t(9;11)(p21;q23) KMT2A/MLLT3

Jeroen Knijnenburg, H. Berna Beverloo

Department of Clinical Genetics, Erasmus Medical Center, Rotterdam, The Netherlands. b.beverloo@erasmusmc.nl

Published in Atlas Database: March 2016
Online updated version : http://AtlasGeneticsOncology.org/Anomalies/t0911ID1001.html
Printable original version : http://documents.revuees.inist.fr/bitstream/handle/2042/66949/03-2016-t0911ID1001.pdf
DOI: 10.42672042/66949

This article is an update of : t(9;11)(p22;q23) KMT2A/MLLT3. Atlas Genet Cytogenet Oncol Haematol 2016;20(12)
Huret JL. t(9;11)(p22;q23). Atlas Genet Cytogenet Oncol Haematol 1997;1(2)

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 2.0 France Licence.
© 2016 Atlas of Genetics and Cytogenetics in Oncology and Haematology

Abstract
Review on t(9;11)(p21;q23), with data on clinics, and the genes involved.

Keywords
chromosome 9; chromosome 11; acute myeloid leukemia; KMT2A; MLLT3.

Clinics and pathology

Disease
Acute myeloid leukemia (AML).

Phenotype/cell stem origin
Most often found in acute monocytic and myelomonocytic leukaemias, although occasionally also seen in AML with or without maturation (WHO 2008).
M5 most often (especially M5a, M4); both found in de novo and therapy related AML with antitopoisomerase II drugs (epipodophyllotoxins, anthracyclins, actinomycin D).
Immunophenotype typically shows positivity for CD11, CD13, CD15 and CD33, but less often shows positivity for CD14, CD34 and lymphoid markers.

Epidemiology
May occur at any age, but is more common in children, being present in 5-12% of paediatric and 1-2% of adult AML, and equally common in males and females.

Clinics
Organomegaly, frequent central nervous system (CNS) involvement, especially in de novo cases; no preceding myelodysplastic phase, unlike classic therapy related AML with chromosome 5 and/or 7 involvement, short interval from initial drug therapy (may even be of 1-2 yrs). Patients may present with disseminated intravascular coagulation and may have tissue infiltration.

Cytology
Absence of trilineage dysplasia, unlike classic therapy related AML.

Prognosis
Survival is described as poor to intermediate, being superior to AML with other KMT2A translocations.

Cytogenetics

Cytogenetics morphological
May easily be overlooked. Previously described as t(9;11)(p22;q23) based on band estimation, but nowadays it is known that MLLT3 is located in 9p21.3 based on molecular positioning.

Cytogenetics molecular
FISH or RT-PCR is indicated in cases with poor chromosome morphology or in cases where the translocation is expected in cases based on morphology, immunophenotype or clinical presentation.
**t(9;11)(p21;q23) KMT2A/MLLT3**

**Knijnenburg J, Beverloo HB**


**Additional anomalies**

None in 70% of cases, +8 in 20%, less frequently: additional trisomies of chromosome 6, 19 or 21.

**Variants**

Complex 3 way translocations t(9;11;Var) involving a (variable) third chromosome and insertions have been described, and showed that der(11) is the crucial on

**Genes involved and proteins**

**MLLT3** *(myeloid/lymphoid or mixed-lineage leukemia (trithorax homolog, Drosophila); translocated to, 3)*

**Location**

9p21.3

**Protein**

Contains a nuclear targeting sequence; transcriptional activator; nuclear localisation.

**KMT2A** *(myeloid/lymphoid or mixed lineage leukemia)*

**Location**

11q23.3

**Protein**

Contains two DNA binding motifs (a AT hook, and Zinc fingers), a DNA methyl transferase motif, a bromodomain; transcriptional regulatory factor; nuclear localisation.

**Result of the chromosomal anomaly**

**Hybrid gene**

**Description**

5' KMT2A- 3' MLLT3; variable breakpoints.

**Fusion protein**

**Description**

N-term -- AT hook and DNA methyltransferase from KMT2A (1444 amino acids) fused to the 192
C-term amino acids from MLLT3 (as breakpoints are variable, this is only an example): 180 kDa.

**Expression / Localisation**

Nuclear localisation.

**To be noted**

You may also have a glance at 11q23 rearrangements, which gives an overview of related diseases.

**References**


**This article should be referenced as such:**