FINAL AGENDA

ENGINEERING
- Display of Biologics
- Engineering Antibodies
- Machine Learning

TARGETS
- Optimisation & Developability
- Emerging Targets & Approaches
- Membrane Protein Targets

BISPECIFICS
- Intro to Bispecifics
- Advancing Bispecifics
- Engineering Bispecifics

IMMUNOTHERAPY
- Tumour Microenvironment
- CAR T, TIL & TCR Therapy
- Immunotherapy Safety & Efficacy

ANALYTICAL
- Cell & Gene Therapy Analytics
- Analytical Characterisation
- Protein Stability & Aggregation

EXPRESSION
- Cell Line Engineering
- Optimising Expression
- Protein Purification Technologies

PREMIER SPONSORS

ASIMOV

Benchling

charles river

BERKELEY LIGHTS

evitria

Fluidic Analytics

GenScript Make Research Easy

immatics

PELICAN expression technology

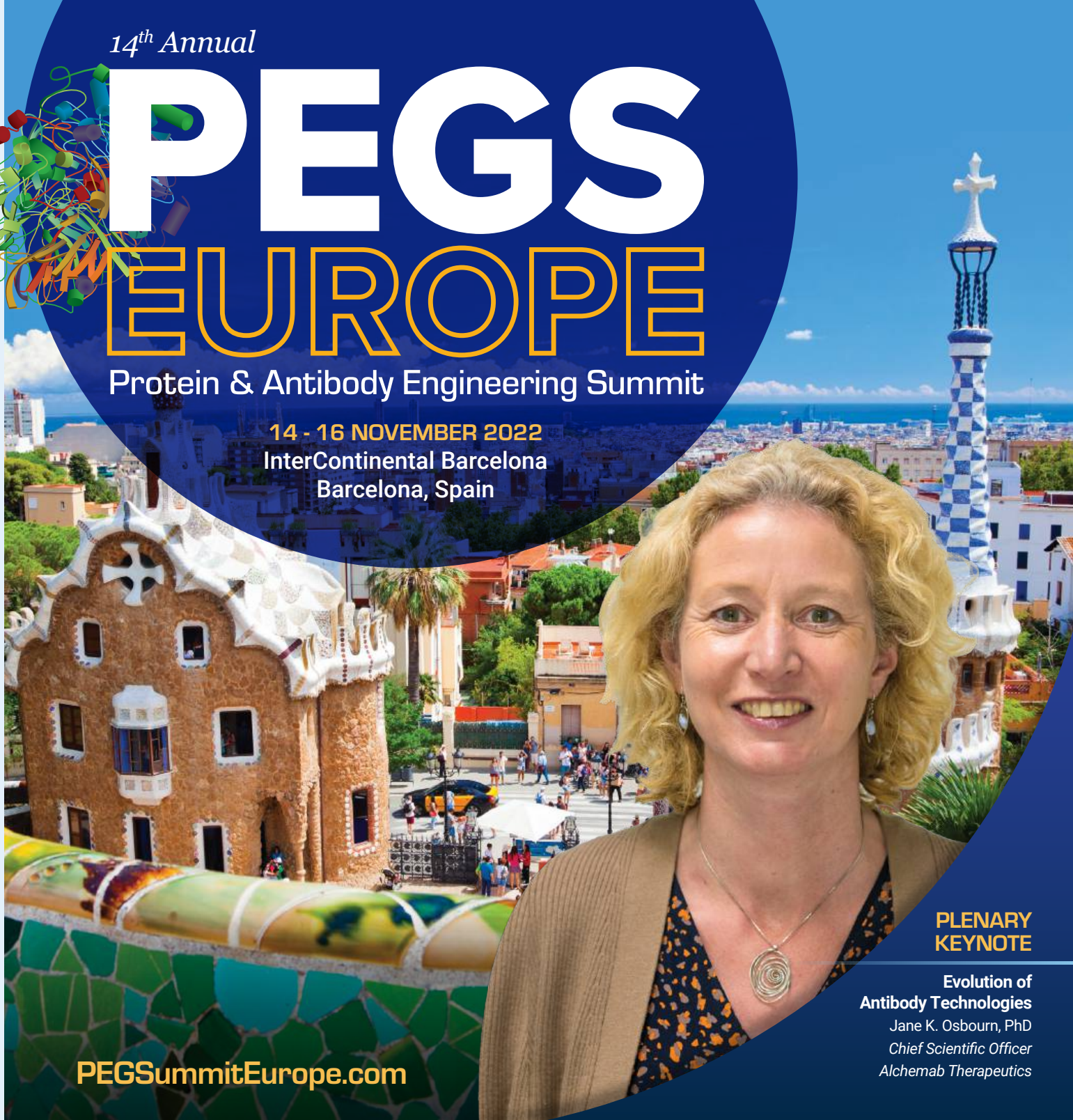
14th Annual

PEGS EUROPE

Protein & Antibody Engineering Summit

14 - 16 NOVEMBER 2022

InterContinental Barcelona
Barcelona, Spain



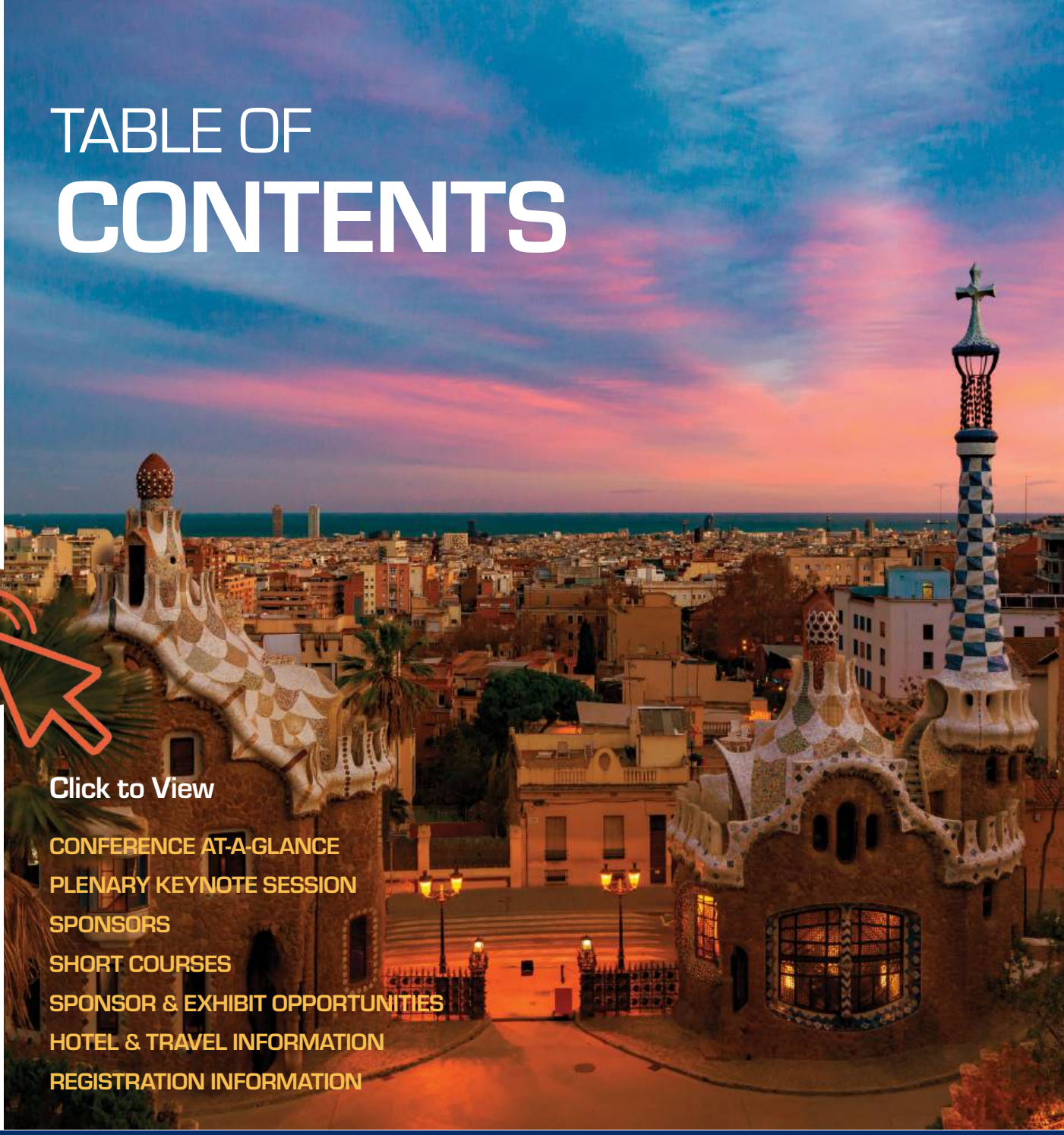
PLENARY KEYNOTE

Evolution of Antibody Technologies

Jane K. Osbourn, PhD
Chief Scientific Officer
Alchemab Therapeutics

PEGSummitEurope.com

TABLE OF CONTENTS



Click to View

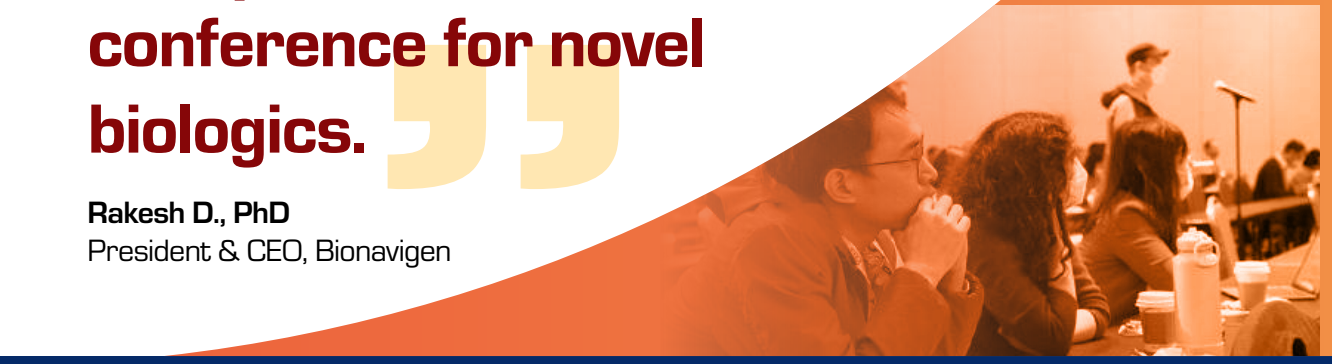
CONFERENCE AT-A-GLANCE

	SUNDAY 13 November Pre-conference short courses*	MONDAY 14 November	TUESDAY 15 November	WEDNESDAY 16 November
ENGINEERING		Display of Biologics	Engineering Antibodies	Machine Learning
TARGETS		Optimisation & Developability	Emerging Targets & Approaches	Membrane Protein Targets
BISPECIFICS		Intro to Bispecifics	Advancing Bispecifics	Engineering Bispecifics
IMMUNOTHERAPY		Tumour Microenvironment	CAR T, TIL & TCR Therapy	Immunotherapy Safety & Efficacy
ANALYTICAL		Cell & Gene Therapy Analytics	Analytical Characterisation	Protein Stability & Aggregation
EXPRESSION		Cell Line Engineering	Optimising Expression	Protein Purification Technologies

*Separate registration required for short courses.

The best biologics technology meeting in Europe. A must-attend conference for novel biologics.

Rakesh D., PhD
President & CEO, Bionavigen



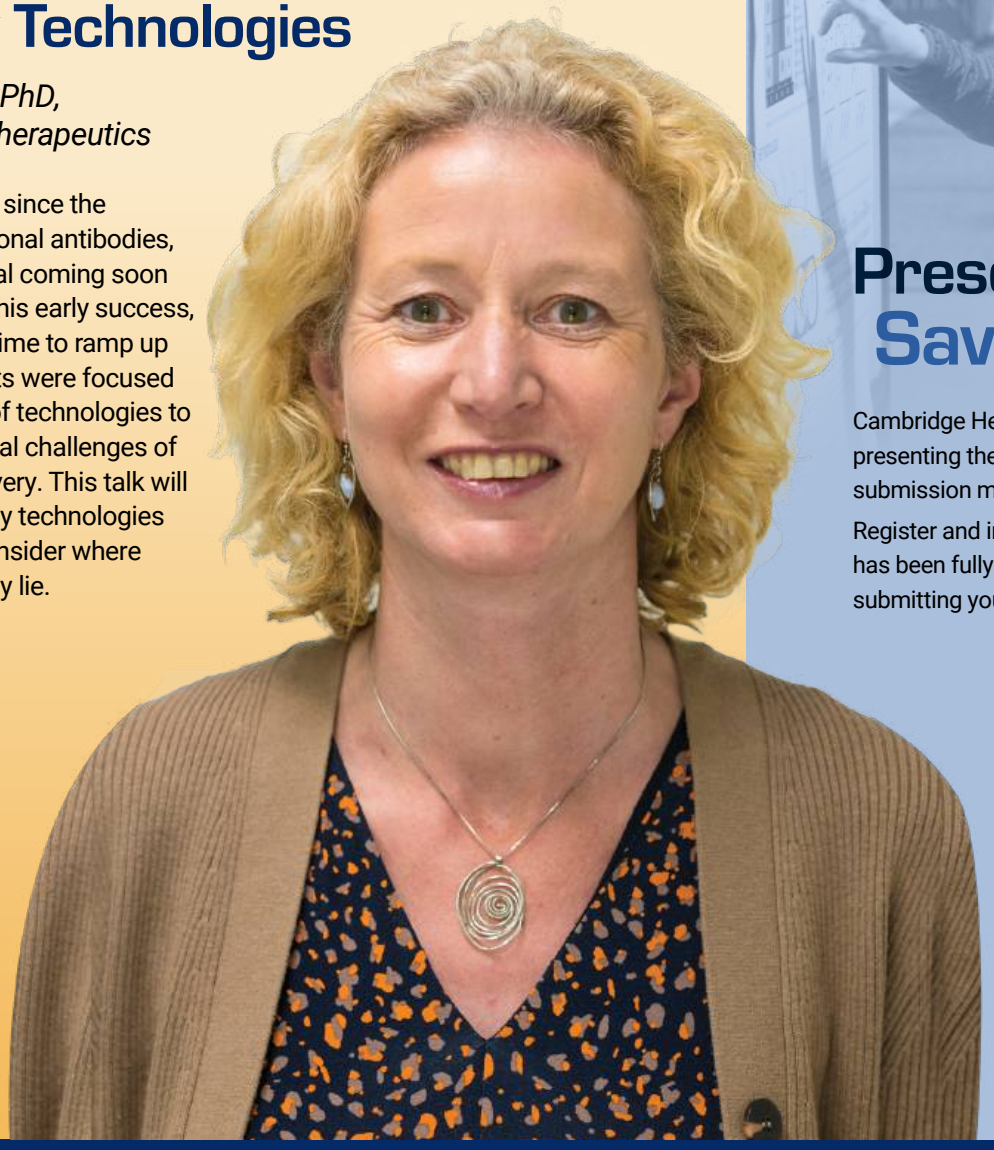
PLENARY KEYNOTE SESSION

15 NOVEMBER 2022 | 10:40-11:30

Evolution of Antibody Technologies

Jane K. Osbourn, PhD,
CSO, Alchemab Therapeutics

It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.



Present a Poster Save €50*

Cambridge Healthtech Institute encourages attendees to gain further exposure by presenting their work in the poster sessions. To secure an onsite poster board, your full submission must be received, and your registration paid in full by 14 October 2022.

Register and indicate that you would like to present a poster. Once your registration has been fully processed, we will send an email with a unique link and instructions for submitting your materials. Please see below for more information.

Reasons you should present your research poster at this conference:

- Your research will be seen by our international delegation, representing leaders from top pharmaceutical, biotech, academic and government institutions
- Discuss your research and collaborate with other attendees
- Your poster title will be published on our website
- Receive €50 off your registration*

**this discount does not apply to product or service providers*

LEARN MORE

CURRENT SPONSORS

PREMIER SPONSORS

ASIMOV · Benchling · BERKELEY LIGHTS · charles river · evitria · Fluidic Analytics · GenScript Make Research Easy · immatics · PELICAN expression technology

CORPORATE SPONSORS

10x GENOMICS · AbCellera · AB CHECK · ABLEXIS AlivaMab DISCOVERY SERVICES · absolute antibody · Nabveris · ABZENA Enabling better biopharmaceuticals · Acro BIOSYSTEMS Recombinant Proteins for Biopharma Industry · ADVANCED INSTRUMENTS · Alloy Therapeutics · ATUM · BIOCYTOGEN · bioNEER · BIO-RAD · bio-techne · BIOVIA · BRUKER · carterra · Catalent BIOLOGICS · Chemical Computing Group · Creoptix · CYTENA A BICO COMPANY · dynamic BIOSENSORS · Element Biosciences · ENPICOM DECODING THE IMMUNE SYSTEM · Entegris · eppendorf · eurofins | DiscoverX · ExcellGene EXPECT GREAT SCIENCE · FOx BIOSYSTEMS Breaking limits in bioanalysis · FyoniBio · GeneFrontier · GENOVAC · GYROS PROTEIN Technologies · halo labs · HexagonFab · horizon a PerkinElmer company · iba · ICOSAGEN · INFORS HT · The Jackson Laboratory · KBI BIOPHARMA · SELEXIS · LenioBio · Lonza · MOLECULAR DEVICES · NONA BIOSCIENCES · OmniAb · OpenEye SCIENTIFIC CADENCE MOLECULAR SCIENCES · PipeBio · polpharma biologics · PROIMMUNE www.proimmune.com · Promega · rapid novor · REDSHIFTBio See change · RIC biologics · SARTORIUS · SinoBiological · SPECIFICA · Sphere Fluidics · SVAR Answers in Life Science · TELESIS BIO · ThermoFisher SCIENTIFIC · TWIST BIOSCIENCE · UNCHAINED LABS · Waters THE SCIENCE OF WHAT'S POSSIBLE.™

CORPORATE SUPPORT SPONSORS

AppliedPhotophysics · BIOINTRON · CONSTANT SYSTEMS · C.T.L. Europe GmbH · Deeptope · DIATHEVA · IpA · Kuhner shaker · Premas Biotech · ProteoGenix · REFEYN · Samplix

SHORT COURSES *

All short courses will take place in-person only from 14:00 – 17:00 on 13 November.

