

## Product Survey: Cell Culture Media

# Feeding the Babies

Though cell culturing is similar to feeding small babies, a few fundamental differences exist. Whilst babies cry if they are hungry or are given the wrong food, cells will no longer divide or will even die if they aren't fed with the right media.

In the early days of cell culturing, an appetising aroma of beef must have permeated the incubators. Some of the cell culture pioneers tried to feed their cells with a hearty beef broth. Later on they changed the diet to blood or lymph liquid until the nineteen-fifties when Harry Eagle came up with his famous minimal medium (EMEM) that still provides the basic “bare bone” for a lot of today's animal or human cell culture media. Its main contents are salts, glucose, vitamins and amino acids.

The beef broth soon disappeared from the cell culture labs; cows however, are still present – of course not life-sized. They find their way into the cell culture dishes in the shape of foetal calf (bovine) serum (FCS), which is still widely used to supply the cells, e.g., with growth factors, hormones and attachment factors.

FCS is a rather controversial supplement of culture media. It is obtained from fetuses harvested in abattoirs from healthy dams fit for human consumption. Aside from the ethical concerns of using FCS, there are also scientific reasons speaking against the use of ill-defined calf serum. Notably, scientists culturing human embryonic stem cells (hESC) recently became aware that FCS could cause problems. Though FCS passes a rather strict quality control, including microbiological and other tests to assure that it is, e.g., free of prions and foot and mouth disease agents, researchers working with hESC are afraid that bovine viruses and other unwanted FCS components may enter their cell lines.

### Simple but effective

Another source of impurities are feeder cells, usually mouse embryonic skin cells, used as a coating layer on the inner surface of cell culture dishes, providing a sticky surface to which the stem cells can attach. In addition, feeder cells release nutrients into the cell culture medium. There is however, a risk, that they may also transmit viruses or other macromolecules to the stem cells.

A rather simple way to circumvent problems with FCS is to reduce its concentration. Many researchers use media contain-

ing 10 to 20% FCS. According to a cell culture guide published by Corning Life Sciences, many cell types tolerate lowering the FCS concentration by 50%. Reducing the FCS concentration has another positive effect – it will save you a lot of money! Switching from 10% to 5% FCS reduces total media costs by one third, Corning's guide says.

### Only defined contents

The future gold standard, however, are serum-free media containing nothing else but defined components. Recently, scientists have made considerable progress towards this goal. It seems that even the most delicate hESC-cells can be cultivated in a defined media.

Tenneille Ludwig from James Thomson's group at the Wisconsin based WiCell Institute, reports in a *Nature Biotechnology* paper (Vol 24, pp. 185-187, 2006) that she has established two new stem cell lines in a chemically defined media lacking FCS and feeder cells. It took Ludwig and her colleagues four years to come up with their media formulation, which they patented before publishing. Besides the mandatory Dulbecco's Modified Eagle's Media (DMEM/F12), Ludwig's defined culture broth, called TeSR1, is composed of human serum albumin, vitamins, antioxidants, trace elements, lipids and the growth factors bFGF, LiCl, aminobutyric acid, pipercolic acid and TGF-alpha. That's it! Obviously hES cells do not need more nutrients to grow well in cell culture dishes. Instead of feeder cells, Ludwig uses a matrix composed of collagen IV, fibronectin, laminin and vibronectin.

A few months after Ludwig, Jean Lu et al. described in *PNAS* (Vol 103, 5688-93, 2006) a defined media they called HESCO, which stands for hESC cocktail. HESCO has a somewhat different composition to TeSR1. According to Lu, only eight components are required to sustain hESC growth, namely bFGF, Wnt3a, April/BAFF, albumin, cholesterol, insulin, transferrin and fibronectin as coating material. Though the optimal xeno-free culture conditions for hESCs



Once culture media and popular food product: Liebig's Extract of Meat.

and other cell lines are not exactly clear yet, a tendency to well defined media is also to be seen if looking at the media producers catalogue lists. Many manufacturers deliver chemically defined media, free of proteins, animal components and serum. There is also no further need to buy supplements from dubious sources. Today, almost every growth factor or cytokine is available as recombinant protein.

