Leukaemia Section
Mini Review

**t(4;11)(q21;q23)**

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**Identity**

![Image](image_url)

Identity

**Clinics and pathology**

**Disease**
ALL mainly.

**Phenotype / cell stem origin**
B-ALL (L1 or L2), biphenotypic AL, at times ANLL (M4/M5 types mainly); has been found in treatment related leukaemia; T-ALL as an exception.

**Epidemiology**
Children (including infants: named a congenital leukaemia when before 1 yr or 2 yrs of age) and adults; half cases are under 4 yrs, 1/3 under 1 yr; unbalanced sex ratio in cases < 4 yrs (1M/2F); 2 to 5% of ALL.

**Clinics**
Organomegaly, CNS involvement not rare; can be secondary to epipodophyllotoxins (antitopoisomerase drugs for various cancers treatment); high WBC (median around 200 X 10^9/l), anaemia, thrombocytopenia; 90% blasts in blood.

**Cytology**
Typically CD19+; may be accompanied with myeloid markers.

**Treatment**
Bone marrow transplantation is highly indicated, as the prognosis is very poor.

**Prognosis**
CR is obtained but is promptly followed by relapse; median survival: 7 mths in adult cases, 9 mths in children.
Cytogenetics

Additional anomalies
In ¼ of cases at diagnosis, clonal evolution to hyperploidy: i(7q) in 10%. +X, +Mar, +6, +8, +19, +21, +13, +10, +14; no difference in outcome.

Variants
Three way complex t(4;11;Var) exist and showed that the crucial event lies on der(11).

Genes involved and Proteins

AF4
Location: 4q21
DNA / RNA
10.5-12 kb mRNA.
Protein
Contains a nuclear targeting sequence; nuclear localisation; function: transcription activator.

MLL
Location: 11q23
DNA / RNA
21 exons, spanning over 100 kb; 13-15 kb mRNA.
Protein
431 kDa; contains two DNA binding motifs (a AT hook, and Zinc fingers), a DNA methyl transferase motif, a bromodomain; transcriptional regulatory factor; nuclear localisation.

Results of the chromosomal anomaly

Hybrid gene
Description
5’ MLL - 3’ AF4; variable breakpoints.
Transcript
12 kb

Fusion protein
Description
e.g. 2319 amino acids; 240 kDa; N-term AT hook and DNA methyltransferase from MLL fused to AF4 C- term; the reciprocal (AF4-MLL) may or may not be expressed; quite similar to the MLL/ENL fusion protein found with t(11;19).

Expression localisation
Nuclear localisation.

References

This article should be referenced as such: