



Workshop

**Cell Culture
Economy, Technology and Solutions**

11 November 2010

Royal Institute of Technology, Stockholm, Sweden



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Venue: Royal Institute of Technology, Albanova, Roslagstullsbacken 21, Stockholm, Sweden (room **FA32**)

Overview Programme

09.30 - 10.00 Registration with coffee/tea

10.00 - 10.10 **Welcome - Intention with this meeting**
(Gunnar Hörnsten, CEFFORT AB)

Plenary program:

10.10 - 11.00 What is realistic and effective in disposable, multiple Mab processing (Günter Jagschies, GE Healthcare Life Sciences)

11.10 - 11.25 Short break

11.30 - 12.00 Scientifically realistic bioanalysis at-line cell cultures (Gunnar Hörnsten, CEFFORT AB)

12.10 - 12.40 Mastering Oxygen and Carbon dioxide in cell culture (Veronique Chotteau, Royal Institute of Technology, Stockholm)

12.50 - 14.00 Lunch and networking

14.00 - 14.30 Automation of suspension culture handling (Dietmar Weilguny, Symphogen A/S)

14.40 - 15.10 Understanding the challenges involved in stem cell production scale-up (Fredrik Wessberg, CELLARTIS AB)

15.20 - 15.40 Mastering auto-sampling and at-line analysis in industrial cell culture (György Rajkai, Belach Bioteknik AB)

15.50 - 16.10 Technical solutions for sampling and analysis (Marit Hoppe, Nordic Biolabs AB)

16.20 - 16.50 Need for Nordic Forum on Small Scale Cell Culture? (Chair: Cecilia Weigelt, Zymenex A/S)

What are the needs of companies performing cell culture? Is there for instance a need for sharing of experiences on best practices and professional networking in this area. These and related questions will be discussed.

16.50 - 17.00 Closing remarks (Gunnar Hörnsten, CEFFORT AB)

17.10 Drinks

The intention with this meeting

(Gunnar Hörnsten, CEO, CEFFORT AB)

Abstract: CELS meetings contribute to networking, information exchange and development of business, technologies and solutions within Life Sciences; production and R&D in the Nordic region.

At this meeting we will present a balanced program from over-views to the important details that are necessary to master for being successful in cell culture.

We have also strong reasons to believe that Nordic Industry would benefit from establishing a Forum on Small Scale Cell Culture to aid Industry and Academy in the further development of best practices. This suggestion will be discussed at the meeting.

What is realistic and effective in disposable, multiple Mab processing

(Günter Jagschies, GE Healthcare Life Sciences)

Abstract: A step-by-step review of a typical Mab platform process from inoculation to final filtration will provide solutions for single- or campaign-use technology as well as technical and economic criteria to decide what the best alternative would be: a classic equipment setup or the disposable option.

Scientifically realistic bioanalysis at-line cell cultures

(Gunnar Hörnsten, CEFFORT AB)

Abstract: An overview will be given that covers a diversity of examples of at-line analytical methods described in scientific articles over the past 25 year period. Using e.g. an electronic nose, physical or biochemical means for monitoring of growth, substrate, metabolite and product analysis.

Mastering Oxygen and Carbon dioxide in cell culture

(Veronique Chotteau, Royal Institute of Technology, Stockholm)

Abstract: Mammalian cells need adequate aeration for the cellular respiration and simultaneously produce carbon dioxide. Aeration in pilot and large scale cultivation is operated by blowing oxygen or oxygen enriched air in the culture, i.e. sparging. The gas bubbles reaching the surface generate foam formation, which is well known to be damageable for the cells. Therefore, it can be preferable to reduce the bubble sparging while maintaining the oxygen concentration in the culture. Carbon dioxide produced by the cells can accumulate in the culture in case its removal rate from the liquid phase is not fast enough. This provokes an acidification of the medium, which has to be compensated by alkali addition. High levels of carbon dioxide and high levels of alkali can be damage-

able for the process performances. A common way to actively remove the carbon dioxide from the liquid phase is to benefit from the bubbles moving to the liquid surface. Obviously, large scale cultivation can present a dilemma in which reduced sparging is favoured for the aeration strategy in order to avoid cell damage by excessive foaming while increased sparging provide reduced accumulation of carbon dioxide. Typical approaches used in the biopharmaceutical industry for aeration and carbon dioxide removal will be reviewed in the presentation.

