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InnoCyto Inc.

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Anti-Mouse TCR β chain Antibody

Catalog Number:	200401, 200402
Size:	100 μg, 500 μg
Target Name:	TCR β chain, TCR-β
Regulatory Status:	RUO

PRODUCT DETAILS

Clone:	H57-597-M2a
Application:	Flow Cytometry
Reactivity:	Mouse
Format:	Purified
Isotype:	Mouse IgG2a
Antibody Type:	Monoclonal
Formulation:	Phosphate-buffered solution, pH 7.2, containing 0.09% sodium azide
Protein Concentration:	0.5 mg/mL
Storage and Handling:	Store the antibody undiluted at 2°C to 8°C.
Recommended Usage:	For flow cytometric staining, it is recommended to use less than 0.2 µg of this reagent per 0.5-1.0 million cells in a 100 µL volume. Optimal reagent performance should be determined by titration for each specific application.
Isotype Control:	301501
RRID:	AB_3738986

BACKGROUND INFORMATION

The mouse T cell receptor (TCR) β chain is a critical component of the heterodimeric αβ TCR complex expressed on most mature T lymphocytes. Together with the TCR α chain, it confers antigen specificity to T cells, enabling the recognition of peptide fragments presented by major histocompatibility complex (MHC) molecules on antigen-presenting cells. This recognition event is essential for initiating adaptive immune responses, including T cell activation, proliferation, and differentiation into effector and memory subsets.

Structurally, the TCR β chain is composed of variable (V), diversity (D), joining (J), and constant (C) gene segments that undergo somatic recombination during T cell development in the thymus. This recombination process generates the highly variable complementarity-determining region 3 (CDR3), which contributes most significantly to antigen specificity. The β chain pairs non-covalently with the TCR α chain, forming the antigen-binding site. Each chain contains two extracellular immunoglobulin-like domains, a variable domain involved in antigen binding and a constant domain that stabilizes structure, along with a transmembrane segment and a short cytoplasmic tail. The TCR complex also associates with CD3 signaling molecules (CD3γ, CD3δ, CD3ε, and CD3ζ), which transduce activation signals through immunoreceptor tyrosine-based activation motifs (ITAMs).

The ligands for the mouse TCR β chain are peptide antigens bound to MHC class I or II molecules. Engagement of the αβ TCR with these peptide-MHC complexes triggers receptor conformational changes that initiate intracellular signaling cascades involving kinases such as Lck and ZAP-70, leading to T cell activation and effector function.

In disease, alterations in TCR β chain expression or repertoire diversity can contribute to immune dysfunction. Restricted TCR β repertoires are associated with autoimmune diseases, such as experimental autoimmune encephalomyelitis (EAE, a model for multiple sclerosis), and with impaired immune defense in infections or cancer. Somatic mutations or skewed TCR β usage have also been observed in T cell lymphomas and leukemia.

The mouse TCR β chain has significant therapeutic and experimental relevance. It serves as a model for studying clonal selection, antigen recognition, and tolerance mechanisms. In immunotherapy, manipulation of TCR β sequence diversity underpins TCR-engineered T cell strategies for cancer and infection control. Furthermore, analyzing mouse TCR β repertoires provides insights into vaccine efficacy, autoimmune mechanisms, and immune reconstitution following bone marrow transplantation.

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