

DEFINED MEDIA AND SUPPLEMENTS FOR HEMATOPOIETIC CELL EXPANSION

StemSpan™

Background

The ability to culture hematopoietic stem and progenitor cells (HSPCs) in vitro has been instrumental in advancing our understanding of hematopoiesis. As interest in this field has grown, so has the need for highly defined, reliable, and robust media for the expansion and lineage-specific differentiation of HSPCs.

Product Description

StemSpan™ media are available in serum-free, xeno-free, and animal component-free formulations. All StemSpan™ media have been extensively tested in assays to expand cord blood (CB)- and bone marrow-derived CD34⁺ cells. StemSpan™ media do not contain cytokines or growth factors, which allows users the flexibility to prepare a medium that meets their specific requirements. StemSpan™ Expansion Supplements or custom cytokine cocktails may be added to StemSpan™ media to support the expansion of CD34⁺ cells or drive the lineage-specific differentiation of CD34⁺ cells. The StemSpan™ T Cell Generation Kit, StemSpan™ NK Cell Generation Kit, and StemSpan™ B Cell Generation Kit have been developed to differentiate CB-derived CD34⁺ cells to T, NK, or B cells, without the use of stromal cells.

Why Use StemSpan™ Media and Expansion Supplements?

REPRODUCIBLE. Components are carefully selected and screened to minimize lot-to-lot variability, consistently providing optimal culture conditions.

CONVENIENT. Media do not contain cytokines, allowing the flexibility to add StemSpan™ Expansion Supplements, cytokines and/or additives.

SUPERIOR PERFORMANCE. StemSpan™ SFEM II, combined with the appropriate Expansion Supplement, supports greater expansion of CD34⁺ cells and differentiation of erythroid cells, granulocytes, monocytes, and megakaryocytes, than other media tested.

SERUM-FREE AND DEFINED. In addition to serum- and xeno-free formulations, StemSpan™-AOF is the first commercially available animal component-free medium for culturing HSPCs.

StemSpan™ Media

Product	Description	Applications
StemSpan™ SFEM 09600 (100 mL) 09650 (500 mL)	StemSpan™ Serum-Free Expansion Medium (SFEM) contains pre-tested bovine serum albumin, insulin, transferrin and supplements in Iscove's MDM	<ul style="list-style-type: none">For the serum-free culture of human hematopoietic cellsHas also been used in the culture of mouse, non-human primate and canine hematopoietic cells
StemSpan™ SFEM II 09605 (100 mL) 09655 (500 mL)	<ul style="list-style-type: none">StemSpan™ SFEM II contains pre-tested bovine serum albumin, insulin, transferrin and supplements in Iscove's MDMEnhanced version of StemSpan™ SFEM	<ul style="list-style-type: none">For the serum-free culture of human hematopoietic cellsWhen combined with the appropriate supplement this medium supports the highest expansion and/or lineage-specific differentiation of hematopoietic cells*
StemSpan™-XF 100-0073 (500 mL)	StemSpan™-XF is a xeno-free medium which contains only human-derived or recombinant human proteins	For the culture of human HSPCs in conditions devoid of non-human animal-derived components, where the presence of human plasma-derived components is acceptable
StemSpan™-AOF 100-0130 (500 mL)	StemSpan™-AOF is the only truly animal origin-free (AOF) cGMP medium on the market for the in vitro culture and expansion of hematopoietic cells, when appropriate growth factors/cytokines and supplements (e.g. small molecules) are added.	For applications in which a culture medium devoid of animal- or human-derived components is required, and for pre-clinical expansion that requires maximum lot-to-lot consistency
StemSpan™-ACF Erythroid 09860 (500 mL)	StemSpan™-ACF Erythroid Expansion Medium (ACF-E) is an animal component-free (ACF) medium for the in vitro culture and expansion of human hematopoietic cells. This medium only contains recombinant proteins and synthetic components; it does not contain serum or other human- or animal-derived components.	Erythroid differentiation of human hematopoietic progenitor cells into CD71 ⁺ and Glycophorin A ⁺ erythroblasts in ACF culture conditions

*Versus leading commercially available competitors tested, see Figure 2.

