SHIMADZU
Excellence in Science

Shimadzu Diagnostics Corporation

Culture Medium for Regenerative and Cell Therapy Research

Liquid Medium

Human mesenchymal stormal cell culture medium

MSF-BM/Supplement A

Research Reagent

Features

- **Medium for the culture of human mesenchymal stormal cells**

  When MSF-BM and Supplement A are used in combination, human mesenchymal stormal cells (MSC) can be cultured at a high proliferation rate while maintaining their undifferentiated state, compared to classical media with fetal bovine serum (FBS)

- **Choice of culture additives**

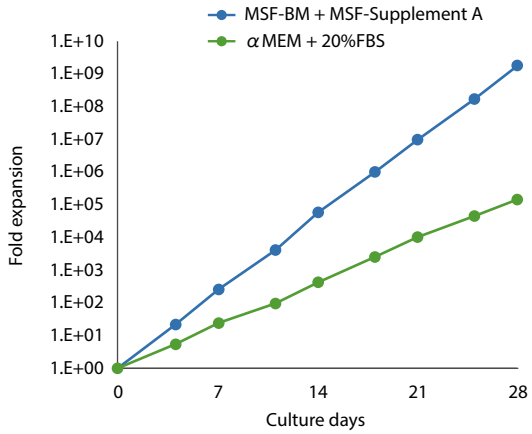
  Supplement A is a low serum (2% final concentration) supplement developed for MSC expansion culture (FBS is γ-ray treated) Alternatively, combination with the human platelet-derived cell culture additive UltraGRO can increase proliferation

- **Certified as eligible for regenerative medical products**

  MSF-BM has obtained a certificate of material eligibility for regenerative medical products from PMDA (Pharmaceuticals and Medical Devices Agency)

Adipose-derived MSC proliferation study using MSF-Supplement A

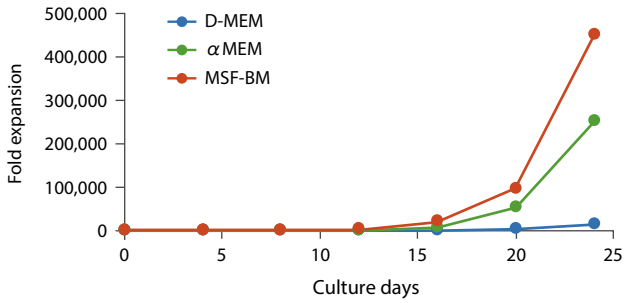
MSF-BM + Supplement A provides better support for proliferation than αMEM with 20% FBS.



Adipose-derived MSC proliferation study using UltraGRO

5% UltraGRO was added to each medium, and the proliferation rates of adipose-derived MSC compared.

Higher proliferation of MSC was obtained with MSF-BM than with the classical media, D-MEM and αMEM.