SC1: Developability of Bispecific Antibodies: Formats and Applications

Instructor:

Nimish Gera, PhD, Vice President, Biologics, Mythic Therapeutics

Bispecific antibodies are a rapidly growing and clinically validated class of antibodies with marketed drugs and multiple candidates in clinical trials. Targeting multiple antigens in a synergistic manner can confer enhanced therapeutic benefits and potentially uncover novel biological mechanisms. However, multiple formats and a tedious candidate selection process to select functional and developable bispecific antibodies make such programs cumbersome. This short course highlights the rapid growth in the field, therapeutic applications, and it focuses on challenges with discovery and development of bispecific antibodies. We will use an approved bispecific antibody as a case study to understand the varied aspects of discovery and development of bispecific antibody programs.

ROOM LOCATION: Rossini 1

SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy

Instructors:

Stephen A. Beers, PhD, Professor of Immunology & Immunotherapy, University of Southampton

Björn L. Frendeus, PhD, CSO, BioInvent International AB

The tumour microenvironment (TME) is a complex, dynamic environment containing tumour cells, extracellular matrix (ECM), cytokines, immune cells, and stromal cells. These cell populations interact and influence each other to help the tumour grow and suppress immune responses. As well as propagating tumour growth and spread, the TME may also influence the response to immunotherapy. In this short course, we will discuss the nature of the TME and the multiple ways in which it promotes an immunosuppressive environment. Opportunities to alter the TME in order to more effectively deliver immunotherapy will also be discussed. Finally, we will present and discuss emerging therapeutic approaches and consider how they might be used to enhance patient outcomes.

Your Safety Is Our Top Priority

To ensure maximum safety, CHI has instituted mandatory health and safety protocols for all attendees, exhibitors, speakers and staff who attend in person. Attendees that cannot participate because of this policy, or due to travel restrictions, are encouraged to participate using our highly praised virtual event platform. Our virtual events are designed to provide you with an in-person experience at your convenience, anywhere, anytime. We are actively following news and recommendations around COVID-19 and the Omicron variant. These protocols are subject to change as we continue to learn more.

All in-person attendees *must*:

Have a negative COVID-19 test result from an FDA-authorized, a WHO-authorized, or European authorized over-the-counter antigen test within 24 hours prior to arriving at the event. You will be asked your results at registration.

CHI *recommends* all attendees:

Have an updated COVID-19 vaccination and wear a mask in public spaces at the event.

ROOM LOCATION: Rossini 2

SC3: Use and Troubleshooting of Eukaryotic Expression Systems

Instructors:

Richard Altman, MS, Field Application Scientist, Life Science Solutions, Thermo Fisher Scientific

Henry C. Chiou, PhD, Senior Director General Manager, Biosciences, Thermo Fisher Scientific

Kenneth Thompson, PhD, Manager, R&D Cell Biology, Thermo Fisher Scientific

Eukaryotic expression systems are extensively used for the generation of recombinant proteins thereby becoming an essential protein engineering tool. The choice of a suitable eukaryotic expression system depends mainly on the biological and biochemical properties of an individual protein. The course will focus on both the insect and mammalian expression systems, which have demonstrated the ability to express complex proteins for a wide variety of applications. We will discuss the concepts, uses, and optimization of these systems along with sharing experimental troubleshooting lessons learned. The course combines instruction and case studies in an interactive environment.

ROOM LOCATION: Group Lounge

SC4: Potency Assays and Comparability for Cell & Gene Therapies

Instructor:

Christopher Bravery, PhD, Consulting Regulatory Scientist, Advanced Biologicals Ltd.

Potency assays are an essential concept in determining the quality of any biological medicinal product/biologic. Extending this concept to cell, gene and tissue products is more challenging and often the most difficult aspect of characterising these products. The relevance of the approach taken is often challenged by regulators both during development and when seeking market approval. Change is inevitable and necessary both in development and over the post-approval product lifecycle. Whenever changes are made it is necessary to confirm they do not adversely impact the quality and therefore safety and efficacy of the product; this requires data beyond meeting current specifications. With any biological product, this is challenging, for cell, gene, and tissue products that cannot be fully characterised the challenges are greater still. Any development program should therefore aim to ensure the tools are in place to allow changes to be implemented. How characterisation and process development provides these tools will be discussed.

ROOM LOCATION: Cristal

SC5: Machine Learning Tools for Protein Engineering

Instructor:

Victor Greiff, PhD, Associate Professor, Immunology, University of Oslo

In silico prediction, engineering, and design are changing how large molecule drugs (proteins) will be discovered, designed, and optimized. However, these tools are still in their early development, and much needs to be learned on how to adapt them for use in, e.g., antibody and vaccine discovery, training, prediction, developability, simulation, and optimization. This short course highlights the rapid growth and availability of machine learning techniques and tools for protein engineering, focusing specifically on advances, opportunities, and challenges. As a case study, we will work through recent high-profile publications in the AI protein engineering field to understand how machine learning can guide the *in silico* discovery and subsequent experimental validation of novel protein designs.

**** Separate registration required***

9th Annual

DISPLAY OF BIOLOGICS

Leading the Way for New Classes of Therapy

SUNDAY 13 NOVEMBER

12:00 Registration Open

14:00 Recommended Short Course*
SC5: Machine Learning Tools for Protein Engineering
*Separate registration required. See short courses page for details.

MONDAY 14 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Zafir

ONCOLOGY AND BEYOND IN INFECTIOUS, AUTOIMMUNE, AND CHRONIC DISEASES

8:25 Chairperson's Remarks
Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London

8:30 Phage and Mammalian Display for Improved Therapeutic Antibodies
Pierre Martineau, PhD, Deputy Director, Functional Screening & Targeting of Cancer, IRCM Institut de Recherche en Cancerologie De Montpellier
Whereas antibodies are frequently selected as fragments in simple buffer, the therapeutic molecule is a much larger and bivalent molecule, the IgG, that must interact with its target in the conditions found in pathologic tissues. We have developed a system to easily couple phage and mammalian display of full-length IgG, selection procedures, and optimized synthetic libraries to constrain binding in the acidic conditions that pertain in some pathology.

9:00 An Antibody Identified by Phage Display Targets a Protein Expressed in Both Cancer and Fibrosis
Aaron M. LeBeau, PhD, Associate Professor, Pathology & Lab Medicine, University of Wisconsin Madison
We developed a high-diversity single-chain variable fragment phage display library from naïve mice that allowed us to identify a suite of fragments that bound the serine protease Fibroblast Activation Protein (FAP).

9:30 Development of Potent Antagonist Against Target-of-Interest with Phage-Displayed Alternative Scaffolds
Yingnan Zhang, PhD, Senior Scientific Manager, Early Discovery Biochemistry, Genentech, Inc
A robust, alternative peptide-scaffolds platform, which consists of disulfide bond-constrained peptides that are resistant to thermal, proteolytic, and chemical degradation, has been developed with phage display. Ensembles of tens of libraries with overall diversity of 10^11 have been constructed. Binders against a target of interest have been identified from the libraries and further optimized with display technology and chemical synthesis to highly potent and stable leads with ideal pharmacological properties.

10:00 Extending the Specifica Generation 3 platform to affinity maturation and VHH libraries
Sarah D'Angelo, PhD, Chief Technical Officer, Specifica
The Specifica Generation-3 Library Platform is based on highly developable clinical scaffolds, into which natural CDRs purged of sequence liabilities are embedded. The platform directly yields highly diverse, high affinity, developable, drug-like antibodies, as potent as those from immune sources, with minimal need for downstream optimization. This talk will discuss extension of the Platform to VHH libraries and lead antibody improvement, with simultaneous enhancement of both affinity and developability.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

CONDITIONAL ACTIVATION

11:10 Chairperson's Remarks
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

11:15 Engineering Therapeutic Antibodies for Conditional Activation of Antigen Binding and Effector Functions
Harald Kolmar, PhD, Professor and Head, Institute for Organic Chemistry and Biochemistry, Technische Universität Darmstadt
We have generated a series of conditionally masked therapeutic antibodies that are unmasked in the tumor microenvironment by acid pH and/or by proteolytic removal of the masking entity. Using anti-idiotype shark-derived vNARs, pH-responsive paratope binders were generated by yeast display screening. As an additional broadly applicable approach to modulate effector functions of IgG1 therapeutic antibodies, a protease-cleavable Fc-masking scFv was developed, efficiently blocking Fc-gamma receptor binding conditionally.

11:45 Generation and Engineering of Mono- and Bispecific Cattle-Derived Ultralong CDR-H3 Antibodies by Yeast Surface Display
Stefan Zielonka, PhD, Director, Protein Engineering & Antibody Technologies Discovery Technologies, Global Research and Development, Merck KGaA
A subset of antibodies found in cattle comprises ultralong CDR-H3 regions of up to 70 amino acids. These peculiar entities display a huge structural diversity that makes them attractive for biomedical applications. We have generated a robust platform process to specifically harness this subset after immunization. Moreover, we have engineered bispecific common-light-chain antibodies based on ultralong CDR-H3 diversities and demonstrated that these molecules are versatile for conditionally activating NK cells.

12:15 Targeting the High-Hanging Fruit - Icosagen Therapeutics Antibody Development Pipeline
Siret Tahk, PhD, Senior Researcher, Icosagen Cell Factory
Multi-pass integral membrane proteins compose the largest therapeutically relevant group of proteins that have so far not been effectively targeted with antibody-based molecules. Icosagen has developed a wide array of expertise and technologies in protein production, antibody development, protein engineering and analytics over the past 10 years and here we present the integration of these technologies by launching our therapeutic antibody development pipeline to specifically target those proteins.

12:45 Session Break

12:55 LUNCHEON PRESENTATION I: Writing the Future of Biologics with Synthetic DNA and Machine Learning

Aaron Sato, PhD, Chief Scientific Officer, Twist Bioscience

Utilizing its proprietary DNA technology to write synthetic libraries, Twist Biopharma provides end-to-end antibody discovery libraries including highly diverse, synthetic, naïve antibody phage display libraries and target class specific antibody phage display libraries against difficult-to-drug targets. Here, Aaron will cover how Twist uses these libraries coupled with Machine Learning to discover 1) antibody sequences from NGS sequencing of our successive panning rounds and 2) optimize existing leads derived from traditional screening.

13:25 LUNCHEON PRESENTATION II: Concurrent use of Humanized and Hyperimmune Mice for Rapid, Function-Forward mAb Discovery

Ryan Kelly, Head, Business Development, In Vivo Antibody Discovery Services, Business Development, Abveris, A Division of Twist Bioscience

Leveraging the natural immune repertoire for antibody discovery has distinct advantages for positive downstream outcomes; however, conventional antibody screening methodologies typically fail to provide the throughput and resolution required to thoroughly mine the full genetic diversity in these *in vivo* workflows. In this presentation, Abveris will discuss some strategies for overcoming these challenges in the context of a case study highlighting a discovery campaign against a notoriously intractable cell surface receptor.

13:55 Session Break

PHENOTYPIC SCREENING

14:15 Chairperson's Remarks

Joao Goncalves, PhD, Full Professor, Microbiology & Immunology, University of Lisbon

14:20 A Bench-to-Bedside Phenotypic Discovery Approach Identifies Anti-FcgRIIB as a Promising Strategy to Overcome Antibody Drug Resistance

Björn L. Frendeus, PhD, CSO, BioInvent International AB

We used a phenotypic discovery approach comprising differential antibody display screening of primary leukaemic B cells and healthy donor PBMCs to identify antibodies and targets associated with direct and immune effector cell-mediated killing of leukaemic B cells. The inhibitory FcγRIIB was identified as a promising target. Anti-FcγRIIB overcame rituximab resistance *in vivo* and is currently being trialed in clinical Phase I/II trials with relapsed/refractory NHL patients.

14:50 Deploying Antibody Fragments inside Cells for Phenotype Modulation and Drug Discovery in Cancer

Terence Rabbitts, FRS, FMedSci, Professor, Molecular Immunology, Center for Cancer Drug Discovery, Institute of Cancer Research

Chromosomal translocation-proteins and mutant RAS are among hard-to-drug proteins in cancer. Intracellular antibodies are a starting point as inhibitors via design to block protein-protein interactions or to carry effector functions. Fusion with E3 ligases creates bio-degrader intracellular antibodies to eliminate target proteins. The effect of bio-degraders targeting LMO2 and mutant RAS on cancer cells will be discussed and approaches to establish delivery of intracellular antibodies as drugsper se.

15:20 Selection and Characterization of Cell Binding and Internalizing Anti-Nucleolin Antibodies

Joao Goncalves, PhD, Full Professor, Microbiology & Immunology, University of Lisbon

New nucleolin-targeting nanobodies with cytotoxic activity against nucleolin-overexpressing breast cancer cells were developed. The nanobody-Fc antibody presented nucleolin-mediated ADCC capacity. Antibodies were optimized by random mutagenesis in *E. coli* and selected by endocytic properties by flow cytometry. The best nanobody candidates presented a single mutation in CDR3 and showed increased potency. Data will be presented on the optimization and biologic activities of selected anti-nucleolin antibodies.

15:50 Effectively Meeting Today's Antibody Discovery Needs: Methods to Address Narrow Diversity Targets and Functionality

Pavel Pitule, PhD, Vice President Discovery, AbCheck s.r.o.

Novel technology solutions are needed to overcome the challenges of today's drug discovery and development. In particular, tailored solutions beyond antibody-antigen binding affinity criteria are required for the discovery of therapeutic antibodies with challenging Target Product Profiles (TPPs). AbCheck's customized microfluidics solutions address these challenges by meeting the key requirements for potent, function-specific antibodies and enabling functional screening of millions of single cells/day.

16:20 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:05 Measuring Antibody-Antigen Interactions at a Library-on-Library Scale Using a Yeast Display Platform to Discover and Optimize Antibodies with Defined Specificity and Cross-Reactivity Profiles

David A. Younger, PhD, Co-Founder & CEO, A Alpha Bio

We will demonstrate how multi-dimensional antibody-antigen protein interaction datasets generated using the AlphaSeq platform enable the discovery and optimization of antibodies to diverse target epitopes with desired specificity and cross-reactivity profiles. In addition to direct selection of antibodies with desirable binding properties, AlphaSeq data is used to train machine learning models to improve the speed and quality of subsequent antibody designs.

17:35 PANEL DISCUSSION: Display Developments for Bench-to-Bedside Applications

Co-Moderators:

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London

E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

Panelists:

Fortunato Ferrara, PhD, Vice President, Discovery Services, Discovery, Specifica Inc

Harald Kolmar, PhD, Professor and Head, Institute for Organic Chemistry and Biochemistry, Technische Universität Darmstadt

Stefan Zielonka, PhD, Director, Protein Engineering & Antibody Technologies Discovery Technologies, Global Research and Development, Merck KGaA

18:05 Welcome Reception in the Exhibit Hall with Poster Viewing

19:05 Close of Display of Biologics Conference

7th Annual

ENGINEERING ANTIBODIES

Designing the Next Best-in-Class Biologics

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC5: Machine Learning Tools for Protein Engineering
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Zafir

SINGLE DOMAIN ANTIBODIES

8:25 Chairperson's Opening Remarks
Lars Linden, PhD, Vice President, Head, Biologics Research, Bayer HealthCare AG

8:30 Engineering Options to Exploit the Novel Epitope Targeting of soloMER Biologics
Caroline J. Barelle, PhD, CEO & Founder, Elasmogen Ltd.
Our single domain technology consistently demonstrates novel epitope targeting compared with VHHs and mAbs. We have explored multiple engineered constructs to exploit this plus other advantages of our platform to develop novel autoimmune and cancer products. I will discuss technology platforms, advantages, and exploitation of these through engineering in addition to sharing our *in vivo* disease model data on both inflammatory and oncology indications as we progress towards the clinic.

9:00 AAV and mRNA Delivery of VHH Intrabodies for *in vivo* Targeting of Intracellular Proteins
Erwin De Genst, PhD, Senior Research Scientist, AstraZeneca
Intrabodies have significant biotherapeutic potential. However, challenges remain regarding development and delivery. Using a synthetic VHH phage display library and modified RNA, we developed VHH intrabodies that target the aberrant interactions between two intracellular calcium handling proteins in heart failure. We delivered these VHH intrabodies *in vivo* and expressed them specifically in the heart using Adeno-Associated Viral (AAV) transduction, resulting in improved cardiac function in a murine heart failure model.

9:30 Development of Brain Shuttles Based on TfR1-Specific VNAR Antibodies – Translation to Primates
Pawel Stocki, PhD, Vice President, Research, Ossianix, Inc.
Poor brain delivery is a major hurdle in the development of biological therapeutics for neurologic diseases because of poor Blood-Brain Barrier (BBB) penetration. Numerous brain shuttles based on single-domain VNAR antibodies were developed by Ossianix. These include TXP1, which was demonstrated to penetrate the brain with high efficiency when injected at a low therapeutic dose in non-human primates with an over 30-fold increase in comparison to the control.

10:00 Structure-Based Charge Calculations for Predicting Properties and Profiling Antibody Therapeutics
Nels Thorsteinson, PhD, Director of Biologics, Chemical Computing Group
We present a method for modeling antibodies and performing pH-dependent conformational sampling, which can enhance property calculations. Structure-based charge descriptors are evaluated for their predictive performance on recently published antibody pI, viscosity, and clearance data. From this, we devised four rules for therapeutic antibody profiling which address developability issues arising from hydrophobicity and charged-based solution behavior, PK, and the ability to enrich for those that are approved by the FDA.

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

12:10 Chairperson's Remarks
Lars Linden, PhD, Vice President, Head, Biologics Research, Bayer HealthCare AG

12:15 KEYNOTE PRESENTATION: Development of New Stimuli-Sensitive Antibodies
Benjami Oller-Salvia, PhD, Assistant Professor, "La Caixa" Junior Leader Fellow, Bioengineering, Protein and Peptide Targeted Nanotherapeutics Program, Ramon Llull University
Conditionally-activated antibodies enable decreased side effects resulting from off-site target engagement. Reversibly masking the antibody can maximize antigen binding in the tumor and minimize it in healthy tissues. In this talk, we will present efficient masking strategies we have recently developed that enable antibody activation with tumor-specific proteases.

12:45 Long Read Sequencing for Protein & Antibody Engineering
Caroline Obert, PhD, Staff Study Manager, Synthetic Long Read Applications, Element Biosciences
Our ability to efficiently engineer antibodies and proteins has been limited to a large extent by our ability to only read partial segments of protein coding sequences using short read sequencing technology. Here, we describe how highly accurate synthetic long read sequencing technology is integrated into and facilitates the design-build-test cycle in antibody and protein engineering.

