

Proteins

Antibodies

ELISAs

Assay Services

MultiAnalyte Profiling

Activity Assays

Stem Cells

ELISpot Kits

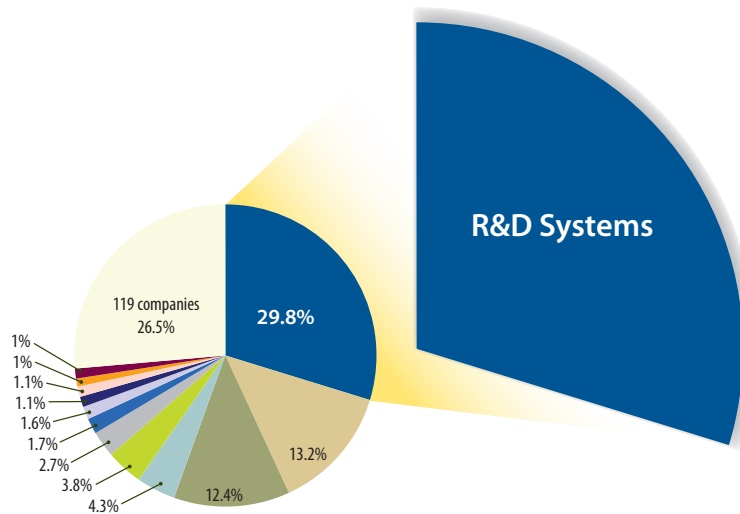
Flow Cytometry

Cell Selection

## R&D Systems Quality Bioactive Proteins

R&D Systems is the most referenced manufacturer of recombinant and natural proteins in the scientific literature. We currently offer more than 1,700 proteins from 16 different species for a wide range of research areas including immunology, development, cancer, neuroscience, endocrinology, signal transduction, stem cells, & more. Researchers choose our proteins because we have over 20 years of experience expressing and purifying proteins using a variety of different systems. The proteins that we offer exhibit high purity and are tested for stability, lot-to-lot consistency, low endotoxin levels, and biological activity. By maintaining stringent production and purification standards, we strive to provide our customers with quality proteins that produce consistent, reliable results.

### R&D Systems is the Most Referenced Protein Manufacturer

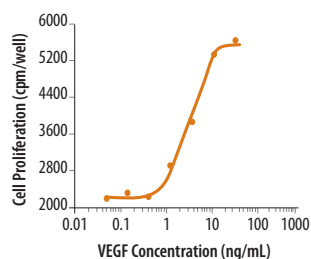


A literature survey of 860 articles with citations that were published in 44 high impact journals from four different general research areas including immunology, signal transduction, development/neuroscience, and bone/endocrinology/hematology, was conducted to determine the number of citations referencing the use of R&D Systems proteins compared to the number referencing proteins manufactured by other companies. 839 total protein citations were identified in the survey, approximately 30% of these cited the use of R&D Systems proteins. The percentage of citations attributed to 11 other major protein manufacturers is also shown (clockwise from R&D Systems, tan-burgundy sections). The final section in the pie chart (26.5%, yellow section) includes 215 citations referencing products from 119 different companies. No company listed under this category had more than 1% of the total number of citations.

### Performance

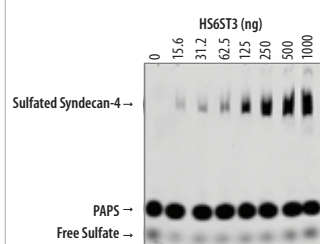
Every protein that R&D Systems offers is tested for a specific biological activity based on how it has been described in the scientific literature. This may include any of a wide range of assays such as the ability to stimulate or inhibit cell proliferation, cell adhesion, cytokine secretion, alkaline phosphatase production, chemotaxis, transcriptional activation, protein phosphorylation, or assays that directly measure enzymatic activity. Examples of some of these assays are described below.

#### CELL PROLIFERATION



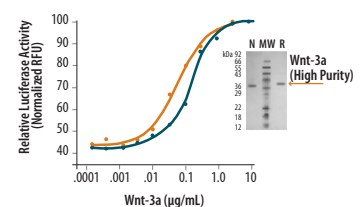
**VEGF Induces HUVEC Proliferation.** Human umbilical vein endothelial cells (HUVECs) were incubated with increasing concentrations of recombinant human VEGF<sub>165</sub> (Catalog # 293-VE) and cell proliferation was assessed by measuring <sup>3</sup>H-thymidine incorporation.

#### ENZYMATIC ACTIVITY



**HS6ST3 Transfers Sulfate to Syndecan-4.** Each reaction contained the indicated amount of recombinant mouse HS6ST3 (Catalog # 5406-ST), recombinant human Syndecan-4 (Catalog # 2918-SD) as an acceptor substrate, and the sulfate donor PAPS spiked with <sup>35</sup>S PAPS. Following incubation, reaction products were separated using SDS-PAGE and the gel was exposed to x-ray film.