For related products for HSPC research, including specialized culture and storage media, supplements, antibodies, cytokines, and small molecules, visit www.stemcell.com/HSPCworkflow or contact us at techsupport@stemcell.com. For fresh and cryopreserved peripheral blood, cord blood, and bone marrow products available in your region, visit www.stemcell.com/primarycells.

StemSpan™ Media for Gene Editing Applications

The ability to genetically manipulate HSPCs is notable for its significant advancement of our understanding of hematopoietic regulation and the development of novel cellular therapies for cellular therapies for hematopoietic diseases. Pre- and post-editing culture in all StemSpan™ media and supplements are compatible with all genome editing workflows tested; however, we have found that StemSpan™ SFEM II supplemented with StemSpan™ CD34⁺ Expansion Supplement (Catalog #02691) best supports the maintenance of CD34 expression and expansion of primitive HSPC subsets after genome editing. To learn more about optimizing pre- and post-editing culture conditions to support a high-efficiency genome editing workflow in CD34⁺ HSPCs, read our case study at www.stemcell.com/CRISPR-HSC.

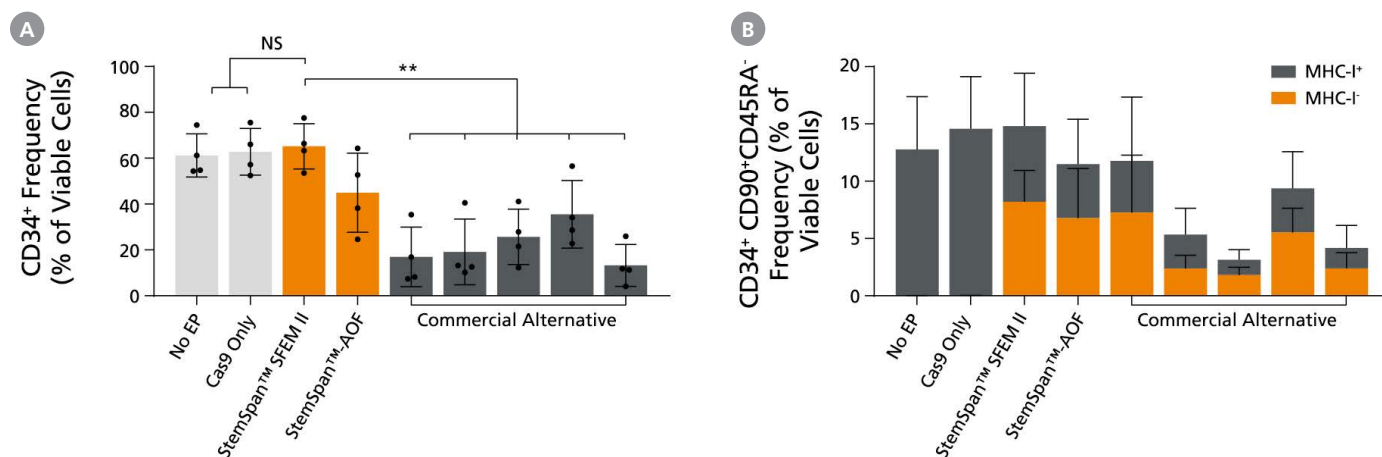


Figure 1. StemSpan™ Media Support Better CD34⁺ and Primitive CD34⁺CD90⁺CD45RA⁻ HSPC Expansion in a Genome Editing Application Compared with Alternative Commercial Media

Purified CB-derived CD34⁺ cells were cultured for 2 days in select StemSpan™ media (StemSpan™ SFEM II or StemSpan™-AOF, orange bars), or five xeno-free media formulations from other suppliers (gray bars). All media were supplemented with StemSpan™ CD34⁺ Expansion Supplement and UM171*. Cells were then electroporated using Arcitect™ CRISPR-Cas9 RNP complexes containing crRNA:tracrRNA targeting beta-2-microglobulin (B2M), and cultured for an additional 4 days in the same conditions. Knockout efficiency as measured by staining for MHC-I and analyzing by flow cytometry, was similar in all media tested, ~70-80%. (A) The percentage of CD34⁺ cells and (B) CD34⁺CD90⁺CD45RA⁻ cells were quantified by flow cytometry 4 days post-electroporation. Data shown are mean + SD (n = 4 donors; **P < 0.01).