7th Annual

ENGINEERING ANTIBODIES

Designing the Next Best-in-Class Biologics

13:15 Session Break

13:20 LUNCHEON PRESENTATION I: Using Physics-Based Molecular Modeling and Deep Learning Approaches to Understand and Design Therapeutic Nanobodies

Anne Goupil - Lamy, PhD, Science Council Fellow at BIOVIA, BIOVIA, Dassault Systèmes

Understanding how nanobodies interact with their target antigens at the atomic level is essential for successful engineering of better binders. The prerequisite is to have an accurate 3D model of the nanobody, especially in the CDR regions. We used comparative modelling approaches, as well as Machine Learning algorithms, to predict 3D structures of several nanobodies that target Glutamate receptors.

13:50 LUNCHEON PRESENTATION II: Implementing MOA-Reflective Cytotoxicity Assays using Ready-to-Use KILR Target Cells from Screening to Lot Release

Andrew Green, Senior Business Development Manager, Sales Department, Eurofins DiscoverX

Evaluation of Fc effector mechanisms of therapeutic antibodies is an important regulatory requirement. Eurofins DiscoverX's MOA-reflective KILR cytotoxicity assays enable precise quantitation of multiple effector-mediated MOA's including ADCP & ADCC applications. These dye-free, radioactivity-free assays measure direct target cell killing. Here we share phase-appropriate data for several KILR bioassay models demonstrating these assays are fit-for-purpose for screening, characterization, & relative potency applications in lot-release testing.

14:20 Session Break

EMERGING FORMATS AND CHALLENGING TARGETS

14:30 Chairperson's Remarks

Caroline J. Barelle, PhD, CEO & Founder, Elasmogen Ltd.

14:35 KnotBodies – Next-Generation Antibody Therapeutics for Modulating Intractable Targets

Aneesh Karatt-Vellatt, PhD, CSO, Maxion Therapeutics

To overcome challenges in antibody discovery against intractable targets such as ion channels, Maxion has developed a novel antibody fusion format (termed KnotBody), by fusing naturally-occurring ion channel modulators (knottins) into peripheral CDR loops. This presentation illustrates the generation of KnotBody inhibitors of multiple ion channels and their optimisation using phage and mammalian display.

15:05 GPCR Active State Conformations Enhancing Therapeutic Agonistic Antibody Discovery

Toon Laeremans, PhD, Co-Founder & Head, Discovery Biologics, Confo Therapeutics

ConfoBodies stabilize a desired conformational state of a GPCR and enable conformation-directed drug screening and structure-guided elaboration. We will show the unique potential of ConfoBody stabilized GPCR conformations to facilitate *de novo* discovery of therapeutic antibodies exhibiting full agonist pharmacology to human GPCRs.

15:35 Accelerating Lead Molecule Discovery against Difficult Targets

Jonathan Didier, PhD, Senior Field Applications Scientist, Berkeley Lights, Inc.

The Berkeley Lights' Opto Plasma B Discovery (OPBD) 4.0 workflow enables recovery of 1000s of hits by screening up to 100,000 plasma cells, down-selection of lead candidates by functional screening, and sequencing and re-expression of >1000 functionally characterized antibodies in one week. By maximizing the diversity of antibodies through direct functional profiling of plasma cells, the OPBD 4.0 workflow allows users to tackle even the most challenging targets.

16:05 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:00 Engineering ISB 2001, A First-In-Class Trispecific BCMA and CD38 T Cell Engager Based on the BEAT Technology

Carole Estoppey, PhD, Head of Structure-Guided Antibody Engineering, Ichnos Sciences Biotherapeutics SA

ISB 2001, a trispecific BCMA, CD38, and CD3-targeted T cell engager, was designed to enable high potency with low risk of on-target off-tumor toxicity and antigen sink effects. We will present the rational design of ISB 2001, exploring affinity of the three binding arms, avidity induction, as well as varying epitopes and architectures. ISB 2001 IND-enabling studies are ongoing, and a first-in-human study is expected to start in 2023.

17:30 Ensovibep, a Clinical Stage DARPin Therapeutic for SARS-CoV-2

Marcel Walser, Senior Director, Research, Molecular Partners AG

Ensovibep is a multi-specific 5-domain DARPin therapeutic under development. Three domains cooperatively bind and block the SARS-CoV-2 spike protein receptor-binding domain; two domains bind HSA. *In vitro* pan-variant (incl. BA.2, BA.2) neutralisation activity has been demonstrated. Ph-1 and Ph-2a studies show favourable safety and viral load reduction (VLR). Ph-2b data from the EMPATHY randomised controlled trial show significant VLR and decreases in hospitalisation and death in ensovibep treated subjects.

18:00 An Advanced Anticalin Platform to Locally Treat Respiratory Diseases

Hitto Kaufmann, PhD, CSO & Senior Vice President, Pieris Pharmaceuticals GmbH

Anticalins represent a class of small and stable therapeutic proteins that can be efficiently delivered to the lung and thus open new opportunities to treat various respiratory diseases locally. Accumulating preclinical and clinical data in asthma and idiopathic fibrosis suggest that these novel therapeutic interventions could help address unmet medical needs. The platform has further evolved with new bi-paratopic formats and tailor-suited developability assessments.

18:30 Antibodies from Resilient Individuals: Progress towards the Clinic

Ralph Minter, PhD, Vice President, Research, Alchemab Therapeutics

At Alchemab, we are harnessing the power of the immune system to counter complex diseases. Using a combination of next-generation sequencing, serum proteomics, and computational discovery we pinpoint antibodies associated with improved outcomes. Selected antibodies are characterized by their biological function and the targets which they bind. Many patient cohorts have been analyzed, across Neurodegeneration and Oncology, and antibodies to novel targets are progressing toward the clinic.

19:00 Direct Tie2 Agonists Promote Vascular Stability for the Intravitreal Treatment of Diabetic Macular Edema

Nicholas Agard, PhD, Principal Scientist, Antibody Engineering, Genentech, Inc.

Inhibition of Ang2, resulting in Tie2 activation, is a clinically validated approach for the treatment of diabetic macular edema. Here we describe the discovery and optimization of a hexavalent direct Tie2 agonist and its physiological impacts in both mice and cynomolgus monkeys. We show the molecule resolves vascular leak in response to multiple inflammatory stimuli, and that it has exposure and stability consistent with infrequent intravitreal administration.

19:30 Close of Engineering Antibodies Conference

Inaugural

MACHINE LEARNING APPROACHES FOR PROTEIN ENGINEERING Balancing Theory with Practice

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC5:Machine Learning Tools for Protein Engineering
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Zafir

NEXT-GENERATION *IN SILICO* PROTEIN ENGINEERING AND *DE NOVO* DESIGN

8:25 Chairperson's Remarks
Enkelejda Miho, PhD, Professor, Dean, University of Applied Sciences and Arts Northwestern Switzerland

8:30 Highly Accurate Protein Structure Prediction with AlphaFold
Simon Kohl, PhD, Senior Research Scientist, DeepMind
Predicting a protein's structure from its primary sequence has been a grand challenge in biology for the past 50 years. In this talk, we will describe work at DeepMind to develop AlphaFold2, a new deep learning-based system for structure prediction that achieves high accuracy across a wide range of targets. The talk will cover both the underlying machine learning ideas and the implications for biological research.

9:00 Antibody Paratope States Improve Structure Prediction to Elucidate Antibody-Antigen Recognition
Monica L. Fernandez-Quintero, PhD, Postdoc Research Scientist, General Inorganic & Theoretical Chemistry, University of Innsbruck
Describing an antibody's binding site using only one single static structure limits the understanding of the antibody's function. To improve antibody structure prediction and to take the strongly correlated loop and interface movements into account, antibody paratopes should be described as interconverting states in the solution. Therefore, the definition of kinetically and functionally relevant states can be successfully used to improve the accuracy and enhance the understanding of antibody-antigen recognition.

POSTER HIGHLIGHTS

9:30 POSTER HIGHLIGHT: Antibody Scanning of Beta-2 Microglobulin
Montader Ali, Graduate Student, Chemistry, University of Cambridge
The identification of key regions of a protein structure can be achieved through antibody scanning, which involves combining a phenotypic assay with a library of antibodies targeting different epitopes on a protein's surface. We used an *in silico* design strategy based on a fragment-based method to generate nanobodies against beta-2 microglobulin, a protein implicated in a wide range of diseases. The nanobodies exhibit high stability, with evidence of high affinity.

9:35 POSTER HIGHLIGHT: Creation of Monoclonal Antibodies via Phage Display to Target Immunoreactive Part of LPS
Alexandra Fux, Graduate Student, Medical Biology, University of Salzburg
Lipopolysaccharide (LPS, endotoxin) is a cell wall component of gram-negative bacteria and highly toxic upon entering the human body. Reliable endotoxin removal or detection assays are in high demand. Many assays face difficulties in providing animal-free, LPS-specific, and low-priced approaches. This study focuses on the creation of an artificial antibody via Phage Display that specifically binds Lipid A and paves the way towards a bead-based detection and removal tool.

9:40 POSTER HIGHLIGHT: Integration of Clinical, Laboratory and Multi-Omics Data to Leverage Machine Learning for Diagnostics
Jan Kruta, Research Associate, School of Life Sciences, University of Applied Sciences & Arts Northwestern Switzerland
CDSS are a promising technology to enhance diagnostics. However, due to the difficulties of omics integration in conjunction with clinical characteristics, such systems are often limited to certain data types. We were able to develop an integration pipeline that reliably diagnosed patients based on multi-omics data combined with clinical and laboratory data. Our results uncover insights in the field of autoimmune diseases and can be adapted for applications across conditions.

9:45 POSTER HIGHLIGHT: Personalized Medical Platform to Support Diagnosis of Autoimmune Diseases with Artificial Intelligence
Patrick Meier, University of Applied Sciences & Arts Northwestern Switzerland
Doctors struggle to diagnose autoimmune diseases because of overlapping symptoms and a multitude of laboratory test results. Together with physicians and researchers we have developed a Swiss and European prototype of a clinical decision support system, Personalis. The software uses artificial intelligence to detect patterns in the genetic, biomedical, and clinical data. These predictions help physicians make an early and correct diagnosis of autoimmune diseases.

9:50 POSTER HIGHLIGHT: Humanness Assessment with Machine Learning for *De Novo* Nanobody Design
Aubin Ramon, PhD Student, Chemistry, University of Cambridge
Computational methods are emerging techniques to design, *in silico*, new therapeutic single-domain antibodies (nanobodies) targeting a wide range of biological molecules. A humanness tool has been here developed using a deep machine learning vector-quantised variational auto-encoder (VQ-VAE) with unsupervised learning to assess the similarity of *de novo*-designed nanobodies with antibodies produced by human immune systems. This humanness assessment even shows significant correlation with immunogenicity antibody data.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

10:45 From Data to Predictions: Virtual Screening for Multi-Specific Protein Therapeutics
Norbert Furtmann, PhD, Head, Computational & High-Throughput Protein Engineering, Large Molecule Research, Sanofi
Our novel, automated, high-throughput engineering platform enables the fast generation of large panels of multi-specific variants (up to 10.000) giving rise to large data sets (more than 100.000 data points). By mining our data sets we were able to extract engineering patters and to develop AI-based virtual screening workflows to guide the exploration of huge design spaces for multi-specific biologics drug discovery.

Inaugural

MACHINE LEARNING APPROACHES FOR PROTEIN ENGINEERING Balancing Theory with Practice

RULES FOR IMPROVING THERAPEUTIC ANTIBODY DEVELOPABILITY WITH MACHINE LEARNING: Immunogenicity, Humanisation, Design, and Formulation

11:10 Chairperson's Remarks

M. Frank Erasmus, PhD, Head, Bioinformatics, Specifica, Inc.

11:15 Design of Biopharmaceutical Formulations Accelerated by Machine Learning

Paolo Arosio, PhD, Assistant Professor, Chemistry & Applied Biosciences, ETH Zurich

The multiple biophysical properties that overall define the developability of biologics depend not only on protein sequence but also on buffer composition. Here we show how machine learning algorithms can accelerate the design of biopharmaceutical formulations that simultaneously optimize multiple biophysical properties.

11:45 AI-Derived Antibody Discovery – Humanoids for Global Good

Joshua Smith, PhD, Molecular Design, Principal Scientist, Just- Evotec Biologics

At Just – Evotec Biologics, we're developing cutting-edge machine learning technologies to accelerate antibody drug development. In this talk, I'll focus on the Antibody-GAN – an ML framework that allows us to generate limitless antibody drug candidates with desirable properties. I'll describe the discovery platform we've built upon this technology (J.HAL) and how we're using data from this platform to develop even more powerful tools for discovery and design.

12:15 An Integrated Discovery Platform: From NovaSeq to an Optimised Antibody

Jannick Bendtsten, CEO, PipeBio

Machine learning and AI are enhancing the drug discovery process and hold the promise of computationally derived antibodies. PipeBio is a leading bioinformatics platform enabling pharmaceutical companies to develop higher quality antibodies by enabling scientists to hitpick from massive amounts of antibody sequence & assay data themselves. We provide a single integrated platform where scientists can perform a range of analyses in one place. Easy labelling, curation and consistent storage of sequence and assay data allows for the deep analysis of datasets as large as NovaSeq as well as ML-assisted engineering of single sequences and everything in between.

12:30 NGS-Guided Selections Enhanced with Early-Stage Biophysical Screening

M. Frank Erasmus, PhD, Head of Bioinformatics, Specifica, Inc.

We show how NGS-guided selection strategies from in-vitro antibody discovery campaigns combined with early-stage screening can be used to improve lead prioritization using our cloud-native bioinformatics platform, AbXtract™. Our approach utilizes a broad sampling mechanism along with clustering to minimize the impact of population biases (e.g., clonal dominance) to obtain a comprehensive understanding of the underlying antibody population, which we subject to rapid biophysical screening for critical feedback metrics.

12:45 Enjoy Lunch on Your Own

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Best Practices for Using Machine Learning in NGS-Guided Antibody Discovery IN PERSON ONLY

M. Frank Erasmus, PhD, Head, Bioinformatics, Specifica, Inc.

- What questions do you aim to address within a given NGS-guided discovery campaign?
- How does unsupervised or supervised machine learning aid in this NGS-guided discovery effort?
- Is deep learning required for your particular application or do shallow learning approaches/simple heuristics suffice?
- How do you collect/prepare your data to established an accurate ground truth
- How do you validate your ML model?
- What data encoding/reduction methods do you employ?

RULES FOR IMPROVING THERAPEUTIC ANTIBODY DEVELOPABILITY WITH MACHINE LEARNING: Immunogenicity, Humanisation, Design, and Formulation

15:25 Chairperson's Remarks

M. Frank Erasmus, PhD, Head, Bioinformatics, Specifica, Inc.

15:30 KEYNOTE PRESENTATION: Applications of Machine Learning and Informatics in Antibody Discovery

Charlotte M. Deane, PhD, Professor of Structural Bioinformatics, Statistics, University of Oxford

Machine learning has shown its power across all of biology and in this talk, I will describe some of the novel machine learning tools we are pioneering in the area of biotherapeutics from computational humanisation to accurate rapid structure prediction and virtual high throughput screening.

16:00 Automated Optimisation of Antibody Developability Potential

Pietro Sormanni, PhD, Group Leader, Royal Society University Research Fellow, Chemistry of Health, Yusuf Hamied Department of Chemistry, University of Cambridge

The development of biologics with suitable functionality into practically useful molecules is often impeded by developability issues. Conformational stability and solubility are arguably the most important biophysical properties underpinning developability potential, as they determine colloidal stability and aggregation, and correlate with yield and poly-reactivity. I will present a computational pipeline, and corresponding experimental validation, for the automated design of antibody variants with improved stability and solubility.

MACHINE LEARNING TO GUIDE SELECTION OF ANTIBODY REPERTOIRES

16:25 Chairperson's Remarks

Victor Greiff, PhD, Associate Professor, Immunology, University of Oslo

16:30 Deciphering the Language of Antibodies Using Self-Supervised Learning

Jinwoo Leem, PhD, Associate Director, Data Science, Alchemab Therapeutics

An individual's B cell receptor (BCR) repertoire encodes information about past immune responses and potential for disease protection. Deciphering the information in BCR sequence datasets will transform our understanding of disease and enable discovery of novel antibody therapeutics. Here, we present an antibody-specific language model, AntiBERTa; it learns a rich, biologically relevant representation of BCR sequences, and the model is generalizable to a number of applications, such as paratope prediction.

17:00 PANEL DISCUSSION: Discovery in the Age of AlphaFold

Moderator: Enkelejda Miho, PhD, Professor, Dean, University of Applied Sciences and Arts Northwestern Switzerland

Panelists:

Charlotte M. Deane, PhD, Professor of Structural Bioinformatics, Statistics, University of Oxford

Monica L. Fernandez-Quintero, PhD, Postdoc Research Scientist, General Inorganic & Theoretical Chemistry, University of Innsbruck

Norbert Furtmann, PhD, Head, Computational & High-Throughput Protein Engineering, Large Molecule Research, Sanofi

Juan Carlos Mobarec, PhD, Head Computational Structural Biology - Associate Director, Mechanistic and Structural Biology, Discovery Sciences, R&D, AstraZeneca, Cambridge, UK

17:30 Close of Summit

13th Annual

OPTIMISATION & DEVELOPABILITY

Improving Candidate Selection and Lead Optimisation

SUNDAY 13 NOVEMBER

12:00 Registration Open

14:00 Recommended Short Course*
SC1: Developability of Bispecific Antibodies
*Separate registration required. See short courses page for details.

MONDAY 14 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Rubi

TAILORING MOLECULES FOR FAVORABLE DRUG PROPERTIES

8:25 Chairperson's Opening Remarks
Andreas Evers, PhD, Principal Scientist, Computational Chemistry & Biology, Global Research & Development Discovery Technology, Merck Healthcare KGaA

8:30 KEYNOTE PRESENTATION: Tailoring of FcRn-Targeted Molecules for Favorable Binding and Transport Properties
Jan Terje Andersen, Professor, Department of Pharmacology, University of Oslo; Research Group Leader, Department of Immunology, Oslo University Hospital
The half-life of IgG and albumin is roughly 3 weeks on average. This has made IgG the natural choice for design of antibody therapeutics, while albumin is increasingly used as a fusion partner. Remarkably, the half-life of these unrelated proteins is prolonged by a common receptor, FcRn. I will discuss how in-depth insights into FcRn biology guide design of antibody and albumin-based technologies for both invasive and non-invasive delivery.

