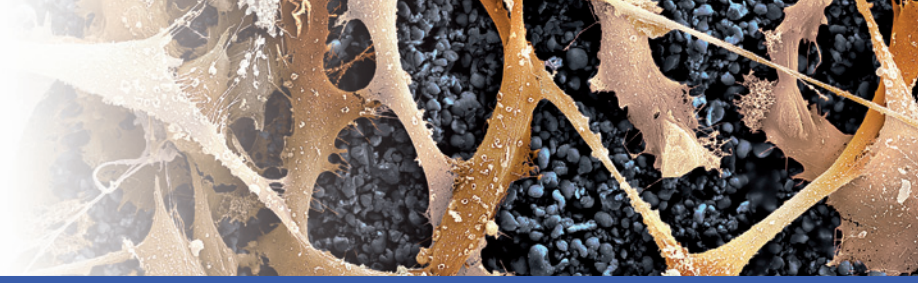
Chimerigen Laboratories

The Experts for High Quality Fusion Proteins



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2nd Edition

Immune Regulation Proteins

Focus: Immune Checkpoint Proteins, Interleukins & Cytokines

Mouse Immune Checkpoint & Interleukin Proteins for *In Vivo* Studies

PID	PRODUCT NAME
CHI-MF-110A4	**CD152 [CTLA-4] (mouse):Fc (mouse) (rec.)**
CHI-MF-120A4	**CD152 [CTLA-4] (mouse):Fc (mouse) (rec.) (non-lytic)**
CHI-MF-110PDL1	**CD274 [B7-H1/PD-L1] (mouse):Fc (mouse) (rec.)**
CHI-MF-120PDL1	**CD274 [B7-H1/PD-L1] (mouse):Fc (mouse) (rec.) (non-lytic)**
CHI-MF-110PD1	**CD279 [PD-1] (mouse):Fc (mouse) (rec.)**
CHI-MF-110B7H4	**B7-H4 (mouse):Fc (mouse) (rec.)**
CHI-MF-11002	**IL-2 (mouse):Fc (mouse) (rec.)**
CHI-MF-12002	**IL-2 (mouse):Fc (mouse) (rec.) (non-lytic)**
CHI-MF-11021	**IL-21 (mouse):Fc (mouse) (rec.)**
CHI-MF-12021	**IL-21 (mouse):Fc (mouse) (rec.) (non-lytic)**

Ask for BULK!

NEW

mIL-35/Fc – An Inhibitory Cytokine

Biological activity tested *in vivo*.

IL-35 suppresses T cell proliferation and converts naïve T cells into IL-35-producing induced regulatory T cells (iTr35). iTr35 cells can mediate self tolerance and prevent autoimmunity in an IL-35-dependent manner. IL-35 is considered to have a potential therapeutic effect against immune diseases and could promote the development of different kinds of vaccines for immunotherapy against cancer and be promising to cure autoimmune and inflammatory diseases.

LIT: Interleukin-35 administration counteracts established murine type 1 diabetes - possible involvement of regulatory T cells: K. Singh, et al.; Sci. Rep. **5,** ID12633 (2015) • Cytokine modulation by IL-35 in mice with allergic rhinitis: M. Yokota, et al.; Am. J. Rhinol. Allergy **29,** 251 (2015)

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
CHI-HF-21035	**IL-35 (human):Fc (human) (rec.)**	25 µg	CHO cells	>98%	<0.06EU/µg
CHI-MF-11135	**IL-35 (mouse):Fc (human) (rec.)**	5 µg 25 µg	CHO cells	>98%	<0.06EU/µg

Contents

Chimerigen

Immune Checkpoint Proteins

The B7-CD28 Superfamily

The B7 family consists of structurally related cell-surface protein ligands, which bind to receptors on lymphocytes that regulate immune responses. Activation of T and B lymphocytes is initiated by engagement of cell-surface, antigen-specific T cell or B cell receptors, but additional signals delivered simultaneously by B7 ligands determine the ultimate immune response. These "costimulatory" or "coinhibitory" signals are delivered by B7 ligands through the CD28 family of receptors on lymphocytes, resulting also in the modulation of interleukin production. Interaction of B7-family members with costimulatory receptors augments immune responses and interaction with coinhibitory receptors attenuates immune responses.

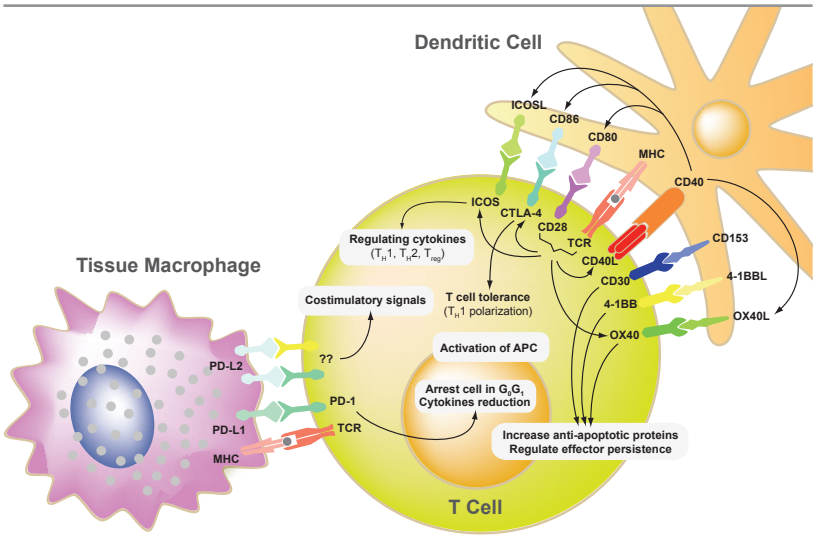


FIGURE: Selected Immune Checkpoint Pathways. *Adapted from P. Sharma 2012 ASCO Annual Meeting.*

