Bio-Process Systems Alliance
Advancing Single-Use Worldwide
A SOCMA VISIONS AFFILIATE

BPSA European Advisory Council F2F Meeting
June 26 & 27, 2019
Thermo Fisher Scientific Facility
D-64293 Darmstadt • Frankfurter Str. 129 B • Germany

AGENDA

Wednesday, June 26, 2019

14h00 Welcome and Overview of BPSA & BPSA European Advisory Council (EAC): **Jeanette McCool, Senior Director, BPSA**; **Eric Isberg, Savillex, BPSA Treasurer**; **Stephen Brown, Naobios & Hélène Pora, Pall Biotech, EAC Co-Chairs**

- Who Is BPSA? BPSA Achievements
- What does BPSA Do? BPSA Current Initiatives
- Importance of BPSA Membership
- Summary/recap of the March 2018 EAC F2F Lyon

14h30 **Thomas Theelen, Business Development Manager, Univercells**
The NevoLine™ Manufacturing System: Intensification & Integration of USP & DSP in a Low-Footprint, Automated Platform for Viral Production

15h30 Break & Networking

16h00 Session on USP 665: **James Hathcock, Sr. Director, Regulatory and Validation Consulting, Pall BioTech** *(via Webex from the USA)*

17h00 Adjourn for Day

19h00 Evening Dinner: **Restaurant Sitte**
Renate Bellin GmbH
Karlstr. 15
64283 Darmstadt
06151-22222
www.restaurant-sitte.de

Thursday, June 27, 2019

09h00 Plenary Presentation: **Kevin Mahony, ARTeSYN Biosolutions; Geoff Malherbe, Thermo Fisher Scientific; Anthony Perret, Thermo Fisher Scientific; Arnaud Schmutz, Sourcin; Stuart Tindal, Sartorius Stedim Biotech GmbH**
Introduction to the Automation of Single-Use Bioprocessing

10h00 Plenary Presentation: **Martin Heitmann, Head of Laboratory, BioProcess Engineering, Sanofi**
Capabilities and Shortcomings of Single-Use Cell Culture Equipment – An End-User's Perspective

11h00 Break

11h15 **Ahd Hamidi, Project Director - Global Health Projects, Batavia Biosciences**
Biopharmaceutical Manufacturing at Lab Scale, Advantages of Highly-Intensified Processing

12h15 Lunch & EAC Working Session: Technical & Regulatory

13h30 Closing Remarks

14h00 ADJOURNMENT

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PLENARY PRESENATION ABSTRACTS

The NevoLine™ Manufacturing System: Intensification & Integration of USP & DSP in a Low-Footprint, Automated Platform for Viral Production
Thomas Theelen, Business Development Manager, Univercells

The world is facing an under-supply of some key vaccines due to poor synergies between growing market demands and aging production models.

In this light, we have developed a proof of concept of a vaccine manufacturing platform aiming at increasing availability and affordability of vaccines - the NevoLineTM system.

This simulated continuous and automated platform integrates both USP and DSP processes and is encapsulated into an isolator, making it a self-contained production unit (10 m^2).
The technology relies on a single-use, high-density fixed-bed bioreactor operated in perfusion chained with downstream filtration, clarification and polishing steps to (a) decrease batch time, (b) reduce equipment utilization, (c) optimize utilities consumption and (d) intensify operations. By optimizing single-use technologies we are able to drastically reduce CAPEX, CoGs and footprint and increase production capacity. Such manufacturing platform can easily be implemented into flexible facilities with simplified infrastructure, increasing adaptability in production and capacity for record time-to-market.

The NevoLine system is expected to produce any type of viral vaccine at a very low cost and large capacities to face global health challenges.

Capabilities and Shortcomings of Single-Use Cell Culture Equipment – An End-User's Perspective
Martin Heitmann, BioProcess Engineering, Sanofi

The move towards single-use processing for early phase clinical manufacturing poses new challenges to the Biopharmaceutical industry. The desire for dual sourcing and need for process transfers within and between companies and e.g. CMOs requires a thorough understanding of a number of different cultivations systems.

