

DESCRIPTION

Source *E. coli*-derived
Glu33-Ser190, with an N-terminal Met
Accession # NP_757350
Produced using non-animal reagents in an animal-free laboratory.
Manufactured and tested under cGMP guidelines.

N-terminal Sequence Analysis Met-Glu-Glu-Val-Ser-Glu-Try-(Cys)-Ser-His

Structure / Form Disulfide-linked homodimer

Predicted Molecular Mass 18.5 kDa (monomer)

SPECIFICATIONS

SDS-PAGE 37 kDa, non-reducing conditions

Activity Measured in a cell proliferation assay using M-NFS-60 mouse myelogenous leukemia lymphoblast cells. Nakoinz, I. *et al.* (1990) J. Immunol. **145**:860.
The ED₅₀ for this effect is 0.5-1.5 ng/mL.

The specific activity of Recombinant Human M-CSF is approximately 1.68 x 10⁵ IU/μg, which is calibrated against recombinant human M-CSF WHO International Standard (NIBSC code: 89/512).

Endotoxin Level <0.01 EU per 1 μg of the protein by the LAL method.

Purity >97%, by SDS-PAGE with silver staining, under reducing conditions.

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 50-500 μg/mL in PBS.

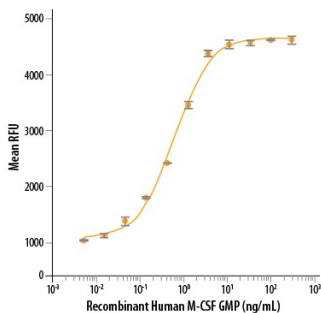
Shipping The product is shipped at ambient temperature. Upon receipt, store it immediately at the temperature recommended below.

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.

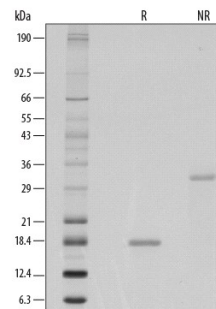
DATA

Bioactivity

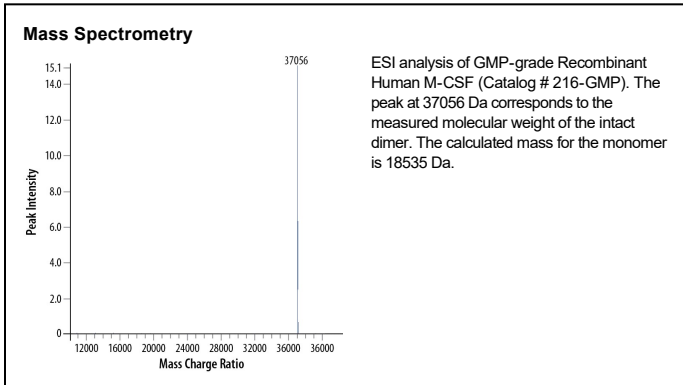


GMP-grade Recombinant Human M-CSF (Catalog # 216-GMP) stimulates cell proliferation in the M-NFS-60 mouse myelogenous leukemia lymphoblast cell line in a dose-dependent manner. The ED₅₀ for this effect is 0.5-1.5 ng/mL.

SDS-PAGE



1 μg/lane of GMP-grade Recombinant Human M-CSF (Catalog # 216-GMP) was resolved with SDS-PAGE under reducing (R) and non-reducing (NR) conditions and visualized by silver staining, showing bands at 18 kDa and 32 kDa, respectively.



BACKGROUND

M-CSF, also known as CSF-1, is a four- α -helical-bundle cytokine that is the primary regulator of macrophage survival, proliferation and differentiation (1-3). M-CSF is also essential for the survival and proliferation of osteoclast progenitors (1, 4). M-CSF also primes and enhances macrophage killing of tumor cells and microorganisms, regulates the release of cytokines and other inflammatory modulators from macrophages, and stimulates pinocytosis (2, 3). M-CSF increases during pregnancy to support implantation and growth of the decidua and placenta (5). Sources of M-CSF include fibroblasts, activated macrophages, endometrial secretory epithelium, bone marrow stromal cells and activated endothelial cells (1-5). The M-CSF receptor (*c-fms*) transduces its pleiotropic effects and mediates its endocytosis. M-CSF mRNAs of various sizes occur (3-9). Full length human M-CSF transcripts encode a 522 amino acid (aa) type I transmembrane (TM) protein with a 464 aa extracellular region, a 21 aa TM domain, and a 37 aa cytoplasmic tail that forms a 140 kDa covalent dimer. Differential processing produces two proteolytically cleaved, secreted dimers. One is an N- and O- glycosylated 86 kDa dimer, while the other is modified by both glycosylation and chondroitin-sulfate proteoglycan (PG) to generate a 200 kDa subunit. Although PG-modified M-CSF can circulate, it may be immobilized by attachment to type V collagen (8). Shorter transcripts encode M-CSF that lacks cleavage and PG sites and produces an N-glycosylated 68 kDa TM dimer and a slowly produced 44 kDa secreted dimer (7). Although forms may vary in activity and half-life, all contain the N-terminal 150 aa portion that is necessary and sufficient for interaction with the M-CSF receptor (10, 11). The first 223 aa of mature human M-CSF shares 88%, 86%, 81% and 74% aa identity with corresponding regions of dog, cow, mouse and rat M-CSF, respectively (12, 13). Human M-CSF is active in the mouse, but mouse M-CSF is reported to be species-specific.