*Similar results are expected when using UM729 (Catalog #72332) prepared to a final concentration of 1 μM. For more information including data comparing UM171 and UM729, see Fares et al., 2014.

Note: Data for StemSpan™-AOF shown were generated with the original phenol red-containing version (Catalog #09855). However internal testing showed that the performance of the new phenol red-free, cGMP-manufactured version of StemSpan™-AOF (Catalog #100-0130) was comparable.



See More Data

Explore data showing expansion of primitive subsets of CD34⁺ cells with StemSpan™ media, and more.

www.stemspan.com

StemSpan™ Media Support Equal or Greater Expansion and/or Lineage-Specific Differentiation of Human CD34+ Cells Than Other Media Tested

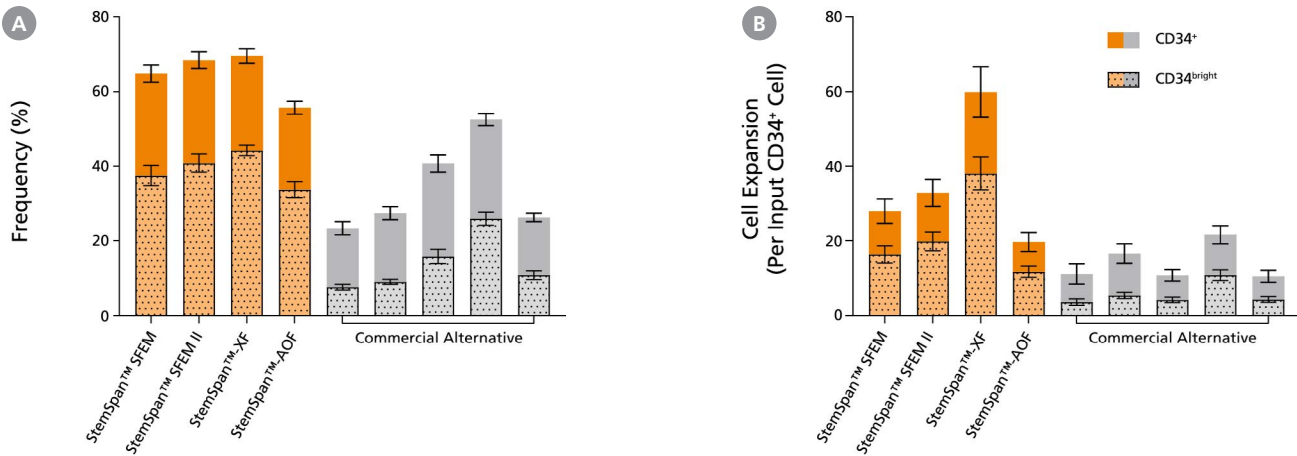


Figure 2. StemSpan™ Media Support Greater Expansion of Human CD34+ and CD34^{bright} Cells Than Other Commercial Media

Purified CB-derived CD34⁺ cells were cultured for 7 days in StemSpan™ media (SFEM, SFEM II, AOF, and XF, orange bars), and in five media from other suppliers (Commercial Alternative, grey bars). All media were supplemented with StemSpan™ CD34⁺ Expansion Supplement and UM171*. The (A) frequency and (B) cell expansion of viable CD34⁺ and CD34^{bright} cells in culture were analyzed by flow cytometry. Compared to the commercial alternatives tested, StemSpan™ media showed significantly higher expansion of CD34⁺ and CD34^{bright} cells ($P < 0.05$ when comparing StemSpan™ SFEM, SFEM II, and XF to five media from other suppliers, calculated using a one-way ANOVA followed by Dunnett's post hoc test). The CD34^{bright} cell population is enriched for functional stem/progenitor cells (See Figure 4 on www.stemspan.com). Data shown are mean \pm SEM ($n = 8$).

