Atlas of Genetics and Cytogenetics in Oncology and Haematology

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Leukaemia Section

Mini Review

t(4;11)(q21;p15)

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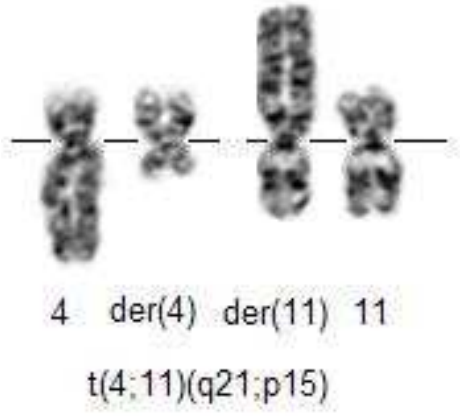
Identity

Note
Not to be confused with a variant of the classical t(4;11)(q21;q23) translocation.



t(4;11)(q21;p15) G- banding - Courtesy Diane H. Norback, Eric B. Johnson, Sara Morrison-Delap Cytogenetics at theWaisman Center

Clinics and pathology

Disease

T-cell acute lymphoblastic leukemia.

Phenotype/cell stem origin

Lymphoblasts, either L1 or L2 in the FAB classification; mature T and myeloid markers variably co-expressed.

Epidemiology

Rare, approximately 10 cases described; evaluated to 2-5% of adult T-ALL; not evaluated in childhood ALL; both sexes equally involved; found in children or young adults.

Clinics

No notable particular aspect.

Prognosis

Probably unfavorable, median survival below 18 months; improved by allogeneic bone marrow transplantation.

Cytogenetics

Cytogenetics morphological

In approximately 2/3 of cases; 2 cases with 12p-.

Cytogenetics molecular

Two BAC clones 290A12 and 118H17 (California Institute of Technology BAC library) encompasses all NUP98 gene and are split by translocation.

Variants
Not described.

Genes involved and proteins

RAP1GDS1

Location
4q22.3

Protein
SmgGDS, 558 amino acids; stimulates GDP --> GTP transition in a series of small GTP-binding proteins (g proteins) including rap1a, rap1b, K-ras, rac1, rac2, rhoA and ralB.

Somatic mutations
Not involved in other known clonal rearrangement associated with tumoral proliferation.

NUP98

Location
11p15.4

Protein
Nucleoporin 98, a 98 kDa component of the nuclear pore complex implicated in nucleo-cytoplasmic transport.

Somatic mutations
involved in different types of acute myeloid leukemia, as fusion gene with HOX A9, DDX10, HOX D13, TOP1, PMX1 and LEDGF, resulting respectively from t(7;11)(p15;p15), inv(11)(p15q22), t(2;11)(q31;p15), t(11;20)(p15;q11), t(1;11)(q23;p15) and t(9;11)(p22;p15).

Result of the chromosomal anomaly

Hybrid gene

Description
NUP98 breakpoint in the intron between exons B and C; 5'-part of NUP98 is fused in frame with the whole coding sequence of RAP1GDS1; fusion gene called NRG: 5'-NUP-RAP1GDS1-3'. Variant described with breakpoint in NUP98 before exon A.

Fusion protein

Description
t(4;11) generates only one chimeric protein 5' - NUP98 - RAP1GDS1 - 3' which contains a variable part of NUP98 and the totality of smgGDS except for the initial methionine.

References

Kalatzis V, Peters GB, Dobrovic A. Mapping of the chromosome 11 breakpoint of the t(4;11)(q21;p14-15) translocation. Cancer Genet Cytogenet. 1993 Sep;69(2):122-5

Hussey DJ, Nicola M, Moore S, Peters GB, Dobrovic A. The (4;11)(q21;p15) translocation fuses the NUP98 and RAP1GDS1 genes and is recurrent in T-cell acute lymphocytic leukemia. Blood. 1999 Sep 15;94(6):2072-9

Mecucci C, La Starza R, Negrini M, Sabbioni S, Crescenzi B, Leoni P, Di Raimondo F, Krampera M, Cimino G, Tafuri A, Cuneo A, Vitale A, Foà R. t(4;11)(q21;p15) translocation involving NUP98 and RAP1GDS1 genes: characterization of a new subset of T acute lymphoblastic leukaemia. Br J Haematol. 2000 Jun;109(4):788-93

Cimino G, Sprovieri T, Rapanotti MC, Foà R, Mecucci C, Mandelli F. Molecular evaluation of the NUP98/RAP1GDS1 gene frequency in adults with T-acute lymphoblastic leukemia. Haematologica. 2001 Apr;86(4):436-7

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