9:00 Increased Antibody Cross-Reactivity by Dual-Affinity Optimization between SARS-CoV Clades
Traian Sulea, PhD, Principal Research Officer, Human Health Therapeutics Research Centre, National Research Council Canada
We applied structure-based constrained optimizations to affinity-mature VHH-72 for the SARS-CoV-2 spike protein while retaining original affinity for SARS-CoV-1. ADAPT-designed mutants improved spike binding and virus neutralization for circulating SARS-CoV-2 variants relative to the parental VHH72-Fc. Remarkably, designed mutants restored binding to the Omicron variant, which was lost in the parental antibody due to spike-RBD mutations. Dual-affinity optimization against sarbecoviruses from different clades can broaden specificity within a given clade.

9:30 Development Strategy Considerations for New Modalities
Achim Frauenschuh, Associate Director, Science and Technology, Novartis Pharma AG
In order to meet patient-centralized needs, the diversity of protein therapeutics has increased considerably. New formats drive the evolution of the clinical and regulatory landscapes. In this presentation we explore early-phase development strategies, covering both fundamentals (platforms) and specialized considerations (novel formats). Topics include: Established/successful strategies; Drivers and typical challenges for new strategies; Desirable expertise/capabilities; Transforming risk perceptions into innovation opportunities.

10:00 POSTER HIGHLIGHT: Developability Assessment of Early Stage Biotherapeutics – A Production Perspective
Stefan Kaden, PhD, Senior Scientist, Protein Sciences, MorphoSys AG
Developability assessment of biotherapeutics is a powerful risk mitigation tool. We consider assessment of candidate Manufacturability as a part of our Developability process. Manufacturability assessments of potential lead molecules starts with early productions and observations in analytical biophysical assays adding a filter to rate the ideal candidates. Here we give insights into our Manufacturability process and comment on applied methods generating potential lead molecules for clinical development.

10:15 POSTER HIGHLIGHT: The Discovery, Engineering, and Characterisation of a Highly Potent Anti-Human IL-22 Antibody Using a High-Throughput Single B Cell Platform
John-Paul Silva, PhD, Director Antibody Discovery, UCB Pharma
We describe the application of a high-throughput B cell culture screening approach which combines automation and the isolation of single, antigen-specific IgG-secreting cells. Efficient mining of the antibody immune repertoire using this platform enables the identification of rare antibodies with desirable characteristics. Showing how the technology was used in the discovery of a highly potent antibody to human interleukin (IL)-22, a cytokine with multiple functions in inflammatory and tissue responses.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

MACHINE LEARNING APPROACH TO ENGINEERING & OPTIMISATION

11:15 Machine Learning for Multi-Parameter Parallelized Protein Engineering and Accelerated Drug Optimization
Nathan Higginson-Scott, PhD, CTO, Seismic Therapeutic
Machine learning has emerged as a powerful tool for parallelized protein mutation effect prediction. Seismic Therapeutic is shifting how drugs for immunology are discovered and developed by integrating machine learning techniques with structural biology, protein engineering, and translational immunology. We'll discuss how machine learning can be used to optimize for several critical drug properties simultaneously, thereby reducing the number of iterations needed to craft a molecule suitable for the clinic.

11:45 Towards ML-Based Multi-Specific Antibody Optimization
Katrin Reichel, PhD, Senior Data Scientist, Computational & HT Protein Engineering, R&D Biologics Research/ Protein Therapeutics, Sanofi
Next-generation multi-specific antibody therapeutics combine functional activities of several mono-specific antibodies and have emerged as successful treatment options for complex, multifactorial illnesses including cancer and inflammatory diseases. Here we report on combining experimental observations with novel *in silico* approaches to predict correct pairing of light chains with their heavy chain partners to optimize bispecific antibodies in the Y-shaped format.

12:15 Lead Discovery through Optimization: A Case Study in Rapid Antibody Discovery

charles river

13th Annual

OPTIMISATION & DEVELOPABILITY

Improving Candidate Selection and Lead Optimisation

Jean-Philippe Burckert, PhD, Director Bioinformatics, Charles River

Here we present case studies on three targets: CD47, TFR1 and SIRPa. All leveraging the Distributed Bio's antibody discovery platforms : ANTIBODY DISCOVERY: Performance of our new flagship – the Cosmic™ antibody library, ANTIBODY SCREENING: Implementations of rapid, multi-dimensional on- and off-target screening for thousands of antibody candidates and, ANTIBODY OPTIMIZATION: Affinity and specificity tuning through our Tumbler™ multiparameter optimization platform

12:45 Session Break

12:55 LUNCHEON PRESENATION I: Minimizing Lead Optimization with Data-Driven Antibody Discovery

Néstor Vázquez Bernat, PhD, Application Science Team Lead, Application Science, ENPICOM

During this presentation, the speaker will focus on showing the IGX platform, IGX-Annotate and its integration.

13:25 LUNCHEON PRESENTATION II: The Critical Role of Developability in Drug Development

Campbell Bunce, PhD, Chief Scientific Officer, Abzena

Key learnings from this presentation include: what we mean by developability and where it is optimally applied to drug development, the value of a holistic approach to developability and breakdown of the key developability parameters.

13:55 Session Break

ASSESSING DEVELOPABILITY OF NOVEL MOLECULES

14:15 Chairperson's Remarks

Traian Sulea, PhD, Principal Research Officer, Human Health Therapeutics Research Centre, National Research Council Canada

14:20 Developability Profiling in Lead Discovery: Keeping the Funnel Wider for Longer

Emma R. Harding, PhD, Director & Head, Molecular Design & Engineering, GlaxoSmithKline

This presentation covers an overview of GSK Discovery's Biopharm developability capability, which builds throughout the discovery process. This includes the ability to generate large panels of leads in a high-throughput, automated manner, enabling parallel biological and developability screening. The resultant multi-faceted lead selection process also highlights risk areas for downstream CMC and *in vivo* groups, such that de-risking packages can be moved off critical path, accelerating the drug discovery process.

14:50 *In silico* Approaches towards Developability Assessment and Optimization of NBEs

Andreas Evers, PhD, Principal Scientist, Computational Chemistry & Biology, Global Research & Development Discovery Technology, Merck Healthcare KGaA

We have implemented a pipeline for ML model generation and property prediction for antibodies/VHHs to evaluate sequences and 3D models with regard to their diversity and developability properties, such as liabilities, PTMs, immunogenicity risks, PK properties, and compatibilities with formulations. This pipeline does not only allow to select sequences from high-throughput screening approaches but is also utilized for optimization towards the desired overall developability profile.

15:20 Bispecific Antibody-Based Molecules Show Multiple Faces: Developability Challenges and Multi-Dimensional Optimization

Guy J. Georges, PhD, Expert Scientist, Computational Engineering and Data Science, Roche Innovation Center, Munich

1+1 does not equal 2. In this presentation, we will summarize the progress made to assess the developability of our antibody-based future drugs. Biophysical properties are predicted by analyzing sequences, computing parameters on structural models, and performing molecular dynamics. However, while progressing in analyzing single binders, the behavior of bi- or tri-specific formats in different flavors remains challenging. Shape, size, and linkers have their importance.

15:50 Go Beyond Titer and Select Top Producers with Favorable Quality Attributes within 5 days of Cloning

Dagmar Zunner, PhD, Technical Sales Specialist, Berkeley Lights, Inc.

Despite a growing need for earlier information on quality and manufacturability, initial clone screening in mammalian cell line development (CLD) continues to focus on selection for growth and titer. Yet the fastest growing and highest producing clones may not secrete a product with the appropriate quality attributes. Come join us and we will show you how to go beyond titer by selecting manufacturable cell lines as early as possible.

16:20 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:05 Exploring *in silico* Approaches for Antibody Drug Conjugates Developability Assessments

Marc Bailly, PhD, Principal Scientist, MSD

ADCs are complex engineered therapeutics that combine the precision of the antibody with the activity of the payload, thus lowering the risks of exposure of normal tissues to the potent agents. The pace of ADC development is accelerating with the number of investigational agents in human trials growing rapidly. Here we will discuss the developability of ADCs and our approach to speeding up the development of this therapeutic modality.

17:35 POSTER HIGHLIGHT: ON203: A Novel Bioengineered Anti-oxMIF Antibody with Improved Biophysicochemical Properties and Antitumorigenic Activity

Gregor Rossmueller, Graduate Student, OncoOne R&D GmbH

ON203 is an antibody targeting the oxidized form of macrophage migration inhibitory factor (oxMIF). ON203 is the result of an extensive screening process of mutations in the VH and VL domains of imalumab to improve physicochemical properties such as surface-hydrophobicity and aggregation propensity, while maintaining affinity & specificity. The *in vitro* efficacy and safety were shown by enhanced ADCC and reduced non-specific cytokine release. This translated into improved tumor suppression *in vivo*.

18:05 Welcome Reception in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

19:05 Close of Optimisation & Developability Conference

6th Annual

EMERGING TARGETS AND THERAPEUTIC APPROACHES

Exploring Unconventional Approaches for Clinical Success in Oncology and Beyond

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Rubi

ENGINEERED CANCER IMMUNOTHERAPY

8:25 Chairpersons' Opening Remarks
Daniel Chen, MD, PhD, Founder, Engenuity Life Sciences
Pablo Umaña, PhD, Head Oncology Discovery, Roche

8:30 KEYNOTE PRESENTATION: The End of One Era and the Beginning of a New One: The State of Cancer Immunotherapy and Opportunities for Next-Generation Engineered Therapeutics
Daniel Chen, MD, PhD, Founder, Engenuity Life Sciences
The emergence of cancer immunotherapy has led to life-altering benefits for some patients with otherwise terminal cancer. However, immunotherapies beyond checkpoint inhibitors that block the PD-L1/PD-1 pathway and CAR T for lymphoma and leukemia have not resulted in similar benefits. Approaches for immunotherapy include combinations, application in earlier diseases, biomarker directed patient selection, and opportunities for next-generation engineered therapeutics.

9:00 Engineering Soluble TCRs into T Cell Engager Bispecifics for Solid Tumors
Annelise Vuidepot, PhD, CTO, Immunocore
A T cell clone that recognises the most common KRAS mutation, KRASG12D, presented as a peptide by HLA-A11, was isolated from PBMCs. The affinity of the TCR was enhanced a million-fold and demonstrated remarkable ability to distinguish between KRASG12D and KRASWT peptides. ImmTAC molecules were generated; the binding selectivity translated into biological specificity, redirecting T cell cytotoxicity towards KRASG12D presenting colon cancer cells while sparing normal colon epithelial cells.

9:30 Nanobody®-Based T Cell Engagers
Paolo Meoni, PhD, Distinguished Scientist & Project Head, Sanofi
TCEs are multi-specific molecules typically binding the CD3/TCR complex and a specific tumor membrane antigen, triggering (MHC)-independent cancer cell elimination. NANOBODY molecules are engineered proteins derived from "heavy chain" antibodies that can be connected like beads on a string creating highly developable new multi-valent and multi-specific compounds. An example of a NANOBODY-based TCE will be presented.

10:00 SC134-TCB, a FucosylGM1 Glycolipid-Targeting T Cell Redirecting Bispecific Antibody for SCLC Treatment
Foram Dave, PhD, Scientist, Scancell
Fucosyl-GM1 is a glycosphingolipid that is highly expressed in 75-90% of SCLC tumours. We have generated a high affinity monoclonal antibody SC134, against fucosylGM1 and used it as a scaffold for a T cell redirecting bispecific antibody (TCB). SC134-TCB simultaneously binds to fucosylGM1 and CD3. The functional characterisation of the SC134-TCBs will be presented including their binding characteristics, impact on T cell activation, cytokine production and SCLC killing.

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

ENGINEERED CANCER IMMUNOTHERAPY

12:15 Enhancing Endogenous and Synthetic Immunity with Engineered Antibody-Fusion Proteins for Cancer Immunotherapy
Pablo Umaña, PhD, Head Oncology Discovery, Roche
This talk will cover both a PD-1-cis-targeted IL-2 variant used to differentiate antigen-specific, stem-like T cells into better effectors and the combination of tumor-targeted costimulatory receptor agonists with T cell engaging bispecific antibodies as an off-the-shelf approach for enhanced T cell redirection. Both of these approaches are currently being tested in first-in-class clinical trials.

12:45 Genetic Immunization and Single Cell Screening – Advanced Tools for Antibody Discovery
Andreas Weise, Senior Account Manager, Genovac

Successful antibody discovery against challenging targets requires robust immunization and advanced screening technologies. Genovac has 20+ years of genetic immunization experience, successfully completing over 3,500 projects. In this session, Dr. Andreas Weise will cover:
• Defining characteristics and strategies for challenging targets
• Overview of various antigens and immunization approaches
• Advantages of genetic immunization
• Case studies showing the power of genetic immunization

13:15 Session Break

13:20 LUNCHEON PRESENTATION I: Pioneer – an Optimized Synthetic Human Antibody Library for Rapid Selection of Therapeutic Leads

BIO-RAD

Mateusz Putyrski, PhD, Senior Scientist, New Technologies, Bio-Rad AbD Serotec GmbH

The Pioneer Antibody Library stems from our deep and long-standing expertise in Fab phage display – extensive optimization of the displayed sequences has resulted in an exceptional library for the generation of therapeutic lead candidates. With over 2x10^11 unique antibodies, Pioneer is one of the largest phage display Fab libraries ever made. Pioneer takes advantage of SpyDisplay - a novel selection system with unique features. In this talk, we will introduce the Pioneer library and the SpyDisplay selection system and will show data on selection and characterization of antibodies against therapeutically relevant targets, thus demonstrating the potential of Pioneer in combination with SpyDisplay for generating human antibodies for therapeutic development.

13:50 LUNCHEON CO-PRESENTATION II: Building a Central Source of Truth to Accelerate Next-Generation Biologics

Benchling

Harry Dobson, Senior Software Engineer, Alchemab Therapeutics

Tatiana Gubser, Implementation Manager, Benchling

Alchemab is pioneering novel approaches to antibody engineering that include identification of naturally occurring protective antibodies, followed by development and optimization of potent therapeutic candidates that replicate the protective effect. Given the high data complexity across this R&D spectrum, establishing robust and scalable data models was an essential component to these initiatives. In this session, you'll hear how Alchemab established a scalable informatics platform to support their rapidly growing biologics programs.

14:20 Session Break

14:30 Chairperson's Remarks

Daniel Chen, MD, PhD, Founder, Engenuity Life Sciences

Pablo Umaña, PhD, Head Oncology Discovery, Roche

14:35 Including Neutrophils in Anti-Cancer Therapy: Targeting the IgA Fc Receptor Is the Way Forward

Marjolein van Egmond, PhD, Professor, Oncology and Inflammation, Amsterdam UMC

Antibody-based immunotherapy is a promising strategy in cancer treatment. IgG eliminates tumor cells through NK cell-mediated ADCC and macrophage-mediated antibody-dependent phagocytosis. Neutrophils have been largely overlooked as potential effector cells because IgG ineffectively recruits neutrophils. By contrast, IgA potently activates neutrophils and induces migration through FcaRI. IgA has poorer half-life and does not activate NK cells. Bispecific antibodies targeting FcaRI combine the best of both worlds and will be discussed.

15:05 PANEL DISCUSSION: Re-Engineering Cancer Immunotherapy: Where Are We Going and How Can We Get There?

Moderator: Daniel Chen, MD, PhD, Founder, Engenuity Life Sciences

• What have we learned from the clinic about why cancer immunotherapy doesn't work better in some patients?
• How can engineered therapeutics optimize outcomes for patients by addressing these challenges?
• What technologies are most likely to be effective in addressing these challenges?
• How can we better develop these therapies in the clinic?

Panelists:

Annelise Vuidepot, PhD, CTO, Immunocore

Paolo Meoni, PhD, Distinguished Scientist & Project Head, Sanofi

Pablo Umaña, PhD, Head Oncology Discovery, Roche

Marjolein van Egmond, PhD, Professor, Oncology and Inflammation, Amsterdam UMC

15:35 Accelerating Immunotherapeutic Drug Development Through Advanced Protein Production and Antibody Development Platforms

Sino Biological

Ali Abdul-Gader, PhD, Technical Specialist, Sino Biological Europe

Sino Biological is a global leading supplier specializing in recombinant protein production and antibody development. We offer proprietary target reagents for biomarkers, immune checkpoint, CAR-T cell, and cancer immunotherapy drug development. Sino Biological has established extensive recombinant protein expression and antibody discovery platforms for customized projects. We will introduce the CRO services landscape at Sino Biological focussing on strategies in protein production and high-quality antibody development for challenging immunotherapeutic research.

15:50 Target-Agnostic Antibody Discovery: Antigen and Epitope Identification of Patient-Derived Glycan and EphA2 binders

Philippe Marguet, PhD, Associate Director, Target Biochemistry, Atreca

The discovery of appropriate targets and epitopes remains a bottleneck to developing antibody-based therapeutics, such as bispecific cell engagers and ADCs. Atreca's Immune Repertoire Capture® (IRC™) platform identifies tumor-selective antibodies directly from patients experiencing active immune responses. Target- and epitope- identification for Fvs emerging from Atreca's target-agnostic approach will be presented. In particular EphA2 and glycan binders, and the yeast-display and CRISPR tools applied in these cases, will be highlighted.

16:05 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

INFECTIOUS DISEASES AND PULMONARY FIBROSIS

16:55 Chairperson's Remarks

Michael Hust, PhD, Professor & Research Group Leader, Biotechnology, Technische Universität Braunschweig

17:00 Fighting Infectious Diseases and Toxins with Recombinant Antibodies

Michael Hust, PhD, Professor & Research Group Leader, Biotechnology, Technische Universität Braunschweig

We have developed human and human-like antibodies against several infectious diseases and toxins (e.g. diphtheria toxin, botulinum toxins, VEEV, WEEV, Marburg virus, Ebola virus). In the last few years, we have focused our antibody and biomarker development on infectious diseases and have developed a unique repertoire of neutralizing and protective human antibodies using our phage display development pipeline. In this presentation several examples from our infectious diseases pipeline will be presented.