There are currently nine known members of the B7 family: B7.1 (CD80), B7.2 (CD86), inducible costimulator ligand (ICOS-L), programmed death-1 ligand (PD-L1), programmed death-2 ligand (PD-L2), B7-H3, B7-H4, VISTA (B7-H5) and B7-H7, and four known members of the CD28 family: CD28, CTLA-4 (CD152), ICOS, PD-1. The importance of the B7-CD28 superfamily in regulating immune responses is shown by the role of some members in the development of immunodeficiency and autoimmune diseases. Manipulation of the signals delivered by B7 ligands has shown potential in the treatment of autoimmunity, inflammatory diseases and cancer.

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
B7-CD28 Members – T Cell						
CHI-HF-210CD28	**CD28 (human):Fc (human) (rec.)**	200 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-MF-110CD28	**CD28 (mouse):Fc (mouse) (rec.)**	200 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-210A4	**CD152 [CTLA-4] (human):Fc (human) (rec.)**	100 µg 500 µg 1 mg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220A4	**CD152 [CTLA-4] (human):Fc (human) (rec.) (non-lytic)**	100 µg 500 µg 1 mg	CHO cells	≥98%	<0.06EU/µg	✓
CHI-HF-211A4	**CD152 [CTLA-4] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110A4	**CD152 [CTLA-4] (mouse):Fc (mouse) (rec.)**	100 µg 500 µg 1 mg	NS1 cells	>98%	<0.06EU/µg	
CHI-MF-120A4	**CD152 [CTLA-4] (mouse):Fc (mouse) (rec.) (non-lytic)**	100 µg 500 µg 1 mg	NS1 cells	>98%	<0.06EU/µg	✓
CHI-HF-210ICOS	**CD278 [ICOS] (human):Fc (human) (rec.)**	25 µg 100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220ICOS	**CD278 [ICOS] (human):Fc (human) (rec.) (non-lytic)**	25 µg 100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211ICOS	**CD278 [ICOS] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110ICOS	**CD278 [ICOS] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-200PD1	**CD279 [PD-1] (human) (rec.)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210PD1	**CD279 [PD-1] (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220PD1	**CD279 [PD-1] (human):Fc (human) (rec.) (non-lytic)**	200 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211PD1	**CD279 [PD-1] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	≥98%	<0.06EU/µg	
CHI-MF-110PD1	**CD279 [PD-1] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
B7-CD28 Members – APC / Tumor Cell / Dendritic Cell						
CHI-HF-210CD80	**CD80 (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-211CD80	**CD80 (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110CD80	**CD80 (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-210CD86	**CD86 (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-211CD86	**CD86 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110CD86	**CD86 (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-210PDL2	**CD273 [PD-L2] (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-220PDL2	**CD273 [PD-L2] (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211PDL2	**CD273 [PD-L2] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110PDL2	**CD273 [PD-L2] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-200PDL1	**CD274 [B7-H1/PD-L1] (human) (rec.)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210PDL1	**CD274 [B7-H1/PD-L1] (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220PDL1	**CD274 [B7-H1/PD-L1] (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211PDL1	**CD274 [B7-H1/PD-L1] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110PDL1	**CD274 [B7-H1/PD-L1] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-120PDL1	**CD274 [B7-H1/PD-L1] (mouse):Fc (mouse) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-201B7H2	**CD275 [B7-H2] (human) (rec.) (His)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210B7H2	**CD275 [B7-H2] (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-220B7H2	**CD275 [B7-H2] (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	≥98%	<0.06EU/µg	✓
CHI-HF-211B7H2	**CD275 [B7-H2] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110B7H2	**CD275 [B7-H2] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-120B7H2	**CD275 [B7-H2] (mouse):Fc (mouse) (rec.) (non-lytic)**	100 µg	CHO cells	≥98%	<0.06EU/µg	✓
CHI-HF-200B7H3	**CD276 [B7-H3] (human) (rec.)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210B7H3	**CD276 [B7-H3] (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-211B7H3	**CD276 [B7-H3] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110B7H3	**CD276 [B7-H3] (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-201B7H3B	**B7-H3(4Ig) [B7-H3b] (human) (rec.) (His)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-211B7H3B	**B7-H3(4Ig) [B7-H3b] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-200B7H4	**B7-H4 (human) (rec.)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-201B7H4	**B7-H4 (human) (rec.) (His)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210B7H4	**B7-H4 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-211B7H4	**B7-H4 (human):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-212B7H4	**B7-H4 (human):Fc (rabbit) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110B7H4	**B7-H4 (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-211B7H6	**B7-H6 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	≥98%	<5EU/mg	

LATEST INSIGHT

Human VISTA [B7-H5] – A new Immune Checkpoint Protein

Human VISTA is a 55 to 65kDa type I Ig membrane protein with the extracellular domain homologous to PD-L1. VISTA is mainly expressed on hematopoietic tissues (spleen, thymus and bone marrow) and on myeloid cells with lower expression on $CD4^+$ and $CD8^+$ T cells. VISTA is a new negative immune checkpoint regulator that potently suppresses T cell activation. Overexpression of VISTA on tumors inhibits the protective antitumor immunity and blockade of VISTA enhances antitumor immunity in multiple tumor models. VISTA on APC delivers negative signaling to T cells via a yet-to-identify binding partner on T cells.

