

Leukaemia Section

Short Communication

t(5;11)(q33;q13) NUMA1/PDGFRB a novel fusion

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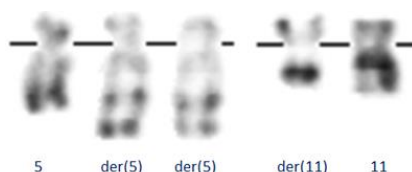
Abstract

A novel NUMA1/PDGFRB fusion identified in B-cell precursor acute lymphoblastic leukemia is described.

KEYWORDS

Chromosome 5; chromosome 11; acute lymphoblastic leukemia; B-ALL; NUMA1; PDGFRB; translocation t(5;11)(q33;q13); fusion gene

Identity



t(5;11)(q33;q13) R-banding, courtesy Virginie Eclache.

Clinics and pathology

Disease

B-cell precursor acute lymphoblastic leukemia (BCP-ALL).

Phenotype/cell stem origin

Common-B immunophenotype (B-II EGIL classification): CD19+, CD22+, CD79a+, CD10+, C μ -

Epidemiology

Only one case described, a 61-year-old man.

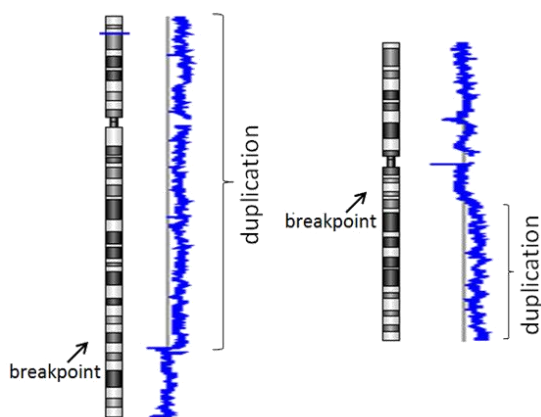
Treatment

GRAAL 2012 (Group for Research in Adult Acute Lymphoblastic Leukemia).

Cytogenetics

Cytogenetics morphological

Unbalanced t(5;11): t(5;11)(q33;q13),+der(5)t(5;11).



CGH analysis suggested a rearrangement between 5q33 and 11q13.

Genes involved and proteins

PDGFRB (platelet-derived growth factor receptor, beta polypeptide)

Location

5q32

DNA/RNA

PDGFRB locus spans approximately 149.5 Mb and contains 23 exons. PDGFRB has been involved in over 30 gene fusion (Roberts, 2012; Kobayashi, 2014).

Protein

The PDGFRB gene encodes a protein of 1106 amino acids with a molecular weight of approximately 124 kDa. Tyrosine-protein kinase that acts as cell-surface receptor for homodimeric PDGFB and PDGFD and for heterodimers formed by PDGFA and PDGFB, and plays an essential role in the regulation of embryonic development, cell proliferation, survival, differentiation, chemotaxis and migration. Play an

essential role in blood vessel development by promoting proliferation, migration and recruitment of pericytes and smooth muscle cells to endothelial cells. Binding of its cognate ligands - homodimeric PDGFB, heterodimers formed by PDGFA and PDGFB or homodimeric PDGFD - leads to the activation of several signaling cascades; the response depends on the nature of the bound ligand and is modulated by the formation of heterodimers between PDGFRA and PDGFRB.

NUMA1 (nuclear mitotic apparatus protein 1)

Location

11q13.4

DNA/RNA

NUMA1 locus spans approximately 78 kb and contains 27 exons; NUMA1 has been involved in a gene fusion with RARA (Wells RA, 1997; Melnick, 1999)