17:30 PRS-220: An Inhaled Anticalin Protein Targeting CTGF for the Treatment of Pulmonary Fibrosis in the Lung

Marina Pavlidou, PhD, Director and Project Leader, Pieris Pharmaceuticals

Anticalin proteins are a novel class of biotherapeutics which are particularly well-suited for delivery via inhalation. Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive, and ultimately fatal lung disease lacking well-tolerated and effective therapies. We will describe the preclinical development of the inhaled Anticalin protein PRS-220 that targets connective tissue growth factor (CTGF), a driver of fibrotic lung remodeling, as a novel and promising inhaled therapy for IPF.

IDENTIFYING AND VALIDATING NEW TARGETS IN ONCOLOGY

18:00 Identifying and Validating Novel Oncology ADC Targets

Mark J. Austin, PhD, Team Leader, Display Technology, CRUK AstraZeneca Antibody Alliance Laboratory (AAL)

The CRUK AstraZeneca Antibody Alliance collaborates with the oncology academic community to discover novel medicines for cancer patients. Here we will describe how we find and validate novel ADC targets for cancer. The presentation will walk through the discovery of putative targets by AI collaborations and move on to discuss the key experiments required to build enough confidence to deliver an ADC therapeutic campaign.

18:30 Discovery and Characterisation of the CD96 Antibody GSK6097608, a High-Affinity, Antagonistic Anti-CD96 Antibody for Cancer Immunotherapy

Sarah Stuart, PhD, Team Leader, Biopharm Discovery, GlaxoSmithKline

This talk will describe the discovery and biological characterization of GSK6097608 which targets the inhibitory immune receptor CD96. We used the yeast-based Adimab platform for rapid discovery and subsequent selection of higher affinity variants. GSK6097608 can block CD155 binding and compete off bound CD155 from CD96. We demonstrated that wild-type Fc is required for its activity and showed Fc-dependent potentiation of both primary human T and NK cells.

19:00 Close of Emerging Targets and Therapeutic Approaches Conference

Inaugural

ANTIBODIES AGAINST MEMBRANE PROTEIN TARGETS

Therapeutic Antibodies for GPCR and Ion Channel Targets

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC5: Machine Learning Tools for Protein Engineering
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Rubi

SELECTION & SCREENING

8:25 Chairperson's Remarks
Erik Vernet, PhD, Director, Antibody Technology, Novo Nordisk

8:30 New Advances in Exploiting Nanobodies for Drug Discovery on Membrane Protein Targets
Jan Steyaert, PhD, Francqui Research Professor, Vrije Universiteit Brussel (VUB); Director, VIB-VUB Center for Structural Biology, VIB
The Steyaert lab pioneered the use of nanobodies in X-ray crystallography, aiming at the highest-hanging fruits of structural biology including membrane proteins, amyloidogenic proteins, and now also (transient) multiprotein complexes. Recent work focuses on exploiting nanobodies for drug discovery on difficult targets like GPCRs and on the engineering of nanobodies to be used in single-particle cryo-EM and OMICs applications.

9:00 Discovery of Therapeutic Antibodies that Target Specific GPCRs Using a Novel Discovery Platform
Peter McNamara, PhD, Senior Vice President, Head of Research, Tectonic Therapeutics
Tectonic Therapeutic is a preclinical stage biotechnology company transforming the discovery of novel GPCR-targeted therapies. Our GEODe platform is a suite of discovery tools comprising biochemistry techniques, protocols that enable presentation of GPCR antigens in the correct conformation to enable successful discovery campaigns using yeast-display antibody libraries. Our antigen engineering approaches boost receptor, bias receptor conformation to facilitate agonist/antagonist selections and improve receptor thermostability for selection condition compatibility.

9:30 Solutions for Accelerating Biotherapeutic Discovery SARTORIUS
Eduardo Flamini, Technical Sales Specialist, Sales BioAnalytics SE, Sartorius Spain S.A.
Biotherapeutics are part of growing modern medicine and are used to treat a wide range of diseases including cancer, diabetes, arthritis and more. Sartorius technologies are providing rapid, multifactorial results that enable insights and ensure the acceleration and the quality of biopharmaceutical products in development and production.This presentation will highlight our solutions covering molecule and cell-line development workflows, from screening, high-throughput single-cell cloning and picking, to functional characterization of leads.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

10:45 Discovery of Antibodies against a Complex Target
Trevor Wattam, PhD, Scientific Leader, Antibody Discovery, GlaxoSmithKline
Membrane proteins are still the greatest challenge when it comes to antibody generation against these complex targets. Whilst there are numerous options for immunisation and screening, there is no one method that is guaranteed for every target and thus multiple strategies have to be used. Here I present some examples of antibody discovery against challenging targets (GPCRs , Ion channels) done at Glaxosmithkline.

11:15 Sensitizing Insulin Signaling through Antibody Discovery
Erik Vernet, PhD, Director, Antibody Technology, Novo Nordisk
Even well-characterized cell surface receptors can pose challenges in selective targeting and efficient disease modulation and at the same time offer opportunities for innovation. In this talk, I will present antibody discovery at Novo Nordisk and give a case story of how we have generated antibodies targeting a receptor-ligand complex for the treatment of type 2 diabetes.

11:45 KEYNOTE PRESENTATION: Nanobodies Modulating Human and Viral Chemokine Receptor Function
Martine Smit, PhD, Professor Target and Systems Biochemistry, Vrije Universiteit Amsterdam
Nanobodies are attractive tools in detecting, stabilizing, modulating, and therapeutically targeting G protein-coupled receptors (GPCRs). Their size and molecular structure allow extracellular and intracellular modulation of GPCR function. Besides modulating GPCR activity as monovalent or multivalent constructs, nanobodies can also be functionalized for imaging and therapy. Examples of nanobodies targeting human and viral chemokine receptors will be provided.

12:15 Single Cell Microfluidic Trapping Enables the Quantification of Binding Kinetics on Membrane Protein Targets *in situ* dynamic BIOSENSORS
Nena Matscheko, PhD, Team Lead R&D Cells & Antibodies, R&D Team, Dynamic Biosensors GmbH
Real-Time Interaction Cytometry (RT-IC) enables kinetic studies of membrane protein targets in a native cellular environment. The automated workflow immobilizes single suspension or adherent cells in a microfluidic chip. Predictive time-resolved association and dissociation rates of analytes, ranging from small molecules to biologics (mAbs, BiTE, nanobodies, etc.), enable the engineering of on- and off-target affinity and avidity of drugs.

12:30 ConfoBodies from Non-Immune Repertoires to Accelerate GPCR Drug Discovery
Toon Laeremans, PhD, Co-Founder & Head, Discovery Biologics, Confo Therapeutics
ConfoBodies stabilize disease-relevant pharmacological states of GPCRs. Such tools are used for *in vitro* screening immediately triaging for compounds with the pharmacology of interest and to enable structure-guided drug discovery. Without the need for affinity maturation, active state stabilizing ConfoBodies from large non-immune repertoires have been identified that enable screening and structural biology.

12:45 Session Break

12:50 LUNCHEON PRESENTATION I: Simultaneous Quantification of Absolute Concentration and Affinities of Membrane Protein Targets without Purification Fluidic Analytics

Inaugural

ANTIBODIES AGAINST MEMBRANE PROTEIN TARGETS

Therapeutic Antibodies for GPCR and Ion Channel Targets

Sebastian Fiedler, PhD, Lead Application Scientist, Lifesciences and Services, Applications, Fluidic Analytics

We introduce a membrane protein affinity and concentration assay for working with unpurified membrane proteins in a native lipid-bilayer environment. To demonstrate our approach, we determined both the concentration of endogenous HER2 from a breast cancer cell line and its affinity to trastuzumab, a therapeutic antibody. The method only takes a few hours to complete and has the potential to be expanded from cell lines to tissues and tumor biopsies.

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Technologies to Discover Functional Antibodies Targeting GPCRs IN PERSON ONLY

Peter McNamara, PhD, Senior Vice President, Head of Research, Tectonic Therapeutics

BIOTHERAPEUTICS FOR GPCR AND ION CHANNEL TARGETS

15:25 Chairperson's Remarks

Robin Loeving, PhD, CSO, Salipro Biotech AB

15:30 Tuning the P2X7 Ion Channel with Functional Nanobodies

Friedrich Koch-Nolte, PhD, Professor, Immunology & Molecular Biology, Institute of Immunology, University Medical Center Hamburg-Eppendorf

The P2X7 ion channel is a key sensor of ATP released from stressed cells. Blocking ATP-mediated gating of P2X7 ameliorates disease in animal models of sterile inflammation. We have generated nanobodies that antagonize or potentiate gating of P2X7 with high specificity and efficacy. We engineer these robust single variable immunoglobulin domains to target specific immune cells in different tissues and to tune the duration of P2X7 antagonism *in vivo*.

16:00 Pipeline Update for Antibody-Based Therapeutics against GPCR, Ion Channel, and Transporter Targets

Catherine Hutchings, PhD, Independent Consultant

Multi-pass transmembrane proteins represent some of the most important drug target classes across a wide range of therapeutic areas. An update on antibody-based therapeutics in the GPCR, ion channel, and transporter pipeline will be provided outlining the breadth and diversity of the target landscape, progress in preclinical and clinical development, including next-generation modalities.

16:30 Overcoming Challenges in Developing Full-Length Multi-Pass Transmembrane Proteins

Ren Wenlin, Deputy Director, Product Development, ACROBiosystems

Full-length, biologically active, multi-pass transmembrane proteins (TPs) are one of the most challenging types of proteins to develop due to its innately complex structure and assortment of hydrophobic and hydrophilic regions. Furthermore, difficulties such as low-expression levels contribute to complications in purification and solubility. However, in recent years, multi-pass transmembrane proteins have been highlighted as a major therapeutic target in developing immunotherapies. The role of TPs as a molecular gatekeeper, selectively transporting molecules and receiving external messages, plays a critical function in regulating cell metabolism, cellular activity, and cellular fate. This is further evidenced by more than 50% of pharmaceuticals targeting multi-pass TPs, including CD20, G Protein-coupled receptors (GPCRs), ion channels, and others. To overcome the challenges in developing high-quality and bioactive multi-pass TPs, we needed to re-design our entire development system and optimize the expression level, system, and culture conditions. Furthermore, ACROBiosystems also specially built a comprehensive platform solution for the R&D and production of multi-pass transmembrane proteins, including VLP technology platform, detergent micelle technology platform and Nanodisc technology platform. As a result, a series of full-length multi-pass transmembrane proteins was successfully developed with native conformation and high bioactivity based on our platforms.

17:00 Structure of the Oligomeric CXCR4-CXCL12 Complex for Drug Discovery

Robin Loeving, PhD, CSO, Salipro Biotech AB

GPCRs and Ion Channels are important drug targets yet are notoriously difficult to work with. We'll present the direct extraction of GPCRs from crude cells as well as case studies on our latest developments, including CXCR4 oligomers that can be reconstituted into Salipro-CXCR4 nanoparticles, enabling new possibilities for development of therapeutic antibodies, including phage display, immunisation, B-cell sorting and antibody characterisation with SPR and high-resolution cryoEM.

17:30 Agonist Anti-ChemR23 Antibody for Inflammatory Diseases

Nicolas Poirier, PhD, CSO, OSE Immunotherapeutics

Resolution of inflammation is elicited by proresolving lipids activating GPCRs. ChemR23 is overexpressed in inflamed colon tissues of severe IBD patients unresponsive to anti-TNF or integrins therapies and associated with mucosal neutrophil accumulation. We generated an anti-ChemR23 mAb for Resolvin E1-like activity capable to repolarize human Macrophages and limits Neutrophil-mediated inflammation and NETosis. This mAb triggered resolution in ongoing chronic colitis models with significant decrease in tissue fibrosis.

18:00 Preserving Native Interactions of Membrane Proteins for Antibody Generation

Timothy R. Dafforn, PhD, Professor, Biotechnology, University of Birmingham

18:30 Close of Summit

Training SEMINARS
By Cambridge Healthtech Institute

INTRODUCTION TO BISPECIFIC ANTIBODIES:

History, Engineering, and Application

Instructor: G. Jonah Rainey, PhD, Vice President, Antibody Engineering, AlivaMab Discovery Services

Introduction to Bispecific Antibodies will be organized as an informative and practical guide to get up to speed on critical aspects of bispecific antibody therapeutics. Topics will include historical successes, failures, and lessons learned. Specific practical instruction will span mechanisms of action, engineering, developability, regulatory considerations, and translational guidelines. Perspectives on ideal implementation of bispecifics as targeted and immunomodulatory approaches will be discussed.

This Training Seminar Will Be In-Person Only

Topics to be Covered:

- A brief history of bispecific antibodies: 60 years of progress with critical advances and key pioneers
- Bispecific applications and powerful mechanisms of action
- Engineering bispecific antibodies: 100 formats and counting
- Bispecific-specific considerations in preclinical development and regulatory landscape
- Developability, manufacturing, and analytical considerations
- Clinical experience, translation, and regulatory approval
- Current trends and future opportunities in regulating immune checkpoints, cell-based therapies, and personalized approaches

Jonah Rainey holds a PhD in Biochemistry from Tufts University and completed postdoctoral training at the University of Wisconsin and the Salk Institute. He has engaged in discovery, research, and development of bispecific antibodies for more than 15 years. He is an inventor on several patents describing novel bispecific platforms and current clinical candidates that exploit these platforms. Jonah contributed to research and early development of multiple clinical candidates in Phase 1 and 2 and led many advanced preclinical programs in oncology, infectious disease, autoimmunity, and other therapeutic areas. Previous industry experience includes MacroGenics, MedImmune/AZ, Oriole Biotech, and Gritstone Oncology.

MEDIA PARTNERS

Sponsoring Societies

ANTIBODY SOCIETY

Lead Sponsoring Publications

Bio·IT World | GEN Genetic Engineering & Biotechnology News | INSIGHT PHARMA REPORTS | Science AAAS | The Scientist EXPLORING LIFE, INSPIRING INNOVATION

Sponsoring Publications

1st Oncology | American Pharmaceutical Review | Antibody Therapeutics | Drug Target Review | Cell Culture Dish | Downstream Column | CAS 华人抗体协会 | Pharmaceutical Outsourcing | SelectScience

Lead Media Partners:

Biocompare | labcompare

Media Sponsor

NEWS MEDICAL LIFE SCIENCES

14th Annual

ADVANCING BISPECIFICS AND COMBINATION THERAPY TO THE CLINIC Novel and Synergistic Combinations

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC1: Developability of Bispecific Antibodies
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Rossini 1+2

TARGETING THE TME BEYOND T CELLS

8:25 Chairperson's Remarks
Jeanette H.W. Leusen, PhD, Associate Professor, Translational Immunology, Utrecht University

8:30 Implementing "Activity-on-Demand" Strategies with Bispecifics and Antibody-Cytokine Fusion Proteins
Dario Neri, PhD, CEO and CSO, Philogen
Bifunctional antibody products (e.g., bispecific antibodies, antibody-cytokine fusions) can be potently active for the therapy of cancer and other types of diseases, but their use may be associated with certain side effects. In this lecture, I will present experimental strategies for achieving "activity-on-demand", helping spare normal tissues from undesired toxicity

9:00 Manipulating the Innate-Adaptive Immune Interface with CD27 Stimulation for Effective Anti-Cancer Therapy
Sean H. Lim, MBChB PhD, Associate Professor & Honorary Consultant in Haematological Oncology, Centre for Cancer Immunology, University of Southampton
The translation of immunostimulatory antibodies into clinically effective therapies lags behind that of checkpoint inhibitors and direct targeting monoclonal antibodies. This talk will focus on the reasons for this, and how might immunostimulatory antibodies be developed into more effective anti-cancer drugs, using the TNFRSF CD27, as an example.

9:30 Activating and Killing by PMN-MDSC with Tumor-Targeted IgA Antibodies
Jeanette H.W. Leusen, PhD, Associate Professor, Translational Immunology, Utrecht University
At present, all antibody therapeutics are based on IgG antibodies. However, IgA has great potential to stimulate neutrophils to kill tumor cells. We have investigated whether IgA can also be used to activate the myeloid-derived suppressor cells (MDSC) to kill cancer cells. Both *in vivo* and human data will be presented.

10:00 Meet and Greet

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

12:15 Bispecific Antibodies Increase the Therapeutic Window of CD40 Agonists through Selective Dendritic Cell Targeting
Rony Dahan, PhD, Principal Investigator, Immunology, Weizmann Institute of Science
I'll describe our approach of cell-selective bispecific agonistic antibodies as a drug platform to bypass the dose-limiting toxicities of agonistic antibodies used for cancer immunotherapy. We designed bispecific antibodies that target CD40 activation preferentially to dendritic cells, the cells leading to antitumor activity but not toxicity by these agonists. These bispecific reagents demonstrate a superior safety profile compared to their parental CD40 monospecific antibody while triggering potent antitumor activity.

12:45 CMC Strategy to take Bispecifics from DNA to IND in 13 Months Lonza
Stuart Jamieson, Director, Global Technical & CMC, Downstream Development, Lonza
Lonza has applied 35 years' of CMC experience in Biologics development to deliver a 13 month end-to-end DNA to IND strategy for bispecific molecules. Case studies highlighting key approaches and technologies for vector, process, analytical and formulation development, which enable acceleration of bispecific antibody pre-clinical development, will be presented.

13:15 Session Break

13:20 LUNCHEON PRESENATION I: Building Next-Gen Biologics Leveraging Industry-Leading Technology Platforms with Nona Biosciences NONA BIOSCIENCES
Frank Grosveld, PhD, CSO, Harbour BioMed Rotterdam, Harbour BioMed
Nona Biosciences is a newly established independent subsidiary company of Harbour BioMed. Nona is committed to providing a total solution to therapeutic antibody discovery, engineering, and development for academics, biotech startups and biopharma giants from Idea to IND. The core platform is our proprietary transgenic Harbour Mice® H2L2 and HCAb fully human antibody technologies that have been well validated

by 50 industry and academic partners with over 200 projects.

13:50 LUNCHEON PRESENTATION II: Innovative Bispecific Therapeutic Antibody Discovery with the Relite™ Fully Human Common Light Chain Antibody Platform

BIOCYTOGEN

W. Frank An, PhD, Senior Director of Antibody Therapeutics, Biocytogen Pharmaceuticals (Beijing) co. ltd

Bispecific antibodies are increasingly employed as a versatile, off-the-shelf approach in therapeutic antibody discovery. Biocytogen, a clinical-stage biotech company, features the world-leading transgenic RenLite™ mice that produce high-quality fully human common light chain antibodies that greatly expedite bispecific antibody construction. This presentation introduces Biocytogen's bispecific antibody discovery platform, highlighting recent innovative applications including bispecific checkpoint inhibitors and bispecific antibody drug conjugates (ADCs).