LIT: VISTA is an immune checkpoint molecule for human T cells: J.L. Lines, et al.; Cancer Res. **74,** 1924 (2014) • VISTA Regulates the Development of Protective Antitumor Immunity: I. Le Mercier, et al.; Cancer Res. **74,** 1933 (2014) • VISTA is a novel broad-spectrum negative checkpoint regulator for cancer immunotherapy: J.L. Lines, et al.; Cancer Immunol. Res. **2,** 510 (2014)

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
CHI-HF-201B7H5	**B7-H5 [VISTA; Gi24] (human) (rec.) (His)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg
CHI-HF-211B7H5	**B7-H5 [VISTA; Gi24] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg

Other Immune Checkpoint Proteins

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
T Cell						
CHI-HR-200CD27	**CD27 (human) (rec.) (His)**	50 µg	E. coli	≥97%	<0.1EU/µg	
CHI-HF-210CD27	**CD27 (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-210CD40L	**CD40L [CD154] (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HR-200CD134	**CD134 [OX40] (human) (rec.) (His)**	25 µg	E. coli	≥97%	<0.1EU/µg	
CHI-HF-210CD134	**CD134 [OX40] (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-211CD134	**CD134 [OX40] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-111CD134	**CD134 [OX40] (mouse):Fc (human) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HR-200CD137	**CD137 (human) (rec.) (His)**	25 µg	E. coli	≥95%	<0.1EU/µg	
CHI-HF-210CD137	**CD137 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-211CD137	**CD137 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-210CD272	**CD272 [BTLA] (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-211CD272	**CD272 [BTLA] (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-210LAG3	**LAG-3 (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
APC / Tumor Cell / Dendritic Cell						
CHI-HF-210CD40	**CD40 (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-220CD200	**CD200 (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-120CD200	**CD200 (mouse):Fc (mouse) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-201CD252	**CD252 [OX40L] (human) (rec.) (His)**	50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-211CD252	**CD252 [OX40L] (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	

For more information on TIMs see Page 6.

Targeting Immune Checkpoints

Regulation and activation of T lymphocytes depend on signaling by the T cell receptor (TCR) and also by cosignaling receptors that deliver negative (⊖→) or positive (⊕→) signals. The amplitude and quality of the immune response of T cells is controlled by an equilibrium between costimulatory and inhibitory signals called immune checkpoints. Under normal physiological conditions, immune checkpoints are crucial for the maintenance of self-tolerance and to protect tissues from damage during pathogenic infection. Manipulations of the inhibitory immune checkpoints using monoclonal antibodies or soluble receptors may provide therapeutic strategies for autoimmune diseases, tumor growth, infectious diseases and transplantation by enhancing T cell activity.

Some immune checkpoints have been actively studied for clinical immunotherapies:

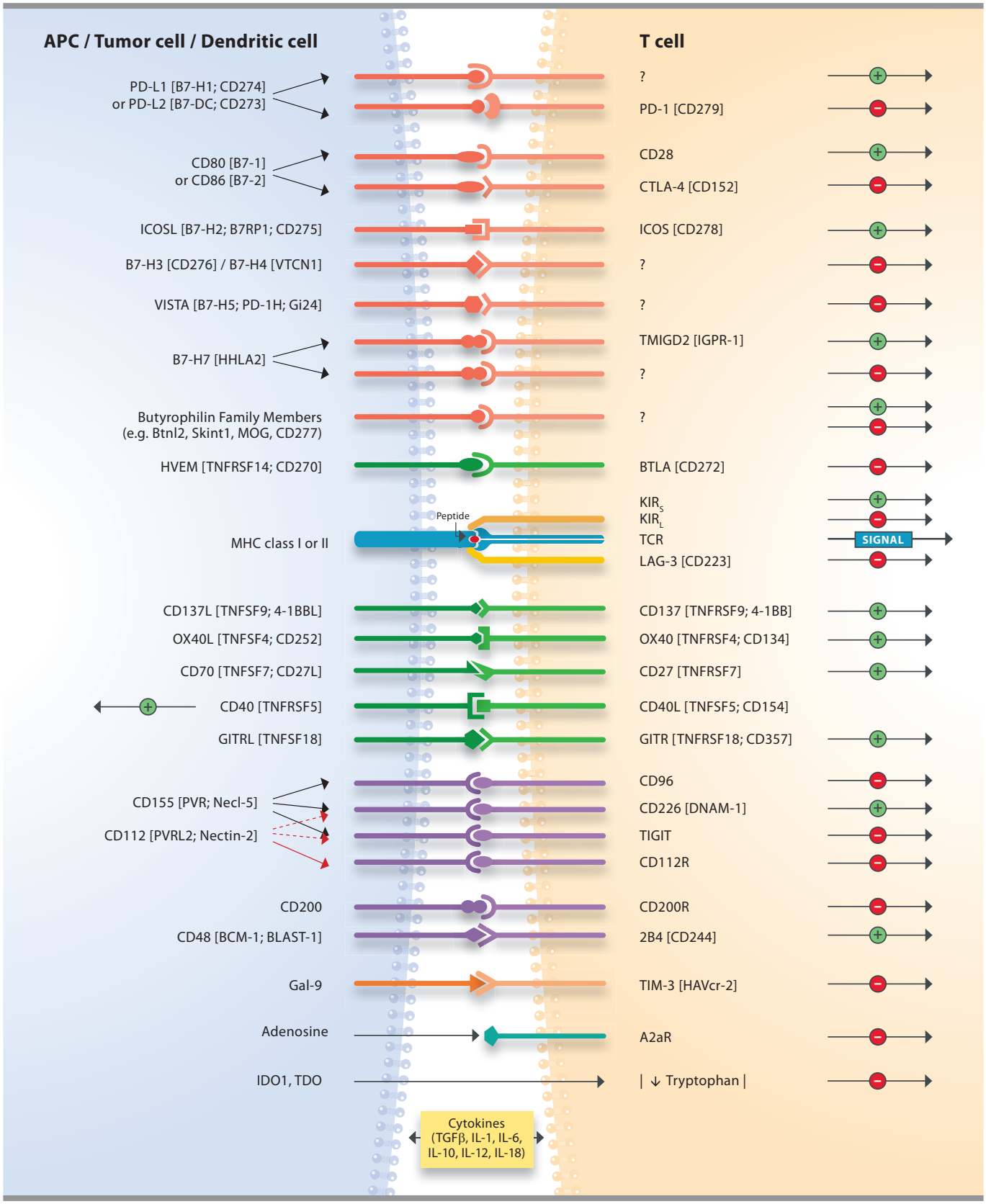
- **CTLA-4** (Cytotoxic T Lymphocyte Antigen-4) shares sequence homology and ligands (CD80/B7-1 or CD86/B7-2) with the costimulatory molecule CD28, but differs by delivering inhibitory signals to the T cells on which it is expressed as a receptor.
- **PD-1** (Programmed Cell Death Protein-1) is a negative costimulatory molecule with two ligands, PD-L1 (also known as B7-H1; CD274) and PD-L2 (B7-DC; CD273).
  Antagonistic monoclonal antibodies to CTLA-4 or PD-1 and soluble CTLA-4 or PD-1 receptors fused to the Fc region of immunoglobulin (Ig) are used for the enhancement of T cell cytotoxicity against tumor cells.
- **LAG-3** (Lymphocyte Activation Gene-3 Protein) is a CD4-like negative regulatory protein with a high affinity binding to MHC Class II that leads to tolerance of T cell proliferation and homeostasis.
  Blockade of the LAG-3/Class II interaction using a LAG-3-Ig fusion protein enhances antitumor immune responses. Combinatorial blockade of PD-1 and LAG-3 synergistically reduces the growth of established tumors.