References:

1. Pixley, F.J. and E.R. Stanley (2004) *Trends Cell Biol.* **14**:628.
2. Chitu, V. and E.R. Stanley (2006) *Curr. Opin. Immunol.* **18**:39.
3. Fixe, P. and V. Praloran (1997) *Eur. Cytokine Netw.* **8**:125.
4. Ryan, G.R. *et al.* (2001) *Blood* **98**:74.
5. Makriganakis, A. *et al.* (2006) *Trends Endocrinol. Metab.* **17**:178.
6. Nandi, S. *et al.* (2006) *Blood* **107**:786.
7. Rettenmier, C.W. and M.F. Roussel (1988) *Mol. Cell Biol.* **8**:5026.
8. Suzu, S. *et al.* (1992) *J. Biol. Chem.* **267**:16812.
9. Manos, M.M. (1988) *Mol. Cell. Biol.* **8**:5035.
10. Kothe, K. (1997) *Mol. Reprod. Dev.* **46**:31.
11. Jang, M-H. *et al.* (2006) *J. Immunol.* **177**:4055.
12. Kawasaki, E.S. *et al.* (1985) *Science* **230**: 291.
13. Wong, G.G. *et al.* (1987) *Science* **235**:1504.

MANUFACTURING SPECIFICATIONS

GMP Proteins

R&D Systems, a Bio-Techne Brand's GMP proteins are produced according to relevant sections of the following documents: WHO TRS, No. 822, 1992 Annex 1, Good Manufacturing Practices for Biological Products; USP Chapter 1043, Ancillary Materials for Cell, Gene and Tissue-Engineered Products and USP Chapter 92, Growth Factors and Cytokines Used in Cell Therapy Manufacturing.

R&D Systems' quality focus includes:

- Manufactured and tested under an ISO 9001:2015 and ISO 13485:2016 certified quality system
- Documented processes and QA control of documentation and process changes
- Personnel training programs
- Raw material testing and vendor qualification/monitoring
- Fully validated equipment, processes and test methods
- Equipment calibration schedules using a computerized calibration program
- Facility maintenance, safety programs and pest control
- Material review process for variances
- Monitoring of stability over product shelf-life

R&D Systems strives to provide our customers with the analytical characteristics of each product so that customers may determine whether our products are appropriate for their research. The Certificate of Analysis provided contains the following lot specific information:

- N-terminal amino acid analysis, SDS-PAGE analysis, and endotoxin level (as determined by LAL assay) performed on each bulk QC lot, not on individual bottlings of each QC lot
- Post-bottling lot-specific bioassay results (compliance with an established range) and results of microbial bioburden testing (using broth culture, Sabourand's dextrose and blood agar plates with results reported at 3 days and at 7 days)
- Host Cell Protein testing performed by ELISA
- Mycoplasma testing by ribosomal RNA hybridization assay

Additional testing and documentation requested by the customer can be arranged at an additional cost. Testing may include, but is not limited to, USP <61> bioburden testing, positive identity testing, testing for adventitious agents and testing for residual host cell content.

Production records and facilities are available for examination by appropriate personnel on-site at R&D Systems in Minneapolis, Minnesota USA.

R&D Systems sells its GMP grade recombinant protein products for research use or further manufacturing use in *ex vivo* cell therapy applications. They are not for *in vivo* use or for use as therapeutic or other drugs, biologic products or devices. Please read the following End User Terms prior to using this product.

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Production

- All molecular biology procedures use animal-free media and dedicated labware.
- Dedicated fermentors are utilized in committed animal-free areas.

Purification

- Protein purification columns are animal-free.
- Bulk proteins are filtered using animal-free filters.
- Purified proteins are stored in animal-free containers in a dedicated cold storage room.

Quality Assurance

- Low Endotoxin Level.
- No impairment of biological activity.
- High quality product obtained under stringent conditions.
- For *ex vivo* research or bioproduction, [additional documentation](#) can be provided.

[Please read our complete Animal-Free Statement.](#)

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