Automation of suspension culture handling

(Dietmar Weilguny, Symphogen A/S)

Abstract: Symphogen has introduced robotic handling of mammalian cell suspension cultures. This presentation will focus on the processes and challenges encountered during the establishment of a flexible and affordable automated platform for tracing and handling of medium size suspension cultures.

Understanding the challenges involved in stem cell production scale-up

(Fredrik Wessberg, CELLARTIS AB)

Abstract: Human embryonic stem cells offer a potential unlimited supply for functional cells that could be used in various applications such as drug discovery studies, toxicity testing and in the longer run regenerative medicine. Today we focus on and offer functional Cardiomyocytes and Hepatocytes in ready-to-use formats. These cells are used worldwide in research applications and as the interest increases a strong scale-up production strategy is essential. The presentation put focus on factors to consider when up-scaling production from trials to a commercial market. It also examines the value and applicability of automation technologies within the field and discusses solutions for meeting up-scale challenges in the future.

Mastering auto-sampling and at-line analysis in industrial cell culture

(György Rajkai, Belach Bioteknik AB)

Abstract: In bioprocessing sampling is always a source of contamination. In cell cultures the risk of virus contamination and long process times require even safer methods. That underlines the importance of autosampling which is less prone to human errors. When autosampling is combined with integration of process control and analytics it results in improved economics. This presentation will propose that bioreactor control sequential functions can coordinate autosampling and execute on-line calculations. The combined sample analytical data with bioreactor instrument data results in on-line software sensors. We present a case study where application of Belach Bioreactor control and samples analysed by HPLC, provided sensors for specific substrate uptake rate and by-product rate. We conclude that an advanced bioreactor control system with on-line instrumentation (hardware sensors) and autosampling combined with analytics, can increase the potential of software sensors. This would also strongly support the intentions with Process Analytical Technology and Quality-by-Design concepts.

Technical solutions for sampling and analysis

(Marit Hoppe, Nordic Biolabs AB)

Abstract: A brief review of technology solutions for sampling and analysis of cell cultures. Crucial questions when

sampling is how to receive accurate results in a time and labour effective way, as well as minimizing the risk of contaminating the cultures. This review presents a solution of how to provide the necessary information about the state of your cell culture and how to keep contamination at a minimum.

Persons:

Dr. Gunnar Hörnsten has more than 25 years of experience within Nordic biotechnology, spanning academic R&D, at industrial research institutes and in business. He has established and coordinated/managed Networks and larger R&D programmes involving many participants (total exceeding 150 companies) on the Nordic market since 1994. His speciality area involves analytics within Microbiology and Biotechnology in which he holds an associate professorship (docent) at Linköping Institute of Technology where he worked 1982-1993. In 1997-2003 he worked part time at the Biotechnology department at Lund University while employed at the Swedish Institute for Food and Biotechnology. He takes part in EFB activities e.g. M³C on Modelling, Measurement, Monitoring and Control; in the external advisory board of ERA-net (ERA-IB) on Industrial Biotechnology; previously involved in European metrology (iMERA) and Swedish representative in the CCQM BioAnalysis Working Group 2006-7. Founder of Hörnstsens Analytica in 1992. Founder and CEO of CEFFORT AB in 2009.

Dr. Günter Jagschies has been with GE Healthcare Life Sciences (former Amersham) for 25 years and has held senior management positions in sales, marketing, and R&D within the bioprocess division of the company. His current role is Senior Director Strategic Customer Relations (R&D and BioTechnologies business) working globally with industrial collaborations and as business advisor for the Life Sciences R&D and Business team.

Günter represents the company in numerous technical and business oriented conferences and publications directed at the biopharmaceutical industry. He is co-author of "Process Chromatography", a recent handbook for the biopharmaceutical industry and co-editor of "The Development of Therapeutic Monoclonal Antibody Products", a comprehensive review and analysis of the Chemistry, Manufacturing, and Control (CMC) activities and regulatory requirements for the development of therapeutic monoclonal antibody products. Günter has published numerous papers on the development and manufacturing of biotherapeutics. He is based in Uppsala, Sweden.