14:20 Session Break

MULTI-SPECIFIC ANTIBODIES FOR ONCOLOGY AND INFECTIOUS DISEASE

14:30 Chairperson's Remarks

Pieter Fokko van Loo, PhD, Senior Director, Oncology – Immunology, Merus NV

14:35 Antibody Engineering Towards HIV Cure

Marit van Gils, PhD, Associate Professor, Department of Medical Microbiology & Infection Prevention, Amsterdam University Medical Centers

Since the discovery of HIV-1 as the causative agent of AIDS, no vaccines or therapeutics for a total cure are available to date. Recently, there is a growing interest in potentiating antibody effector functions to pursue HIV-1 cure. We use four approaches of antibody engineering; bi and trispecific antibodies, Fc-modifications to increase antibody effector functions, antibody-drug conjugation, and engager antibodies, to complete the ultimate goal of curing HIV infection.

15:05 Trispecific T Cell Engagers for Solid Cancers

Pieter Fokko van Loo, PhD, Senior Director, Oncology – Immunology, Merus NV

The wide expression of tumor-associated antigens (TAA) on solid tumors as well as on normal tissue limits the therapeutic window of T cell engagers for solid tumors. A new solid tumor selectivity can be created by targeting two tumor targets (TAA1xTAA2) simultaneously that are only co-expressed on solid tumors and not on normal tissue. Trispecific TAA1xTAA2xCD3 Triclonics provide therapeutic opportunities for T cell engagers in solid tumors.

15:35 A Platform for Tuning Therapeutic Efficacy of T-Cell-Engaging Bispecific Antibodies

ABLEXIS | AlivaMab

Jane Seagal, PhD, VP of Antibody Discovery, AlivaMab Discovery Services

T-cell activation requires appropriate strength of stimulation and costimulation. Blocking coinhibitory pathways prevents T-cell exhaustion and escape. Here, we present diverse panels of lead-quality antibodies ready for reformatting into advanced modalities for the development of finely tuned multi-drug approaches against a variety of tumor targets. We demonstrate that in bispecific contexts these antibodies are biologically active and have favorable biophysical properties.

16:05 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:00 Phase I Study of AMG 509, a STEAP1 x CD3 T Cell-Recruiting XmAb 2+1 Immune Therapy, in Patients with Metastatic Castration-Resistant Prostate Cancer (mCRPC)

Daniel C. Danila, MD, Medical Oncologist, Memorial Sloan Kettering Cancer Center

Six-transmembrane epithelial antigen of prostate 1 (STEAP1) is overexpressed on prostate cancer cells with low or no expression on normal tissue. AMG 509 is a bispecific XmAb 2+1 T cell engager that simultaneously binds to STEAP1 on tumor cells and the CD3 complex on T cells resulting in T cell-mediated lysis of STEAP1-expressing cells. AMG 509 demonstrated significant antitumor activity in preclinical prostate cancer models.

TUMOR SPECIFIC CD28 CO-STIMULATION APPROACHES (DELIVERING SIGNAL 2)

17:25 Chairperson's Remarks

Nicolas Fischer, PhD, CEO, Light Chain Bioscience

17:30 Costimulatory CD28 Bispecific Antibodies for Tumor-Targeted T Cell Activation

Sara Majocchi, PhD, Therapeutic Program Leader, Light Chain Bioscience

Tumor-targeted CD28 bispecific antibodies (bsAbs) are designed to co-stimulate T cells specifically within the tumor microenvironment. By bridging T cells to malignant cells expressing a selected tumor-associated antigen (TAA), CD28 bsAbs deliver Signal 2 to T cells, unleashing their full cytotoxic potential. Using our κλ body antibody platform, an array of TAA-CD28 κλ bodies was generated and their capacity to provide Signal 2 was assessed *in vitro* and *in vivo*.

18:00 CD19-Targeted Affinity-Reduced CD28-Bispecific Antibody Enhances and Prolongs Anti-Tumor Activity of Glofitamab

Johannes Sam, PhD, Principal Scientist & Group Leader, Roche Innovation Center Zurich

A new CD19-CD28 bispecific antibody for the combination with Glofitamab (CD20-TCB) will be introduced. Costimulation via CD19-CD28 enhances Glofitamab-induced T cell activation and deepens and prolongs the anti-tumor efficacy. The IND-enabling preclinical data package will be summarized.

18:30 Harnessing T Cell Costimulation in Solid Tumors with Targeted CD28 Bispecific Antibodies

David E. Szymkowski, PhD, Vice President Preclinical Operations, Xencor, Inc.

T cells require both TCR/MHC ("Signal 1") and CD28 costimulatory receptor ("Signal 2") engagement for maximal activation. Tumors often lack CD28 ligand expression; therefore, to restore costimulation in the TME, we designed TAA×CD28 bispecifics that provide Signal 2 only in the presence of tumor antigen. Such novel targeted Signal 2 T cell engagers may enhance clinical responses to both anti-PD(L)1 antibodies and classical targeted Signal 1 (CD3) T cell engagers.

ADVANCES IN BISPECIFIC AND TRISPECIFIC ANTIBODIES AGAINST CANCERS

19:00 SIRPa-Fc-CD40L Engagement with CD40 Enhances Type I Interferon Responses Downstream of CD47 Blockade to Bridge Innate and Adaptive Immunity

George J. Fromm Jr., PhD, Vice President, R&D, Shattuck Labs, Inc.

CD47/SIRPa blockade enhances macrophage-mediated phagocytosis of tumor cells that are dying or have been tagged with an ADCP-competent antibody, however, this event does not enhance anti-tumor immunity in the absence of antigen presentation to CD8+ T cells. SIRPa-Fc-CD40L (SL-172154) links these two mechanisms via a type I interferon response and has shown profound activity in both mouse and non-human primate studies.

19:30 Close of Advancing Bispecific Antibodies Conference

13th Annual

ENGINEERING BISPECIFIC ANTIBODIES

Designing New Antibody Therapies

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC1: Developability of Bispecific Antibodies
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Rossini 1+2

EXPLORATORY FORMATS AND PRO-DRUG APPROACHES

8:25 Chairperson's Remarks
Stefan Zielonka, PhD, Director, Protein Engineering & Antibody Technologies Discovery Technologies, Global Research and Development, Merck KGaA

8:30 KEYNOTE PRESENTATION: Ten Years in the Making – Therapeutic Applications of CrossMab Technology
Christian Klein, PhD, Head of Oncology Programs, and Department Head, Cancer Immunotherapy Discovery, Roche Innovation Center Zurich, Roche Pharma Research & Early Development, pRED
With more than 20 CrossMab-based antibodies entering clinical trials and the recent FDA approval of faricimab (VABYSMO) CrossMab technology has evolved during the past decade into one of the most mature, versatile, and broadly applied technologies for the generation of BsAbs. An overview of CrossMab technology and its therapeutic applications will be provided.

9:00 Trispecific Antibodies Produced from mAb2 Pairs by Controlled Fab-Arm Exchange
Gordana Wozniak-Knopp, PhD, Senior Scientist, Molecular Biology, University of Natural Resources and Life Sciences Vienna
Bispecific antibodies and antibody fragments are one of the most rapidly progressing classes of antibody-based therapeutics. Their differentiating functionalities could profit from a third antigen specificity. We have employed symmetrical bispecific parental antibodies of mAb2 format, which features a novel antigen-binding site in the CH3 domains, and engineered them by controlled Fab-arm exchange into biologically active trispecific well-expressing molecules with good biophysical characteristics.

9:30 Mastering Immunogenicity in Biologics Development
Jeremy Fry, PhD, Director, ProImmune Ltd.
Mitigating immunogenicity risk is a crucial step in drug development. In this talk I will use a series of case studies to demonstrate ProImmune's expertise with adaptive and innate immunogenicity and epitope identification, covering the range of solutions ProImmune provides. These include DC-T/T cell proliferation assays for lead selection/optimization, MAPPS assays for characterization of antigen presentation; HLA-peptide binding assays to characterize individual epitopes & undiluted whole blood cytokine storm assays.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

10:45 KEYNOTE PRESENTATION: Trispecific Antibodies – Taking the Concept of Multi-Targeting One Step Further
Ercole Rao, PhD, Group Leader Biologics Research, Engineered Protein Therapeutics, Sanofi Germany GmbH
Despite the success of bispecific antibodies in the past decade, antibody engineers try to add even more functionality to the ever-growing multi-specific antibody toolbox. Novel trispecific antibodies, like trispecific T cell engager, have been developed and are currently evaluated in clinical studies. However, the molecular complexity of such molecules poses significant challenges to their developability. Therefore, Sanofi has developed a high-throughput engineering platform that allows combinatorial screening, addressing multi-parametric design.

11:15 Prodrug-Activating Chain Exchange (PACE) Converts Targeted Prodrug Derivatives to Functional Bi- or Multi-Specific Antibodies
Ulrich Brinkmann, PhD, Expert Scientist, Pharma Research & Early Development, Roche Innovation Center, Munich
Antibody-domain exchange reactions can be applied to generate hybrid antibodies under physiological conditions, thereby enabling prodrug functionalities. T cell bispecific antibodies (TCBs) can be assembled on target cells from two inactive prodrugs. Prodrug-Activating Chain Exchange (PACE) can thereby conditionally activate therapeutics at the target site. Examples will be provided that demonstrate potential applications of PACE as a new approach in conditional immunotherapy.

11:45 Design and Characterization of a Trispecific Antibody Discovery Platform
Nesrine Chakroun, PhD, Senior Scientist, Merus NV
Triple-targeting formats hold great therapeutic promise but translation of concepts into active molecules is challenging both in obtaining differentiated functional activity, as well as meeting stringent developability criteria. We discuss the discovery and characterization of the components and final candidates of a trispecific antibody format referred to as Triclonics that permits high-throughput in-format repertoire screening to result in active molecules that harness the developability characteristics of regular human monoclonal antibodies.

12:15 Discovery of Diverse Antibody Panels Using AlivaMab® Mouse: The Foundation for Successful Antibody Therapeutics
Jane Seagal, PhD, VP of Antibody Discovery, AlivaMab Discovery Services
More challenging targets, more challenging design goals, and complexly engineered advanced therapeutic modalities require panels of highly diverse antibodies as the foundation for success. AlivaMab Discovery Services' fit-for-purpose strategies and technologies efficiently deliver panels of highly diverse antibodies with inherent characteristics required for successful biologic drug discovery and development. These antibody panels are application-ready for both standard antibody formats and as substrate for advanced therapeutic modalities.

12:45 Session Break

12:50 LUNCHEON PRESENTATION I: bYlok® Technology: A Novel Solution for

13th Annual

ENGINEERING BISPECIFIC ANTIBODIES

Designing New Antibody Therapies

Improved Production of Bispecific Therapeutics

Peter O'Callaghan, Head of Expression System Sciences, Biologics and Licensing, Lonza

Bispecific antibodies offer numerous advantages as therapeutic modalities over existing monoclonal antibodies, including more precise targeting and increased efficacy. However, their production can present challenges that significantly affect the cost of goods, such as how to achieve highly efficient inter-chain dimerization of both the heavy chains and heavy-light chain pairings. In this presentation we will described bYlok®, a new technology that promotes correct heavy-light chain dimerization with high efficiency

13:20 LUNCHEON PRESENTATION II: Potent Anti-Tumoral eEfficacy with a First-in-Class Antibody Drug Conjugate OmniAb

Cecilia Drakskog, Head of Preclinical Program, Genagon Therapeutics AB

Clptm1 is a conserved ™ protein whose natural role is to limit forward trafficking of receptors to the cell surface. In cancer, Clptm1 is dysregulated and accumulates on the cell surface, making it a promising novel target for tumor therapy. GEN202 is a tubulin-inhibitor conjugated ADC targeting Clptm1 with a rapid internalization rate and a potent anti-tumoral efficacy in over 10 murine tumor models (up 90% TGI).

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Latest in the Development of Bispecific Antibodies and What's Next on the Horizon (IN-PERSON ONLY)

Christian Klein, PhD, Head of Oncology Programs, and Department Head, Cancer Immunotherapy Discovery, Roche Innovation Center Zurich, Roche Pharma Research & Early Development, pRED

CONDITIONALLY ACTIVE BISPECIFICS & MULTI-SPECIFICS FOR CANCER INDICATIONS

15:25 Chairperson's Remarks

Christian Klein, PhD, Head of Oncology Programs, and Department Head, Cancer Immunotherapy Discovery, Roche Innovation Center Zurich, Roche Pharma Research & Early Development, pRED

15:30 Immunomodulatory Trifunctional Antibody-Fusion Proteins for Cancer Therapy

Dafne Müller, PhD, Group Leader, Institute of Cell Biology and Immunology, University of Stuttgart

We develop trifunctional antibody-fusion proteins composed of a tumor-directed antibody moiety and two different immunomodulatory molecules – common gamma chain receptor cytokines/ costimulatory ligands of the TNF-superfamily. Aiming for improved localization and efficacy at the tumor site, the design focus on targeted presentation and combined mode of action. Molecular properties will be discussed.

16:00 A Novel 2-in-1 Dual Antagonistic Antibody Targeting PD1/VEGFR2

Orla Cunningham, PhD, CSO, Ultrahuman Eight Ltd.

The number of combinatorial approaches in the clinic has increased exponentially with PD1/VEGF targeting combos being the most represented. While this combo has shown efficacy, dose-limiting tox is a concern. We have engineered a standard antibody targeting both PD1 & VEGFR2 to maximize potency while minimizing the significant peripheral tox associated with VEGF pathway targeting.

16:30 Comparing Potential Bispecific Formats of Trastuzumab and a Humanized OKT3 absolute antibody

Donmienne Leung, PhD, Head, Protein Engineering, Absolute Antibody

Not every antibody can be combined to produce well-behaved multi-specifics. The valency and geometry of each design can determine the production, target engagement and ultimately the requisite biological functions. In this case study, we selected two established antibody therapeutics, trastuzumab and a humanized OKT3 to produce 20 different bispecific formats to compare the feasibility of each format.

BISPECIFICS FOR NON-CANCER INDICATIONS

16:55 Chairperson's Remarks

Harald Kolmar, PhD, Professor and Head, Institute for Organic Chemistry and Biochemistry, Technische Universität Darmstadt

17:00 TrYbe: A Multi-Specific, Fc-Free, Therapeutic Antibody Format

Sam P. Heywood, PhD, Director, Antibody Therapeutics, Discovery Science, UCB Pharma

TrYbe is a multi-specific, Fc-free, therapeutic antibody format. The design consideration for this new fragment-based therapeutic format will be discussed, both in terms of the functional biology and the molecular properties. Data from multiple programs will be shared that exemplify a range of functional activities; demonstrate some beneficial properties of target engagement with respect to immune complex formation; show consistent *in vivo* PK from albumin binding.

17:30 Human Bispecific Antibodies against Infectious Diseases

Luca Varani, PhD, Group Leader, Institute for Research in Biomedicine

We developed human, IgG-like bispecifics simultaneously targeting two sites on SARS-CoV-2 (Nature, 2021). It potently neutralizes all variants of concern; protects and prevents formation of viral escape mutants *in vivo*. Bispecifics against Zika (Cell 2017) and Prion also had synergistic properties beyond the parental monoclonals. Simultaneous targeting of non-overlapping epitopes by IgG-like bispecific antibodies is effective against infectious diseases, combining the advantages of antibody cocktails with those of single-molecule approaches.

18:00 Novel Bispecific Antibody for Synovial-Specific Target Delivery of Anti-TNF Therapy in Rheumatoid Arthritis

Costantino Pitzalis, MD, PhD, FRCP, Professor, Rheumatology Versus Arthritis; Director Versus Arthritis Experimental Arthritis Treatment Centre; Deputy Director, William Harvey Research Institute; Head of Centre for Experimental Medicine & Rheumatology, Barts and The London School of Medicine & Dentistry, Queen Mary University of London

This study provides the first description of a BsAb capable of drug delivery, specifically to the disease tissue, and strong evidence of improved therapeutic effect on the human arthritic synovium, with applications to other existing biologics.

18:30 Close of Summit

5th Annual

MODULATING THE TUMOUR MICROENVIRONMENT

Activating Tumour Response and Overcoming Resistance

SUNDAY 13 NOVEMBER

12:00 Registration Open

14:00 Recommended Short Course*
SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy
*Separate registration required. See short courses page for details.

MONDAY 14 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Diamant + Coral

UNDERSTANDING IMMUNE TOLERANCE & OVERCOMING RESISTANCE

8:25 Chairperson's Opening Remarks
Mark S. Cragg, PhD, Professor of Experimental Cancer Biology, School of Cancer Sciences, Faculty of Medicine, University of Southampton

8:30 Immunological Configuration of Ovarian Carcinoma: The Impact on Disease Outcome and Response to Immunotherapy
Jitka Palich Fucikova, PhD, Senior Scientist, Sotio Biotech a.s.
Ovarian carcinoma (OC) is among the top five causes of cancer-related death in women. At odds with other neoplasms, OC is poorly sensitive to immune checkpoint inhibitors, correlating with a tumor microenvironment that exhibits poor infiltration by immune cells and active immunosuppression. Thus, novel strategies are needed alongside the identification of biomarkers that can prospectively identify OC patients who may benefit from specific immunotherapeutic regimens.

9:00 Overcoming Suppressive Tumour Microenvironments to Augment Antibody Therapy
Stephen A. Beers, PhD, Professor of Immunology & Immunotherapy, University of Southampton
The tumour microenvironment is frequently immune suppressive and can negatively impact the efficacy of antibody therapies. Identifying and understanding key mechanisms of resistance to antibody drugs could be instrumental to enhancing and widening responses. Here, we will present examples of how the tumour microenvironment can suppress antibody therapy and discuss strategies to overcome this suppression to enhance outcomes.