Although it's taken more than 50 years since Harry Eagle's minimal media, it seems that the “mixture between gardening and cooking”, as Harry Moore from the centre of Stem Cell Biology in Sheffield cell culturing once dubbed it, is becoming a “real” scientific discipline after all. On the ensuing pages you will find plenty of media needed for successful “scientific” cell culturing.

HARALD ZÄHRINGER

## Cell Culture Media

Company	Product	Applications	Supported cells/cell lines	Serum/protein free? Animal components?	Package size	Miscellaneous, Specialities, Generally	Price [EUR]
<b>AbD Serotec</b> www.ab-direct.com Contact: Freya Wedekind Phone +49 2119350310/11 sales.de@ab-direct.com	Mycoplasma Removal Agent	Mycoplasma Removal	All types of cell lines	N/A	Liquid 5ml (50µg/ml)	- Rapid and effective removal of Mycoplasma species	190,-
<b>BD Biosciences</b> Belgium, Erembodegem www.bd.com Contact: Peter Weiser Phone +49 6221 305 529 Peter.Weiser@europe.bd.com	BD Cell Basal MAb Medium	High-yield monoclonal antibody production	Myeloma fusion-partners and hybridomas	Serum-supplementation required Animal comp.: yes	Liquid - 1000 ml	N/A	On request
	BD Cell Serum-Free MAb Medium	High-yield monoclonal antibody production	See above	Serum-free Animal comp.: yes	Liquid - 1000 ml	N/A	On request
	BD Cell Animal-Free Medium	High-yield monoclonal antibody production	See above	Serum-free, animal-free	Liquid - 1000 ml	N/A	On request
	hESCCell Cult. Environ.: BD Matrigel hESC-qual. Matrix	Maintenance of human embryonic stem cells	Various human ES cell lines	Serum-free & feeder-free	Liquid - 5 ml	- Qualified for mTeSR1 (StemCell Technologies Inc.)	On request
	BD BioCoat HTS Caco-2 Assay System	Caco-2 Assay	Enterocytes (Caco-2)	Serum-free or serum-reduced Animal comp.: yes	Liquid-kit (24-w ins. plate, 250, 250 ml, 0,5 ml)	- Insert-plates, media - Mito+ serum extender	On request
	BD BioCoat Intestinal Epithelium Differ. Environment	In-vitro in testinal models	Intestinal epithelial cells	See above	Liquid - kit (24 inserts, 100 ml, 450 ml, 0,5 ml)	- See above	On request
	BD Int. Epith. Differ. Media Packs	In-vitro in testinal models	Intestinal epithelial cells	See above	Liquid (500, 500, 2x2,5 ml)	- Seeding & differentiation media - Serum extender	On request
	BD Int. Epith Seed. Basal Medium	In-vitro in testinal models	Intestinal epithelial cells	See above	Liquid - 2 x 250 ml	N/A	On request
