A Xeno-Free Culture System for Human Mesenchymal Stem Cells (hMSC)

BI offers a novel, serum-free, xeno-free system to support hMSC expansion under xeno-free culture conditions, suitable for medical applications.
The xeno-free culture system includes solutions for attachment, dissociation and cryopreservation of hMSCs. In completion, soon to be available, a new xeno-free culture medium NutriStem™ MSC XF that enables long-term culture of hMSCs, while maintaining their multi-lineage differentiation potential.

NutriStem™ MSC XF

A xeno-free culture medium for hMSC that promotes the growth and expansion of hMSCs derived from a variety of sources, i.e. bone marrow (hMSC-BM) and adipose tissue (hMSC-AT). NutriStem™ MSC XF medium supports long-term growth of hMSCs, maintaining normal fibroblast-like cell morphology and demonstrating self-renewal and multi-lineage differentiation potential.

High proliferation rate

A. High proliferation rate while retaining typically fibroblast-like cell morphology
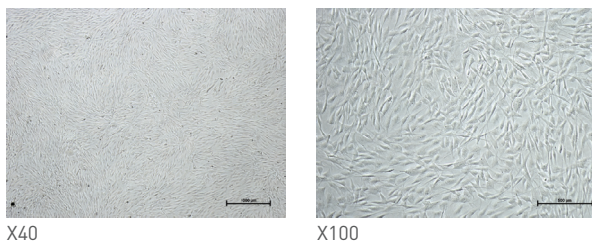

X40

X100

Figure 1. hMSC-AT (x40 and x100) cultured in NutriStem™ MSC XF medium, 3 days post-reseeding (passage 2).

B. High proliferation rate compared with serum-containing medium

hMSC-AT cultured on MSC Attachment Solution coated plates in NutriStem™ MSC XF medium. Total cell numbers per well (12 plates) were calculated for hMSC growing in NutriStem™ MSC XF and commercial serum-containing media. The culture had a seed density of $2x10^4$ cells/well and a split frequency of 3 days.
Superior hMSC expansion is achieved using NutriStem™ MSC XF medium compared to serum-containing medium.

—♦— NutriStem™ MSCXF medium
—■— Commercial serum-containing medium
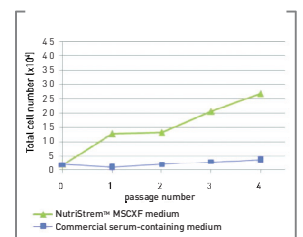
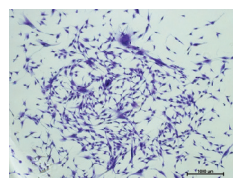## Maintaining hMSC characteristics

A. hMSC cultured in NutriStem™ MSC XF medium maintain their multi-lineage differentiation potential and showed no differentiation background.

Figure 2. Differentiation of hMSC-BM cultured in NutriStem™ MSC XF medium
(a) Adipogenic, Oil Red O staining **(b)** Osteogenic, Alizarin Red staining **(c)** Chondrogenic, Alcian Blue staining **(d-f)** Negative controls (treated and stained accordingly).

Adipogenic Differentiation

a (X400)

d (X400)

Osteogenic Differentiation

b (X200)

e (X200)

Chondrogenic Differentiation

c (X200)

f (X200)
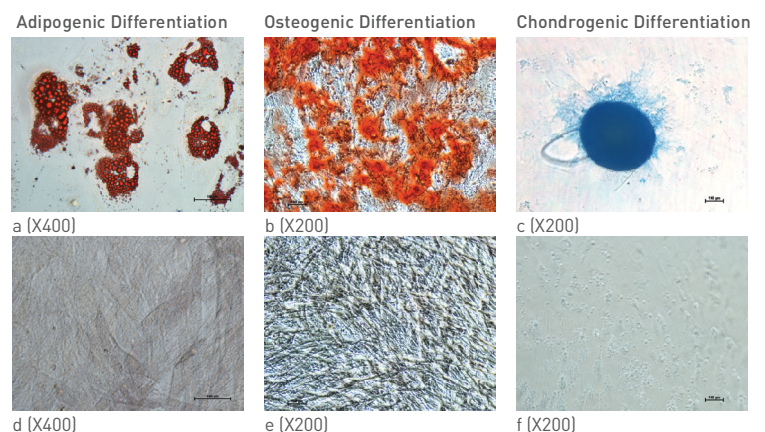
B. hMSC cultured in NutriStem™ MSC XF medium maintain their self-renewal potential

Figure 3. CFU-F of hMSC-AT cultured in NutriStem™ MSC XF medium (x40).

A Xeno-Free Culture System for Human Mesenchymal Stem Cells (hMSC)

BI
Biological Industries
Culture of Excellence

MSC Freezing Solution

Cat. No.:
05-712-1D   10ml
05-712-1E   50ml

A chemically defined, animal component-free and protein-free formulation for optimal cryopreservation of hMSC

- A complete, ready-to-use solution
- Protein-free
- Non-animal or human derived components
- Suitable for cells cultured in both serum-free and serum-containing media
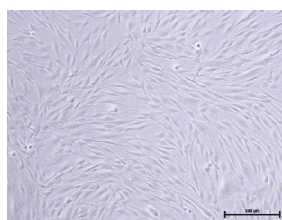- High cell viability after thawing

Figure 4
hMSC-AT were cryopreserved in MSC Freezing Solution, 3 days after thawing in NutriStem™ MSC XF medium.

Xeno-Free MSC Attachment Solution

Cat. No.:
05-752-1F   1ml
05-752-1H   5ml

A xeno-free solution for attachment and spreading of hMSC in serum-free conditions

- Ready-to-use solution
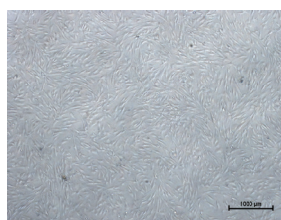- Xeno-free
- Designed for use in serum-free culture systems

Figure 5
hMSC-BM 3 days from seeding cultured in NutriStem™ MSC XF medium, on plates pre-coated with MSC Attachment Solution.

Trypsin Substitutes for Cell Dissociation

MSC Dissociation Solution
(Plant-derived enzyme)

Cat. No.:
03-075-1B   100ml
03-075-1C   20ml

Optimized animal component-free (ACF) formulation for efficient detachment of hMSCs from culture vessels

- Ready-to-use solution
- No animal or human derived components
- Contains plant-derived enzyme
- Works with both serum-free and serum-containing media
- Allows high cell viability after dissociation

MSC Dissociation Solution
(Non-Enzymatic)

Cat. No.:
03-077-1A   500ml
03-077-1B   100ml
03-077-1C   20ml

A chemically defined, animal component-free formulation for gentle and efficient dissociation of hMSCs

- Ready-to-use solution
- Chemically defined
- Contains a proprietary mixture of chelators
- Suitable for both serum-free and serum-containing media
- Reduces the risk of cell damage associated with enzyme based solutions

Culture of Excellence

CERTIFIED QMS ISO 9001 2008   CERTIFIED QMS ISO 13485 2003   CE   cGMP Manufacturing Facility