Veronique Chottea is researcher, group leader of the Animal Cell Technology group at the Div. of Bioprocess, School of Biotechnology, KTH. Her research is focused on actual problems met in the biopharmaceutical industry in the development of animal cell cultivation processes and on stem cell cultivation processes. Veronique has worked more than ten years at Biovitrum/Pharmacia in Sweden before she joined KTH. She has more than twenty years of experience with animal cell cultivation in suspension and adherence including an expertise in mammalian cell-based process devel-



Workshop organiser

CELS Network

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Gunnar Hörnsten, CEO
CEFFORT AB

opment, fed-batch and perfusion, small and pilot scale (clinical and commercial production), pilot scale/up-scaling.

Dietmar Weilguny is principle scientist at Symphogen A/S. He has 20 years experience in biotechnology, spanning the pharmaceutical and biotechnology sectors. Prior to joining Symphogen A/S he was head of the molecular biology lab at NatImmune A/S with focus on the development of recombinant protein production cell lines. He began his commercial career at Novo-Nordisk A/S, where he for 10 years had different responsibilities including genetic characterization, development of analytical assays and expression of recombinant proteins in *E. coli*, yeast and mammalian cells. Dietmar Weilguny received his MSc in Biochemistry and PhD in Molecular Genetics from the University of Copenhagen.

Fredrik Wessberg has been part of the Cellartis stem cell team since 2005 after finishing a MSc degree in Biomedical Technology at the Royal Institute of Technology (KTH) in Stockholm. He is currently holding the position of Production Manager at Cellartis and is dedicated to the production of human embryonic stem cells and the development of the existing cell culture technologies. Fredrik is directly responsible for the manufacturing of the worlds first functional cell products derived from pluripotent stem cells. The responsibilities includes routine but also custom made manufacturing, exportation and direct client contact in an exciting and intensively growing area of high-technology. Fredrik has previously had numerous responsibilities in Cellartis and was extensively involved in the development of Cellartis first commercial products.

György Rajkai has a Chemical Engineer degree (MSc) from Technical University of Budapest. After ten years of university and academic research he joined Belach Bioteknik AB as head of process automation in 1991. He was involved in definition of user requirements, design, implementation, testing and in operation and maintenance of large number of microbial and cell culture systems ranging from small scale laboratory R&D systems to large scale GMP production systems. During the years at Belach he developed a unique bioreactor control system – the BioPhantom® that has proved to be a successful control platform for bioprocess solutions and has been used in most Swedish biotech companies and institutes.

Marit Hoppe is product specialist, instrumentation at Nordic Biolabs AB since 2007. Before that 6 years with BioRad Technical Support. BSc in Chemistry Engineering at Mälardalen University, courses in cell culturing and fermentation, biosensor technology etc at Linköping Institute of Technology.

Dr. Cecilia Weigelt is Manager of Cell Biology at Zymenex A/S, a Danish-Swedish biopharmaceutical company with the aim to develop protein therapeutics to treat orphan diseases. Cecilia started at the company in 2000 and was responsible for the establishment of the Cell Biology unit at the R&D department at Lidingö, Stockholm. During her time at Zymenex A/S, she has been involved in the development and optimization of several upstream production processes in collaboration with different companies and university research groups. These processes include both perfusion as well as fed-batch processes using CHO cells. Cecilia Weigelt received her PhD in Clinical Immunology from Uppsala University in 1998.



Binding Registration

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Registration fees

Early registration (before 2010-10-27) 1 800 SEK per person
Final registration deadline 2010-11-03 2 250 SEK per person

Members of CELS Network pays 1 450 SEK per person

*VAT (25 %) will be added for Swedish participants and participants without an international VAT registration number.

Send an email with the information below to:

registration@ceffort.org

Needed information:

- Company/University/Organisation
- Name, email, telephone and address of Participant
- International VAT reg. Number (non-swedish participant)

***The number of participants are limited.
'First registered are first served' applies.***

Please: specify which meeting that you register to!

Confirmation of Meeting and Registration (Disclaimer)

A formal confirmation of the meeting will be sent via email to the participants on the day after the final registration date. The organisers takes no responsibility for travel or other costs in the case an unconfirmed meeting is moved to a different venue, cancelled or postponed.

Questions on registration: Call +46 (0)46 286 3351

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