Atlas of Genetics and Cytogenetics in Oncology and Haematology

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Leukaemia Section

Mini Review

t(5;9)(q33;q22)

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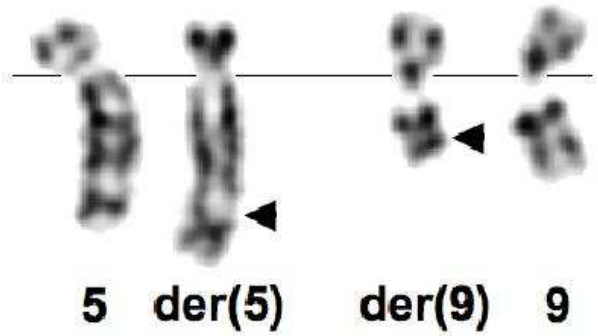
Identity



t(5;9)(q33;q22) G-banding.

Clinics and pathology

Disease

ITK-SYK transcripts were detected in 5 of 30 (17%) unspecified peripheral T-cell lymphomas, but not in cases of angioimmunoblastic T-cell lymphoma (n=9) and ALK-negative anaplastic large cell lymphoma (n=7).

Phenotype / cell stem origin

The majority of t(5;9)(q33;q22)+ unspecified peripheral T-cell lymphomas share a very similar histological pattern with predominant involvement of lymphoid follicles and the same CD3+CD5+CD4+bcl-6+CD10+ immunophenotype.

Cytogenetics

Probes

RP11-563G12 and RP11-1091N2 dual color, break apart rearrangement probe for ITK, RP11-31B18 and RP11-47O12 dual color, break apart rearrangement.

Genes involved and Proteins

ITK

Location: 5q33

DNA / RNA

Centromere to telomere orientation; exons: 17.

Protein

The Tec family tyrosine kinase Itk has become increasingly recognized for its important role in regulating T-helper-cell differentiation. ITK is not required for Th2 differentiation per se, but effector Th2 cytokine production during recall responses is severely impaired in the absence of ITK.