#### TRANSCRIPTIONAL ACTIVATION



**Human Wnt-3a Induces  $\beta$ -Catenin-responsive Transcriptional Activation.** Recombinant human Wnt-3a (Catalog # 5036-WN; blue) and recombinant human Wnt-3a (High Purity; Catalog # 5036-WNP; orange) both stimulate  $\beta$ -Catenin-responsive transcriptional activation assessed using the TOPflash TCF reporter in the human kidney cell line, HEK293T. Purity is highlighted in a silver-stained, SDS-PAGE gel loaded with 1  $\mu$ g/lane Wnt-3a (High Purity) under both non-reducing (N) and reducing (R) conditions (inset). MW = Molecular weight markers.

## Quality

**PURITY:** Our proteins are typically over 95% pure. This ensures that the results observed in activity assays are due to the protein itself rather than a contaminant.

**BIOLOGICAL ACTIVITY:** The biological activity of each protein is tested in an appropriate biological system to ensure that it is consistent with literature-based expectations.

**STABILITY:** The bioactivity and physical state of proteins stored under various conditions are monitored over long periods of time. Freeze/thaw cycles are also carried out to ensure that the buffer provides for long-term stability. Various analyses including SDS-PAGE, reverse phase HPLC, size exclusion chromatography, and mass spectra may be used when necessary to provide supporting evidence that proteins have the correct structure.

**LOW ENDOTOXIN LEVELS:** Each new production lot of a protein is assessed for endotoxins using the Limulus Amoebocyte Lysates (LAL) assay. Low endotoxin levels are essential for proteins used in biological systems that may be sensitive to endotoxins.

**LOT-TO-LOT CONSISTENCY:** Minimal lot-to-lot variability is ensured by maintaining consistent manufacturing conditions and testing each new lot side-by-side with previous lots to compare biological activity, endotoxin levels, and purity.

## Bulk Quantities

When experimental protocols require large quantities of a particular protein, special bulk pack sizes are available. This will reduce the cost per unit mass. For a bulk order quote for a particular protein, please contact a customer sales representative at 1-800-343-7475.

## Selection

R&D Systems currently offers an extensive selection of purified recombinant and natural proteins including:

- Cytokines
- Developmental Proteins
- Growth Factors
- Proteases
- Adhesion Molecules
- Chemokines
- Neurotrophic Factors
- Signal Transduction Molecules & More

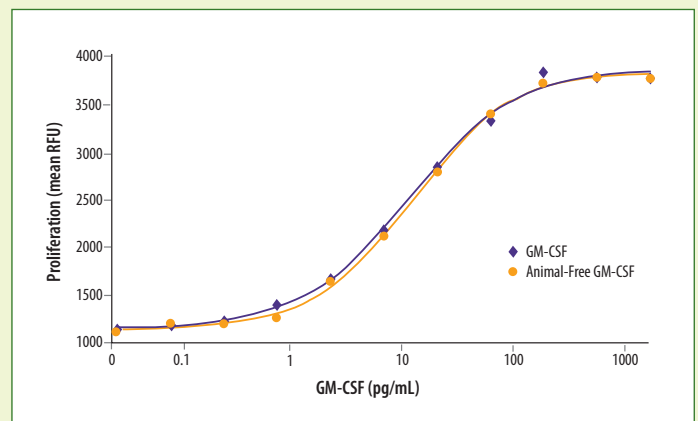
These are from a wide range of species including human, mouse, rat, bovine, equine, feline, porcine, canine, cotton rat, chicken, primate, *Xenopus*, and zebrafish. We also offer insect, viral, and bacterial proteins. Please refer to our website at [www.RnDSystems.com](http://www.RnDSystems.com) for a complete listing. New products are released weekly. For notification, please subscribe to our weekly new product email at [www.RnDSystems.com/go/Request](http://www.RnDSystems.com/go/Request).

## Formulation

All proteins offered by R&D Systems are available carrier-free. Carrier-free proteins are particularly useful for *in vivo* experiments or other applications where a carrier protein may interfere with the outcome of the experiment. Most recombinant proteins are also available lyophilized from a sterile filtered solution containing a carrier protein, typically bovine serum albumin (BSA) at 50 micrograms per 1 microgram of the protein of interest. The presence of the carrier protein gives the lyophilized protein greater stability, maximizes recovery upon reconstitution, and allows easy handling and storage. Recombinant enzymes are provided ready-to-use in solution.

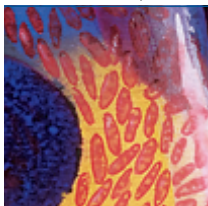
## Animal-Free™ Recombinant Proteins

R&D Systems also offers animal-free recombinant proteins. These proteins are manufactured in a laboratory exclusively dedicated to the production and purification of products under animal-free conditions. Animal-free proteins are particularly important for researchers concerned with experimental variables caused by trace animal components or mammalian pathogens. Animal-free proteins are confirmed to share the same biological activities as those produced under standard laboratory conditions. For more information, please visit our website at [www.RnDSystems.com/go/AnimalFree](http://www.RnDSystems.com/go/AnimalFree).



**Bioactivity of Animal-Free GM-CSF.** TF-1 human erythroleukemic cells were treated with the indicated concentrations of recombinant human GM-CSF (Catalog # 215-GM; purple line) or animal-free recombinant human GM-CSF (Catalog # AFL215; gold line) for three days. Cell number was determined in a fluorometric assay using the redox sensitive dye, Resazurin (Catalog # AR002).

For research use only. Not for use in diagnostic procedures.



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