Serum-free, human mesenchymal stormal cell culture medium

MSH-BM/Supplement A

Research Reagent

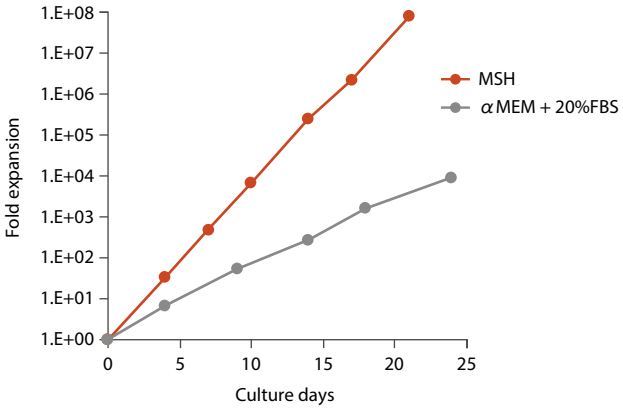
Features

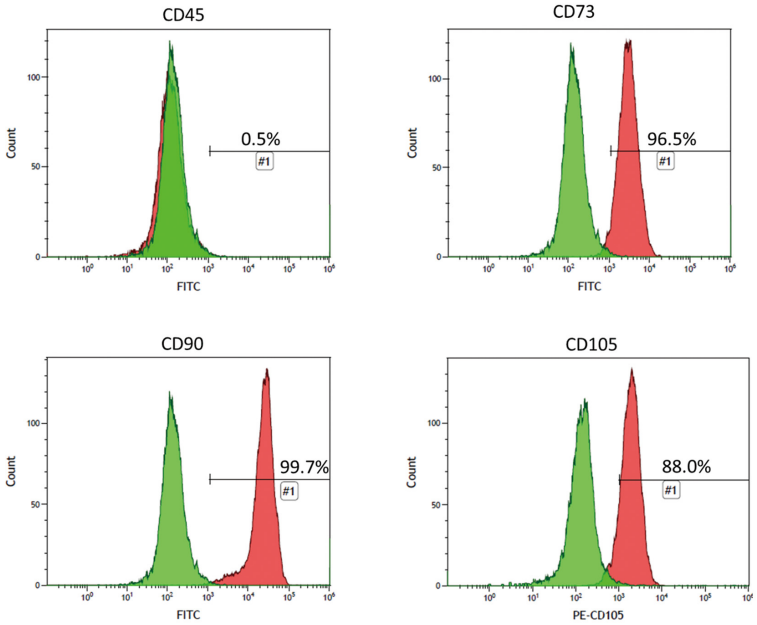
- **Xeno-free medium**
  It does not contain fetal bovine serum (FBS) or human platelet lysate
  The protein ingredients consist solely of recombinant proteins expressed inmicroorganisms, and pharmaceutical grade human serum-derived albumin
- **Good support for proliferation**
  Higher proliferation compared to αMEM with 20% FBS
- **Maintains an undifferentiated state**
  Proliferates human mesenchymal stormal cells (MSC) while maintaining their differentiation potential
  Marker expression and differentiation potential into adipocytes, osteoblasts, and chondrocytes confirmed

MSC proliferation tests and surface markers

Higher proliferation of human adipose tissue-derived MSC was obtained in MSH medium than in αMEM with 20% FBS.

In addition, positivity for MSC markers CD73, CD90, and CD105 was confirmed.

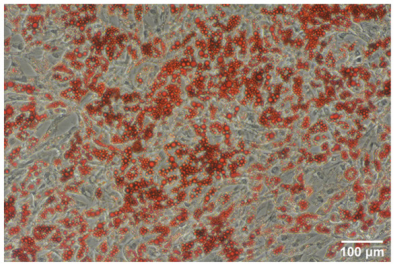




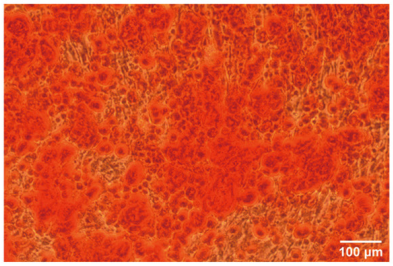
Confirmation of MSC differentiation potential

Human adipose tissue-derived MSC cultured in MSH medium for six passages maintained the ability to differentiate into adipocytes, osteoblasts, and chondrocytes.