SYK

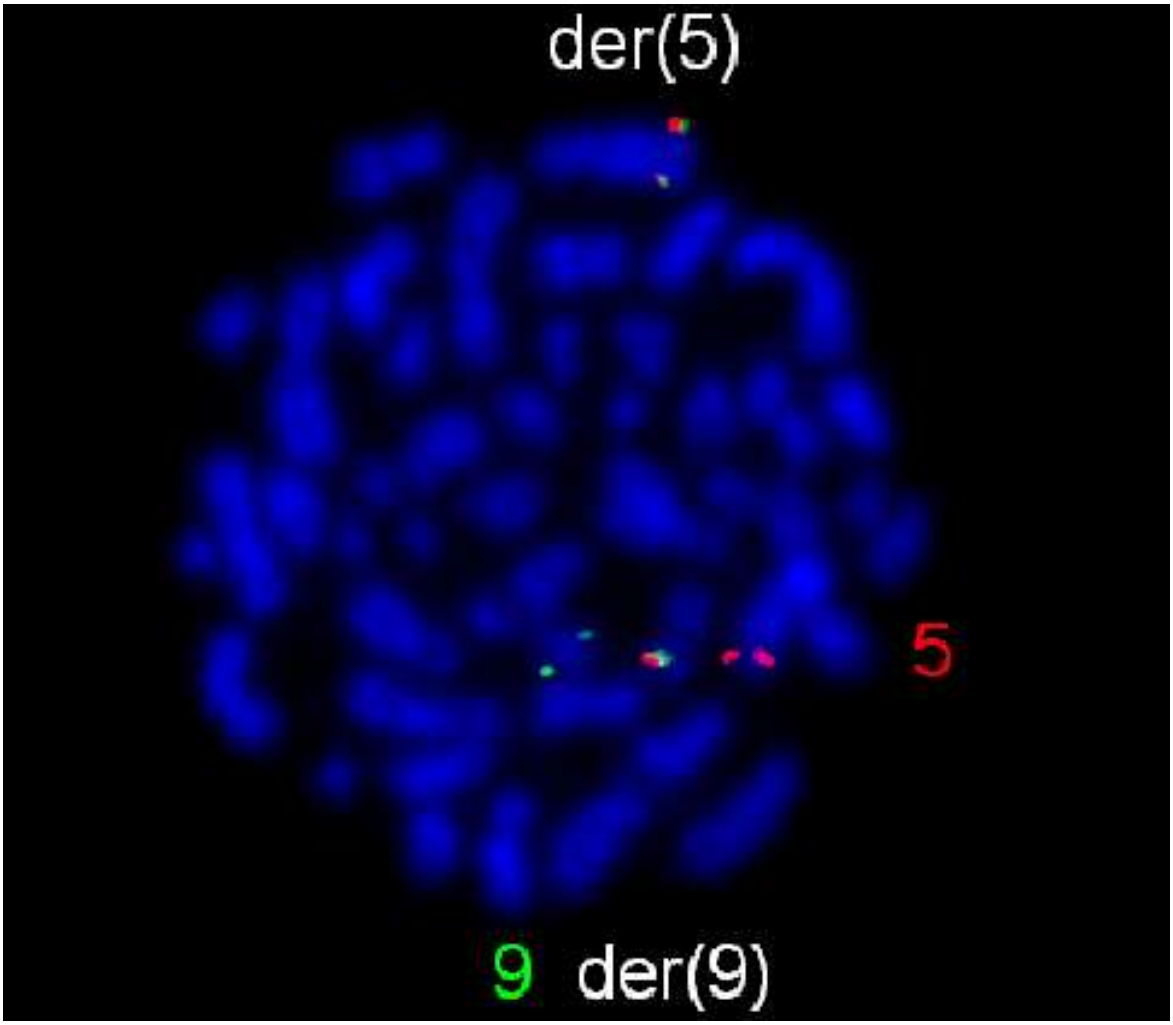
Location: 9q22

DNA / RNA

Centromere to telomere orientation; exons: 13-14 (alternative spliced).

Protein

SYK is a nonreceptor protein kinase that serves as a key regulator of multiple biochemical signal transduction events and has high homology to ZAP70 protein tyrosine kinase. In contrast to ITK, a translocation of SYK has been observed in hematopoietic neoplasia. Syk is expressed in a wide variety of hematopoietic cells but only in low levels in peripheral T-cells. Treatment of human Jurkat T-cells with the proapoptotic and inflammatory cytokine TNF activates SYK which consequently plays an essential role in TNF-induced activation of JNK, p38 MAPK, p44/p42 MAPK, NF- B, and apoptosis.



Colocalized fusion signals on the der(5) and der(9) confirm ITK-SYK rearrangement.

Results of the chromosomal anomaly

Hybrid gene

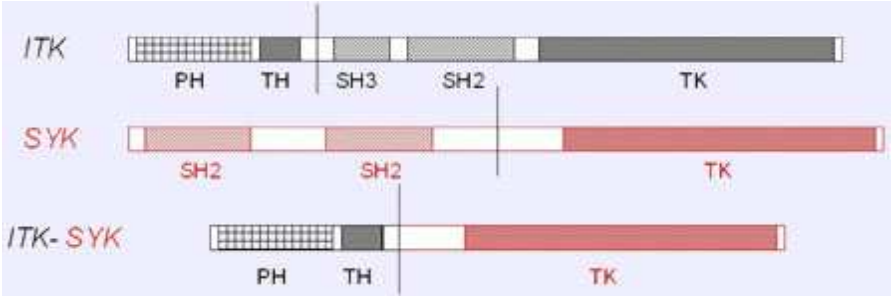
Description

5'ITK-3'SYK

Transcript

N-terminal ITK (bp 1-577) fused in frame with C-terminal SYK cDNA (breakpoint bp 1063).

Fusion protein



In frame fusion of N-terminal ITK to C-terminal SYK. The individual domains of Itk are indicated PH (pleckstrin homology), TH (proline-rich Tec homology), SH3 (Src homology), SH2 (Src homology), TK (tyrosine kinase) and of SYK N-terminal and C-terminal SH2 (Src homology), and TK (tyrosine kinase).

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