

A high-magnification, false-colored scanning electron micrograph of several CHO cells. The cells are spherical with a prominent, bright, star-like nucleus in the center. The cell surface is covered in numerous fine, hair-like projections (microvilli) that radiate outwards, giving the cells a fuzzy, textured appearance. The color palette is dominated by deep blues and purples, with bright green and yellow highlights on the cell surfaces and nuclei.

**MAM-PF®**

# CHO PRODUCTION MEDIA

ACF (Animal Component Free)

Chemically defined

High cell densities

Pharmaceutical application

High product yield



**BioConcept**



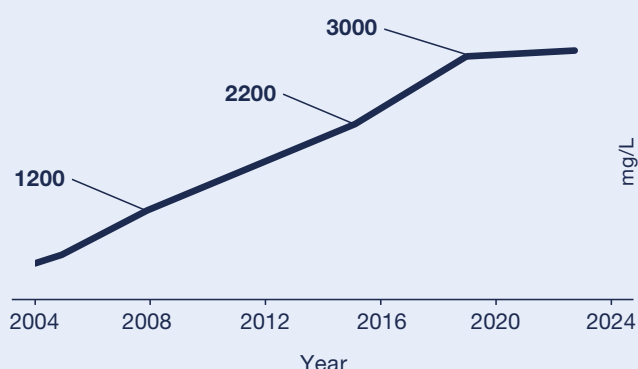
**MAM-PF®**

# Use the Benefits of CHO Production Media

Mammalian Artificial Cell Culture Media – Protein and Animal Component Free (ACF) for CHO, BHK, and other mammalian cells in accordance with the strict quality guidelines EMA/410/01.

## MAM-PF® series

MAM-PF® is a production media. It is protein-free and protein hydrolysates free, chemically defined and for high cell density cultivation of a variety of cell lines such as CHO (Chinese Hamster Ovary) cells or BHK (Baby Hamster Kidney) cells and the high level expression of recombinant proteins. BioConcept holds a certificate for every single component used in the MAM-PF® media series to guarantee an untainted and exceptional final product.



### Development of MAM-PF®

Increase of Erythropoietin (EPO) yields during the system development. Within the last 4 years the product yield could be quadrupled up to 2.3 g/L using the MAM-PF77® medium and FMS3 in a fed-batch.

### Animal Component Free

MAM-PF® media do not contain proteins or undefined hydrolysates.

### Chemically defined

BioConcept holds TSE certificates for each component to ensure EMA/410/01 conformity.

### Easy adaptation

In many cases it is possible to switch directly from your current medium to MAM-PF®.

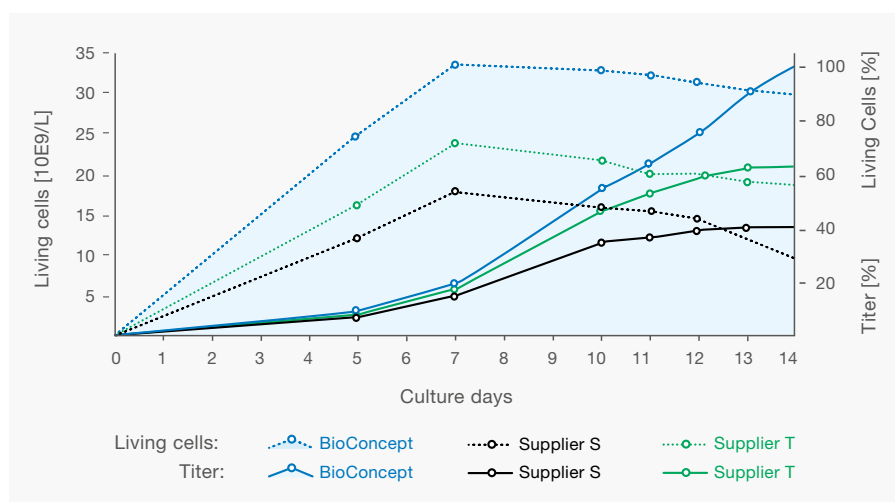
### High cell density combined with high product yield

- Antibody production of up to 5.5 g/L.
- EPO of up to 2.5 g/L (see graph).
- Cell density up to  $3.7 \times 10^7$  cells/ml.

# Fast Growth High Density

## Cell density

CHOSI cells cultured in our media have shown fast growth and a much higher cell density compared to other media. This results in final product titers at the end of the fed-batch cycle. The higher viability in the stationary phase shows that the glycosylation is superior.