	BD Int. Epithelium Differentiat. Med.	In-vitro in testinal models	Intestinal epithelial cells	See above	Liquid - 2 x 250 ml	N/A	On request
	BD Mito+ Serum Extender	For culture of a variety of cells under serum-free/-reduced conditions (concentrated formulation of hormones and growth factors)	Various	See above	Liquid - 5 ml	N/A	On request
	BD Nu-Serum Culture Supplement	Protein purification, virus production, monoclonal antibody production	Embryo fibroblasts, HeLa, Mouse L cells, BALB/c-3T3, COS, etc.	Low protein alternative to FCS (2,5 % Serum final) Animal comp.: yes	Liquid - 100 or 500 ml	N/A	On request
	BD T-Cell Culture Supplement	Proliferation & activation of T-cells, IL-2 supplement	T-cells	10% FCS Animal comp.: yes	Liquid - 100 ml	- With or without ConA	On request
	BD BioCoat Hepatocyte Differentiation Environment	Hepatocyte differentiation	Hepatocytes	Serum-free Animal comp.: yes	(liquid) - kit (500 ml, 5 6-well plates, 5 g)	- Medium, plates & rEGF	On request
	BD Hepatocyte Culture Medium (Hepato-STIM)	Hepatocyte differentiation	Hepatocytes	Serum-free Animal comp.: yes	Liquid - 500 ml	N/A	On request
	IL-3 Culture Supplement	IL-3 supplement	Respons. cells like Mast, basoph., NK, hematop. precursor	0,5 % FCS Animal comp.: yes	Liquid - 25 ml	N/A	On request
	Endothelial Cell Growth Supplem.	Supplement growth factors for endothelial cells	Endothelial cells	Serum-free Animal comp.: yes	Lyophilized - 15 or 100 mg	N/A	On request
	Bovine Pituitary Extract	Supplement growth factors for epithelial and endothelial cells	Epithelial cells, endothelial cells	Serum-free Animal comp.: yes	Lyophilized - 15 or 75 mg	N/A	On request
	ITS Universal Supplements	Proliferation; Insulin, transferrin and selenous acid supplement	Various cells, e.g. HeLa	Serum-reduc. cond. Animal comp.: yes	Liquid - 5 or 20 ml	N/A	On request
<b>BioCat</b> Heidelberg, Germany www.biocat.de Contact: Elke Gamer Phone +49 6221-7141516 gamer@biocat.de	Bambanker Cell Freezing Media	Serum-free medium for long-term storage of cultured cells in a deep freezer at -80°C	All common cell lines (normal and tumor; adherent and suspension) can be preserved	Serum-free	20 ml 5 x 20 ml 120 ml	- Recovery rates higher compared to regular cell freezing media - No risk of contaminat./ interaction with cells by serum proteins - No diluting, no add. of compon. - No programmable freezer, no sequentialfreezing steps required - No liquid nitrogen needed	40,- (20 ml) 125,- (5x 20 ml) 120,- (120 ml)

