

## iF647 Anti-Mouse TCR $\beta$ chain Antibody

<b>Catalog Number:</b>	200405, 200406
<b>Size:</b>	25 tests, 100 tests
<b>Target Name:</b>	TCR $\beta$ chain, TCR- $\beta$
<b>Regulatory Status:</b>	RUO

### PRODUCT DETAILS

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<b>Clone:</b>	H57-597-M2a
<b>Application:</b>	Flow Cytometry
<b>Reactivity:</b>	Mouse
<b>Format:</b>	iF647
<b>Isotype:</b>	Mouse IgG2a
<b>Antibody Type:</b>	Monoclonal
<b>Formulation:</b>	Phosphate-buffered solution, pH 7.2, containing 0.09% sodium azide and 0.2% (w/v) BSA
<b>Protein Concentration:</b>	Supplied at a lot-specific concentration.
<b>Storage and Handling:</b>	The antibody solution should be stored undiluted between 2°C and 8°C, and protected from prolonged exposure to light. Do not freeze.
<b>Recommended Usage:</b>	For flow cytometric staining, it is recommended to use 5 $\mu$ L of this reagent per 0.5-1.0 million cells in a 100 $\mu$ L volume. Optimal reagent performance should be determined by titration for each specific application. iF647 has an excitation max at 656 nm and an emission max at 670 nm.
<b>Excitation Laser:</b>	Red Laser (633 nm)
<b>Isotype Control:</b>	302607

### BACKGROUND INFORMATION

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The mouse T cell receptor (TCR)  $\beta$  chain is a critical component of the heterodimeric  $\alpha\beta$  TCR complex expressed on most mature T lymphocytes. Together with the TCR  $\alpha$  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  $\beta$  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  $\beta$  chain pairs non-covalently with the TCR  $\alpha$  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 (CD3 $\gamma$ , CD3 $\delta$ , CD3 $\epsilon$ , and CD3 $\zeta$ ), which transduce activation signals through immunoreceptor tyrosine-based activation motifs (ITAMs).

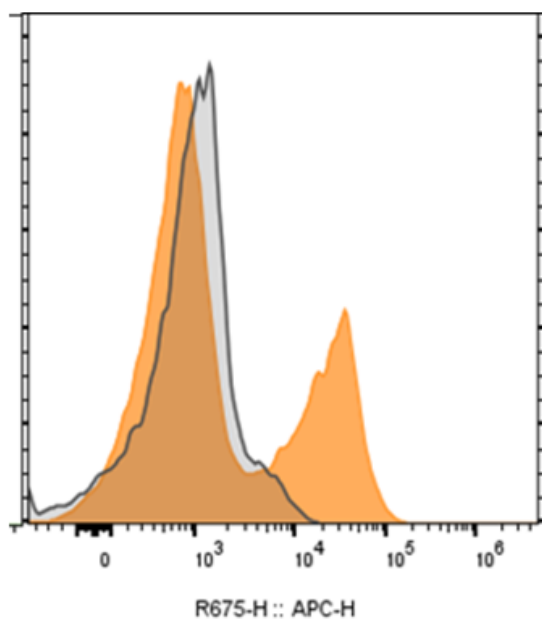
The ligands for the mouse TCR  $\beta$  chain are peptide antigens bound to MHC class I or II molecules. Engagement of the  $\alpha\beta$  TCR with these peptide-MHC complexes triggers receptor conformational changes that initiate intracellular signaling cascades involving kinases such as Lck and ZAP-70,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

In disease, alterations in TCR  $\beta$  chain expression or repertoire diversity can contribute to immune dysfunction. Restricted TCR  $\beta$  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  $\beta$  usage have also been observed in T cell lymphomas and leukemia.

The mouse TCR  $\beta$  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  $\beta$  sequence diversity underpins TCR-engineered T cell strategies for cancer and infection control. Furthermore, analyzing mouse TCR  $\beta$  repertoires provides insights into vaccine efficacy, autoimmune mechanisms, and immune reconstitution following bone marrow transplantation.

## PRODUCT DATA

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Mouse splenocytes stained with either iF647 Anti-Mouse TCR  $\beta$  chain clone H57-597-M2a (orange histogram) or an isotype control (gray histogram).

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