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Breakpoint junctional site of KMT2A (MLL) rearrangements in acute leukemia: A brief review of cases

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Introduction: Recurring non-random clonal cytogenetic changes have been identified in specific morphologic tumor types. In a multidisciplinary approach to patient care, Cytogenetics, Fluorescence in situ hybridization (FISH) and Chromosomal microarray (CMA) play a crucial role in contributing to diagnosis, prognosis and genotype-specific therapy decisions for clinicians in the management of hematological neoplasm. We report here two cases of leukemia with abnormal findings by Cytogenetics, FISH and copy number variation (CNV) with Affymetrix CytoScan HD Array.

Case 1: A 11 year old male with pediatric B cell ALL was referred for increased lymphoblasts with 92% of CD19+ cells Cd10, CD13, CD20, CD33, CD34 partial+ and TdT+. The karyotype of this patient was identified as: 46, XY, t(4;11)(q21;q23)[4]/47, idem, +21[14]/46, XY. FISH revealed a rearrangement of KMT2A locus in 93.5% and 3 copies of the RUNX1 locus at 21q22 in 58% of cells confirming the presence of t(4;11) and +21.

Case 2: A 50 year old male with monocytic differentiation, 87% blasts, NPM!-, *FLT3*-ITD, CEBPA-AML was referred for cytogenetics and FISH testing. He was identified with 46, XY, t(9;11)(p22;q23) in all the 20 cells and KMT2A (MLL) rearrangement in 85.5% of the cells. Affymetrix SNP array identified small genomic deletion or copy number variation at the breakpoint junction site of t(4;11) involving AFF1-KMT2A and t(9;11) translocation involving MLLT3-KMT2A genes. It is not clear at this point if genes with copy number breakpoints are represented at much higher level in cancer versus normal cells. It is also not clear if the size of these small deletions at junctional sites of translocations differs from patient to patient with similar translocations and/or differs between array platforms. These genes involved in recurrent translocations and or rearrangements are worthy of further studies.

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Working with families who have patient with leukemia

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Background: Leukemia is a cancer that starts in the stem cells of the bone marrow that make blood cells. Survival from childhood acute lymphoblastic leukemia (ALL) has continued to improve in economically-developed regions of the world, but 20% of patients still die within 5 years of diagnosis. Factors relating to socioeconomic status and or treatment adherence are increasingly scrutinized as potentially important determinants of outcome.

Objectives: The objectives of this study were to assess the effect of the leukemia on the patient, to assess the effect of leukemia on family members and to develop an approach to support the patients with leukemia and their family.

Methods: This study is based on use of textbooks, internet searches (PubMed, BMJ & Medline) and reviewing published articles.

Results & Conclusions: The results of most of the studies indicated that social functioning of the family is important. Families who were able to act openly, express feelings directly and solve problems effectively had lower levels of depression. Direct communication of information within the family was associated with lower levels of anxiety. Researchers and clinicians need to be family-focused since cancer affects the whole family not just the patient.

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