## Cell Culture Media

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<b>BioCat</b> Contact see page 54	Genlantis Media	Cell type-specific growth media	Endothelial, smooth muscle cells, derm. fibroblasts, epidermal keratinocytes	Available with serum and serum-free	500 ml	- Optimized for specific cell types/species - Keratinocyte growth medium also available calcium-free	245,- to 255,-	
	Zen-Bio Media	Growth and differentiation of adipocytes, osteoblasts, and chondrocytes	Subcutaneous and omental adipocytes and pre-adipocytes	Available with serum and serum-free	100/500 ml (differentiation/growth media)	- Also available without phenol red	140,- to 295,-	
	Zen-Bio Media for hepatocytes	Plating and maintenance of hepatocytes	Primary hepatocytes	Plat. med. w. serum, maint. med. without	500 ml	- See above	210,-	
	B-Bridge Media for osteoclasts	Growth of osteoclast precursor cells	Primary mouse and rat osteoclasts	Contains M-CSF and RANKL	50 ml	- Avail. with wash medium & ivory sections for pit formation assay	520,-	
<b>CCS Cell Culture Serv.</b> Hamburg, Germany www.cellcultureservice.com Contact: Oliver Klotzsche Phone +49 40 471 96 574 klotzsche@cellcultureservice.com	SynQ	Protein Free Serum Substitute	HEK, CHO, HepG2, L929, Vero, BHK and others	Serumfree Proteinfree No animal components	Liquid 50 ml (10x) 500 ml (10x)	- Convenient to use - Applicable for many cells - Free of animal components - Chemically defined - Protein free	36,- (50 ml) 169,- (500 ml)	
<b>CellGenix Technologie Transfer</b> Freiburg, Germany www.cellgenix.com	CellGro DC Medium	Clinical Cell Therapy	Dendritic Cells, T-cells	Serum-free, Hum. proteins only, ADCF, (1 drug compon.)	Liquid, 500 ml Bottle or bag	- Manufactured under GMP - Drug Master File	80,- (bottle) 90,- (bag)	
	CellGro SCGM	Clinical Cell Therapy	Hematopoiet. Stem, T-cells, NK cells	Serum-free, Human proteins only, ADCF	Liquid 500 ml Bottle or bag	- See above	90,- (bott.) 110,- (bag)	
<b>Gentaur BVBA</b> Phone +32 16 58 90 45 info@gentaur.com	MelanoMax	Supplement for cell culture	Melanocytes	Contains animal components	75 ml bottle	- To add to 500 ml HAMF10	On request	
<b>ibidi</b> Martinsried, Germany www.ibidi.de Contact: Ulf Rädler Phone +49 89 520 46 17 31 uraedler@ibidi.de	Freezing media	Freezing cells	No restrictions	Serum free Proteins included BSA included	Liquid 20 ml 5 x 20 ml 120 ml	- Optimal recovery rates - Direct freezing without intermediate steps possible - Easy handling - Great for sensitive cells - DMSO free, var. pack., low price	25,- (20 ml)	
