoma, 2008. This study was carried out amongst 120 cases of newly diagnosed acute leukemia in a regional cancer institute in India. A complete diagnostic work-up included a complete blood count, peripheral blood and bone marrow smears, bone marrow trephine biopsy and touch imprints, cytochemical study with myeloperoxidase and non-specific esterase; multiparametric 2-laser-4-color flow cytometry and multiplex PCR that could detect 28 translocations or chromosomal rearrangements including more than 80 breakpoints of mRNA spice variants. This study demonstrated a significant correlation of underlying recurrent genetic abnormalities in acute leukemia with corresponding, well defined variations in the blast morphology. This study also emphasizes the clinical significance and cost effectiveness of early recognition of such variants of blastic morphology consistent with specific recurrent genetic abnormalities.

Biography

Biswadip Hazarika, MD, is working at present as an Assistant Professor in the department of Pathology in the Gulf Medical University, Ajman, United Arab Emirates. He is the Program Coordinator for the graduate program, Masters of Science in Clinical Pathology, and course Chairperson for Hematology. Before joining in the Gulf Medical University, he worked as a Consultant and Laboratory- In-Charge in the hemato-oncology laboratory in a regional institute of cancer treatment & research, B. Borooah Cancer Institute, in India. He also served as a Junior Consultant in the Department of Hematology in the Apollo Hospital, Chennai, India. Hazarika's recent publications in the academic year September 2012- August 2013 include 3 papers in the journal Blood, the official journal of the American Society of Hematology, 2 papers in American Journal of Hematology and 1 paper in the International Journal of Laboratory Hematology, the official journal of the International Society for Laboratory Hematology. Hazarika's research interests are diagnostic morphology and molecular studies in hematological malignancies.

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