Cellastim® S Recombinant HSA Reconstitution

Marcus Curl, Vice President of Product Applications
InVitria, Inc., USA

APPLICATION BENEFITS

- ***Recombinant, blood-free, and animal-origin-free HSA***
- ***Enhances cell health via antioxidant, fatty acid transport, and metal ion stabilization functions***
- ***Consistently supports expansion of diverse cell types including MSCs, HSCs, T cells, HEK293, and VERO***
- ***Scalable and chemically defined, ideal for large-scale biomanufacturing***
- ***Manufactured animal-free at the tertiary level per GMP in ISO 9001:2015–certified facility***

INVITRIA SOLUTIONS

Cellastim S - Recombinant Human Serum Albumin

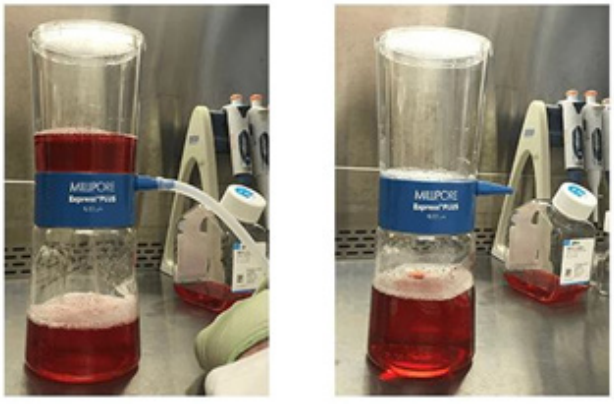


EXECUTIVE SUMMARY

Cellastim S is InVitria's recombinant, animal-origin-free human serum albumin designed for reliable preparation and use in cell culture workflows. Unlike serum-derived albumin, which introduces risks of variability, adventitious agents, and supply limitations, Cellastim S provides a safe, scalable, and chemically defined alternative. This application note outlines a step-by-step process for reconstituting Cellastim S into a 10% sterile liquid stock solution suitable for a wide range of cell culture applications. By replacing blood-derived albumin with Cellastim S, scientists can improve consistency, reduce regulatory burden, and streamline clinical manufacturing.

Key Highlights

- Simple, reproducible reconstitution protocol
- Consistent, animal-origin-free media supplementation
- Reduced variability vs. serum-derived HSA/BSA
- Proven across multiple cell types
- Animal-origin-free and GMP-grade recombinant albumin



Sterile filtration ensures Cellastim S is ready for consistent, animal-origin-free cell culture workflows.

INTRODUCTION

Human serum albumin (HSA) has been identified as a powerful tool for the expansion of many cell types in vitro (Francis, 2010). HSA is a multifaceted protein capable of binding a wide range of molecules, enabling it to act as an antioxidant by binding reactive oxygen species, as an energy-delivery system by transporting fatty acids, and as a stabilizer of essential metal ions (He & Carter, 1992; Taverna et al., 2013). These functions make HSA supplementation of cell culture media an integral step in supporting cell growth and expansion, especially when serum or blood-derived proteins are removed for clinical manufacturing.

As cell-based immunotherapies, gene therapies, and stem cell therapies continue to show promise in the laboratory and the clinic (Maude et al., 2015; Trounson et al., 2011; Cavazzana-Calvo et al., 2000), the availability of safe and consistently high-performing HSA grows in importance for the future of these technologies (van der Valk et al., 2010). Currently, HSA used in the expansion of mesenchymal stem cells (MSCs), hematopoietic stem cells (HSCs), T cells, HEK293, VERO, MDCK, BHK-21, and other cell types is often sourced from human serum (Francis, 2010; Blázquez-Prunera et al., 2017). While this has been instrumental to the development of novel therapeutics, serum-derived albumin introduces variability, risk of adventitious agents, and potential supply bottlenecks (Chisini et al., 2017).

To address these challenges, chemically defined media supplemented with recombinant and well-characterized alternatives to animal-derived components is increasingly being adopted as a strategy to improve consistency, reduce risk, and enable scalability (van der Valk et al., 2010). Cellastim S is a recombinant, blood-free, and animal-free human albumin produced in a scalable, non-mammalian expression system. It is naturally free of prion agents and other mammalian adventitious contaminants and has demonstrated consistent performance in supporting the culture of T lymphocytes, HEK293, MSCs, HSCs, and VERO cells (Alfano, 2017; Pennybaker & Alfano, 2018).

This application note provides a step-by-step protocol for preparing Cellastim S as a sterile, 10% liquid stock solution for use in in vitro cell culture applications.

