

## Case Report Section

# Second case of t(2;21)(q11.2;q22.3) in a child with T-cell acute lymphoblastic leukemia

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### Abstract

Case report on second case of t(2;21)(q11.2;q22.3) in a child with T-cell acute lymphoblastic leukemia.

### Clinics

**Age and sex:** 10 years old female patient.

**Previous history:** no preleukemia, no pertinent past medical history, no previous malignancy, no inborn condition of note

**Organomegaly:** no hepatomegaly, no splenomegaly, no enlarged lymph nodes, no central nervous system involvement

### Blood

**WBC:** 29.8X 10<sup>9</sup>/l

**HB:** 13.4g/dl

**Platelets:** 184X 10<sup>9</sup>/l

**Blasts:** 0% none seen in peripheral blood.%

**Bone marrow:** 70%. The bone marrow shows partial involvement of the marrow by blasts with abnormal T-cell phenotype similar to the patient's mediastinal mass. The blasts represent 72% of cells by flow cytometry. Reduced trilineage hematopoiesis is present in the background. No dysplasia is identified. Megakaryocytes are present in normal numbers and show normal morphology. Monocytes are not increased. Plasma cells are not increased. No iron is identified on Prussian blue

stain. Differential: Blasts: 70%; Promyelocytes: 4%; Myelocytes: 2%; Metamyelocytes: 2%; Neutrophils: 5%; Eosinophils: 1%; Monocytes: 1%; Erythroblasts: 15% %

### Cyto-Pathology Classification

**Cytology** L1 ALL

**Immunophenotype** Flow cytometric analysis of the mediastinal mass shows mostly a T-lineage immature cell population (99% of analyzed events) expressing: cytoplasmic CD3, CD5, CD7, small subset CD11c, CD38, CD45, CD71 and TdT. Significantly negative for CD2, surface CD3, CD4, CD8, CD10, CD19, CD20, CD13/CD33 and CD34. Based on light scatter characteristics the cells are enlarged to medium in size and have no increase in side scatter.

**Rearranged Ig Tcr** Unknown.

**Diagnosis** T-cell lymphoblastic acute leukemia.

### Survival

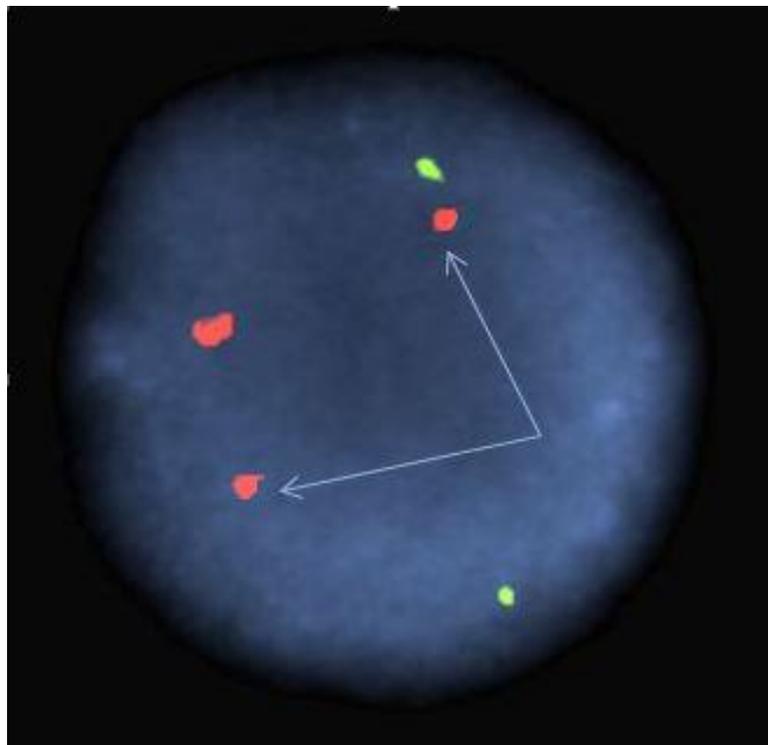
**Date of diagnosis** 04/2015

**Treatment**

Chemotherapy per children oncology group (cog) protocol aall1231: induction with vincristine, daunorubicin, prednisone, peg-asparaginase; intrathecal cytarabine/methotrexate.