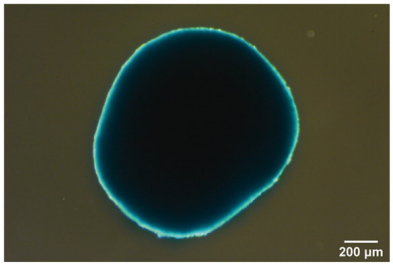
Oil red O



Alizarin red S



Alcian blue



Mesenchymal stormal cell culture medium for exosome production

MSH-EV-Supplement A

Research Reagent

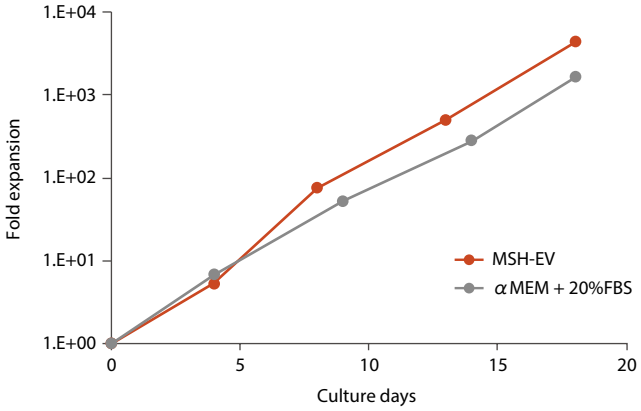
Features

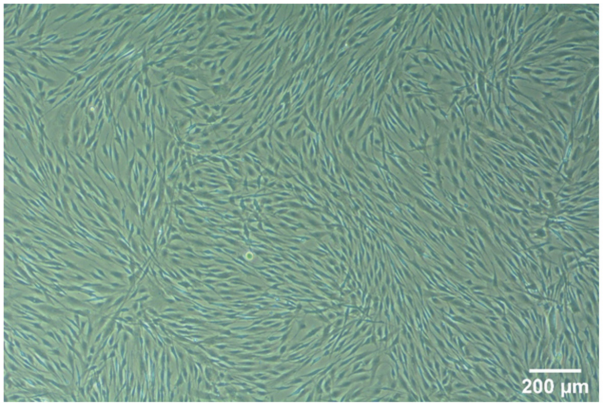
- **Chemically defined medium**
  Can be used as a medium for the proliferation of human mesenchymal stormal cells (MSC) and exosome production
- **Improved exosome purification**
  MSH-EV is low in particulate contamination*, enabling the use of ultracentrifugation and ultrafiltration
  Reduces contamination by particles derived from the culture medium during exosome purification
- **Exosomes can be recovered from the supernatant during expansion culture**
  A series of processes — from MSC proliferation to exosome purification — can be performed in a single medium

* Lower than the detection limit by Nanoparticle Tracking Analysis (model: NanoSight)

MSC proliferation potential

MSH-EV medium could support the proliferation of human adipose tissue-derived MSC (hAd-MSC) at an equal or higher level than αMEM with 20% FBS.

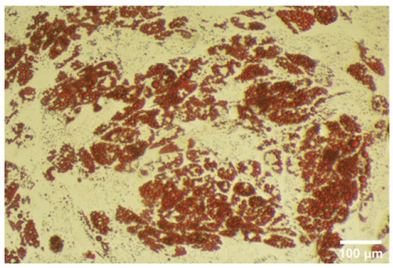




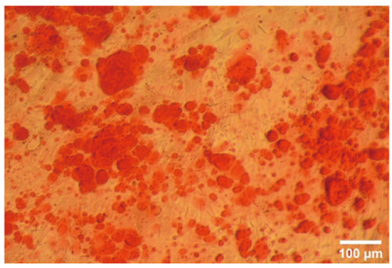
Confirmation of MSC differentiation potential

When hAd-MSC was cultured in MSH-EV medium for approximately 1 month, it maintained the ability to differentiate into adipocytes, osteoblasts, and chondrocytes.