MATERIALS & METHODS

Materials

Recombinant Human Serum Albumin

- Cellastim S (InVitria 777HSA017S)

Reconstitution Supplies

- 125 mL sterile PETG media bottle (ThermoFisher 2019-0125)
- Cell culture–grade DPBS, PBS, or basal media (e.g., DMEM/F-12, DMEM, MEM, RPMI)

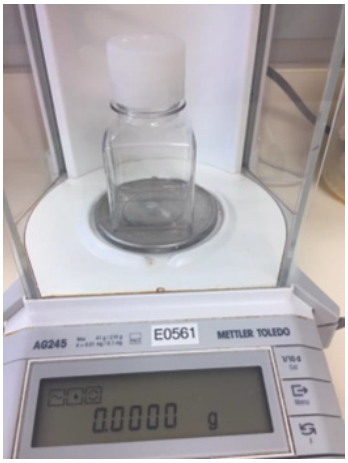
Filtration System

- 500 mL 0.2 µm vacuum filtration system (Millipore SCGPU05RE)

Cellastim S Reconstitution Protocol

Step 1 - Weigh bottle

- Begin with an empty 125 mL sterile PETG media bottle.
- Record its weight.



Step 2 - Add Cellastim S powder

- Under a laminar flow hood, add 10 g Cellastim S to the bottle.



- Weigh again to confirm the actual powder weight added.



- Use this recorded weight to calculate the final resuspension volume.

Example Calculation

$$\text{Resuspension Volume (mL)} = \frac{\text{Cellastim S weighed (mg)}}{\text{100 mg/mL}}$$

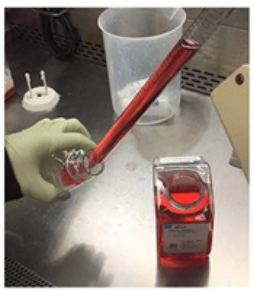
$$\text{Resuspension Volume (mL)} = \frac{\text{10828.6 (mg)}}{\text{100 mg/mL (10\%)}}$$

Target Resuspension Volume (mL) = 108.3 mL

Step 3 - Add buffer

- Add ~70% of the calculated buffer volume (DPBS, PBS, or basal media) to the 125 mL bottle.
  Caution: *Do NOT add full buffer volume yet — allow for powder displacement.*

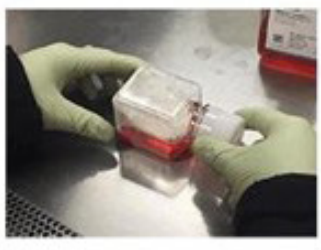




Step 4 - Dissolve the powder

- Cap the bottle and gently tip the bottle on its side so the powder falls into the buffer.
  Caution: *Do not shake or vortex. Gently roll to wet all powder with liquid.*





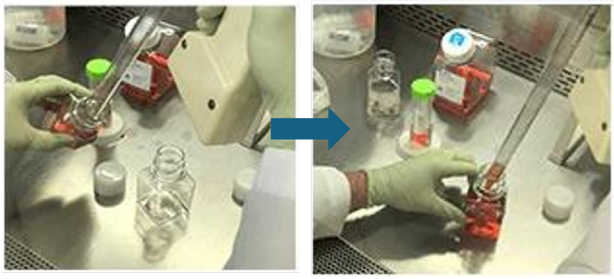
- Return the container upright and allow the albumin to dissolve, undisturbed at 4°C for at least 12 hours, protected from light.





Step 5 - Adjust to final volume

- Once the powder is fully dissolved, bring the solution up to the calculated final volume with additional buffer.



- Transfer ~50 mL of the solution into a fresh sterile 125 mL bottle.
- Move the remaining solution into the same bottle and record the total volume.
- Add the difference between the measured volume and the target volume using buffer.

Step 6 - Sterile filter

- Filter the reconstituted solution through a 0.2 µm vacuum-driven disposable filtration system.





- Collect sterile stock in a clean, labeled container.
- Store under sterile conditions until use.

Note (Manual Filtration Option):

For manual filtration, use a 25 mm 0.8 µm filter (Pall 4188), followed by a 0.2 µm 30 mm PES low–protein-binding filter (Celltreat 229747), with a sterile Luer-lock syringe (Medline SYR103010H).

CONCLUSION

This application note provides a clear and reproducible method for preparing Cellastim S as a sterile 10% stock solution. By following this protocol, researchers can reliably incorporate recombinant, animal-origin-free HSA into serum-free and chemically defined media formulations. Cellastim S offers consistent performance across a range of cell types, while reducing the risks and variability associated with serum-derived albumin. Its scalability and safety make it well-suited for cell therapy, gene therapy, vaccine production, and other advanced biomanufacturing applications.

