

DESCRIPTION

Species Reactivity	Human
Specificity	Detects human 4-1BB/TNFRSF9/CD137 in direct ELISAs.
Source	Recombinant Monoclonal Rabbit IgG Clone # 2356B
Purification	Protein A or G purified from cell culture supernatant
Immunogen	Chinese hamster ovary cell line CHO-derived recombinant human 4-1BB/TNFRSF9/CD137 Leu24-His183 Accession # Q07011
Formulation	Lyophilized from a 0.2 µm filtered solution in PBS with Trehalose. See Certificate of Analysis for details. *Small pack size (-SP) is supplied either lyophilized or as a 0.2 µm filtered solution in PBS.

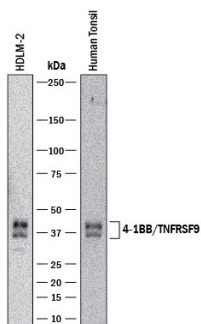
APPLICATIONS

Please Note: Optimal dilutions should be determined by each laboratory for each application. *General Protocols* are available in the *Technical Information* section on our website.

	Recommended Concentration	Sample
Western Blot	2 µg/mL	See Below
Flow Cytometry	0.25 µg/10 ⁶ cells	See Below
Immunocytochemistry	8-25 µg/mL	See Below
CyTOF-ready	Ready to be labeled using established conjugation methods. No BSA or other carrier proteins that could interfere with conjugation.	

DATA

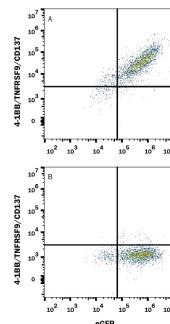
Western Blot



Detection of Human 4-1BB/TNFRSF9/CD137 by Western Blot.

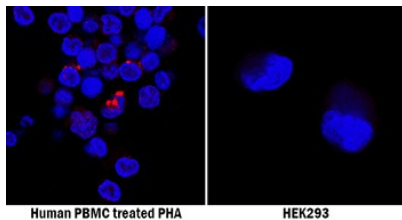
Western blot shows lysates of HDLM-2 human Hodgkin's lymphoma cell line and human tonsil tissue. PVDF membrane was probed with 2 µg/mL of Rabbit Anti-Human 4-1BB/TNFRSF9/CD137 Monoclonal Antibody (Catalog # MAB8381) followed by HRP-conjugated Anti-Rabbit IgG Secondary Antibody (Catalog # HAF008). Specific bands were detected for 4-1BB/TNFRSF9/CD137 at approximately 32 and 40 kDa (as indicated). This experiment was conducted under reducing conditions and using [Immunoblot Buffer Group 1](#).

Flow Cytometry



Detection of 4-1BB/TNFRSF9/CD137 in HEK293 Human Cell Line Transfected with Human 4-1BB/TNFRSF9/CD137 and eGFP by Flow Cytometry. HEK293 human embryonic kidney cell line transfected with either (A) human 4-1BB/TNFRSF9/CD137 or (B) irrelevant protein, and eGFP was stained with Rabbit Anti-Human 4-1BB/TNFRSF9/CD137 Monoclonal Antibody (Catalog # MAB8381) followed by APC-conjugated Goat-anti Rabbit IgG secondary antibody (Catalog # F0111). Quadrant markers were set based on control antibody staining (Catalog # MAB1050). View our protocol for [Staining Membrane-associated Proteins](#).

Immunocytochemistry



4-1BB/TNFRSF9/CD137 in Human PBMCs and HEK293 Cell Line.

4-1BB/TNFRSF9/CD137 was detected in immersion fixed peripheral blood mononuclear cells (PBMCs) treated with PHA (positive control, left panel) and HEK293 human embryonic kidney cell line (negative control, right panel) using Rabbit Anti-Human 4-1BB/TNFRSF9/CD137 Monoclonal Antibody (Catalog # MAB8381) at 8 µg/mL for 3 hours at room temperature. Cells were stained using the NorthernLights™ 557-conjugated Anti-Rabbit IgG Secondary Antibody (red; Catalog # NL004) and counterstained with DAPI (blue). Specific staining was localized to cell surfaces. View our protocol for [Fluorescent ICC Staining of Non-adherent Cells](#).

PREPARATION AND STORAGE

Reconstitution	Reconstitute at 0.5 mg/mL in sterile PBS.
Shipping	The product is shipped at ambient temperature. Upon receipt, store it immediately at the temperature recommended below. *Small pack size (-SP) is shipped with polar packs. Upon receipt, store it immediately at -20 to -70 °C
Stability & Storage	Use a manual defrost freezer and avoid repeated freeze-thaw cycles. <ul style="list-style-type: none"> • 12 months from date of receipt, -20 to -70 °C as supplied. • 1 month, 2 to 8 °C under sterile conditions after reconstitution. • 6 months, -20 to -70 °C under sterile conditions after reconstitution.

BACKGROUND

4-1BB, also known as CD137 and TNFRSF9, is an approximately 30 kDa transmembrane glycoprotein in the TNF receptor superfamily. 4-1BB functions in the development and activation of multiple immune cells (1). Mature human 4-1BB consists of a 163 amino acid (aa) extracellular domain (ECD) with four TNFR cysteine-rich repeats, a 27 aa transmembrane segment, and a 42 aa cytoplasmic domain (2, 3). Within the ECD, human 4-1BB shares 60% aa sequence identity with mouse and rat 4-1BB. 4-1BB is expressed as a disulfide-linked homodimer on various populations of activated T cell including CD4⁺, CD8⁺, memory CD8⁺, NKT, and regulatory T cells (4-7) as well as on myeloid and mast cell progenitors, dendritic cells, mast cells, and bacterially infected osteoblasts (8-11). It binds with high affinity to the transmembrane 4-1BB Ligand/TNFSF9 which is expressed on antigen presenting cells and myeloid progenitor cells (3, 8). This interaction costimulates the proliferation, activation, and/or survival of the 4-1BB expressing cell (3-7). It can also enhance the activation-induced cell death of repetitively stimulated T cells (3). Mice lacking 4-1BB show augmented T cell activation, perhaps due to its absence on regulatory T cells (12). 4-1BB can associate with OX40 on activated T cells, forming a complex that responds to either ligand and inhibits Treg and CD8⁺ T cell proliferation (13). Reverse signaling through 4-1BB Ligand inhibits the development of dendritic cells, B cells, and osteoclasts (8, 11) but supports mature dendritic cell survival and costimulates the proliferation and activation of mast cells (9, 10). 4-1BB activation enhances CD8⁺ T cell and NK cell mediated anti-tumor immunity (14). It also contributes to the development of inflammation in high fat diet-induced metabolic syndrome (15). Soluble forms of 4-1BB and 4-1BB Ligand circulate at elevated levels in the serum of rheumatoid arthritis and hematologic cancer patients, respectively (16, 17).

References:

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