Sequence of the TCR β chain gene used by a T cell clone specific for the synthetic polymer, GAT

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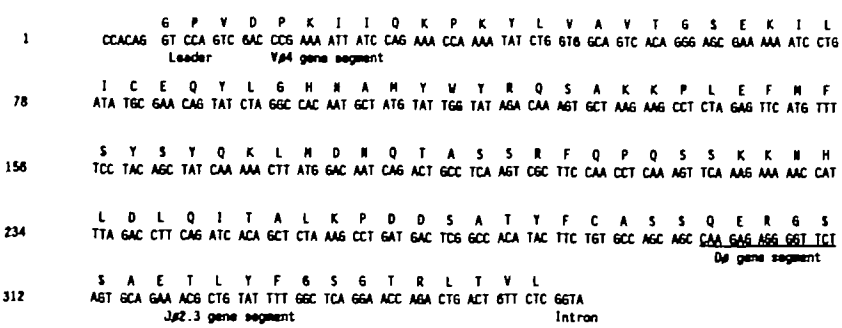
The murine immune response to GAT, a synthetic polymer of glutamic acid[60]:alanine[30]:tyrosine[10], is of particular interest for two reasons. First, the ability to generate an immune response to GAT is under genetic control (1). Second, the immunoglobulin (Ig) molecules produced by GAT-specific B cells are unusually homogeneous (2); a single VH gene segment (3, 4) and at most 2 Vx gene segments (5) encode most of the anti-GAT Ig. Given the unique aspects of this immune response, it is possible to determine whether GAT-specific T cells are as homogeneous as GAT-specific B cells and whether the T cell receptors (TCR) used in recognizing GAT share regions of sequence similarity with the anti-GAT Ig.

The gene encoding the β chain of the TCR was identified as a rearranged Jβ-containing DNA fragment that was unique to BB02′ (3), a GAT-specific helper T (Th) cell clone. This fragment was cloned into λgtWesB; the internal fragments containing the V, D, and J gene segments were then subcloned into M13 and sequenced. As presented below, the rearranged TCR β chain gene from BB02′ contained in-frame joins of the Vβ4 (6), Dβ2, and Jβ2.3 (7) gene segments and there was no evidence of somatic mutation. To ascertain that this was in fact the expressed gene, replicate slot blots containing BB02′ RNA were hybridized with seven Vβ probes; only Vβ4 hybridized.

The protein sequence predicted from this Vβ gene was then compared with the Vx and VH polypeptides used by GAT-specific B cells. Interestingly, there were no regions of significantly greater similarity between these sequences than between any random β and Ig polypeptides. This was true even when comparing the critical V(D)J junction regions. Lastly, to determine whether other GAT-specific T cells utilize the same TCR, a series of 17 Vβ probes was hybridized in parallel to slot blots containing RNA from another Th clone, BD01′ (3), and from a series of 22 GAT-specific T-cell hybridomas (Zborowski and Kraig, unpublished). Of these 23 additional T cells, only one contained detectable levels of Vβ4 RNA. This suggests that the GAT-specific TCR repertoire is more heterogeneous than the anti-GAT B cell repertoire.



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