GTW-banded abnormal karyogram showing the  $t(2;21)(q11.2;q22.3)$  and other rearrangements: 46,XX,t(2;21)(q11.2;q22.3),ins(3;?)(q21;?),del(5)(q15q31),del(6)(q13q21).



Interphase FISH showing the splitting of one of the RUNX1 signals due to the  $t(2;21)$ . ETV6 (12p13) is labeled in SpectrumGreen and RUNX1 (21q22) in SpectrumOrange. Arrows point to the split RUNX1.

Flow cytometric remission after four weeks. Consolidation therapy with cyclophosphamide, cytarabine, vincristine, peg-asparaginase; intrathecal methotrexate. More therapy to follow.

**Complete remission :** Yes (still on therapy)

**Treatment related death :** no

**Relapse :** no

**Status Alive**

**Last follow up** 08/2015

**Survival** 3months

## Karyotype

**Culture time:** 24 and 48 hours unstimulated

**Banding :** GTW t

**Results :**46,XX,t(2;21)(q11.2;q22.3),ins(3;?)(q21;?),del(5)(q15q31),del(6)(q13q21) [cp21]

**Karyotype at Relapse:** N/A

## Other Molecular Studies

**Technics:** FISH ETV6-RUNX1 (12;21) dual-color ES translocation probe. Abbott Molecular, Des Plaines, IL, USA.

**Results:** nuc ish(ETV6x2,RUNX1x3)[98/100].

## Comments

This is the second case of T-ALL with t(2;21)(q11.2;q22.3) and involvement of RUNX1. The first case, which was reported in 2008, affected a 6-year-old boy (Chinen et al. 2008). In the previous report, the authors demonstrated that the t(2;21) resulted in a fusion between the AFF3 (aka., LAF4) and the RUNX1 (aka., AML1) genes located at 2q11.2 and 21q22.3, respectively. In the present case, we used FISH to demonstrate the involvement of RUNX1 in the t(2;21). It is, therefore, reasonable to assume that the t(2;21) observed here leads to an AFF3-RUNX1 fusion as well. AFF3 belongs to a family of putative transcription factors also comprising AFF1 (4q21), AFF2 (Xq28), and AFF4 (5q31). In both previous and present cases, the t(2;21) is present together with other chromosome abnormalities.

Both patients responded well to the therapeutic approach. According to Chinen and coauthors, their patient was treated on the Tokyo Children's Cancer Study Group (TCCSG) L04-16 extremely high-risk (HEX) protocol, including stem cell transplantation. He achieved complete remission after the induction phase. After the early consolidation phase and two courses of the consolidation phase, he received allogeneic bone marrow transplantation from an unrelated HLA-matched donor 4 months after diagnosis. At the time of the case report in 2008, he was in complete remission for 17 months. Our patient also responded favorably to the therapeutic protocol (induction with vincristine, daunorubicin, prednisone, peg-asparaginase; intrathecal cytarabine/methotrexate; flow cytometric remission after four weeks; consolidation therapy with cyclophosphamide, cytarabine, vincristine, peg-asparaginase; intrathecal methotrexate). She is in complete remission for 5 months.

The present case report provides further support that the t(2;21) is a rare but recurrent finding in pediatric T-ALL.

This translocation seems to occur together with other chromosome abnormalities.

Patients have responded favorably to the therapy and have achieved complete remission.

## References

Chinen Y, Taki T, Nishida K, Shimizu D, Okuda T, Yoshida N, Kobayashi C, Koike K, Tsuchida M, Hayashi Y, Taniwaki M. Identification of the novel AML1 fusion partner gene, LAF4, a fusion partner of MLL, in childhood T-cell acute lymphoblastic leukemia with t(2;21)(q11;q22) by bubble PCR method for cDNA. *Oncogene*. 2008 Apr 3;27(15):2249-56

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*This article should be referenced as such:*

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