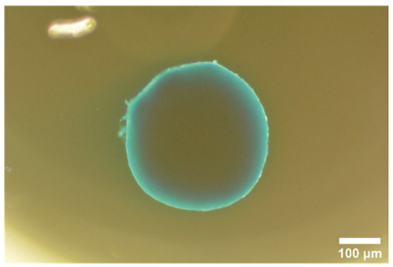
Oil red O



Alizarin red S

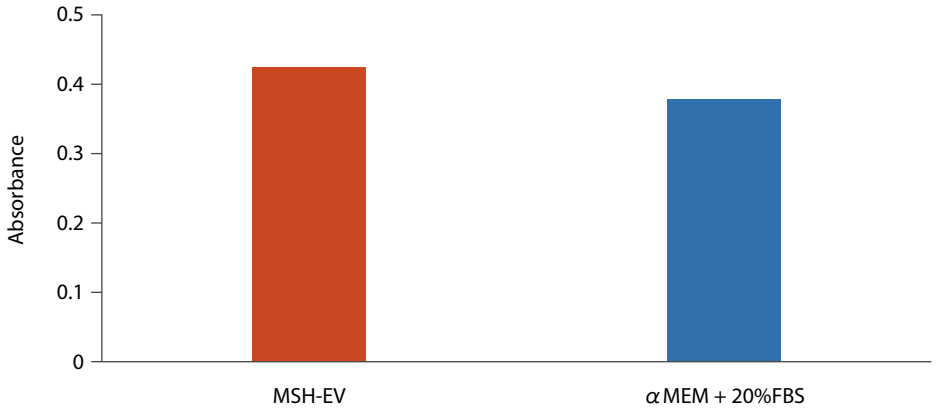


Alcian blue



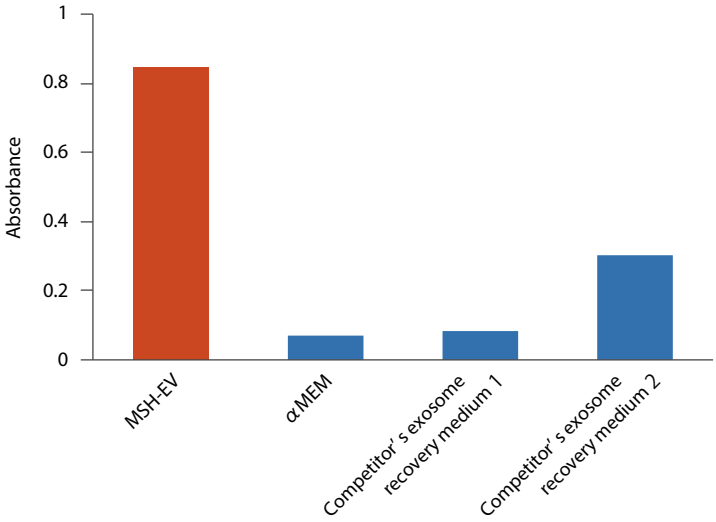
MSC exosome production capacity (as medium for expansion culture)

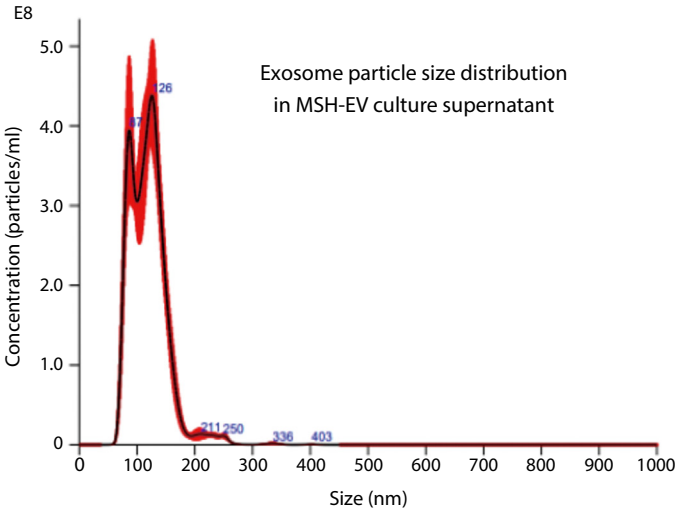
Culture supernatants from hAd-MSC expanded and cultured in MSH-EV medium yielded as many exosomes as those using αMEM + 20% FBS (exosomes positive for phosphatidylserine and CD63 by ELISA).



Exosome recovery and particle size distribution

MSH-EV medium yielded more exosomes than αMEM or competitor's exosome recovery media (exosomes positive for Phosphatidylserine and CD63 by ELISA).