In addition, blockade of other inhibitory receptors, such as **BTLA** (B- and T-lymphocyte attenuator), **KIR** (killer immunoglobulin-like receptors), **TIM-3** (T cell immunoglobulin and mucin domain-containing protein 3), **A2aR** (adenosine 2A receptor), **B7-H3, H4, H5 or H7** (B7 family members) either alone or in combination with a second immune checkpoint inhibitor has also been shown to enhance antitumor immunity.

Costimulatory signaling proteins such as **ICOS** (inducible T cell costimulator), **CD28** or the TNF family members **4-1BB** (CD137), **OX40**, **CD27** or **CD40** have been shown to be involved in allergy, autoimmune or inflammatory diseases.

REFERENCES: The blockade of immune checkpoints in cancer immunotherapy: D.M. Pardoll; Nat. Rev. Canc. **12,** 252 (2012) • Immunotherapies: The Blockade of Inhibitory Signals: Y.L. Wu, et al.; Int. J. Biol. Sci. **8,** 1420 (2012) • CTLA-4 blockade in tumor models: an overview of preclinical and translational research: J.F. Grosso & M.N. Jure-Kunkel; Cancer Immun. **13,** 5 (2013) • Combinatorial immunotherapy: PD-1 may not be LAG-ing behind any more: M.E. Turnis, et al.; OncoImmunology **1,** 1172 (2012) • Immune checkpoint blockade immunotherapy to activate anti-tumour T-cell immunity: A.G. Ramsay; Br. J. Haematol. **162,** 313 (2013) • Molecular pathways: coexpression of immune checkpoint molecules: signaling pathways and implications for cancer immunotherapy: C.J. Nirschl & C.G. Drake; Clin. Cancer Res. **19,** 4917 (2013) • Immune checkpoint blockade: a common denominator approach to cancer therapy: S.L. Topalian, et al.; Cancer Cell. **27,** 450 (2015)

Immune Checkpoints Overview



TIMs – Regulating Immune Responses

The TIM (T cell/transmembrane, immunoglobulin and mucin) family plays a critical role in regulating immune responses, including allergy, asthma, transplant tolerance, autoimmunity and the response to viral infections. The unique structure of TIM immunoglobulin variable region domains allows highly specific recognition of phosphatidylserine (PtdSer), exposed on the surface of apoptotic cells. Tim-1, important for asthma and allergy, is preferentially expressed on T-helper 2 (Th2) cells and functions as a potent costimulatory molecule for T cell activation. Tim-1 also mediates phagocytosis of apoptotic cells. Tim-2 is preferentially up-regulated during Th2 differentiation and functions as a potent costimulatory molecule for T cell immunity. Tim-3 is preferentially expressed on Th1, Tc1 (cytotoxic T cell Type 1) and Th17 cells and generates an inhibitory signal resulting in apoptosis of Th1 and Tc1 cells. Tim-3 is also expressed on some dendritic cells and can mediate phagocytosis of apoptotic cells and cross-presentation of antigens. Tim-4 is exclusively expressed on antigen-presenting cells, where it mediates phagocytosis of apoptotic cells and plays an important role in maintaining tolerance.

Under physiological conditions, interaction of Tim-3 with its ligand galectin-9 silences Th1 immune responses by inducing a death signal in the Th1 cells in order to prevent autoimmunity and undesirable immunopathology. Additionally, this interaction regulates responses that are critically important in fighting cancer. Due to its negative regulatory function on the immune system Tim-3 is classified as an immune checkpoint.