<b>Irvine Scientific</b> Santa Ana, California, USA www.irvinesci.com Contact: Sandy Parten, Phone +1 949-261-7800, ext. 259 sparten@irvinesci.com	IS CHO-CD	Chemically defined medium for CHO Cells	CHO cells in suspension	Animal component-free, chemically-defined	Liq, avail. in 1 l/ powder in 10 l. Cust. packaging	- Custom Media Manufacturing Available	40,07 174,08	
	IS CHO FEED-CD	Chemically defined feed medium for CHO Cells	CHO cells in suspension	See above	500 ml (Liquid)	See above	40,74	
<b>Merck Chemicals Ltd.</b> (Calbiochem, Novagen, Novabiochem) www.merckbio.eu Contact: Customer Service Phone 0800 693 1000 customer.service@merckbio.eu	TriEx Insect Cell Medium	Optimized for growth and protein production	TriEx Sf9 Cells	Serum-free	Liquid	- Matched cell/medium combination f. rapid, vigorous cell growth & high protein expression levels	98,-/l	
	BacVector Insect Cell Medium	Cotransfect. of BacVector Triple Cut Virus DNA/BacMagic DNA/transf. plasm. to constr. baculovir.	Sf9 Insect Cells	Serum-free	Liquid	- Compat. with GeneJuice; also recommend. f. transient express. from pLEx/pBiEx vector recomb.	94,-/l	
<b>Millipore</b> Schwalbach, Germany www.millipore.com Contact: Florian Meier Phone +49 6196 494 299 technischerservice@millipore.com	EmbryoMax	General Cell Culture, Stem Cells	Various mammalian cell lines	SF	Liquid 1l 500 ml	- ES Cell Qualified - DMEM 1X w/ 25mM HEPES/ L-Glutam., w/o Sodium Pyruvate	68,- (1l) 33,- (500 ml)	
	EmbryoMax	General Cell Culture, Stem Cells	Various mammalian cell lines	SF	Liquid 500 ml	- ES Cell Qualified - DMEM 1X w/ 4500mg/L Gluc., 2.25g/L Sod. Bicarb & L-Glutam., w/o Sodium Pyruvate	23,- (500 ml) 33,- (1l)	
	EmbryoMax	General Cell Culture, Stem Cells	Various mammalian cell lines	SF	Liquid 1l 500 ml	- ES Cell Qualified - DMEM 1X w/ 4500mg/l Glucose, w/o L-Glutamin & Sod. Pyruvate	19,- (500 ml)	
	EmbryoMax	General Cell Culture, Stem Cells	Various mammalian cell lines	SF	Liquid 500 ml	- ES Cell Qualified - DMEM 1X w/ 4500mg/l Glucose, 2.25g/l Sodium Bicarb w/o L-Glutamin & Sod. Pyruvate	23,- (500 ml)	
	EmbryoMax	General Cell Culture, Stem Cells	Various	Various	SF	Liquid 500 ml	- ES Cell Qualified - DMEM/F12 w/ HEPES & L-Glut.	29,- (500 ml)
	EmbryoMax	General Cell Culture, Stem Cells	Various	Various	SF	Liquid 500 ml	- ES Cell Qualified - DMEM/F12 w/ L-Glutamine, w/o HEPES	29,- (500 ml)