9:30 A Multipronged Approach to Overcoming Cold Tumor Resistance to Immunotherapy
Björn L. Frendeus, PhD, CSO, BioInvent International AB
Patients with "cold" tumors rarely benefit from immune checkpoint blockade (ICB). Seeking to bring clinical benefit of ICB to these patients, we assessed the potential of FcgR blockade and spatially restricted vectorized anti-CTLA-4 to help overcome resistance in the cold tumor microenvironment. We provide *in vivo* proof-of-concept that triplet aPD-1/aCTLA-4/aFcgRIIB and doublet vectorized aCTLA-4/aPD-1 induce cures in B16 melanoma-bearing mice resistant to systemic aCTLA-4/aPD-1 combination immunotherapy.

10:00 POSTER HIGHLIGHT: A CXCL10-Based Biologic Which Mobilizes T Cells through Enhanced GAG-Binding
Tanja Gerlza, PhD, Postdoctoral Research Fellow, Institute of Pharmaceutical Sciences, University of Graz
The immune system uses checkpoints to maintain immune homeostasis, but cancer cells copy this technique to defend themselves against it, resulting in immune escape. We've engineered a mutant of the T cell mobilizing chemokine CXCL10 that acts as a superagonist via its improved GAG binding affinity. In pathological conditions with impaired immunosurveillance, this decoy could help bypass the immune system blockade and re-install T cell response leading to tumor necrosis.

10:15 POSTER HIGHLIGHT: CD3 Bispecific Antibody Therapy Is Effective in Solid Tumors After Increased T Cell Infiltration Induced by Vaccines
Katy Lloyd, PhD, Senior Scientist, Genmab BV
One of the main hurdles for CD3-bispecific antibody therapy for solid tumors is the lack of tumor-infiltrating T cells, which are essential for therapeutic efficacy. We found that systemic administration of tumor-aspecific vaccination increased T cell infiltration in solid tumors and engaging these T cells with CD3-bispecific antibodies delayed tumor outgrowth and improve survival in syngeneic mouse models.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

REPROGRAMMING THE TUMOUR MICROENVIRONMENT

11:15 KEYNOTE PRESENTATION: Antibody-Cytokine Fusions: Emerging Clinical Data in Glioblastoma, Sarcoma, and Dermato-Oncology Indications
Dario Neri, PhD, CEO and CSO, Philogen
Antibody-cytokine fusions hold promises for the treatment of cancer and other serious conditions. In this presentation, I will present emerging preclinical and clinical data related to Philogen's clinical-stage antibody-cytokine fusions, which are being used for the treatment of patients with glioblastoma, sarcoma, and various dermato-oncology conditions.

11:45 A-Kine Platform: On-Target Cytokines to Reprogram Cell Targets for Immune-Oncology
Erik Depla, PhD, Director, Biology, Orionis Biosciences NV
Cytokines are powerful regulators of the immune system and attractive therapeutic effector candidates – provided that their sites of action can be restricted to avoid systemic exposure and toxicity. To achieve such spatial control of cytokine bioactivity upon drug administration, we have evolved a proprietary biologics platform that integrates a strategic "plug-and-play" assembly of modular, biomolecular building blocks into therapeutic agents with unique conditional effector functions and cell target selectivity.

12:15 Accelerate Cancer Research and Cancer-Immune Cell Therapies with Single Cell and Spatial Resolution 10x GENOMICS
Jose Jacob, Product Manager, Single Cell Immune Profiling, 10x Genomics
Mustafa Sibai, Research Assistant & Predoctoral Fellow, Cancer Immunogenomics Group, Josep Carreras Leukaemia Research Institute
The path from research discovery to effective immune cell therapies requires innovative approaches to match the challenges we face. Examining the full richness of biological complexity can uncover molecular insights into therapeutic efficacy and toxicity, and accelerate the development of novel treatments. Join us to learn how Chromium Single Cell and Visium Spatial solutions from 10x Genomics can transform the way

5th Annual

MODULATING THE TUMOUR MICROENVIRONMENT

Activating Tumour Response and Overcoming Resistance

you approach cancer biology and tackle immune cell therapies.

12:45 Session Break

12:55 LUNCHEON PRESENTATION I: 3D Multicellular Spheroids as Models for Preclinical Drug Testing

Natasha Helleberg Madsen, PhD Student, Cellular Engineering and Disease Models- Immune Models, Bioneer A/S

In vitro models are important tools in cancer research, enabling screening and evaluation of novel drug candidates. Therapies targeting macrophages in tumors have emerged as promising treatments as tumor-associated macrophages often correlate with tumor progression. We established *in vitro* 3D multicellular spheroid models to reliably mimic the microenvironment of solid tumors and propose that these models can be used to improve the drug screening process of anti-cancer immunotherapies.

13:55 Session Break

STIMULATING IMMUNE RESPONSE

14:15 Chairperson's Remarks

Dario Neri, PhD, CEO and CSO, Philogen

14:20 Interference with the Myeloid CD47/SIRPα Checkpoint to Improve Tumor Cell Killing by Neutrophils

Thomas Valerius, MD, Professor, Stem Cell Transplantation & Immunotherapy, Christian Albrechts University of Kiel

Myeloid cells like monocytes/macrophages and PMN constitute a major population of tumor cell infiltrates. Myeloid checkpoint blockade e.g. with CD47 antibodies or QPTCL inhibitors can improve the therapeutic efficacy of tumor-directed antibodies. Additionally, switching to IgA antibodies can improve myeloid effector cell recruitment. Thus, the future challenge will be to identify situations in which myeloid effector cells in the tumor microenvironment can be optimally recruited to contribute to antibody efficacy.

14:50 Engineering Antibodies for Immune Stimulation

Mark S. Cragg, PhD, Professor of Experimental Cancer Biology, School of Cancer Sciences, Faculty of Medicine, University of Southampton

Agonistic antibodies directed to immunostimulatory receptors are a currently untapped source for immunotherapy. Whereas checkpoint blockers have translated into the clinic, the rules for agonistic antibodies have been more difficult to discern and these reagents await further optimization. Here we discuss the salient properties of monoclonal antibodies (mAb) required to strongly agonize these receptors and discuss potential antibody engineering strategies for the future.

15:20 Engineering Tumor-Selective Biologics for Immune-Oncology

Uli Bialucha, PhD, CSO, Xilio Therapeutics

At Xilio Therapeutics we design and develop biotherapeutics that enable localized activity within the tumor microenvironment. Our molecules are engineered with the goal of achieving increased dosing while limiting systemic side effects. By being able to deliver a full therapeutic dose of potent immune modulators we aim to enhance anti-tumor activity. We will provide an update on our pipeline including a pre-clinical overview of XTX301, our tumor-activated IL-12 program.[JV1] [CF2]

15:50 Microenvironment *In Vitro*, Using Axtex 4D; A Scaffold Based Tissueoid Generation Platform

Prabuddha Kundu to be Announced, PhD, Managing Director, Premas Biotech

AXTEX-4D is a scaffold based 3D culture platform to generate tissueoids *ex vivo*. These tissueoids recapitulate the *in vivo* microenvironment and demonstrate constitutional & biochemical similarity, e.g. proliferation, longevity, contiguous cytoskeleton, hypoxic core, etc. It has potential in diverse applications as Drug testing, toxicity models, Immuno-oncology assays, Angiogenesis etc. component based tri-culture models using diverse cell lines, that mimic the native TME more closely than monoculture assays and allow for performing studies have been established.

16:05 Presentation to be Announced

16:20 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:05 Off-the-Shelf Allogeneic EBV CAR T Cells

Jakob Dupont, MD, Global Head, R&D, Atara Biotherapeutics

Allogeneic T cells have qualities that make them an ideal platform for treating disease. Evolution of CAR T designs and next-generation armoring technologies to overcome the hostile tumor microenvironment will be explored, including the promise of a platform that doesn't require HLA or TCR gene editing and safety, expansion, and persistence implications.

17:35 B Cells and Tertiary Lymphoid Structures: Biomarkers for Survival and Therapeutic Response of Cancer Patients

Florent Petitprez, PhD, Postdoctoral Research Fellow, MRC Centre for Reproductive Health, The Queen's Medical Research Institute, University of Edinburgh

Immune checkpoint inhibitors have revolutionized cancer treatment, but only a minority of patients respond and there is a critical need to identify reliable predictive biomarkers. The tumor microenvironment holds key information to predict clinical outcomes. Notably, B cells and tertiary lymphoid structures (TLS) have recently been shown to predict immunotherapy efficacy in various malignancies. The latest developments regarding B cells and TLS will be discussed during this talk.

18:05 Welcome Reception in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

19:05 Close of Modulating the Tumour Microenvironment Conference

5th Annual

WINNING STRATEGIES FOR CAR T, TCR, AND TIL THERAPIES Advancing Off-the-Shelf Cell and Antibody Approaches

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee

ROOM LOCATION: Diamant + Coral

EFFECTOR CELL ACTIVATING ANTIBODIES IN THE CLINIC

8:25 Chairperson's Remarks
Paul Parren, PhD, Executive Vice President, Lava Therapeutics; Professor, Leiden University Medical Center

8:30 KEYNOTE PRESENTATION: Advances in Bispecific T Cell Engager Therapies
Koustubh Ranade, PhD, Head, Translational Medicine, Immunocore LLC
Unlike antibodies that target extracellular proteins, T cell receptors can target intracellular proteins, processed into peptides, and brought to the surface by HLA. Most solid tumor protein targets are intracellular. Tebentafusp, a bispecific gp 100 peptide-HLA-directed CD3 T cell engager indicated for the treatment of HLA-A*02:01-positive adult patients with unresectable or metastatic uveal melanoma was the first TCR therapeutic to demonstrate a survival benefit in a Phase III trial.

9:00 Novel Bispecific Gamma-Delta T Cell Engagers for Treating Prostate Cancer
Paul Parren, PhD, Executive Vice President, Lava Therapeutics; Professor, Leiden University Medical Center
LAVA Therapeutics is developing a Gammabody that engages V?9Vd2-T cells and a cascade of downstream immune cells to attack tumor cells expressing PSMA as a novel bispecific antibody therapeutic for the treatment of prostate cancer. The presentation will address the lead candidate selection as well as our progress to the clinic.

9:30 Innate Cell Engagers as Combination Partners: Early Clinical Outcomes of AFM13 Combined with Cord Blood-Derived NK Cells in Patients with CD30-Positive Lymphoma
Arndt Schottelius, MD, PhD, CSO, Affimed GmbH
Engaging the innate immune system is a novel approach in immuno-oncology and Affimed's innate cell engagers (ICE) redirect innate immune cells to kill tumors. Combining ICE with adaptive immuno-therapeutic agents, e.g. checkpoint inhibitors, or with NK cells holds promise to elicit maximum clinical benefit. Early results from a Phase 1/2a study of the ICE AFM13 precomplexed with cord blood-derived NK cells, followed by AFM13 monotherapy, showed highly encouraging response rates.

10:00 Automated Synthetic Biology Solutions for Optimizing CAR-T Development Workflows TELESIS BIO
Jason Lehmann, PhD, Senior Product Marketing Manager, Product Marketing, Telesis Bio
We will present a series of case studies demonstrating how our automated synthetic biology workstation can rapidly accelerate CAR-T/TCR workflows.
Learn how gene fragments, variant libraries, and discovery grade mRNA can all be built at scale from a digital sequence, in less than a day via a single hands-free instrument run. By addressing key synthesis bottlenecks in discovery cycles, researchers can now rapidly evaluate candidate immunotherapy biologics at speeds previously unattainable.

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing

PRECLINICAL PROGRESS WITH CAR Ts

12:10 Chairperson's Remarks
John Maher, PhD, Consultant & Senior Lecturer, Immunology, Kings College London; CSO, Leucid Bio

12:15 New Targets and Technologies for CAR T Cells
Justus Weber, University Hospital Wuerzburg
This talk will feature novel mechanisms of resistance to CAR T therapy, novel target antigens and CAR T cell products for treating multiple myeloma, virus-free transposon-based gene-transfer for CAR T manufacturing, and a novel application for CAR T in fungal infections.

12:45 Bioluminescent Assay Platforms for Phase-Appropriate Engineered T Cell Potency Assessment Promega
Julia Gilden, Sr Research Scientist, Integrated Biology, Promega Corporation
Engineered T cell therapies present many analytical challenges over the course of development. We

will describe a reporter bioassay for selection of optimal CARs and TCRs during early discovery, and homogenous LUMIT cytokine immunoassays for fast and easy characterization of T cell therapies. Finally, we will discuss use of HiBiT Target Cells in MoA-based assays for quantitative measurement of CAR-T cytotoxicity, specificity, and kinetics in late stage clinical and commercial products.

13:15 Enjoy Lunch on Your Own

CLINICAL PROGRESS WITH CAR T IMMUNOTHERAPY

14:30 Chairperson's Remarks

René M.A. Hoet, PhD, Chief Innovation Officer, FairJourney Biologics

14:35 ADI-001: First-in-Class Allogeneic Gamma Delta CD20 CAR T Cells in Non-Hodgkin's Lymphoma

Francesco Galimi, PhD, Senior Vice President & CMO, Adicet Bio, Inc.

γd T cells are an attractive platform for off-the-shelf, allogeneic CAR T cell therapy. ADI-001, the first CAR-engineered γd T cell product to reach the clinic, consists of allogeneic peripheral blood Vd1 γd T cells expressing a second-generation CAR directed against CD20. We will discuss available clinical data from the ongoing Phase I trial of ADI-001 in patients with Non-Hodgkin's Lymphoma.

15:05 CAR T-Cell Immunotherapy of Solid Tumours: Working Through the Generations

John Maher, PhD, Consultant & Senior Lecturer, Immunology, Kings College London; CSO, Leucid Bio

I will present the results of the dose escalation phase of a phase 1 CAR T-cell clinical trial of second generation T4 immunotherapy in patients with relapsed refractory head and neck cancer. Thereafter I will describe two new CAR platforms entitled parallel CAR and adapter CAR with potential for greater impact in relapsed refractory solid tumours.

15:35 A High Throughput mRNA-Based Method for Screening Chimeric Antigen Receptors in T Cells

Alloy Therapeutics

Pinar Aksoy, PhD, Scientist II, Translational Medicine, Alloy Therapeutics

Alloy Therapeutics has developed an integrated workflow for CAR-T discovery, incorporating human antibody discovery, HTS for evaluating CAR functions, and an mRNA-based screening method using a cost-efficient PCR template without cloning. This novel approach offers one-stop-shopping, from antigen-binding domain identification through assessment and optimization of CAR constructs as receptors in T cells, and accelerates the timeline of cell therapy development from target to clinical candidate nomination.

16:05 Refreshment Break in the Hall with Poster Viewing

PRECLINICAL PROGRESS WITH CAR Ts

16:55 Chairperson's Remarks

John Maher, PhD, Consultant & Senior Lecturer, Immunology, Kings College London; CSO, Leucid Bio

17:00 Exploiting Glycosylation Inhibition to Improve CAR T Cell Efficacy in Solid Malignancies

Monica Casucci, PhD, Group Leader, Innovative Immunotherapies, San Raffaele Hospital

We recently described that malignant cells overexpress branched N-glycans that protect them from CAR T cell targeting, interfering with proper immunological synapse formation and promoting T cell exhaustion. Disrupting N-glycans synthesis with the glucose/mannose analogue 2DG allows to overcome this barrier and improve CAR T cell efficacy in different solid tumors. We are expanding this scenario by investigating the impact of N-glycosylation blockade on cellular components within the tumor microenvironment.

17:30 Imaging of CAR T Cell Success and Failure in Human Tumors

Emmanuel Donnadieu, PhD, Team Leader & Director, Research, Immunity & Infection & Inflammation, Institut Cochin

Adoptive transfer of CAR T cells has demonstrated striking efficacy for the treatment of several hematological malignancies. However, many patients still do not respond or relapse. In most solid tumors, efficacy has been very limited. It is of paramount importance to understand the mechanisms of tumor resistance to CAR T cells. Our recent findings suggest that downregulation of adhesion molecules constitutes a novel class of resistance mechanism to CAR T cells.

18:00 Bringing CAR T to the Next Generation for Efficacy and Safety

Maria Themeli, PhD, Assistant Professor, Hematology, Vrije University Amsterdam

Despite the high remission rates achieved against B cell leukemias, CAR T cell therapy is less effective for other tumor types, while there are still challenges hindering its broader usage. Next-generation genetic engineering employing multi-targeting, multi-costimulation, and spatially-controlled activation can overcome the current limitations in efficacy and safety.

18:30 NOT LIVE - SLIDES AVAILABLE IN PATHABLE: Migratory Engineering of CAR T Cells

Sebastian Kobold, MD, Professor, Clinical Pharmacology, Klinikum der Universität München

CAR T cell therapy in solid tumors is limited by the access of the therapeutic cell to cancer tissue. Migration of cells is a tightly regulated process involving chemokine receptors and their matching ligands guiding cells to specific sites. We have developed approaches how we can target T cell migration to tumor tissue by means of engineering. I will discuss different translational approaches along these lines.

19:00 Close of Winning Strategies for CAR T, TCR, and TIL Therapies Conference

2nd Annual

IMMUNOTHERAPY SAFETY AND EFFICACY

Overcoming Toxicities and Improving Clinical Outcomes

SUNDAY 13 NOVEMBER

14:00 Recommended Short Courses*
SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Diamant + Coral

CHECKPOINT INHIBITORS

8:25 Chairperson's Opening Remarks
Lenka Sadilkova, PhD, Head, Preclinical R&D, Mablink

8:30 Electrostatic-Driven Interactions Enhance Intratumoral Retention and Antitumor Efficacy of Immune Checkpoint Blockade Antibodies
Debadyuti R. Ghosh, PhD, Associate Professor, Molecular Pharmaceutics & Drug Delivery, University of Texas, Austin
Local immunotherapy is attractive to overcome the challenges of toxicity and limited bioavailability observed with systemic delivery of immunotherapies yet elicit systemic immunity. We show that cationic peptides can be deployed as a modular anchor to enhance intratumoral retention and penetration of immune checkpoint inhibitor antibodies in tumor ECM via electrostatic interactions towards improved antitumor efficacy.

9:00 KEYNOTE PRESENTATION: Overcoming Safety and Efficacy Challenges of Dual Checkpoint Inhibitor Combinations
Jonathan D. Cheng, Senior Vice President & Therapeutic Area Head, Oncology Clinical Development, Bristol Myers Squibb Co.
The field of immunotherapies has transformed the treatment of cancer by providing durable responses to many difficult to treat cancers. Immunotherapy combinations are a major focus area for drug developers given the opportunity to improve on established treatment options and identify novel combinations that have the potential to deliver transformative clinical outcomes for oncology patients. This presentation will provide an overview of these therapies in solid tumor oncology.