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
TIM Receptors					
CHI-HF-210T1	**Tim-1 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-211T1	**Tim-1 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
CHI-MF-111T1	**Tim-1 (mouse):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg
CHI-MF-110T1	**Tim-1 (mouse):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
CHI-MF-111T2	**Tim-2 (mouse):Fc (human) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
CHI-MF-110T2	**Tim-2 (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<5EU/mg
CHI-HF-210T3	**Tim-3 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-211T3	**Tim-3 (human):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg
CHI-MF-111T3	**Tim-3 (mouse):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg
CHI-MF-110T3	**Tim-3 (mouse):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
CHI-HF-210T4	**Tim-4 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-211T4	**Tim-4 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
CHI-MF-111T4	**Tim-4 (mouse):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg
CHI-MF-110T4	**Tim-4 (mouse):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg
TIM Ligands					
CHI-HF-210GAL9	**Galectin-9 (human):Fc (human) (rec.) [Tim-3 Ligand]**	50 µg	HEK 293 cells	>95%	<5EU/mg
CHI-MF-111SEMA4	**Semaphorin-4A (mouse):Fc (human) (rec.) [Tim-2 Ligand]**	100 µg	CHO cells	>98%	<0.06EU/µg

NEW

Butyrophilin-like 2 [BTNL2]

Human immunoglobulin (Ig) superfamily receptor proteins of the structural and functional diverse butyrophilin and butyrophilin-like families, termed BTN and BTNL, are recognized as potentially important immune modulators. Butyrophilin family members have been shown to have high homology to the B7 costimulatory molecules and include molecules such as BTN3A1 (CD277), myelin oligodendrocyte glycoprotein (MOG) and mouse Skint1 and Btnl2.

Butyrophilin-like 2 (BTNL2-Ig fusion protein) recognizes a putative receptor whose expression on B and T cells was significantly enhanced after activation. It inhibits T cell proliferation and TCR activation of NFAT, NF-κB and AP-1 signaling pathways. BTNL2 was the first member of the butyrophilin family that was shown to regulate T cell activation, which has implications in immune diseases and immunotherapy.

SELECTED REVIEWS: Immune modulation by butyrophilins: H.A. Arnett & J.L. Viney; Nat. Rev. Immunol. **14,** 559 (2014) • Novel Immune Check-Point Regulators in Tolerance Maintenance: Y. Guo & A.Y. Wang; Front. Immunol. **6,** 421 (2015) • Regulation of Immunity by Butyrophilins: D.A. Rhodes, et al.; Annu. Rev. Immunol. **(Epub ahead of print)** (2016)

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
CHI-MF-110BTNL2	**BTNL2 (mouse):Fc (mouse) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg

Costimulation & Immune Regulation Factors

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
CHI-HF-210CD38	**CD38 (human):Fc (human) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-211CD38	**CD38 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-211CD45	**CD45 (human):Fc (mouse) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-220ICAM1	**CD54 [ICAM-1] (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-120ICAM1	**CD54 [ICAM-1] (mouse):Fc (mouse) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211CD56	**CD56 [NCAM] (human):Fc (mouse) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-210CD68	**CD68 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110CD74	**CD74 (mouse):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-210CD83	**CD83 (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220CD83	**CD83 (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-110CD83	**CD83 (mouse):Fc (mouse) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-210CD160	**CD160 (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220LTBR	**LTβR (human):Fc (human) (rec.) (non-lytic)**	100 µg	CHO cells	>98%	<0.06EU/µg	✓

TECHNICAL NOTE

Non-lytic Ig-based Chimeric Fusion Cytokines with Long Circulating Half-life

The potential clinical application of cytokines to modulate immune responses is very high. Unfortunately, most cytokines have short circulating half-lives. Therefore, to facilitate the study of cytokine effects *in vivo*, a variety of non-lytic immunoglobulin-based chimeric cytokine Fc-fusion proteins have been created.

- These non-lytic fusion proteins possess the biological functions of the cytokine moiety.
- The genetically fusion of a cytokine sequence to the hinge, CH2 and CH3 regions of an immunoglobulin (Fc domain), determines a prolonged circulating half-life.
- Non-lytic: Mutations to the complement (C1q) and FcγR I binding sites of the IgGs Fc fragment render the fusion proteins incapable of antibody directed cytotoxicity (ADCC) and complement directed cytotoxicity (CDC).
- These fusion molecules also have the promise of being minimally to negligibly immunogenic since they can be made entirely from elements derived from the species to be treated.

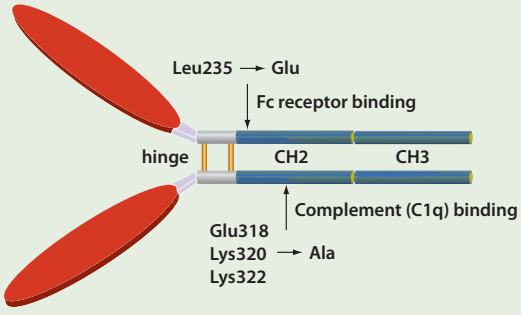


FIGURE: General structure of mouse non-lytic fusion proteins.

LIT: Localization of the binding site for the human high-affinity Fc receptor on IgG: A.R. Duncan, et al.; Nature **332,** 563 (1988) • The binding site for Clq on IgG: A.R. Duncan & G. Winter; Nature **332,** 738 (1988) • Administration of noncytolytic IL-10/Fc in murine models of lipopolysaccharide-induced septic shock and allogeneic islet transplantation: X.X. Zheng, et al.; J. Immunol. **154,** 5590 (1995)

Non-lytic Fusion Proteins are Highlighted in Yellow in this Catalog!

