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Leukaemia Section
Short Communication

t(1;14)(q25;q32)

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Identity

Note
Chromosome band 1q21-25 is one of the hotspots of chromosomal abnormalities in hematological malignancy. LHX4 gene at 1q25 is a novel gene coding for LIM proteins.

Clinics and pathology

Disease
Only two cases : Case 1: acute pre-B lymphoblastic leukemia (ALL); case 2: biphenotypic blast crisis of a chronic myelogenous leukemia(CML).

Epidemiology
Rare.

Clinics
Case 1: A 53-year-old woman with ALL; case 2: A 52-year-old in CML blast crisis.

Cytogenetics

Cytogenetics morphological
dup(1)(q21-25) is frequently detected in ALL of B-cell lineage.

Additional anomalies
Case 1: associated with t(9;22)(q23 ?;q11) : the breakpoint at 9q23 reported in this paper needs to be confirmed; case 2: 46,XY,t(9;22)(q34;q11)/46, XY,t(1;14(q25;q32), del(20)(q11;q13.3) / 46,XY, t(1;14)(q25;q32) , add(19)(p13).

Genes involved and proteins

LHX4
Location
1q25.2

Note
Alias: Gsh-4. LHX4 gene is a member of the LIM-homeobox gene.

DNA/RNA
DNA: 44,66 kb and 6 exons. RNA: 1913 bp.

Protein
LHX4 protein (40,8kDa, 390 aa) is very close to LHX3.The human LHX4 includes one tandem pair of zinc-finger LIM motifs and one adjacent homeodomain.

IgH
Location
14q32

Result of the chromosomal anomaly

Hybrid gene
Description
Case 1: the enhancer region of the IgH gene is fused to the 5' regulatory region of the Lhx4 gene in a head-to-head configuration. LHX4 mRNA is expressed at high levels; case 2: the breakpoint fuses the J4 segment of IgH to sequences located
16kb from LHX4 Exon 1 in a head-to-head configuration. LHX4 mRNA is expressed at high levels.

Fusion protein
Note
No fusion protein.

Oncogenesis
LHX4 homeodomain could play an important role as transcriptional regulators in cell regulation, but there is no report about the impairment of hematopoiesis in LHX4 deficient mice and human. There is no report about the transformation activity in the LHX4 gene.

Overexpression of LXH2 has been reported in chronic myeloid leukemias and ALL.

References

Kawamata N, Sakajiri S, Sugimoto KJ, Isobe Y, Kobayashi H, Oshimi K. A novel chromosomal translocation t(1;14)(q25;q32) in pre-B acute lymphoblastic leukemia involves the LIM homeodomain protein gene, Lhx4. Oncogene. 2002 Jul 25;21(32):4983-91

Yamaguchi M, Yamamoto K, Miura O. Aberrant expression of the LHX4 LIM-homeobox gene caused by t(1;14)(q25;q32) in chronic myelogenous leukemia in biphenotypic blast crisis. Genes Chromosomes Cancer. 2003 Nov;38(3):269-73

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