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Discrepancies between DNA index by flow cytometry and cytogenetic studies in childhood β-lymphoblastic leukemia

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Objectives: To estimate the reliability of flow cytometry in the early classification of childhood acute lymphoblastic leukemia (B-ALL) and to analyze the causes of discrepancies between the DNA index by flow cytometry (DNAI-FCM) and the cytogenetic studies (CG);(Karyotype and Fluorescent in situ hybridization; FISH).

Methods: DNAI-FCM and CG (Karyotype and FISH) were analyzed in 69 consecutive children, newly diagnosed with acute B-lymphoblastic leukemia (B-ALL) in King Faisal Specialist Hospital between the years 2012 and 2014.

Results: A statistically significant correlation existed between DNAI-FCM and CG ($p = 0.001$). DNAI-FCM was proportional to CG in (57/69) 82.6% of the cases. There was a discrepancy between the DNAI-FCM and the CG in (12/69) 17.4% of the cases. Ten cases had a DNAI-FCM of 1 and were hyperdiploid (47-50) by karyotype and/or FISH, one case had a DNAI-FCM of 0.8 with a diploid karyotype and hyperdiploid by FISH. One case had DNAI-FCM of 1.14 and diploid karyotype while FISH was not done. In studying these cases, three cases showed a hyperdiploid karyotype detected in less than 10% of the cells by FISH or small number of cells by karyotype. One case had DNAI-FCM of 1.14, karyotype revealed a diploid number of chromosomes in 4 cells, while FISH was not done due to insufficient quantity. Four cases exhibit trisomy or tetrasomy 21 in almost 100% of the cells by FISH, while compared to the matching cases 24/ 57 have extra copies of chromosome 21. These extra copies in 22/24 are exclusively along with extra copies of chromosome 4, 10, 17. 2/24, karyotype was not done and they were negative for the B-ALL FISH panel. Trisomy 4,10,17 are detected in (47-50) hyperdiploid cases. The cause of the discrepancy in the remaining 4 cases was not clear.

Conclusion: DNAI-FCM is 82.6% reliable in the early classification of childhood B-ALL with a predictive value of 81%. Discrepancies do occur in 17.4%. In 66.66% this mismatch refers to either the small size of the chromosome or to an insufficient genetic material representing abnormality.

Biography

Nour Al-Mozain has graduated from the King Khalid University Hospital, College of Medicine with a second degree honor. She is currently a resident in King Saud Fellowship of Hematopathology.

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