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<b>Millipore</b> Contact see page 55	EmbryoMax	General Cell Culture, Cell Preservation Media, Stem Cells	Various	No Yes	Liquid, frozen 10 x 10 ml, 5 x 10 ml, 50 ml	- ES Cell Qualified - 2X Cell Culture Freezing Medium, w/ 20% DMSO & FBS	254,- 167,- 142,-
	Cell Culture Freezing Medium	General Cell Culture, Cell Preservation Media	Various Mammalian Cells	No Yes	See above	- w/ DMEM, 10% Glycerol, & FBS	220/128,- 116,-
	Cell Culture Freezing Medium	General Cell Culture, Cell Preservation Media	Various Mammalian Cells	No Yes	See above	- w/ 10% DMSO, DMEM, & FBS	220/128,- 107,-
	IMDM	General Cell Culture	Various	SF	Liquid 1 l 500 ml	- w/25mM HEPES, 3024mg/l NaHCO <sub>3</sub> ; L-Glutamine, w/o $\alpha$ -thioglycerol; $\beta$ -mercaptoethanol	50,- (1 l) 30,- (500 ml)
	Modified ND96 Medium	General Cell Culture	Xenopus oocytes	SF	Liquid 500 ml	N/A	32,- (500 ml)
	RPMI 1640 1X w/ 25mM HEPES & L-Glutamine	General Cell Culture	Various	SF	Liquid 500 ml	N/A	30,- (500 ml)
<b>Miltenyi Biotec</b> Bergisch Gladbach, Germany www.miltenyibiotec.com Contact: Jürgen Eiberger Phone +49 2204 8306 6641 juergene@miltenyibiotec.de	DMEM	Basic cell culture medium	N/A	Serum/protein-free	500 ml (liquid)	N/A	On request
	DMEM	Basic cell culture medium with stable glutamine	N/A	Serum- and protein-free	500 ml (liquid)	N/A	On request
	NH CFU-F Medium	Colony-forming unit fibroblast (CFU-F) assay, an enumeration method for CFU-Fs	Marrow stromal cells (MSC) (adherent)	FBS	24 x 5 ml (liquid)	N/A	On request
	NH Expansion Medium	Optimized, standardized medium for reproducible/ reliable expansion of human MSCs	See above	FBS	500 ml (liquid)	N/A	On request
	NH AdipoDiff Medium	Differentiat. of hum. marrow stromal cells (MSCs) into adipocytes	MSCs into adipocytes (adherent)	FBS	100 ml (liquid)	N/A	On request
	NH ChondroDiff Medium	See above	Diff. of MSCs in-to chondrocyt. (adh.)	FBS	100 ml (liquid)	N/A	On request
	NH OsteoDiff Medium	See above	Diff. of MSCs into osteoblasts (adh.)	FBS	100 ml (liquid)	N/A	On request
	HSC-CFU basic	Analys. of hematop. engrafm. pot. of hem. stem cells, unsep. blood, bone marrow, fetal liver cells	Semi-solid: Allows addit. of cytokines and other factors	30% FBS, 1% BSA	80 ml (liquid)	- w/o Growth factors - w/o Cytokines - w/o Epo	On request
	HSC-CFU lite with Epo	See above	Semi-solid medium. Supports growth of granulocyte, macrophage, erythroid, mixed colonies	30% FBS, 1% BSA	100 ml or 24 x 3 ml (liquid)	- Stem Cell Factor (50 ng/ml) - GM-CSF (10 ng/ml) - IL-3 (10 ng/ml) - Epo (3 U/ml) - w/o G-CSF, w/o IL-6	On request
	HSC-CFU complete with Epo	See above	See above	30% FBS, 1% BSA	See above	- Stem Cell Factor (50 ng/ml) - GM-CSF/G-CSF (20 ng/ml ea.) - IL-3 (20 ng/ml), IL-6 (20) - Epo (3 U/ml)	On request
	HSC-CFU complete w/o Epo	See above	See above	30% FBS, 1% BSA	See above	- Stem Cell Factor (50 ng/ml) - GM-CSF (20 ng/ml) - G-CSF / IL-3 (20 ng/ml each) - IL-6 (20 ng/ml), w/o Epo	On request
<b>PAA Laboratories</b> Cölbe, Germany www.paa.com Contact: Andreas Jahn Phone +49 6421-175390 info@paa.com	DMEM high Gluc. (4.5 g/l) w. D-Valine wo. L-Valine	Primary cells; liver- cells (mouse) endothelial cells; most celllines	Adherent	Yes No	Liquid 500 ml	- Additional energy source for highly proliferating cells - Prevents fibroblast growth	18,50
	DMEM high Gluc. (4.5 g/l) wo Calc.	Most cell types	Adherent	Yes No	Liquid 500 ml	- Minimizes effect on differentiation or activation of cells	18,50
	DMEM without Glucose	Most cell types	Adherent	Yes No	Liquid 500 ml	- For glucose free cultivation - For cell-starvation	10,-
	Insect Express SF9-S2	Spodoptera frugiperda; for baculovirus expression system	Suspension & adherent	Yes No	Liquid 500 ml	- Protein free complete medium - Suitable for bioreactors	35,-
	Hybridoma Express Plus	Various hybridoma cells	Suspension & adherent	Yes No	Liquid 100 ml 500 ml	- Ready to use - Serum free - Low endotoxin - Suitable for fermenters	On request

