

Cytokines and Growth Factors

Cytokines are a category of signalling proteins and glycoproteins that, like hormones and

neurotransmitters, are used extensively in cellular communication. While hormones are

secreted from specific organs to the blood, and neurotransmitters are related to neural activity,

the cytokines are a more diverse class of compounds in terms of origin and purpose. They are

produced by a wide variety of hematopoietic and non-hematopoietic cell types and can have

autocrine, paracrine and endocrine effects, sometimes strongly dependent on the presence of

other chemicals. The cytokine family consists mainly of smaller, water-soluble proteins and

glycoproteins with a mass between 8 and 30 kDa.

Cytokines are critical to the development and functioning of both the innate and adaptive

immune response. They are often secreted by immune cells that have encountered a pathogen,

thereby activating and recruiting further immune cells to increase the system's response to the

pathogen. Cytokines are also involved in several developmental processes during

embryogenesis.

Effects

Each cytokine binds to a specific cell-surface receptor. Subsequent cascades of intracellular

signalling then alter cell functions. This may include the upregulation and/or downregulation of

several genes and their transcription factors, resulting in the production of other cytokines, an

increase in the number of surface receptors for other molecules, or the suppression of their own

effect by feedback inhibition.

The effect of a particular cytokine on a given cell depends on the cytokine, its extracellular

abundance, the presence and abundance of the complementary receptor on the cell surface,

and downstream signals activated by receptor binding; these last two factors can vary by cell

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type. Cytokines are characterized by considerable "redundancy", in that many cytokines appear to share similar functions.

Generalization of functions is not possible with cytokines. Nonetheless, their actions may be grouped as:

- autocrine, if the cytokine acts on the cell that secretes it.
- paracrine, if the target is restricted to the immediate vicinity of a cytokine's secretion.
- endocrine, if the cytokine diffuses to distant regions of the body (carried by blood or plasma).

It seems to be a paradox that cytokines binding to antibodies have a stronger immune effect than the cytokine alone. This may lead to lower therapeutic doses.

Classification

Structural

Structural homology has been able to partially distinguish between cytokines that do not demonstrate a considerable degree of redundancy so that they can be classified into four types:

- The four α-helix bundle family Member cytokines have three-dimensional structures with four bundles of α-helices. This family in turn is divided into three sub-families:
 - 1. the IL-2 subfamily
 - 2. the interferon (IFN) subfamily
 - 3. the IL-10 subfamily.

The first of these three subfamilies is the largest. It contains several non-immunological cytokines including erythropoietin (EPO) and thrombopoietin (THPO). Also, four α -helix bundle cytokines can be grouped into *long-chain* and *short-chain* cytokines.

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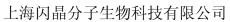
- the IL-1 family, which primarily includes IL-1 and IL-18
- the IL-17 family, which has yet to be completely characterized, though member cytokines have a specific effect in promoting proliferation of T-cells that cause cytotoxic effects

Functional

A classification that proves more useful in clinical and experimental practice divides immunological cytokines into those that enhance cytokine responses, type 1 (IFN- γ , TGF- β etc.), and type 2 (IL-4, IL-10, IL-13, etc.), which favor antibody responses.

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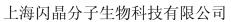
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Cat.No.	Product Name	Product Description	Activity	Package	Price(EUR)
SG002A	hG-CSF	Recombinant Human Granulocyte-Colony	6.0x 107 IU/mg	2µg	15
SG002B				10µg	60
SG002C		Stimulating Factor		50µg	160
SG028A	PEG-GCSF	Pegylated Recombinant Human Granulocyte-Colony Stimulating Factor	1.0x 107 IU/mg	2µg	30
SG028B				10µg	120
SG028C				50µg	320
SG003A			1.0 x 107 IU/mg	2µg	15
SG003B	hGM-CSF	Recombinant Human Granulocyte Macrophage Colony Stimulating Factor		10µg	60
SG003C				50µg	160
SG040A	hGM-CSF	Recombinant Human Granulocyte Macrophage Colony Stimulating Factor P. Pichia Derived (Sargramostim)	5.0 x 106 IU/mg	2µg	15
SG040B				10µg	60
SG040C				50µg	160
SG025A		Recombinant Human Interferon-alpha 2a	1.0 x 108 IU/mg	2µg	3
SG025B	hIFNα-2a			10µg	10
SG025C				50µg	30
SG005A			1.0 x 108 IU/mg	2µg	3
SG005B	hIFNα-2b	Recombinant Human Interferon-alpha 2b		10µg	10
SG005C				50µg	30
SG007A	PEG-IFNα2b	Pegylated Recombinant 1.0 x 106 Human Interferon-alpha 2b IU/mg		2µg	30
SG007B			1.0 x 106 IU/mg	10µg	120
SG007C				50µg	320
SG014A	hIFNγ	Recombinant Human Interferon-gamma	1.5 x 107 IU/mg	2µg	3
SG014B				10µg	10
SG014C		.		50µg	30
SG008A	hTNFα	Recombinant Human Tumor		2µg	4