A technical evaluation of 50 L SUB bioreactors from 5 main vendors was conducted at Sanofi. The technical characterization and user experience using these systems will be presented. Particular emphasis will be on implications for bio-processing when moving from one system to the other.

Finally, a broader view on implemented single-use processes and perceived gaps will be presented encompassing the whole value chain from seed culture to formulated drug substance.

Biopharmaceutical Manufacturing at Lab Scale, Advantages of Highly-Intensified Processing
Ahd Hamidi, Project Director - Global Health Projects, Batavia Biosciences

Vaccine manufacturing for global distribution typically requires large and expensive manufacturing facilities that result in high Cost of Goods and impede developing countries from initiating or expanding in-country manufacturing capabilities.

One of the strategies to address this issue, is to intensify the vaccine production processes. This presentation will give an overview of a project funded by the Bill & Melinda Gates foundation where the latest process intensification technologies have been applied, to dramatically increase process efficiency, decrease production scale and reduce the CoGs.

The platform is based on a high cell density fixed-bed bioreactor (scale-XTM, by Univercells) combined with high efficiency purification membranes (by Merck, former Natrix) and state-of-the-art process intensification know-how that can increase process output by a factor of up to 80-fold. This allows miniaturization of the manufacturing footprint to such an extent that the yields of a 1200 L bioreactor can be obtained in a footprint of no more than 35 m2. Such miniaturization makes commercial manufacture possible at a significantly smaller scale in a micro-facility (NevoLineTM, by Univercells) and allows it to be performed in an isolator set up, massively reducing costs for manufacturing viral vaccines with a high biological safety requirement.

The first production process that Batavia Biosciences developed on the platform is a Sabin inactivated polio vaccine (sIPV). CoGs modelling with BioSolve software using current yields obtained at bench- and pilot-scale indicate a fully loaded CoGs of <$0.30 per trivalent dose of drug product, an approximate 5-fold reduction over current IPV prices. Moreover, the vaccine can be produced in a small footprint micro-facility, costing approximately $30-40M and capable of delivering 50M trivalent doses per year. Performance of the manufacturing process in isolators allows this production platform for IPV to be fully GAPIII compliant.

This presentation will discuss the technologies used in the manufacturing platform and production process development data obtained during sIPV development.

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SPEAKERS

Dr. Ir. Ahd Hamidi, PDeng
Head of Global Health Projects, Batavia Biosciences

Dr. Ahd Hamidi is a bioprocess technologist currently working as a Head of Global Health Projects at Batavia Biosciences. Ahd obtained her master in chemical engineering, a Professional Doctorate in Bioprocess Engineering and a PhD in Bioprocess technology from the Technical University in Delft (TUDelft), the Netherlands. Her main interests are vaccine process development (both Upstream and

Downstream) and technology transfer in the framework of Global Health. Over the past 20+ years, she has been in charge of different Global Health related programs/ projects both at the Rijksinstituut voor Volksgezondheid en Milieu (RIVM), Netherlands Vaccine Institute (NVI), Institute for Translational Vaccinology (Intravacc) and now Batavia Biosciences.

Martin Heitmann
Head of Laboratory, BioProcess Engineering, Sanofi

Martin received his PhD in Biotechnology from Bielefeld University, where he investigated the metabolome of CHO cells to identify growth limiting or inhibiting intracellular components. After his PhD he joined Novo Nordisk's Cell Culture Technology department where his focus was on research protein production, cell line selection and early fed-batch and perfusion process development. In 2017, Martin joined Sanofi in a newly established role being responsible for evaluating and implementing novel single-use technologies within the area of CHO cell cultivation. This responsibility has since been extended to include a non-GMP pilot plant role.

Thomas Theelen
Business Development Manager, Univercells

Thomas earned his PhD in biomedical sciences from Maastricht University in 2016 and worked as a scientist at the University of Eastern Finland where he researched gene therapy applications in cardiovascular diseases. After obtaining an MBA degree from Vlerick Business School he joined Univercells, to leverage his scientific expertise, understanding of biotechnology and business sense. At Univercells he is currently exploring collaboration opportunities in the biosimilar and vaccine field, in his role as business development manager.

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