## Cell Culture Media

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PAA Laboratories Contact see page 56	MEM Alpha Modification with Ribonucleosides	Variety of mammalian cells	Adherent	Yes No	Liquid 500 ml	- High amino acid concentration - W. precursors f. DNA/RNA synth. - Enhanced proliferation	10,50
	Quantum 3-21 Medium f. Cultivat. of Amnion & Chorionic Villi Cells	Amniocytes and chorionic villi cells	Adherent	No Yes	Liquid 100 ml	- IVD product - Ready to use - For prenatal diagnostics - Fast & selected cell growth - Clear & rapid diagnostic results	45,-
	Quantum 333 Complete Medium	Fibroblasts	Adherent	No Yes	Liquid 500 ml	- Special mixture of trace elem. - No addition of serum necessary	12,50
Thermo Fisher Scientific Erembodegem, Belgium www.thermo.com/perbio Contact: Ilona Van Zalm ilona.van.zalm@thermofisher.com  Dorothee Bach-Nadvornik dorothee.bach-nadvornik@thermofisher.com  Sarah Hesbeen sarah.hesbeen@thermofisher.com	Hyclone CDM4CHO	Manufacturing of recombinant proteins using CHO cells Successfully tested with T-flasks, shaker flasks and bioreactors, incl. fed-batch and perfusion	CHO cells Suspension	Chemically Defined Serum free Protein free Animal Derived Component free	Liquid: 500, 1000 ml; Dry Pow. Media: 1x5, 1x10, 1x 50l. Larger sizes	- Support Large-Scale Culture Applications - Available with or without glutamine	N/A
	HycloneSFM4CHO	Industr. manufact. of recombinant proteins f. therapeutic use in CHO cells. Supports tDHFR selec./amplification, GS gene expr. systems	CHO cells Suspension	Protein free	See above	- Support High Density Bioreactor Culture - Available with or without glutamine	N/A
	Hyclone SFM4CHO-Utility	Manufact. of recomb. proteins for academical & industrial research, genomics and proteomics, etc.	CHO cells Suspension	Protein free	See above	- Supports multiple CHO Cell Lines and Culture Environments	N/A
	Hyclone CDM4NSO	Manufact. of monoclo. antibod. using NSO cells. Successfully tested in a variety of culture systems	NSO CellsSuspension	Chem. Def. Serum/ Protein free / Anim. Derived Comp. free	See above	- Requires no cholesterol or GS supplementation	N/A
	Hyclone CDM4MAb	Manufact. of monoclonal antibodies for the therapeutic use in a variety of engineered hybridoma and recombinant myeloma cell lines	NSO other hybridoma and myeloma cells Suspension	See above	See above	- Support Large-Scale Culture Applications	N/A
	Hyclone SFM4MAb	Industrial manufacturing of human and humanized recombinant antibodies and antibody fragments for therapeutic use	Hybridoma and recombinant myeloma cell lines Suspension	Serum free Ultra Low Protein	See above	- Available with and without L-Glutamine - Supports High Density Bioreactor Cultures	N/A
	Hyclone SFM4MAb-Utility	Manufacturing of monoclonal antibodies for academic and industrial research, genomics and proteomics, etc.	Multiple hybridoma and myeloma cell lines Suspension	Serum free Low Protein	See above	- Supports many different culturing systems	N/A
	Hyclone ADCF-MAb	Manufacturing of antibodies and antibody fragments for therapeutic use	Hybridoma/recomb. myeloma cell lines Suspension	Protein free Animal Derived Component free	See above	- With and without L-Glutamine	N/A
	Hyclone CDM4PERMAb	Production of human antibodies and recombinant proteins using PER.C6 technology	PerC6 Suspension	Chem. Def. Serum/ Protein free / Anim. Derived Comp. free	See above	- Successfully tested in a variety of applications - Including fed-batch bioreactors	N/A
	Hyclone CDM4 HEK293	Support the growth of HEK 293 cultures/Promote adenovirus and recombinant protein production	HEK293 cells Suspension	See above	See above	- Support high cell density and specific cell productivity in suspension cultures	N/A
	Hyclone SFM4 Transfx-293	Support the growth of HEK 293 cultures/Promote transfection using lipofection or similar methods	HEK 293 cells Suspension	Animal Derived Component free	See above	- Support high transfection efficiency, productivity and cell density in suspension cultures	N/A
	Hyclone SFM4HEK 293	Support the growth of HEK 293 cells and the production of adenoviral vectors and rproteins	HEK293 cells Suspension	Serum free Protein free	See above	- Successfully tested in culture systems incl. T-flasks, shakers, roller bottles, and bioreactors, including perfusion	N/A
	Hyclone CDM4Retino	Increase proc. yields for industrial manufact. of adenovir. vectors/rprot. using PER.C6 & oth. retinobl. cells	PER.C6 Retinoblasts Sus- pension	Chem. Def. Serum/ Protein free / Anim. Derived Comp. free	See above	- Produc. superior cell yields in diff. culture environm. & applica- tions, incl. perfusion bioreactors	N/A
Hyclone SFX-Insect	Supports the growth of multiple insect cell lines and production of a variety of recombinant proteins	Key ins. cell lines, incl. Sf9, Sf21, High Five, and D.mel (2), Suspension	Serum free	See above	- Superior performance in high density bioreactor applications - Successfully tested in a variety of culture systems	N/A	
Hyclone SFM4 MegaVir	Increase process yields in the manufacture of viral vaccines in a variety of cell lines	Vero, COS-7, MDCK, and MDBK Suspension	Protein free Animal Derived Component free	See above	- Developed for Multi-Culture Environments, including Micro-carrier Bioreactor Cultures	N/A	