Interleukins & Cytokines

The function of the immune system depends in a large part on interleukins, a subset of a larger group of cellular messenger molecules called cytokines, which are modulators of cellular behaviour. The majority of interleukins are synthesized by helper $CD4^+$ T lymphocytes, as well as through monocytes, macrophages and endothelial cells. They promote the development and differentiation of T and B lymphocytes and hematopoietic cells. Interleukins initiate a response by binding to high-affinity receptors located on the surface of cells in a paracrine or autocrine fashion. The response of a particular cell to these cytokines depends on the ligands involved, specific receptors expressed on the cell surface and the particular signaling cascades that are activated. Interleukins can exert both pro-inflammatory and anti-inflammatory actions. Interleukins modulate growth, differentiation and activation during an immune response, which distinguishes them from chemokines, for which the main function is to direct immune cells to the site of inflammation via chemotaxis, or from interferons (IFNs), which predominantly mediate cellular response to viral infection. Despite this definition, a few interleukin members themselves can act as chemo-attractants for helper T cells and others are intimately involved in the cellular response to viral pathogens. Interleukins are very important mediators of the physiological response to infections and contribute significantly to the pathophysiology of a wide range of disorders, including autoimmune diseases or immune deficiency.

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
Interleukin Fusion Receptors					
CHI-HF-20001A	**IL-1α (human) (rec.)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg
CHI-HR-20001A	**IL-1α (human) (rec.) (His)**	10 µg 50 µg	E. coli	>98%	<0.1EU/µg
CHI-HR-20001B	**IL-1β (human) (rec.) (His)**	10 µg 50 µg	E. coli	>98%	<0.1EU/µg

Interleukin-2

Interleukin-2 (IL-2) is secreted by activated T cells and induces proliferation and maturation of activated T cells, natural killer cells and lymphokine activated killer cells. IL-2 also stimulates proliferation of antibody-producing B cells, activates neutrophils and induces mononuclear cells to secrete IFN-γ and TNF-α. IL-2 is required for activation-induced apoptosis, an important homeostatic mechanism in the immune system, which is involved in the maintenance of peripheral tolerance to self-antigens. Low doses of recombinant IL-2 have been used for Treg cell-based immunosuppressive strategies against immune pathologies, while high-doses IL-2 have shown success in stimulating antitumor immune responses.

IL-2 (human) Superkine (Fc): Specific mutations in the recombinant IL-2 protein stabilize the structure and give it a receptor-binding conformation mimicking native IL-2 bound to CD25. This induces superior expansion of cytotoxic T cells, leading to improved antitumor responses *in vivo*, and elicits proportionally less toxicity by lowering the expansion of T regulatory cells.

LIT: Exploiting a natural conformational switch to engineer an interleukin-2 'superkine': AM. Levin, et al.; Nature **484,** 529 (2012)

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
Interleukin-2						
CHI-ZHF-21002S	**IL-2 (human) Superkine (Fc)**	10 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-20102	**IL-2 (human) (C145S Mutant) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-21002	**IL-2 (human):Fc (human) (rec.)**	50 µg 3 x 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22002	**IL-2 (human):Fc (human) (rec.) (non-lytic)**	50 µg 3 x 50 µg	NS1 cells	>98%	<0.06EU/µg	✓
CHI-HF-24002	**IL-2 (human):Fc (human IgG4) (rec.)**	50 µg	CHO cells	>95%	<5EU/mg	
CHI-MF-11002	**IL-2 (mouse):Fc (mouse) (rec.)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-12002	**IL-2 (mouse):Fc (mouse) (rec.) (non-lytic)**	10 µg 5 x 10 µg 50 µg	NS1 cells	>98%	<0.06EU/µg	✓
CHI-RR-30002	**IL-2 (rat) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<1EU/µg	

Interleukin-3 to Interleukin-18

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
Interleukins						
CHI-HF-20103	**IL-3 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-20104	**IL-4 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HR-20004	**IL-4 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>98%	<0.1EU/µg	
CHI-HF-21004	**IL-4 (human):Fc (human) (rec.)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22004	**IL-4 (human):Fc (human) (rec.) (non-lytic)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MR-10004	**IL-4 (mouse) (rec.) (His)**	10 µg 50 µg	E. coli	>98%	<0.1EU/µg	
CHI-MF-12004	**IL-4 (mouse):Fc (mouse) (rec.) (non-lytic)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-20106	**IL-6 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-21006	**IL-6 (human):Fc (human) (rec.)**	50 µg 3 x 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22006	**IL-6 (human):Fc (human) (rec.) (non-lytic)**	50 µg 3 x 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-12006	**IL-6 (mouse):Fc (mouse) (rec.) (non-lytic)**	50 µg 3 x 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-21006R	**IL-6R (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-11006R	**IL-6R (mouse):Fc (mouse) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-RF-311GP130	**IL-6Rβ [GP130] (rat):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-20107	**IL-7 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-22007	**IL-7 (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	≥98%	<0.06EU/µg	✓
CHI-HR-20008	**IL-8 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>97%	<0.1EU/µg	
CHI-HF-22008	**IL-8 (human):Fc (human) (rec.) (non-lytic)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-20110	**IL-10 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HR-20010	**IL-10 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-21010	**IL-10 (human):Fc (human) (rec.)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22010	**IL-10 (human):Fc (human) (rec.) (non-lytic)**	10 µg 5 x 10 µg 50 µg	NS1 cells	>98%	<0.06EU/µg	✓
CHI-MF-12010	**IL-10 (mouse):Fc (mouse) (rec.) (non-lytic)**	10 µg 5 x 10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-21010RA	**IL-10Rα (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-20112	**IL-12 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-21012	**IL-12 (human):Fc (human) (rec.)**	25 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-11112	**IL-12 (mouse):Fc (human) (rec.) (rec.)**	25 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HR-20015	**IL-15 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-21015M	**IL-15 (mutant) (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-21115MBI	**IL-15 (mutant) (human):Fc (mouse) (rec.) (Biotin)**	1 Vial	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22017A	**IL-17A (human):Fc (human) (rec.) (non-lytic)**	50 µg	HEK 293 cells	>98%	<5EU/mg	✓
CHI-HR-20018	**IL-18 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>97%	<1EU/µg	