## MAM-PF® and other Suppliers

Performance of MAM-PF77® and two different CHO media suppliers in a 14-day fed-batch mAb production.

## Variable batch capacity

liter/day

5 up to  
5000

liquid

Water for injection (WFI) is the highest quality available.

kg/production run

2 up to  
800

powder

Particle sizes around 20 µm (d50) for a quick dissolution of the powder medium.

## Feed mixes

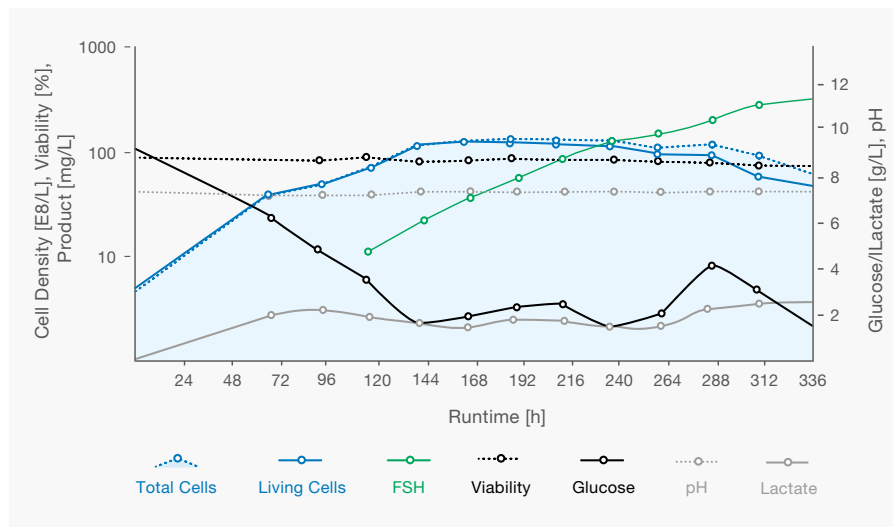
Various feed mixes are available for high density cell culture and high productivity.

## Glycosylation

Best glycosylation pattern observed.

## FSH

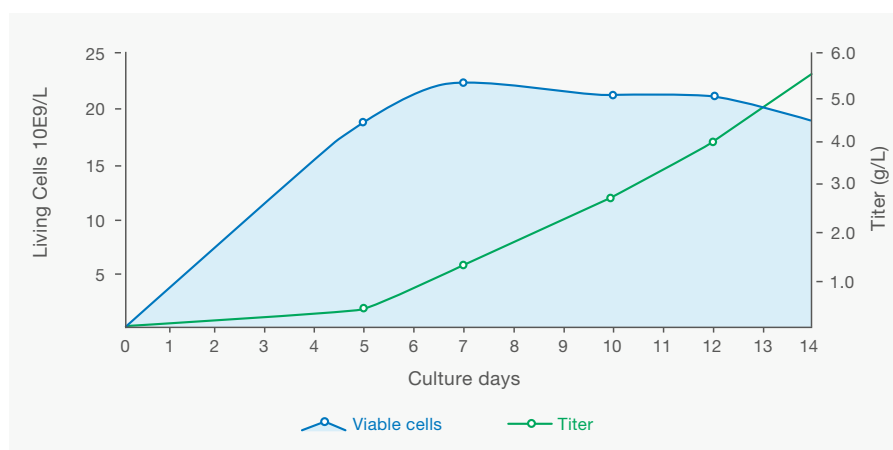
A cell density of over 100 mio. cells per liter can be reached through mixing the CHO feed mix FMS3 to MAM-PF77®. It is possible to achieve a titer of over 350 mg/L of the highly glycosylated follicle-stimulating hormone (FSH) within 14 days in a stirring bioreactor tank, making it a very high quality product. As determined during the purification process, 45% of the product showed an isoform pattern, low aggregates, and low oxidized forms. MAM-PF77® can be used to produce quality FSH that fulfills its Ph. Eur. requirements.



**FSH produced with MAM-PF® and FMS3**  
14-day bioreactor production scheme of the high glycosylated follicle-stimulating hormone (FSH) using MAM-PF77® and the FMS3 feed mix.

## Ipilimumab – Antibody

The continuous innovation and development of the MAM-PF® media series has lead to the brand new MAM-PF77® cell culture medium and CHO Feed Mixes FMS3 and FMU. MAM-PF® media now increase productivity of Ipilimumab (monoclonal antibody) by up to 5g/L. The new expression system is also viable in fed-batch and perfusion systems.