REFERENCES

Francis, G. L. (2010). Albumin and mammalian cell culture: Implications for biotechnology applications. Cytotechnology, 62(1), 1–16. https://doi.org/10.1007/s10616-010-9263-3

He, X. M., & Carter, D. C. (1992). Atomic structure and chemistry of human serum albumin. Nature, 358(6383), 209–215. https://doi.org/10.1038/358209a0

Taverna, M., Marie, A. L., Mira, J. P., & Guidet, B. (2013). Specific antioxidant properties of human serum albumin. Annals of Intensive Care, 3(1), 4. https://doi.org/10.1186/2110-5820-3-4

Maude, S. L., Teachey, D. T., Porter, D. L., & Grupp, S. A. (2015). CD19-targeted chimeric antigen receptor T-cell therapy for acute lymphoblastic leukemia. Blood, 125(26), 4017–4023. https://doi.org/10.1182/blood-2014-12-580068

Trounson, A., Thakar, R. G., Lomax, G., & Gibbons, D. (2011). Clinical trials for stem cell therapies. BMC Medicine, 9, 52. https://doi.org/10.1186/1741-7015-9-52

Cavazzana-Calvo, M., Hacein-Bey, S., de Saint Basile, G., et al. (2000). Gene therapy of human severe combined immunodeficiency (SCID)-X1 disease. Science, 288(5466), 669–672. https://doi.org/10.1126/science.288.5466.669

van der Valk, J., Brunner, D., De Smet, K., et al. (2010). Optimization of chemically defined cell culture media: Replacing fetal bovine serum in mammalian in vitro methods. Toxicology in Vitro, 24(4), 1053–1063. https://doi.org/10.1016/j.tiv.2010.03.016

Blázquez-Prunera, A., Díez, J. M., Gajardo, R., & Grancha, S. (2017). Human mesenchymal stem cells maintain their phenotype, multipotentiality, and genetic stability when cultured using a defined xeno-free human plasma fraction. Stem Cell Research & Therapy, 8(1), 103. https://doi.org/10.1186/s13287-017-0552-z

Chisini, L. A., Conde, M. C. M., Grazioli, G., et al. (2017). Venous blood derivatives as FBS-substitutes for mesenchymal stem cells: A systematic scoping review. Brazilian Dental Journal, 28(6), 657–668. https://doi.org/10.1590/0103-6440201701646

Alfano, R. W. (2017). Albumin in cell culture media—An examination of quality and function. In T. Brieva, W. Miller, & C. Mason (Eds.), Scale-up and manufacturing of cell-based therapies V (pp. 1–6). ECI Symposium Series. https://dc.engconfintl.org/cellbasedtherapies_v/22

Pennybaker, A., & Alfano, R. (2018). Utilization of recombinant albumins in the expansion of human T lymphocytes. Cell & Gene Therapy Insights, 4(4), 231–239. https://doi.org/10.18609/cgti.2018.023

ORDERING INFORMATION

Description	Order Info
Cellastim S - Recombinant Human Serum Albumin Animal-Origin-Free | GMP-Produced	777HSA017S
Cellastim S - Recombinant Human Serum Albumin, 10 g Bottles	777HSA017S-10g
Cellastim S - Recombinant Human Serum Albumin, 100 g Bottles	777HSA017S-100g
Cellastim S - Recombinant Human Serum Albumin, 1 Kg Bottles	777HSA017S-1Kg

ABOUT INVITRIA

InVitria is a global leader in developing and manufacturing high-performance, animal-origin-free cell culture supplements and recombinant proteins. Our products eliminate human and animal serum-derived components to improve consistency, reduce regulatory burden, and accelerate the approval of life-changing therapies. Trusted in clinical and commercial production of cell and gene therapies, vaccines, regenerative medicine, and medical devices, InVitria supports cGMP and ISO-compliant manufacturing aligned with FDA and EMA expectations. Scalable to meet growing global demand, our chemically defined solutions enable safer, more efficient biomanufacturing.

Performance. Defined.

Copyright © 2025 InVitria, Inc. All rights reserved.
Reproduction or distribution of any InVitria materials, in whole or in part, is prohibited without prior written consent. All logos, names, designs, and marks displayed, including InVitria®, the InVitria brand design and Cellastim®, are trademarks or service marks owned or licensed by InVitria, Inc., Kansas, USA, unless otherwise noted. For details on InVitria's registered intellectual property, patents, and additional terms and conditions, please visit www.InVitria.com/terms.

InVitria, Inc.
2718 Industrial Drive
Junction City, KS 66441 USA
Phone: 800-916-8311
Fax: 785-238-5688
Email: info@invitria.com
www.invitria.com