Interleukin-21 to Interleukin-35

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
Interleukins						
CHI-HF-20121	**IL-21 (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-22021	**IL-21 (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-24021	**IL-21 (human):Fc (human IgG4) (rec.)**	50 µg	CHO cells	>95%	<5EU/mg	
CHI-HR-20021M	**IL-21 (mutant) (human) (rec.) (His)**	10 µg 50 µg	E. coli	>90%	<1EU/µg	
CHI-MF-11021	**IL-21 (mouse):Fc (mouse) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-12021	**IL-21 (mouse):Fc (mouse) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-21021R	**IL-21R (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-12021R	**IL-21R (mouse):Fc (mouse) (rec.) (non-lytic)**	25 µg 100 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-21022	**IL-22 (human):Fc (human) (rec.)**	25 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22022	**IL-22 (human):Fc (human) (rec.) (non-lytic)**	25 µg 50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MR-10022	**IL-22 (mouse) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<1EU/µg	
CHI-MF-11022	**IL-22 (mouse):Fc (mouse) (rec.)**	25 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-12022	**IL-22 (mouse):Fc (mouse) (rec.) (non-lytic)**	25 µg 50 µg	CHO cells	>98%	<0.1EU/µg	✓
CHI-MF-11123	**IL-23 (mouse):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-21023R	**IL-23R (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-21024	**IL-24 (human):Fc (human) (rec.)**	25 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-21027	**IL-27 (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-22027	**IL-27 (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-11127	**IL-27 (mouse):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HR-20033	**IL-33 (human) (rec.) (His)**	20 µg 50 µg	E. coli	>98%	<1EU/µg	
CHI-HF-21033	**IL-33 (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-21033R	**IL-33R [ST2] (human):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-11033R	**IL-33R [ST2] (mouse):Fc (mouse) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-21035	**IL-35 (human):Fc (human) (rec.)**	25 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-11135	**IL-35 (mouse):Fc (human) (rec.)**	5 µg 25 µg	CHO cells	>98%	<0.06EU/µg	

Specific IL-15Rα Antagonist

IL-15 (mutant) (human):Fc (mouse) (rec.)

CHI-HF-21015M		50 µg
CHI-HF-21115MBI	Biotin	1 Vial

BIOLOGICAL ACTIVITY: Competitively inhibits IL-15-triggered cell proliferation, promotes transplant tolerance, does not activate the STAT-signaling pathway.

APPLICATION (Biotin): Useful for immunofluorescent staining and flow cytometric analysis to identify and numerate IL-15Rα expressing cells within mixed cell populations.

LIT: Targeting the IL-15 receptor with an antagonist IL-15 mutant/Fc gamma2a protein blocks delayed-type hypersensitivity: Y.S. Kim, et al.; J. Immunol. **160,** 5742 (1998)

NEWLY PUBLISHED

IL-39

X. Wang, et al. (2016), recently described a novel IL-12 cytokine family member composed of an IL-23p19 and Ebi3 heterodimer, called interleukin-39 (IL-39). They showed that this protein is secreted by LPS-stimulated B cells and $GL7^+$ activated B cells of lupus-like mice and mediates inflammatory responses through activation of STAT1/STAT3. Their results show that IL-39 might contribute to immunopathogenic mechanisms of systemic lupus erythematosus (SLE).

LIT: A novel IL-23p19/Ebi3 (IL-39) cytokine mediates inflammation in Lupus-like mice: X. Wang, et al.; Eur. J. Immunol. **(Epub ahead of print)** (2016)

Immunomodulating Cytokines & Growth Factors

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
CHI-HR-200BMP2	**BMP-2 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-220BMP2	**BMP-2 (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-MF-111CDH3	**CDH3 (mouse):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110CSF3	**CSF3 (mouse):Fc (mouse) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-210DcR3	**DcR3 (human):Fc (human) (rec.)**	100 µg	CHO cells	≥98%	<0.06EU/µg	
CHI-HF-201EGF	**EGF (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210EGF	**EGF (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220EPO	**EPO (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HR-200FGF2	**FGF-2 (human) (rec.)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-210FGF18	**FGF-18 (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110FGFR1	**FGFR1 (mouse):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-201FLT3L	**FLT3 Ligand (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HR-200CSF	**GM-CSF (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HR-200HMGB1	**HMGB1 (human) (rec.) (His)**	25 µg	E. coli	>90%	<0.1EU/µg	
CHI-RR-300HMGB1	**HMGB1 (rat) (rec.) (His)**	25 µg	E. coli	>90%	<0.1EU/µg	
CHI-RF-311HMGB1	**HMGB1 (rat):Fc (human) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HR-200IFNG	**IFN-γ (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-201LIF	**LIF (human) (rec.) (His)**	10 µg 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-MF-110LYVE1	**LYVE-1 (mouse):Fc (mouse) (rec.)**	50 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-HF-210TGFBM	**TGFβ1 (mutant) (human):Fc (human) (rec.)**	100 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HR-200TNF	**TNF-α (human) (rec.) (His)**	10 µg 50 µg	E. coli	>95%	<0.1EU/µg	
CHI-HF-211VSIG4	**VSIG4 (human):Fc (mouse) (rec.)**	100 µg	HEK 293 cells	>98%	<0.06EU/µg	

