

Gene Section

Mini Review

TRB@ (T cell Receptor Beta)

Marie-Paule Lefranc

IMGT, LIGM, IGH, UPR CNRS 1142, 141 rue de la Cardonille, 34396 Montpellier Cedex 5, France (MPL)

Published in Atlas Database: September 2003

Online updated version: <http://AtlasGeneticsOncology.org/Genes/TCRBID24.html>

DOI: 10.4267/2042/38017

This article is an update of: Lefranc MP. TRB (T cell Receptor Beta). Atlas Genet Cytogenet Oncol Haematol 2000;4(3):119-120.

This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 2.0 France Licence.

© 2003 Atlas of Genetics and Cytogenetics in Oncology and Haematology

Identity

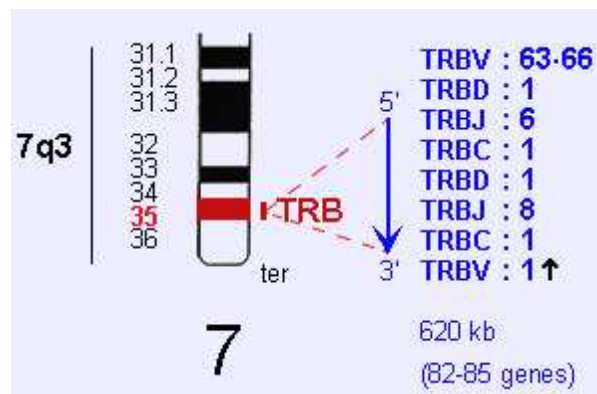
Other names: TRB (T cell Receptor Beta)

HGNC (Hugo): TRB@

Location: 7q35

Note

The human TRB locus is located on chromosome 7 on the long arm, at band 7q35. The orientation of the locus has been determined by the analysis of translocations, involving the TRB locus, in leukemia and lymphoma



For complete Figure, see: chromosome 7, IMGT (The International ImMunoGeneTics information system®) © Copyright 1995-2003 IMGT, IMGT is a CNRS trademark.

DNA/RNA

Description

The human TRB locus at 7q35 spans 620 kb. It consists of 64-67 TRBV genes belonging to 32 subgroups.

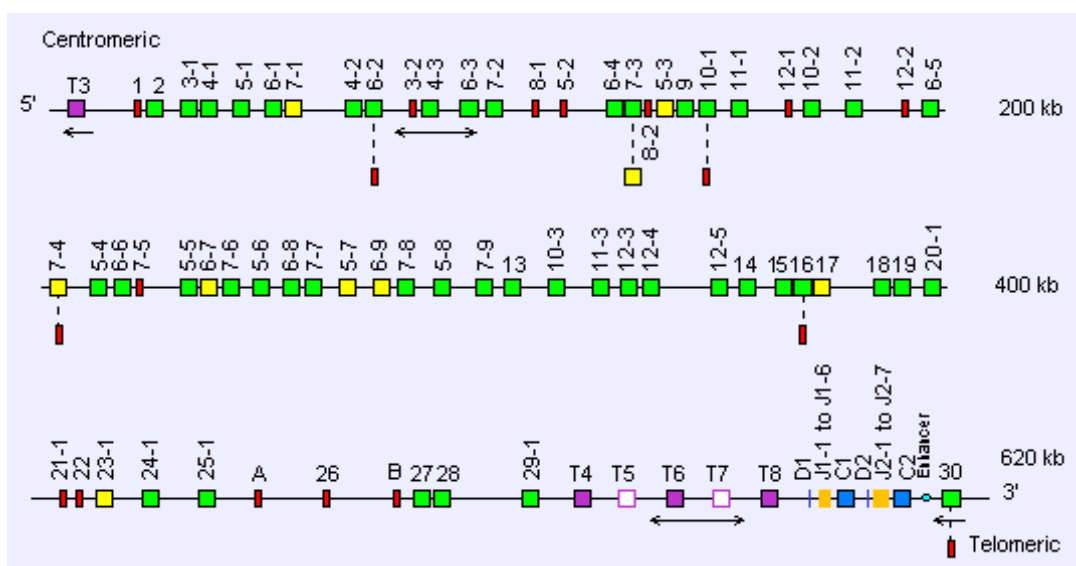
Except for TRBV30, localized downstream of the TRBC2 gene, in inverted orientation of trans-cription, all the other TRBV genes are located upstream of a duplicated D-J-C-cluster, which comprises, for the first part one TRBD, six TRBJ, and the TRBC1 gene, and for the second part, one TRBD, eight TRBJ, and the TRBC2 gene.