*Similar results are expected when using UM729 (Catalog #72332) prepared to a final concentration of 1 μ M. For more information including data comparing UM171 and UM729, see Fares et al. 2014.

Note: Data for StemSpan™-AOF shown were generated with the original phenol red-containing version (Catalog #09855). However internal testing showed that the performance of the new phenol red-free, cGMP-manufactured version of StemSpan™-AOF (Catalog #100-0130) was comparable.

StemSpan™ Expansion Supplements

Product	Description	Applications
CD34 ⁺ Expansion Supplement 02691 (10 mL)	10X concentrated supplement contains rhFlt3L, rhSCF, rhIL-3, rhIL-6, rhTPO and other additives	<ul style="list-style-type: none">Recommended for selective expansion of human CD34⁺ HSPCsStimulates greater CD34⁺ cell expansion compared to CC100 and CC110
StemSpan™ CC100 02690 (1 mL)	100X concentrated supplement contains rhFlt3L, rhSCF, rhIL-3, rhIL-6	Stimulates the production of large numbers of human hematopoietic cells, including CD34 ⁺ progenitor cells
StemSpan™ CC110 02697 (1 mL)	100X concentrated supplement contains rhFlt3L, rhSCF, rhTPO	Stimulates similar expansion of CD34 ⁺ cells as CC100, but with higher purity
Erythroid Expansion Supplement 02692 (1 mL)	100X concentrated supplement contains rhSCF, rhIL-3 and rhEPO	Stimulates the production of human erythroid cells by expansion and lineage-specific differentiation of human CD34 ⁺ cells
Megakaryocyte Expansion Supplement 02696 (1 mL)	100X concentrated supplement contains rhSCF, rhTPO, rhIL-6 and rhIL-9	Stimulates the production of human megakaryocytes by expansion and lineage-specific differentiation of human CD34 ⁺ cells
Myeloid Expansion Supplement 02693 (1 mL)	100X concentrated supplement contains rhSCF, rhTPO, rhG-CSF and rhGM-CSF	Stimulates the production of human granulocytes by expansion and lineage-specific differentiation of human CD34 ⁺ cells
Myeloid Expansion Supplement II 02694 (1 mL)	100X concentrated supplement contains Flt3L, SCF, TPO, M-CSF, GM-CSF and other supplements	Stimulates the production of human monocytes by expansion and lineage-specific differentiation of human CB-derived CD34 ⁺ cells

StemSpan™ Kits

Product	Description	Applications
StemSpan™ T Cell Generation Kit 09940	Contains StemSpan™ SFEM II, StemSpan™ Lymphoid Progenitor Expansion Supplement (10X), StemSpan™ Lymphoid Differentiation Coating Material (100X), StemSpan™ T Cell Progenitor Maturation Supplement (10X)	Stimulates the generation of pro-T cells and DP cells from CB-derived CD34+ cells
StemSpan™ NK Cell Generation Kit 09960	Contains StemSpan™ SFEM II, Lymphoid Progenitor Expansion Supplement (10X), Lymphoid Differentiation Coating Material (100X), NK Cell Differentiation Supplement (100X)	Stimulates the production of human NK cells by expansion and differentiation of human CD34+ HSPCs in stroma-free conditions
StemSpan™ B Cell Generation Kit 100-1250	Contains StemSpan™ SFEM II, StemSpan™ B Cell Differentiation Supplement 1 (20X), StemSpan™ B Cell Differentiation Supplement 2 (20X), StemSpan™ B Cell Differentiation Supplement 3 (20X), StemSpan™ B Cell Differentiation Supplement 4 (20X)	Stimulates the production of B cells and antibody-secreting cells of human CD34+ HSPCs in serum- and feeder-free conditions
StemSpan™ Leukemic Cell Culture Kit 09720	Contains StemSpan™ SFEM II, CD34+ Expansion Supplement UM729, UM171	Stimulates the production of human myeloid leukemia cells, allowing users to expand, culture, and use malignant cells for drug screening

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