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Leukaemia Section
Short Communication

t(7;15)(q22;q14) CUX1/NUTM1 a novel fusion

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Abstract

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A novel CUX1-NUTM1 fusion identified in B-cell precursor acute lymphoblastic leukemia.

Keywords
ALL-B; CUX1; NUTM; translocation

Clinics and pathology

Disease

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

Phenotype/cell stem origin

Pro-B immunophenotype (B-I EGIL cIassification): CD19+, CD22+, CD79a+, partial CD20+, CD10-, cμ- and aberrant expression of CD33.

Epidemiology

Only one case described, a 15-year-old female.

der(7)t(7;15)(q22;q14), R-band analysis.

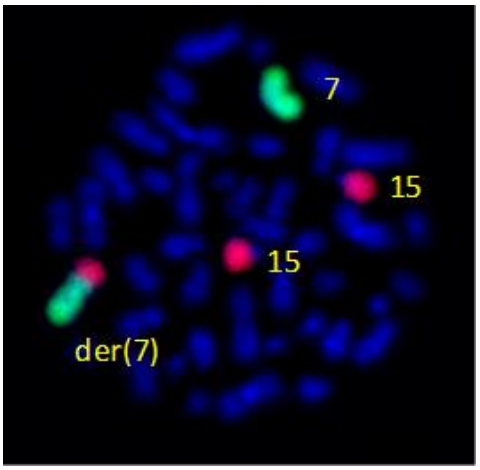
Cytogenetics

Cytogenetics morphological

Unbalanced t(7;15)
der(7)t(7;15)(q22;q14)dup(7)(q11q22)del(7)(p11)

Additional anomalies

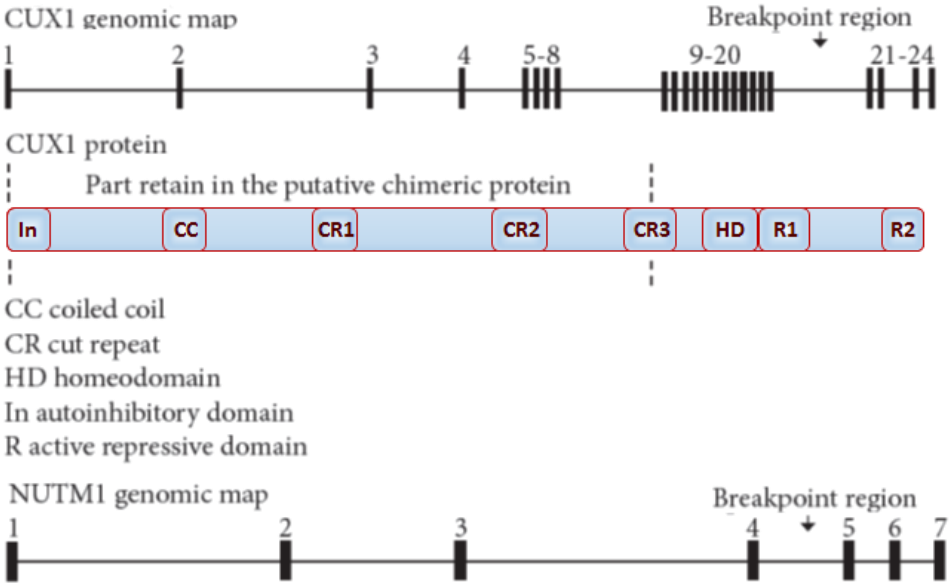
There was no additional anomaly.

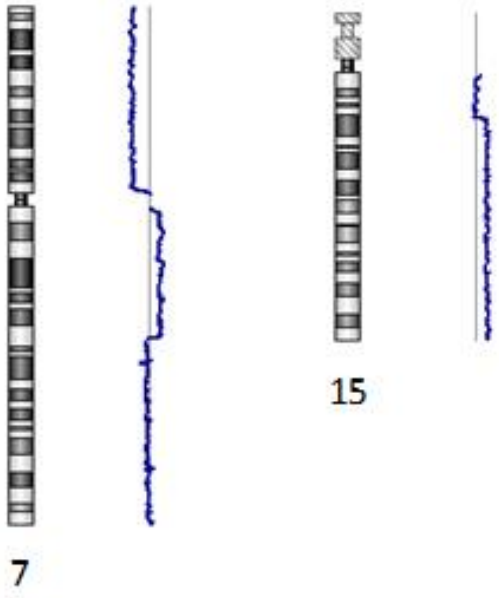


der(7)t(7;15)(q22;q14)dup(7)(q11q22)del(7)(p11); probes: wcp7 green, wcp15 red.

Genes involved and proteins

Note
Fusion CUX1-NUTM1





der(7)t(7;15)(q22;q14)dup(7)(q11q22)del(7)(p11).

CUX1 (cut-like homeobox 1)

Location
7q22.1

DNA/RNA
CUX1 locus spans approximately 468 kb and contains 24 exons.
CUX1 has been reported as a haploinsufficient tumor suppressor gene on chromosome 7 frequently inactivated in acute myeloid leukemia (McNerney, 2013). It has also been involved in a gene fusion with FGFR1 (Wasag, 2011).

Protein
CUX1 is a 164 kDa nuclear protein. This protein is a member of the homeodomain family of DNA binding proteins. It may regulate gene expression, morphogenesis, and differentiation and it may also play a role in the cell cycle progression (Ramdzan ZM, 2014). Several different isoforms encoded by alternatively spliced transcript variants have been identified. [provided by RefSeq, Feb 2011].

NUTM1 (nuclear protein in testis)

Location
15q14

DNA/RNA
NUTM1 locus spans approximately 14 kb and contains 7 exons.

Protein
NUTM1 is a 120 kDa nuclear and cytoplasmic protein. Its function is still unknown.

Result of the chromosomal anomaly

Hybrid gene

Note
CUX1/NUTM1

Description
CUX1 exon 20 is fused in frame with NUTM1 exon 5.

Transcript
The CUX1-NUTM1 fusion transcript was amplified.

References

McNerney ME, Brown CD, Wang X, Bartom ET, Karmakar S, Bandlamudi C, Yu S, Ko J, Sandall BP, Stricker T, Anastasi J, Grossman RL, Cunningham JM, Le Beau MM, White KP. CUX1 is a haploinsufficient tumor suppressor gene on chromosome 7 frequently inactivated in acute myeloid leukemia. Blood. 2013 Feb 7;121(6):975-83

Ramdzan ZM, Nepveu A. CUX1, a haploinsufficient tumour suppressor gene overexpressed in advanced cancers. Nat Rev Cancer. 2014 Oct;14(10):673-82

Wasag B, Lierman E, Meeus P, Cools J, Vandenberghe P. The kinase inhibitor TKI258 is active against the novel CUX1-FGFR1 fusion detected in a patient with T-lymphoblastic leukemia/lymphoma and t(7;8)(q22;p11). Haematologica. 2011 Jun;96(6):922-6

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