Number of particles recovered from the supernatant:
4.6 ± 0.4 x 10^9 particles/mL

List of Related Products

Product Name	Code	Capacity	Storage temperture	Purpose
MSF-BM	66023	500 mL	2–10°C	Human mesenchymal stormal cell culture medium
MSF-Supplement A	66024	10 mL	below –20°C	MSF-BM supplement (Hypoglycemia)
MSH-BM	66213	500 mL	2–10°C	Serum-free, human mesenchymal stormal cell culture medium
MSH-Supplement A	66214	10 mL (for 500 mL)	below –20°C	MSH-BM supplement (Xenofree)
MSH-EV-Supplement A	66216	0.2 mL (for 100 mL)	below –20°C	MSH-BM supplement (for EV production and recovery)
DCO-K	66017	1,000 mL	2–10°C	Serum-free culture medium for immunotherapy research
NS-A2	66001	1,000 mL	2–10°C	Serum-free culture medium for lymphocytes

This product line consists of research reagents.

Serum-free culture medium for lymphocytes

NS-A2

Research Reagent

NS-A2 is a serum-free culture medium developed for immunotherapy applications.

- Supports high proliferation of human peripheral blood T cells.
- It does not use animal-derived protein ingredients.
- CD3 antibodies and other agents support the high proliferation of activated peripheral blood T lymphocytes.
- No protein ingredients other than pharmaceutical-grade human serum albumin and recombinant human insulin are used.
- Testing for sterility, endotoxins, and mycoplasma negativity in accordance with the Japanese Pharmacopoeia are conducted in addition to physicochemical tests.

Literature

Long-term eradication of extranodal natural killer/T-cell lymphoma, nasal type, by induced pluripotent stem cell-derived Epstein-Barr virus-specific rejuvenated T cells *in vivo*. Miki Ando., et al. Haematologica 2020 Volume 105(3):796-807.
https://doi.org/10.3324/haematol.2019.223511

Dual-antigen targeted iPSC-derived chimeric antigen receptor-T cell therapy for refractory lymphoma. Sakiko Harada., et al. Molecular therapy Vol. 30 No 2: 534-549.
https://doi.org/10.1016/j.ymthe.2021.10.006

iPSC-derived hypoimmunogenic tissue resident memory T cells mediate robust anti-tumor activity against cervical cancer. Yoshiki Furukawa., et al. Cell Rep Med. 2023 Dec 8:101327.
https://doi.org/10.1016/j.xcrm.2023.101327

DCO-K

Research Reagent

DCO-K is a serum-free culture medium developed for immunotherapy research.

- Enables efficient differentiation from human monocytes into dendritic cells.
- Does not use animal-derived protein ingredients.
- Addition of UltraGRO, etc. improves yield and survival rate after culture.
- Testing for sterility, endotoxins, and mycoplasma negativity in accordance with the Japanese Pharmacopoeia are conducted in addition to physicochemical tests.
- The product has obtained a certificate of eligibility for regenerative medical product materials from PMDA (Pharmaceuticals and Medical Devices Agency).

Literature

Interferon-α-Induced Dendritic Cells Generated with Human Platelet Lysate Exhibit Elevated Antigen Presenting Ability to Cytotoxic T Lymphocytes. Ippei Date., et al. Vaccines 2021,9(1), 10.
https://dx.doi.org/10.3390/vaccines9010010

Clinical Trial on the Safety and Tolerability of Personalized Cancer Vaccines Using Human Platelet Lysate-Induced Antigen-Presenting Cells. Terutsugu Koya., et al. Cancers 2023, 15, 3627.
https://doi.org/10.3390/cancers15143627

Feeder-free medium for iPS cell maintenance and culture

PSE8-BM/Supplement A

Scheduled for launch outside Japan

Features

- **Chemically defined medium with a composition similar to Essential 8 (E8)**
  Original composition developed in-house (manufactured in Japan). Smooth switching of culture media from E8.
- **Does not use animal-derived ingredients**
  All protein ingredients are recombinants expressed in microorganisms or plants.
- **No need to exchange media on weekend**
  By using ingredients with high thermal stability, we have improved the ease of culture operations.

