

Gene Section

Mini Review

TRA (T cell Receptor Alpha)

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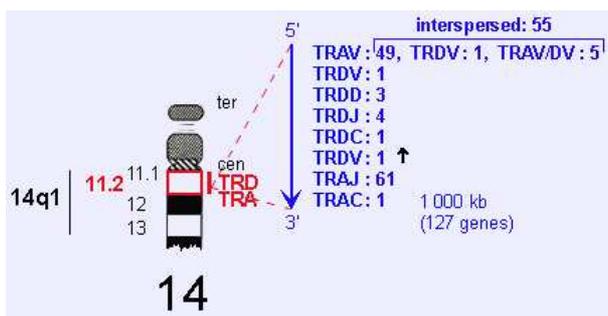
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Identity

HGNC (Hugo): TRA@

Location: 14q11.2



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Note

The human TRA locus is located on the chromosome 14 on the long arm at band 14q11.2. The orientation of the locus has been determined by the analysis of translocations, involving the TRA and TRD loci, in leukemia and lymphoma.

DNA/RNA

Description

The human TRA locus at 14q11.2 spans 1000 kilobases (kb). It consists of 54 TRAV genes belonging to 41

subgroups, 61 TRAJ segments localized on 71 kb, and a unique TRAC gene.

The most 5' TRAV genes occupy the most centromeric position, whereas the TRAC genes, 3' of the locus, is the most telomeric gene in the TRA locus.

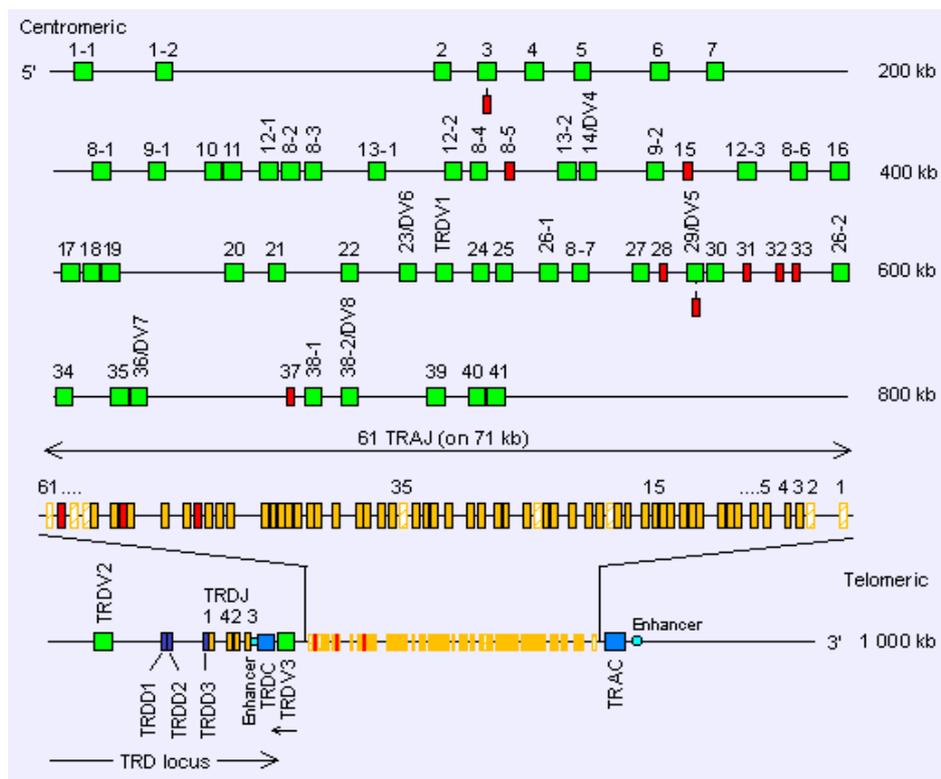
The organization of the TRAJ segments on a large area is quite unusual and has not been observed in the other immunoglobulin or T cell receptor loci.

Moreover the TRD locus is nestled in the TRA locus between the TRAV and TRAJ segments. V-J-rearrangements in the TRA locus therefore result in deletion of the TRD genes localized on the same chromosome. That deletion occurs in two steps, that is a deletion of the TRD genes, involving specific sequences located upstream from TRDC (sequence pseudo J alpha) would take place before the TRAV-J rearrangement.

The potential genomic TRA repertoire comprises 45-47 functional TRAV genes belonging to 33-35 subgroups, 50 functional TRAJ segments, and the unique TRAC gene.

Among the variable genes are included five genes designated as TRAV/DV which belong to five different subgroups and which have been found rearranged either to TRAJ or to TRDD segments and can therefore be used in the synthesis of alpha or delta chains.

The total number of human TRA genes per haploid genome is 116 of which 96 to 98 genes are functional. Enhancer sequences have been characterized 4.5 kb 3' from TRAC.



TRA/TRD
 V-GENE: Green box: Functional; Red: Pseudogene.
 D-GENE: Blue: Functional.
 J-GENE: Yellow: Functional; Pale yellow: Open reading frame; Red: pseudogene.
 C-GENE: Blue: Functional.

For complete Figure, see the international ImMunoGeneTics information system; Copyright 1995-2003 IMGT.

Protein

Description

Proteins encoded by the TRA locus are the T cell receptor alpha chains. They result from the recombination (or rearrangement), at the DNA level, of two genes: TRAV and TRAJ, with deletion of the intermediary DNA to create a rearranged TRAV-J gene. The rearranged TRAV-J gene is transcribed with the TRAC gene and translated into an T cell receptor alpha chain.

Translation of the variable germline genes involved in the TRAV-J rearrangements are available at IMGT Repertoire. TRA V-J rearrangements can be analysed using the IMGT/V-QUEST tool.

Mutations

Note

Mutations which correspond to allelic polymorphisms of the functional germline TRAV, TRAJ and TRAC genes are described in the IMGT database.

Implicated in

Translocations which frequently result from errors of the recombinase enzyme complex

(*RAG1, RAG2, etc.*), which is responsible of the **Immunoglobulin and T cell receptor V-J and V-D-J rearrangements. TRAV or TRAJ recombination signals or isolated heptamer are observed at the breakpoints.**

t(1;14)(p32;q11)

t(8;14)(q24;q11)

t(10;14)(q24;q11)

t(11;14)(p13;q11)

t(14;14)(q11;q32)

References

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