Inflammatory Chemokines

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)
CHI-HF-210CCL2	**CCL2 (human):Fc (human) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-MF-110CCL2	**CCL2 (mouse):Fc (mouse) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-210CCL4	**CCL4 (human):Fc (human) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-HR-200CCL5	**CCL5 (human) (rec.) (His)**	10 µg 50 µg	E. coli	>98%	<0.1EU/µg
CHI-HF-210CCL20	**CCL20 (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>95%	<5EU/mg
CHI-MF-110CCL20	**CCL20 (mouse):Fc (mouse) (rec.)**	50 µg	HEK 293 cells	>95%	<5EU/mg
CHI-HF-210CCL22	**CCL22 (human):Fc (human) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-MF-110CCL22	**CCL22 (mouse):Fc (mouse) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-210CCL24	**CCL24 (human):Fc (human) (rec.)**	10 µg 50 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-210CX3C	**CX3CL1 (human):Fc (human) (rec.)**	25 µg 100 µg	CHO cells	>98%	<0.06EU/µg
CHI-HF-210SDF1A	**SDF-1α [CXCL12] (human):Fc (human) (rec.)**	50 µg	HEK 293 cells	>95%	<5EU/mg

Stem Cell Factor (SCF)

SCF plays an essential role in the regulation of cell survival and proliferation, hematopoiesis, stem cell maintenance (binding to haemapoietic stem cells), gametogenesis, mast cell development, migration and function, and in melanogenesis by activating several signaling pathways.

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
CHI-HF-201SCF	**SCF (human) (rec.) (His)**	10 µg | 50 µg	HEK 293 cells	>95%	<0.01EU/µg	
CHI-HF-210SCF	**SCF (human):Fc (human) (rec.)**	10 µg | 50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-HF-220SCF	**SCF (human):Fc (human) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-HF-211SCF	**SCF (human):Fc (mouse) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-110SCF	**SCF (mouse):Fc (mouse) (rec.)**	50 µg	CHO cells	>98%	<0.06EU/µg	
CHI-MF-120SCF	**SCF (mouse):Fc (mouse) (rec.) (non-lytic)**	50 µg	CHO cells	>98%	<0.06EU/µg	✓
CHI-RF-311SCF	**SCF (rat):Fc (mouse) (rec.)**	10 µg | 50 µg	CHO cells	>98%	<0.06EU/µg	

Transplant Tolerance Induction

TGFβ1 (mutant) (human):Fc (human) (rec.)

CHI-HF-210TGFBM 100 µg

BIOLOGICAL ACTIVITY: Shows the biological functions of TGFβ1 and exerts a prolonged circulation half-live caused by the modified Fc domain.

Produced in CHO cells. The extracellular domain of a mutant human TGFβ1 is fused at the C-terminus to the Fc portion of human IgG4. Site-directed mutagenesis was used to change three cysteine codons into a serine codon that are located in the pro region of the TGFβ precursor at amino acid positions 33, 223 and 225. **PURITY:** ≥98% (SDS-PAGE). **ENDOTOXIN CONTENT:** <0.06EU/µg protein (LAL test; Lonza).

LIT: Combined administration of a mutant TGF-beta1/Fc and rapamycin promotes induction of regulatory T cells and islet allograft tolerance: W. Zhang, et al.; J. Immunol. **185,** 4750 (2010)

EPO – Good Guy goes Bad

EPO (human):Fc (human) (rec.) (non-lytic)

CHI-HF-220EPO 50 µg

Erythropoietin (EPO) is a growth factor and cytokine that governs cell proliferation, immune modulation, metabolic homeostasis, vascular function and cytoprotection. EPO is under investigation for the treatment of variety of diseases. Its physiologic function is to stimulate the production of red blood cells. These beneficial properties make EPO an interesting substance for athletes to illegally improve performance in endurance sports. EPO:Fc can be used in Doping Laboratories as an internal standard for western blotting.

Produced in CHO cells. The extracellular domain of human EPO (aa 30-193) is fused to the N-terminus of the Fc region of a mutant human IgG1. **PURITY:** ≥98% (SDS-PAGE). **ENDOTOXIN CONTENT:** <0.06EU/µg protein (LAL test; Lonza).

Negative Control Fusion Proteins

PID	PRODUCT NAME	SIZE	SOURCE	PURITY (SDS-PAGE)	ENDOTOXIN (LAL TEST)	NON-LYTIC
CHI-HF-210IG1	**Fc (human) IgG1 Control (rec.)**	100 µg	HEK 293 cells	>98%	<0.06EU/µg	
CHI-HF-220IG1	**Fc (human) IgG1 Control (rec.) (non-lytic)**	100 µg	HEK 293 cells	>98%	<0.06EU/µg	✓
CHI-HF-210IG4	**Fc (human) IgG4 Control (rec.)**	100 µg	HEK 293 cells	>98%	<5EU/mg	
CHI-MF-110IG2A	**Fc (mouse) IgG2a Control (rec.)**	100 µg	HEK 293 cells	>98%	<0.06EU/µg	
CHI-MF-120IG2A	**Fc (mouse) IgG2a Control (rec.) (non-lytic)**	100 µg	HEK 293 cells	>98%	<0.06EU/µg	✓

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