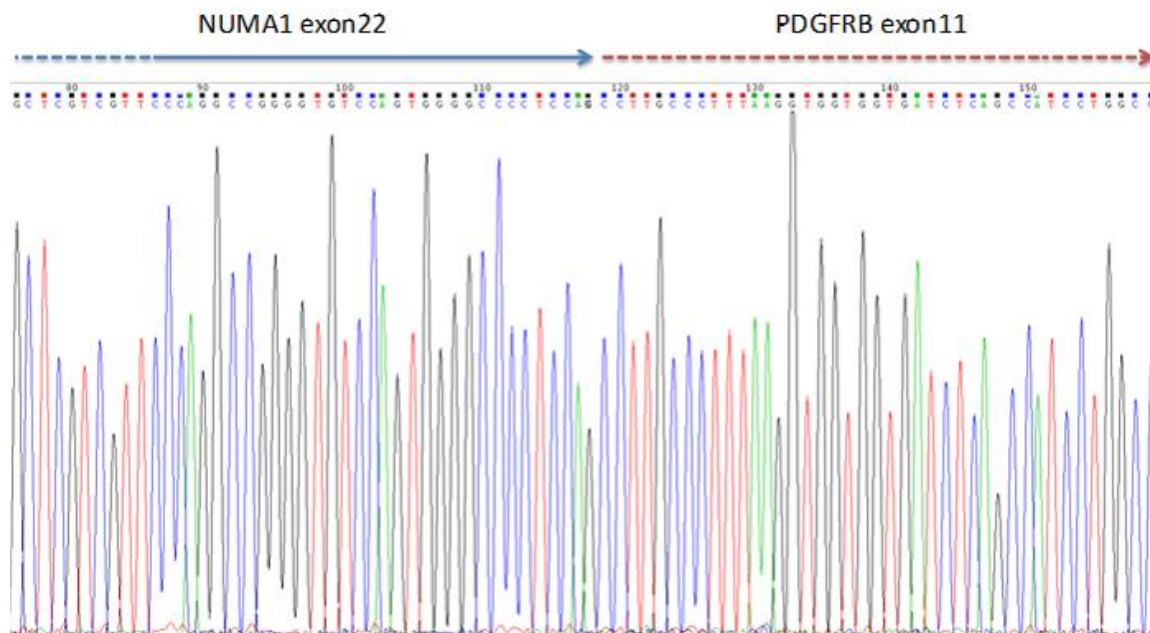
Protein

The NUMA1 gene encodes a protein of 2115 amino acids with a molecular weight of approximately 230 kDa. Highly abundant component of the nuclear matrix where it may serve a non-mitotic structural role, occupies the majority of the nuclear volume. Required for maintenance and establishment of the mitotic spindle poles, functioning as a tether linking bulk microtubules of the spindle to centrosomes. May be involved in coordination of the alignment of the mitotic spindle to the cellular polarity axis, which is a prerequisite for asymmetric cell divisions (Silk, 2009).

Result of the chromosomal anomaly

Hybrid gene

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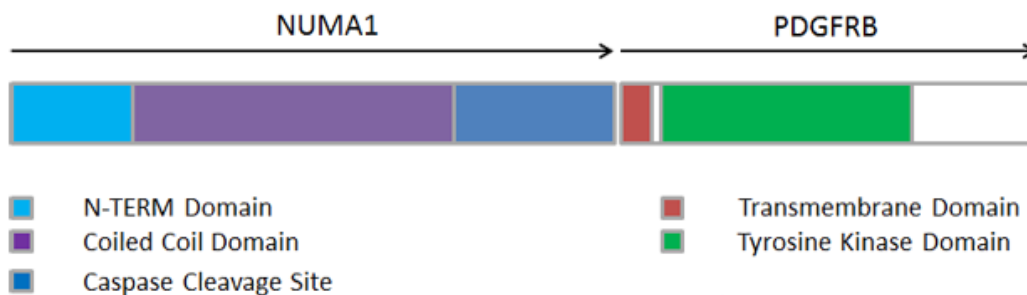
Description

5' NUTM1 - 3' PDGFRB. NUMA1 exon 22 is fused in frame with PDGFRB exon 11.

Transcript

The NUMA1-PDGFRB fusion transcript was amplified.

Fusion protein



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NUTM1/PDGFRB fusion protein.

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