Recommended use

- **Passaging method**: clump passaging using EDTA as cell detachment medium is recommended
- **Scaffolding material**: Vitronectin is recommended

Recommended schedule for medium exchange and passaging

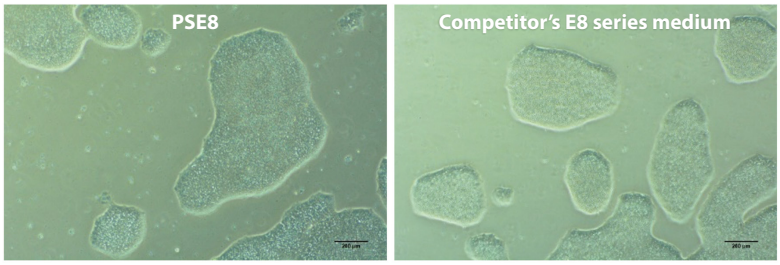
Mon.	Tue.	Wed.	Thu.	Fri.	Sat.	Sun.
Passaging	Medium exchange	–	Passaging	Medium exchange (double dose)	–	–

Evaluation data: proliferation support capacity

Evaluation method

- **Human iPS cells**: strain 802-3G (Reprocell)
- **Cell detachment medium**: PBS containing 0.5 mM EDTA (clump passaging)
- **Culture vessel**: Vitronectin-coated 6-well plate
- **Evaluation medium**: (ROCK inhibitor added to each medium only when passaging)
  1. PSE8-BM/Supplement A
  2. Competitor's E8 series medium (Weekend-free)
- **Cell counting**: Vi-CELL XR (Beckman Coulter)
- See "Recommended use" for medium exchange and passaging schedules

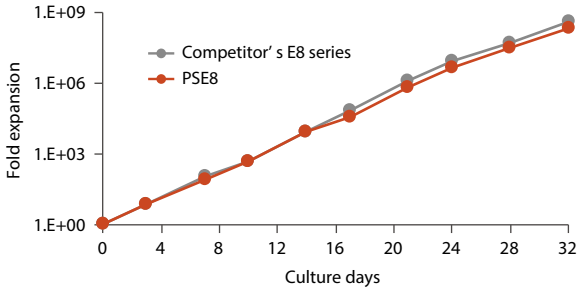
Colony form



Colony morphology of iPS cells cultured in PSE8 was similar to that of competitor's E8-based medium (Weekend-free)

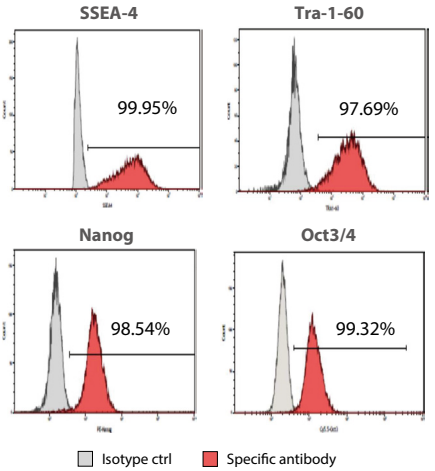
* We have a track record of passaging for over 90 days.

Proliferation of iPS cells



Without an exchange of medium on the weekend, PSE8 could support proliferation at almost the same level as the competitor's E8-based medium (Weekend-free)

Evaluation data: maintenance of undifferentiation

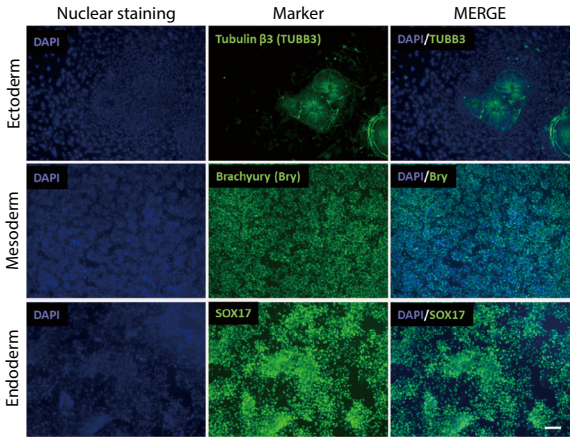


Under development

NK-Cell, HEK293

Evaluation data: differentiation potential

Human iPS cells cultured in PSE8 for 21 passages maintained their differentiation potential



