Recombinant Human GM-CSF GMP

Catalog Number: 215-GMP

DESCRIPTION

Source	*E. coli*-derived human GM-CSF protein Ala18-Glu144 Accession # P04141 Produced using non-animal reagents in an animal-free laboratory. Manufactured and tested under cGMP guidelines.
N-terminal Sequence Analysis	Ala-Pro-Ala-Arg-Ser-Pro-Ser-Pro-Ser-Thr
Predicted Molecular Mass	14.5 kDa

SPECIFICATIONS

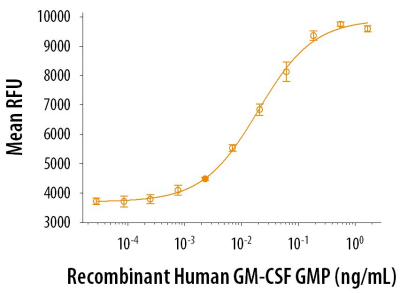
SDS-PAGE	14 kDa, reducing conditions
Activity	Measured in a cell proliferation assay using TF-1 human erythroleukemic cells. Kitamura, T. *et al*. (1989) J. Cell Physiol. **140**:323. The ED_{50} for this effect is 6-30 pg/mL. The specific activity of recombinant human GM-CSF is approximately 1.5 x 10^4 IU/µg, which is calibrated against human GM-CSF WHO International Standard (NIBSC code: 88/646).
Endotoxin Level	<0.10 EU per 1 µg of the protein by the LAL method.
Purity	>97%, by SDS-PAGE under reducing conditions and visualized by silver stain.
Host Cell Protein	< 0.5 ng per µg of protein when tested by ELISA.
Mycoplasma	Negative when tested in a ribosomal RNA hybridization assay.
Formulation	Lyophilized from a 0.2 µm filtered solution in PBS. See Certificate of Analysis for details.

PREPARATION AND STORAGE

Reconstitution	Reconstitute at 100-200 µg/mL in PBS.
Shipping	The product is shipped at ambient temperature. Upon receipt, store it immediately at the temperature recommended below.
Stability & Storage	**Use a manual defrost freezer and avoid repeated freeze-thaw cycles.** ● A minimum of 12 months when stored at ≤ -20 °C as supplied. Refer to lot specific COA for the Use by Date. ● 1 month, 2 to 8 °C under sterile conditions after reconstitution. ● 3 months, ≤ -20 °C under sterile conditions after reconstitution.

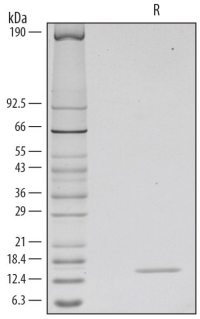
DATA

Bioactivity



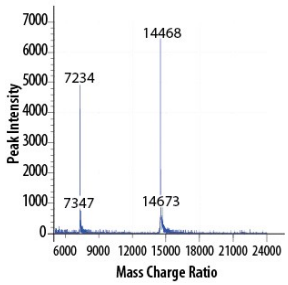
GMP-grade Recombinant Human GM-CSF (Catalog # 215-GMP) stimulates proliferation of TF-1 human erythroleukemic cell line. The ED_{50} is 6-30 pg/mL.

SDS-PAGE



1 µg/lane of GMP-grade Recombinant Human GM-CSF (Catalog # 215-GMP) was resolved with SDS-PAGE under reducing (R) conditions and visualized by silver staining, showing a single band at 14 kDa.

Mass Spectrometry



MALDI-TOF analysis of GMP-grade Recombinant Human GM-CSF (Catalog # 215-GMP). The major peak corresponds to the calculated molecular mass, 14478 Da. The minor peak at 14673 Da is a matrix-associated artifact of the MALDI-TOF.

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BACKGROUND

GM-CSF was initially characterized as a factor that can support the *in vitro* colony formation of granulocyte-macrophage progenitors. It is also a growth factor for erythroid, megakaryocyte, and eosinophil progenitors. GM-CSF is produced by a number of different cell types (including T cells, B cells, macrophages, mast cells, endothelial cells, fibroblasts, and adipocytes) in response to cytokine or inflammatory stimuli. On mature hematopoietic cells, GM-CSF is a survival factor for and activates the effector functions of granulocytes, monocytes/macrophages, and eosinophils (1, 2). GM-CSF promotes a Th1 biased immune response, angiogenesis, allergic inflammation, and the development of autoimmunity (3-5). It shows clinical effectiveness in ameliorating chemotherapy-induced neutropenia, and GM-CSF transfected tumor cells are utilized as cancer vaccines (6, 7). The 22 kDa glycosylated GM-CSF, similar to IL-3 and IL-5, is a cytokine with a core of four bundled α-helices (8-12). Mature human GM-CSF shares 63%-70% amino acid sequence identity with canine, feline, porcine, and rat GM-CSF and 54% with mouse GM-CSF. GM-CSF exerts its biological effects through a heterodimeric receptor complex composed of GM-CSF Rα/CD116 and the signal transducing common β chain (CD131) which is also a component of the high-affinity receptors for IL-3 and IL-5 (13, 14). In addition, GM-CSF binds a naturally occurring soluble form of GM-CSF Rα (15). Human GM-CSF is active on canine and feline cells but not on murine cells (16-18).

References:

1. Martinez-Moczygemba, M. and D.P. Huston (2003) J. Allergy Clin. Immunol. **112**:653.
2. Barreda, D.R. *et al.* (2004) Dev. Comp. Immunol. **28**:509.
3. Eksioglu, E.A. *et al.* (2007) Exp. Hematol. **35**:1163.
4. Cao, Y. (2007) J. Clin. Invest. **117**:2362.
5. Fleetwood, A.J. *et al.* (2005) Crit. Rev. Immunol. **25**:405.
6. Heuser, M. *et al.* (2007) Semin. Hematol. **44**:148.
7. Hege, K.M. *et al.* (2006) Int. Rev. Immunol. **25**:321.
8. Kaushansky, K. *et al.* (1992) Biochemistry **31**:1881.
9. Diederichs, K. *et al.* (1991) Science **254**:1779.
10. Cantrell, M.A. *et al.* (1985) Proc. Natl. Acad. Sci. **82**:6250.
11. Lee, F. *et al.* (1985) Proc. Natl. Acad. Sci. **82**:4360.
12. Wong, G.G. *et al.* (1985) Science **228**:810.
13. Onetto-Pothier, N. *et al.* (1990) Blood **75**:59.
14. Hayashida, K. *et al.* (1990) Proc. Natl. Acad. Sci. **87**:9655.
15. Pelley, J.L. *et al.* (2007) Exp. Hematol. **35**:1483.
16. Hogge, G.S. *et al.* (1990) Cancer Gene Ther. **6**:26.
17. Sprague, W.S. *et al.* (2005) J. Comp. Pathol. **133**:136.
18. Shanafelt, A.B. *et al.* (1991) J. Biol. Chem. **266**:13804.

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- Host Cell Protein testing performed by ELISA
- Mycoplasma testing by ribosomal RNA hybridization assay

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