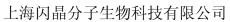
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SG008B		Necrosis Factor alpha	3.0 x 107	10~	15
SG008B		·	IU/mg	10µg	15
SG008C				50µg	50
SG036A	hTNFα-M	Recombinant Human Tumor Necrosis Factor alpha Mutant (ΤΝFα Mutant)	1.0 x 109 IU/mg	2μg	4
SG036B				10µg	15
SG036C		(TWI a Matant)		50µg	50
SG010A		Recombinant Human		10µg	3
SG010B	hPTH1-84	Parathyroid Hormone (PTH1-84)	1.0 x 104 IU/mg	50µg	10
SG010C		,		500µg	30
SG029A		5 (11		10µg	3
SG029B	hEGF	Recombinant Human Epidermal Growth Factor (EGF)	5.0 x 105 IU/mg	50µg	10
SG029C		, ,		500µg	30
SG043A				2µg	10
SG043B	mFGF-acidic	Recombinant Mouse mFGF-acidic Fibroblast Growth Factor-acidic	2.0 x 106 IU/mg	10µg	40
SG043C				50µg	120
SG044A				2μg	10
SG044B	mFGF-basic	Recombinant Mouse nFGF-basic Fibroblast Growth Factor-basic	2.0 x 106 IU/mg	10µg	40
SG044C				50µg	120
SG012A				2μg	15
SG012B	hBMP2	Recombinant Human Bone Morphogenetic Protein -2	2.0 x 104 IU/mg	10µg	65
SG012C			3	50µg	200
SG017A				2µg	30
SG017B	hLIF	Recombinant Human Leukemia Inhibitory Factor	1.0 x 108 IU/mg	10µg	120
SG017C				50µg	320
SG034A		Recombinant Human Stem Cell Factor	5.0 x 105 IU/mg	2μg	15
SG034B	hSCF			10µg	60
SG034C				50µg	160
SG033A	hIL-1RA	Recombinant Human		2μg	8

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SG033B		Interleukin-1 Receptor Antagonist	2.0 x 106 IU/mg	10µg	30
SG033C				50µg	90
SG041A	mlL-1α	Recombinant Mouse Interleukin-1 Alpha		2µg	10
SG041B			1.0 x 108 IU/mg	10ug	40
SG041C			-	50ug	120
SG042A				2µg	10
SG042B	mIL-1β	Recombinant Mouse Interleukin-1 Beta	1.0 x 108 IU/mg	10ug	40
SG042C				50ug	120
SG013A			1.0 x 107 IU/mg	2µg	5
SG013B	hIL-2	Recombinant Human Interleukin-2		10µg	20
SG013C				50µg	65
SG009A				2μg	10
SG009B	hIL-6	Recombinant Human Interleukin-6	5.0 x 107 IU/mg	10µg	40
SG009C				50µg	120
SG035A		Recombinant Human IL-8 /72 Interleukin-8 (8-79)	2.0 x 106 IU/mg	2µg	10
SG035B	hIL-8 /72			10µg	40
SG035C				50µg	120
SG037A			5.0 x 105 IU/mg	2µg	10
SG037B	hIL-8 /77	L-8 /77 Interleukin-8 (3-79)		10µg	40
SG037C				50µg	120
SG027A			1.5 x 106 IU/mg	2µg	15
SG027B	hIL-10	Recombinant Human Interleukin-10		10µg	65
SG027C				50µg	200
SG018A				2µg	15
SG018B	mlL-10	Recombinant Mouse Interleukin-10	5.0 x 105 IU/mg	10µg	65
SG018C				50µg	200
SG019A		Recombinant Rat	5.0 x 105 IU/mg	2μg	15
SG019B	rlL-10			10µg	65
SG019C				50µg	200
SG006A	hlL-11	Recombinant Human		2µg	10

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SG006B		Interleukin-11	8.0 x 106 IU/mg	10µg	40
SG006C			. 	50µg	120
SG016A	hIL-15	Recombinant human Interleukin-15	2.0 x 106 IU/mg	2μg	15
SG016B				2µg	65
SG016C				50µg	200
SG045A	hIL-16		1.0 x 104 IU/mg	2μg	15
SG045B		Recombinant human Interleukin-16		10µg	65
SG045C				50µg	200
SG047A	mIL-22	Recombinant Mouse	2.0 x 106 IU/mg	2μg	15
SG047B				10µg	65
SG047C				50µg	200
SG038A	VEGI	ecombinant Human	2.0 x 102 IU/mg	2μg	15
SG038B		Vascular Endothelial Growth EGI Inhibitor		10µg	65
SG038C				50µg	200



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