Evaluation method: Human iPS cells cultured in PSE8 for 21 passages were differentiated and stained with markers as follows

- **Ectoderm differentiation**: cultured in DMEM/F12+5% KSR for 2 weeks to form embryoid bodies (EB). The resulting EB were dispersion treated with EDTA, then adhered to gelatin-coated plates and incubated for an additional 5 days
- **Mesoderm differentiation**: Cultured in STEMdiff Trilineage Mesoderm Medium for 5 days
- **Endoderm differentiation**: Cultured in STEMdiff Trilineage Endoderm Medium for 5 days

Contract Media Manufacturing Service

We can provide cell culture media tailored to your specific requirements
(Custom formulations, modified compositions, packaging/volume, etc.) .
We offer meticulous support through prior consultation.

Features

- **Operated under ISO 9001 Quality Management System**
- **Facility operation based on PIC/S GMP Annex 1**
- **Only raw materials compliant with STANDARDS FOR BIOLOGICAL RAW MATERIALS**
- **No use of highly bioactive substances such as antibiotics**
- **Production is possible in accordance with raw material standards for regenerative medicine products (powder and liquid culture medium)**

Regenerative Medicine Culture Medium Plant (GMP-Compliant Manufacturing)

Powdered Medium : Up to 10 kg/batch
Liquid Medium : Up to 500 L/batch

Research Reagent Grade Manufacturing Available

Paid Samples for Evaluation Also Available
Inquire regarding manufacturing conditions and scale

Culture Medium Component Analysis Service

Analyzing 95 components in culture media using LCMS
Profiling 95 components (Medium components and secreted metabolites)

Amino Acid and Derivatives	
2-Aminoadipic acid	Histidine
4-Aminobutyric acid	Isoleucine
4-Hydroxyproline	Kynurenine
5-Glutamylcysteine	Leucine
5-Oxoproline	Lysine
Alanine	Methionine
Alanyl-glutamine	Methionine sulfoxide
Arginine	N-Acetylaspartic acid
Asparagine	N-Acetylcysteine
Aspartic acid	Ornithine
Citrulline	Oxidized glutathione
Cystathionine	Phenylalanine
Cysteine	Pipecolic acid
Cystine	Proline
Glutamic acid	Serine
Glutamine	Threonine
Glutathione	Tryptophan
Glycine	Tyrosine
Glycyl-glutamine	Valine

Vitamins
4-Aminobenzoic acid
Ascorbic acid
Ascorbic acid 2-phosphate
Biotin
Choline
Cyanocobalamin
Ergocalciferol
Folic acid
Folinic acid
Lipoic acid
Niacinamide
Nicotinic acid
Pantothenic acid
Pyridoxal
Pyridoxine
Riboflavin
Tocopherol acetate

Nucleic acid associated compounds
Adenine
Adenosine
Adenosine monophosphate
Cytidine
Cytidine monophosphate
Deoxycytidine
Guanine
Guanosine
Guanosine monophosphate
Hypoxanthine
Inosine
Thymidine
Thymine
Uracil
Uric acid
Uridine
Xanthine
Xanthosine

Others
2-Aminoethanol
2-Ketoisovaleric acid
3-Methyl-2-oxovaleric acid
4-Hydroxyphenyllactic acid
Citric acid
Ethylenediamine
Fumaric acid
Glyceric acid
Histamine
Isocitric acid
Lactic acid
Malic acid
O-Phosphoethanolamine
Putrescine
Pyruvic acid
Succinic acid
Penicillin G

Internal Standard
2-Isopropylmalic acid

Sugars
Gluconic acid
Glucosamine
Hexose (Glucose)
Sucrose
Threonic acid

This product line consists of research reagents.

Shimadzu Diagnostics Corporation
E-mail: contact@sdc.shimadzu.co.jp
TEL: +81 (0) 3 (5846) 5701
URL: https://corp.sdc.shimadzu.co.jp/english/

BO2603