**Ipilimumab produced with MAM-PF® and FSU**  
High yields of mAbs, e.g. > 5g/L Ipilimumab can be reached in a 14-day fed-batch system using MAM-PF77® plus the novel CHO feed mix FMU.

# Biosimilars

Selection of pre-developed biosimilars produced with MAM-PF® media series.

Molecule	Reference Product	Main Indication	Availability		
			Cell Line	USP	DSP
Recombinant Proteins					
Epoetin alpha (EPO)	Epogen, Eprex	Anemia	•	•	•
Darbepoetin apha (DPO)	Aranesp	Anemia	•	•	•
Interferon beta- 1a (INFb)	Avonex, Rebif	Multiple Sclerosis	•	•	•
Follicle Stimulating Hormone (FSH)	Gonal-F, Puregon	Infertility	•	•	•
Human Choriogonadotropin (hCG)	Ovidrel	Infertility	•	•	•
Human Luteinizing Hormone (hLH)	Luveris	Infertility	•	•	•
Urokinase (uPA)	Abbokinase	Thrombolysis	•	•	
Alteplase (tPA)	Actilyse, Activase	Thrombolysis	•	•	
Tenecteplase (TNK-tPA)	Metalyse	Thrombolysis	•	•	•
Factor VIIa (FVIIa)	Novoseven	Hemophilia	•	•	
Factor VIII (FVIII)	Recombinate	Hemophilia	•		
beta-Glucocerebrosidase (GCcasebeta)	Cerezyme	Morbus Gaucher	•		
Dornase alpha (DNAse I)	Pulmozyme	Cystic Fibrosis	•	•	
Thrombin (FIIa)	–	Hemostasis	•		
Antibodies					
Adalimumab (TNFa)	Humira	Arthritis, Psoriasis	•	•	•
Rituximab (CD20)	Rituxan	Lymphoma, Arthritis	•	•	•
Trastuzumab (HER2)	Herceptin	Breast & Gastric Cancer	•	•	•
Bevacizumab (VEGF)	Avastin	Lung & Colorectal Cancer	•	•	•
Cetuximab (EGF-Receptor)	Erbitux	Colorectal & Head Cancer	•	•	•
Omalizumab (IgE)	Xolair	Persistent Allergic Asthma	•	•	
Denosumab (RANKL)	Prolia	Osteoporosis	•	•	•
Tocilizumab (IL6-Receptor)	Actemra	COVID-19, Arthritis	•	•	•
Ipilimumab (CTLA-4)	Yervoy	Lung & Renal Cancer	•	•	•
Panitumumab (EGF-Receptor)	Vectibix	Colorectal Cancer	•	•	•
Pertuzumab (HER2)	Perjeta	Breast Cancer	•	•	
Eculizumab (Complement comp. 5)	Soliris	Hemoglobinuria	•	•	
Natalizumab (Integrin a)	Tysabri	Multiple Sclerosis	•	•	
Infliximab (TNFa)	Remicade	Arthritis, Psoriasis	•		
Pembrolizumab (PD1-Receptor)	Keytruda	Lung & Renal Cancer	•	•	
Nivolumab (PD1-Receptor)	Opdivo	Melanoma, Lung Cancer	•	•	
Atezolizumab (PD-L1)	Tecentriq	Urothelial & Breast Cancer	•		
Daratumumab (CD38)	Darzalex	Multiple Myeloma	•		
Guselkumab (IL-23)	Tremfya	Psoriasis	•		
Fusion Proteins					
Etanercept (TNFa/beta)	Enbrel	Chronical Arthritis	•	•	•
Abatacept (CD80, CD86)	Orencia	Rheumatoid Arthritis	•	•	
Belatacept (CD80, CD86)	Nulojix	Kidney Transplantation	•		
Dulaglutid (GLP-1-Receptor)	Trulicity	Diabetes mellitus Type II	•	•	•

All cell lines are propriety of EUGENEX Biotechnologies GmbH.

## References

MAM-PF Media Series



**BioConcept is a leading manufacturer and service partner** for numerous top-tier pharmaceuticals and academic institutions in Switzerland and around the world.

BioConcept has been operating under a certified quality management system since 1995. Our production sites for liquid and powder media production are located in the Life Science area Basel (Switzerland).



Paradiesrain 14  
4123 Allschwil  
Switzerland  
Tel. +41 (0)61 486 80 80  
Fax +41 (0)61 486 80 00  
info@bioconcept  
www.bioconcept.ch