The most 5' TRBV genes occupy the most centro-meric position, whereas the TRBV30 gene, 3' of the locus, is the most telomeric gene in the TRB locus.

The potentiel repertoire consists of 39-46 function-al TRBV genes belonging to 21-23 subgroups, the two TRBD, thirteen TRBJ (6 from the first cluster and 7 from the second cluster), and the two TRBC genes.

Six TRBV orphons have been localized on chromosome 9 at 9p21. Enhancer sequences have been characterized 5.5kb 3' from TRBC2.

List of the human TRB genes.



TRB

V-GENE: Green box: Functional; Yellow box: Open reading frame; Red: Pseudogene

D-GENE: Blue: Functional.

J-GENE: Grey: Functional.

C-GENE: Blue: Functional.

GENES NOT RELATED: Purple: Functional; Purple open box: Pseudogene.

For complete Figure, see: locus TRB, IGMT (The international ImMunoGeneTics information system®) © Copyright 1995-2003 IGMT, IGMT is a CNRS trademark.

Protein

Description

Proteins encoded by the TRB locus are the T cell receptor beta chains. They result from the recombination (or rearrangement), at the DNA level, of three genes: TRBV, TRBD and TRBJ, with deletion of the intermediary DNA to create a rearranged TRBV-D-J gene. The rearranged TRBV -D-J gene is transcribed with one of the two TRBC genes and translated into a T cell receptor beta chain.

Translation of the variable germline genes involved in the TRBV-D-J rearrangements are available at IGMT Repertoire Protein displays. TRB V-D-J rearrangements can be analysed using the IGMT/V-QUEST tool.

Mutations

Note

Mutations which correspond to allelic polymer-phisms of the functional germline TRBV, TRBD, TRBJ and TRBC genes are described in the IGMT database: (IMGT Repertoire>Alignments of alleles).

Implicated in

Translocations which frequently result from errors of the recombinase enzyme complex (RAG1, RAG2, etc.), responsible of the Immunoglobulin and T cell

receptor V-J and V-D-J rearrangements. TRBV, TRBD or TRBJ recombination signals or isolated heptamer are frequently observed at the breakpoints.

t(1;7)(p34;q35); involve LCK in 1p34

Disease

T-cell acute lymphocytic leukemia (ALL).

t(1;7)(p32;q35); involve TAL1 in 1p32

Disease

T-cell acute lymphocytic leukemia (ALL).

Prognosis

Median survival > 5 yrs in children.

t(7;9)(q35;q32); involve TAL2 in 9q32

Disease

T-cell acute lymphocytic leukemia (ALL)

t(7;9)(q35;q34); involve TAN1 in 9q34

Disease

T-cell acute lymphocytic leukemia (ALL).

t(7;10)(q35;q24); involve HOX11 in 10q24

Disease

T-cell acute lymphoblastic leukemia (ALL) and non-Hodgkin lymphoma (NHL).

Prognosis

Not unfavourable.

t(7;11)(q35;p13); involve RBTN2 in 11p13**Disease**

T-cell acute lymphocytic leukemia (ALL).

t(7;14)(q35;q32); involve TCL1 in 14q32**Disease**

T-cell lymphoproliferations.

t(7;19)(q35;p13); involve LYL1 in 19p13**Disease**

T-cell acute lymphoblastic leukemia (ALL).

References

Lefranc MP. Nomenclature of the human T cell Receptor genes (Review) Current Protocols in Immunology. 2000, Wiley, J. and Sons, New York, Supplement 40

Lefranc M-P.. Locus Map and Genomic repertoire of the Human Immunoglobulin Genes (Review) The immunologist. 2000; 8: 80-8.

Lefranc MP and Lefranc G. The T cell Receptor FactsBook (Review) Academic Press, London, UK (2001) ISBN:0124413528.

This article should be referenced as such:

Lefranc MP. TRB@ (T cell Receptor Beta). Atlas Genet Cytogenet Oncol Haematol. 2003; 7(4):247-249.
