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Leukaemia Section
Short Communication

t(10;14)(q24;q11), t(7;10)(q34;q24)

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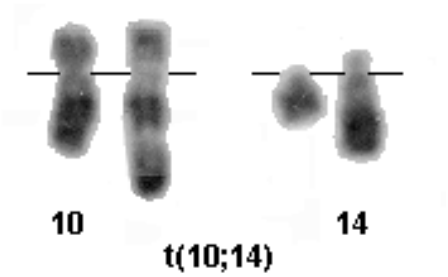

t(10;14)(q24;q11) R-banding -Courtesy Pascale Cornillet-Lefebvre and Stéphanie Struski.

Clinics and pathology

Disease

Acute lymphoblastic leukemia (ALL) and non-Hodgkin lymphoma (NHL) with medullary involvement.

Phenotype/cell stem origin

T lineage; occurs at early stage of T cell development.

Epidemiology

5 to 10% of T cell ALL.

Clinics

Organomegaly with marked hepatosplenomegaly, lymphadenopathy, mediastinal mass, high WBC count (100 to 200 X 10^9/l) sometimes with anemia.

Cytology

High blast count in bone marrow.

Prognosis

Not unfavourable.

Cytogenetics

Cytogenetics morphological

t(10;14)(q24;q11) is the sole anomaly in half cases; t(7;10)(q34;q24) is a rare variant translocation.

Additional anomalies

Number or structural changes involving various chromosomes, sometimes complex.

Genes involved and proteins

HOX 11 (previously called TCL3)

Location
10q24

DNA/RNA
Spans over 7 kb, 3 exons, mRNA 7 kb.

Protein
HOX 11 homeoprotein, 61 amino acids, nuclear localisation, binds DNA to transactivate transcription, not normally expressed in adult tissues at levels detectable by routine Northern analysis.

TRD

Location
14q11

Note
Or TRB in the case of a 7q34-36 involvement.

Protein
T-cell receptor.

Result of the chromosomal anomaly

Fusion protein

Description

No fusion protein, but promoter exchange; through aberrant physiological recombination, HOX 11 is placed under the control of regulatory domains of the TCTD gene and deregulated.

Oncogenesis

Inappropriate and abundant expression of HOX 11 in T- lineage cells bearing the translocation.

References

Dubé ID, Raimondi SC, Pi D, Kalousek DK. A new translocation, t(10;14)(q24;q11), in T cell neoplasia. Blood. 1986 Apr;67(4):1181-4

Kagan J, Finan J, Letofsky J, Besa EC, Nowell PC, Croce CM. Alpha-chain locus of the T-cell antigen receptor is involved in the t(10;14) chromosome translocation of T-cell acute lymphocytic leukemia. Proc Natl Acad Sci U S A. 1987 Jul;84(13):4543-6

Raimondi SC, Pui CH, Behm FG, Williams DL. 7q32-q36 translocations in childhood T cell leukemia: cytogenetic evidence for involvement of the T cell receptor beta-chain gene. Blood. 1987 Jan;69(1):131-4

Kagan J, Finger LR, Letofsky J, Finan J, Nowell PC, Croce CM. Clustering of breakpoints on chromosome 10 in acute T-cell leukemias with the t(10;14) chromosome translocation. Proc Natl Acad Sci U S A. 1989 Jun;86(11):4161-5

Kees UR, Lukeis R, Ford J, Garson OM. Establishment and characterization of a childhood T-cell acute lymphoblastic leukemia cell line, PER-255, with chromosome abnormalities involving 7q32-34 in association with T-cell receptor-beta gene rearrangement. Blood. 1989 Jul;74(1):369-73

Lu M, Dubé I, Raimondi S, Carroll A, Zhao Y, Minden M, Sutherland P. Molecular characterization of the t(10;14) translocation breakpoints in T-cell acute lymphoblastic leukemia: further evidence for illegitimate physiological recombination. Genes Chromosomes Cancer. 1990 Sep;2(3):217-22

Zutter M, Hockett RD, Roberts CW, McGuire EA, Bloomstone J, Morton CC, Deaven LL, Crist WM, Carroll AJ, Korsmeyer SJ. The t(10;14)(q24;q11) of T-cell acute lymphoblastic leukemia juxtaposes the delta T-cell receptor with TCL3, a conserved and activated locus at 10q24. Proc Natl Acad Sci U S A. 1990 Apr;87(8):3161-5

Dubé ID, Kamel-Reid S, Yuan CC, Lu M, Wu X, Corpus G, Raimondi SC, Crist WM, Carroll AJ, Minowada J. A novel human homeobox gene lies at the chromosome 10 breakpoint in lymphoid neoplasias with chromosomal translocation t(10;14). Blood. 1991 Dec 1;78(11):2996-3003

Hatano M, Roberts CW, Minden M, Crist WM, Korsmeyer SJ. Deregulation of a homeobox gene, HOX11, by the t(10;14) in T cell leukemia. Science. 1991 Jul 5;253(5015):79-82

Kennedy MA, Gonzalez-Sarmiento R, Kees UR, Lampert F, Dear N, Boehm T, Rabbitts TH. HOX11, a homeobox-containing T-cell oncogene on human chromosome 10q24. Proc Natl Acad Sci U S A. 1991 Oct 15;88(20):8900-4

Lu M, Gong ZY, Shen WF, Ho AD. The tcl-3 proto-oncogene altered by chromosomal translocation in T-cell leukemia codes for a homeobox protein. EMBO J. 1991 Oct;10(10):2905-10

Lu M, Zhang N, Ho AD. Genomic organization of the putative human homeobox proto-oncogene HOX-11 (TCL-3) and its endogenous expression in T cells. Oncogene. 1992 Jul;7(7):1325-30

Park JK, Le Beau MM, Shows TB, Rowley JD, Diaz MO. A complex genetic rearrangement in a t(10;14)(q24;q11) associated with T-cell acute lymphoblastic leukemia. Genes Chromosomes Cancer. 1992 Jan;4(1):32-40

Kagan J, Joe YS, Freireich EJ. Joining of recombination signals on the der 14q- chromosome in T-cell acute leukemia with t(10;14) chromosome translocation. Cancer Res. 1994 Jan 1;54(1):226-30

Lichty BD, Ackland-Snow J, Noble L, Kamel-Reid S, Dubé ID. Dysregulation of HOX11 by chromosome translocations in T-cell acute lymphoblastic leukemia: a paradigm for homeobox gene involvement in human cancer. Leuk Lymphoma. 1995 Jan;16(3-4):209-15

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