9:30 Evaluation of Safety and Efficacy of Antibody Based and CAR T Therapies in Humanized Mice
James G. Keck, PhD, Senior Director, Innovation and Product Development, The Jackson Laboratory
JAX has developed a fast, sensitive and reproducible *in vivo* platform for evaluating CAR T therapies in PBMC humanized mice.
The platform is being applied to both autologous and allogeneic CAR Ts with an evaluation of cytokine release syndrome, efficacy and CAR T expansion with the goal to help de-risk CAR T preclinical development.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

T CELL ENGAGERS

10:45 Immunotherapy of Cancer Using TGF Beta Educated Gamma Delta T Cells
John Maher, PhD, Consultant & Senior Lecturer, Immunology, Kings College London; CSO, Leucid Bio
The talk will explain how expansion of peripheral blood gamma delta T cells in the presence of TGF beta enhances the yield and fitness of these cells, leading to an increase in their intrinsic anti-tumour activity. We are exploring the use of these TGF-beta-educated GDT cells as a potential off-the-shelf CAR T cell strategy, benefitting from this increase in anti-tumour activity together with novel cytokine armouring technologies.

11:15 CyCAT: A Dual Targeting Anti-CD3 Split Domain-Based T Cell Engager Platform and the Use of Symmetric and Asymmetric Heterodimers to Maximize Potency and Safety
Markus Moosmeier, PhD, Associate Director and Team Leader, Discovery Biology, MorphoSys AG
MorphoSys´ CyCAT (Cytotoxic Cell Activation at Tumor) platform is based on novel T cell engagers that become activated after dual-tumor target binding and reassembling of proprietary anti-CD3 VH/VL split domains. To enhance CyCAT potency, a set of formats was developed that can be combined to enable formation of an optimized immunological synapse between the T cell and the tumor cell especially when different target epitopes, membrane distal and proximal, are simultaneously targeted.

11:45 An Avidity-Driven DARP in T Cell Engager Approach by Targeting Three Tumor-Associated Antigens to Improve Safety and Efficacy for the Treatment of AML
Christian Reichen, PhD, Associate Director, Oncology Research, Lead Generation, Molecular Partners AG
We have designed MP0533, the first avidity-driven T cell engager (TCE) targeting three tumor-associated antigens (TAA) on AML cells to ensure potent T cell-mediated killing of malignant cells while sparing healthy cells. MP0533 has been generated by selecting an optimal affinity against CD70, CD123, and CD33, combined with a suitable CD3-binding DARPin and an optimal molecular architecture to allow exceptional efficacy and superior safety profile *vs* mono-specific TCE approaches.

12:15 Streamline T Cell Engager Discovery with Diverse CD3 Antibodies and an Integrated Bispecific Engineering Platform
Raffi Tonikian, Head, Target Product Profile Integration, AbCellera
T cell engagers are widely recognized for their tremendous potential for cancer therapies, but with hundreds in development, only two are on the market. Limited pools of parental antibodies and limited access to bispecific engineering technologies have been barriers to bringing T cell engagers to the clinic. We combine a diverse panel of fully human CD3-binding antibodies with our clinically-validated bispecific engineering platform to streamline discovery of T cell engager therapies.

12:45 Session Break

12:50 LUNCHEON PRESENTATION I: Deconvoluting Receptor Targets and Assessing Off-Target Activities of Antibodies, Protein, and Cell Therapeutics Using Human Cell Microarray Technology
Diogo Rodrigues, Senior Account Manager, Charles River
Human cell microarray screening enables the discovery of primary cell surface receptors as well as

potential off-targets for a variety of biologics, including peptides, antibodies, scFvs, proteins, CAR T and other cell therapies. This presentation describes the generation of extensive screening libraries of expressed human plasma membrane and tethered secreted proteins, highlighting the role of the technology in identifying novel druggable targets and providing specificity screening case studies relevant to safety assessment and IND submissions.

13:20 Session Break

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Improving Immunotherapy Safety and Managing Toxicity (IN-PERSON ONLY)
Sara M. Mangsbo, PhD, Senior Lecturer, Pharmacy, Uppsala University
- Impact of tumour microenvironment on safety and efficacy
- Engineering immunotherapeutics to improve safety and reduce toxicity
- Emerging trends and technologies

ADJUVANT IMMUNOTHERAPY, BISPECIFICS, AND ADCs

15:25 Chairperson's Opening Remarks
Oliver Schon, PhD, Vice President Development and CMC, BiVictriX Therapeutics PLC

15:30 Immunotherapy of Cancer in the Adjuvant Setting
Nageatte Ibrahim, MD, Vice President, Oncology & Global Clinical Development, MSD

16:00 Improving Safety and Efficacy of CD40 Agonistic Antibodies by the Adaptable Drug Affinity Conjugation (ADAC) Technology
Sara M. Mangsbo, PhD, Senior Lecturer, Pharmacy, Uppsala University

CD40 agonistic antibodies rely on antigen-presentation for optimal efficacy. The source of antigen can be either from the tumor or by exogenous delivery of antigens. Via the ADAC technology, any synthetically produced peptide can be delivered to dendritic cells for optimal cargo delivery and simultaneous immune activation. This strategy improves efficacy while allowing for a dose reduction, thus also reducing the risk for toxicity.

16:30 Quantification of Bispecific Antibody Mediated T Cell Activation with Engineered CD3 Effector and Tailored Target Cells
Michael Schwenkert, PhD, Chief Technology Officer, Svar Life Science AB

Bispecific antibodies efficiently in trigger T-cells mediated cytotoxicity and many T cell engaging biopharmaceuticals are in clinical development. Current analytical methods measuring T cell activation are not optimal. Here we showcase an improved bioassay platform for reliable assessment of T cell activation using CD3xCD19. Effector T cells carry a reporter gen downstream the CD3 signaling cascade and a pair of engineered target cells is used as antigen-positive/-negative control.

16:45 iCIEF-Coupled to Chemometrics Analysis to Identify Therapeutic Monoclonal Antibodies and Detect their Degraded States
Cécile Tardif, Ms, University-Paris-Saclay

Monoclonal antibodies are increasingly employed in hospitals, particularly in the field of cancer therapy. However, mAbs treatments represent a high immunological risk due to degradation and aggregation issues that may occur during the compounding process and manipulations at the hospital. This study provides insights into the use of Imaged Capillary Isoelectric focusing (icIEF) as a QC tool to detect mAbs degradations by controlling both, mAbs identity and degradation state in the infusion bag.

17:00 Imvotamab: A Bispecific IgM T Cell Engager against CD20 with Enhanced Potency and Safety
Bruce Keyt, PhD, CSO, R&D, IGM Biosciences, Inc.

Imvotamab (IGM-2323) is a bispecific IgM antibody that binds very tightly to CD20 and engages CD3 on T cells. This bispecific IgM shows superior binding to CD20+ cells and out-competes a bivalent anti-CD20 IgG. *In vitro*, Imvotamab can kill lymphoma cells via CDC and T cell-dependent cellular cytotoxicity. With robust cytotoxicity and low cytokine release, Imvotamab exhibits an improved safety profile compared to bispecific IgGs.

17:30 The Emerging Use of Kinase Inhibitors for the Mitigation of T Cell Bispecific (TCB) Antibody-Induced Cytokine Release
Gabrielle Leclercq, PhD, Postdoctoral Scientist, Pharma Research & Early Development, Roche

CRS is one of the major safety liabilities associated with T cell engaging therapies in the clinic, including CAR T cells and T cell engagers. A recent screening of FDA-approved kinase inhibitors identified JAK, mTOR, and Src inhibitors as potential candidates for the mitigation of CRS. Here, we present *in vitro* and *in vivo* preclinical studies showing the effects of kinase inhibitors on cytokine release and anti-tumor efficacy.

18:00 PSARlink-Based ADCs: Increasing Therapeutic Index of Next-Generation ADCs by Maximizing the Exposure to the Drug While Minimizing Dose-Limiting Toxicities
Lenka Sadilkova, PhD, Head, Preclinical R&D, Mablink

Mablink is building a diversified proprietary pipeline of novel antibody-drug conjugates based on the strong potential of "hydrophobicity masking" concept with orthogonally-embedded chemical modifiers grafted into drug-linker of ADCs. Nonclinical data collected so far in all proprietary ADC candidate programs represent a broad proof-of-concept and nonclinical validation of hydrophilic monodisperse polysarcosine-based ADCs in targeting both liquid and solid tumors, illustrating its impact on their physicochemical and pharmacological properties.

18:30 Close of Summit

2nd Annual

CELL & GENE THERAPY ANALYTICS

Advancing Vector Understanding and Analysis

SUNDAY 13 NOVEMBER

12:00 Registration Open

14:00 Recommended Short Course*
SC4: Potency Assays and Comparability for Cell & Gene Therapies
*Separate registration required. See short courses page for details.

MONDAY 14 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Fallin 9

ANALYTICAL DEVELOPMENT AND CONTROL STRATEGIES FOR GENE THERAPY VECTORS

8:25 Chairperson's Opening Remarks
Borries Demeler, PhD, Professor, Chemistry & Biochemistry, University of Lethbridge

8:30 KEYNOTE PRESENTATION: Stage-Specific Analytical Development for AAV Gene Therapy Vectors
Liz Higgins, PhD, Vice President, Head of CMC, NysnoBio
This presentation will focus on strategies for prioritizing early analytical development work. The discussion will include which assays should be put in place first and ways to use template assays and/or first-generation assays (to be upgraded later in development) to ensure assays are available to assess vector quality and potency for pre-IND animal studies and process development activities.

9:00 Developing an Analytical Characterization Plan for AAV Gene Therapy Products
Fabien Dorange, PhD, Head, Analytical CMC, SparingVision
Potency is one of the most critical quality attributes for AAV vectors as it is related to the functionality of the product. This presentation will focus on the strategy for the development of the potency assay for SPVN06, a gene-independent treatment for retinitis pigmentosa.

9:30 Characterization of AAV Vectors for Preclinical Use
Eduard Ayuso, DVM, PhD, CEO, DINAQOR DINAMIQS
Alignment on upstream and downstream processes and analytical methods from preclinical to GMP manufacturing reduces time to market and de-risks drug development. The use of standardized assays for the characterization of preclinical vectors provides critical insights on potency, identity, and purity, and strengths the value of PoC and IND-enabling studies performed with those vectors.

10:00 POSTER HIGHLIGHT: Design of Experiment, a Powerful Tool to Simplify Viral Production Process Development
Anna Doshina, Development Tech Lead, Exothera
DoE is a powerful tool that allows us to study the impact of multiple factors on process performance in fewer experiments. We have studied the manufacturing of AAV in scale-down models focusing on optimization of transfection, lysis, endonuclease treatment, and chromatography using DoE. Virus titer and process impurities were evaluated as main outputs. These experiments helped us select process operating ranges and reagents resulting in effective AAV production and purification.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

11:15 Viral Control Strategy for Gene Therapy Vectors
Christopher Bravery, PhD, Consulting Regulatory Scientist, Advanced Biologicals Ltd.
Viral vectors provide limited or no scope for viral reduction and elimination steps, meaning the control of viral adventitious agents is limited. In this presentation, the need to consider a wholistic approach to the control of viral agents will be discussed, along with the types of methodology that might be employed, and why.

11:45 In-Process Monitoring and Final Product Characterization of Enveloped and Non-Enveloped Viral Particles by Capillary Electrophoresis Method
Rita Fernandes, Research Fellow, iBET Instituto de Biologia Experimental Tecnologica
This work presents a highly sensitive CE methodology employing a fluorescence labelling procedure for monitoring different bioprocess steps and performing a final product characterization of several viral vectors. The work developed here enabled the implementation of a novel, robust, and sensitive analytical platform for in-process sample analysis and quantification of different non- and enveloped virus-based targets.

12:15 Aura+: High-Throughput, Low Volume Product Stability, and Purity Analysis for Gene and Cell Therapies halo labs
Paul Dyer, PhD, Field Application Scientist, Halo Labs
Aura+ is the latest instrument designed specifically characterize subvisible aggregates for product quality measurements for gene and cell therapies using as little as 5µL sample. Fluorescent Membrane Microscopy FMM is used to identify aggregates revealing exactly what is in your aggregates. Aura+ can the presence of DNA in AAV aggregation to understand the role of leaky capsids in subvisible particle formation or various cellular markers to assess your cell therapies.

12:45 Session Break

12:55 LUNCHEON PRESENTATION I: Embedding Quality into Cell Line Development via the Application of an Innovative Picodroplet-Based Single Cell Sorter Sphere Fluidics
Jonathan Dempsey, PhD, Managing Director, Pathway Biopharma Consulting
Generation of a highly expressing, regulatory acceptable clonal cell line is the first key activity in the development of a biopharmaceutical. Cell line development is labour intensive, time consuming, costly, and subject to stringent regulations to ensure patient safety. We will describe the implementation of innovative picodroplet-based technology which provides a visual record of clonality and clone derivation and also allows for transfected pool enrichment resulting in highly expressing clones.

13:25 LUNCHEON PRESENTATION II: Reducing Gene Therapy Development Timelines with Integrated Plasmid DNA and AAV Platform Process Catalent BIOLOGICS

2nd Annual

CELL & GENE THERAPY ANALYTICS

Advancing Vector Understanding and Analysis

Denis Burton, Ph.D., Director Business Development, Business Development, Catalent Biologics

Plasmid DNA (pDNA) is a critical starting material for advanced therapies. Leveraging CGMP requirements from an early stage, together with the right tools and analytics to provide the highest quality standards for pDNA, will ensure successful downstream applications such as Adeno-Associated Virus (AAV) from early clinical development to the commercial phase. During this talk, we will share the main analytical development challenges linked to CGMP pDNA production and their impact on AAV programs, with a walk-through of the UpTempo Virtuoso AAV platform, a scalable CGMP-ready platform process that significantly reduces the time from gene to clinic.

13:55 Session Break

ADVANCED TECHNIQUES AND STRATEGIES FOR AAV CHARACTERIZATION

14:15 Chairperson's Remarks

Liz Higgins, PhD, Vice President, Head of CMC, NysnoBio

14:20 Multiplex Digital PCR: An Analytical Method for Gene Therapy, Delivering a Broad Versatile, and Meaningful Readout

Peter Eisenhut, PhD, Research Investigator CMC, Takeda

Quantification of vector genome titer by digital PCR is a modern analytical method in gene therapy. Using a single target for titer determination can provide a consistent concentration of the product, but it lacks important information such as data on the full-length transgene. Multiplex dPCR was used to quantify DNA for multiple targets of the vector genome. A quadruplex dPCR method was developed for simultaneous quantification of 4 transgene targets.

14:50 Addressing Viral Vector Genome Integrity and Capsid Content by Long-Read Sequencing and Multiplex dPCR

David Dobnik, PhD, Senior Research Associate, Biotechnology & Systems Biology, National Institute of Biology

The production of viral vectors for gene therapy is focused on pure, safe, and efficacious products. Absence of impurities and presence of full vector genomes play a crucial role. We have addressed the problem of AAV vector genome integrity by long-read sequencing and an advanced dPCR multiplex approach. Both technologies provide useful information on genome integrity and presence of impurities, but dPCR can go a step further providing a quantitative result.

15:20 Analytical Development of a Gene of Interest (GOI) Expression Bioassay for a Gene Therapy Product to Treat Alzheimer's Disease

Savita Nair, PhD, Senior Manager, Bioassay Development, Sangamo Therapeutics

Using Sangamo's unique zinc finger protein (ZFP) platform it was recently demonstrated that tau down-regulation with AAV ZFP-transcription factors (ZFP-TFs) rescues neuronal damage around amyloid plaques in a mouse model of Alzheimer's disease. Design and analytical development of a quantitative PCR-based assay to measure transgene-specific ZFP mRNA for early product characterization and release studies will be presented.

15:50 Fly through AAV Buffer Exchange and Characterization with Unagi and Stunner

Ross Walton, PhD, Senior Application Scientist for Analytics, Unchained Labs

Getting AAV into a new buffer raises a lot of questions about the final concentration, how much buffer was exchanged, and if sample integrity is still looking good. Unagi provides fast, quantitative buffer exchange where you know your AAV sample will never run dry. Before and after a run, Stunner serves up quick and simple answers on AAV titer, empty/full ratio, and aggregation to make sure you're getting what you want.

16:20 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:05 Analytical Ultracentrifugation as a Multi-Attribute Release and Characterization Method for AAV-Based Products

George Bou-Assaf, PhD, Scientist, Analytical Development – Product & Technology Development, Biogen

Analytical ultracentrifugation is the gold standard method for the characterization of AAV-based products because it has superior resolving power compared to other biophysical and biochemical methods. In addition, the sedimentation velocity AUC method reports on several attributes at once. Here, we discuss recent developments in AUC methodology which allow reduced sample consumption, higher throughput, and transfer of the method to a quality control environment.

17:35 Characterisation of Lipid Nanoparticles by Analytical Ultracentrifugation

Borries Demeler, PhD, Professor, Chemistry & Biochemistry, University of Lethbridge

Distinguishing loaded from empty lipid nanoparticles (LNPs) is challenging, as their overall size and shape may not change proportionally with RNA loading. However, upon loading, their spectral signature and density vary significantly. Using these properties, we developed two analytical ultracentrifuge(AUC) methods that distinguish LNPs. First, density matching AUC, uses varying D2O:H2O ratios to discriminate empty vs loaded LNPs. Second, multi-wavelength AUC, characterizes LNPs based on hydrodynamic and spectral properties.

18:05 Welcome Reception in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

19:05 Close of Cell & Gene Therapy Analytics Conference

9th Annual

ANALYTICAL CHARACTERISATION OF BIOTHERAPEUTICS

Developing Well-Characterized Novel Biologics

SUNDAY 13 NOVEMBER

14:00 Recommended Short Course*
SC4: Potency Assays and Comparability for Cell & Gene Therapies
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Fallin 9

MULTI-ATTRIBUTE MONITORING OF THERAPEUTIC PROTEINS

8:25 Chairperson's Opening Remarks
Dan Bach Kristensen, PhD, Principal Scientist, Symphogen, Denmark

8:30 Harmonised MAM Platform across Sanofi CMC Development Sites for Process Support and Characterization
Yann Fromentin, Team Manager, High Throughput Analysis & Biopharmaceutical Development, Sanofi
MAM allows a CQA-driven CMC development according to QbD approach, providing a better process and product knowledge, decreasing comparability risk, and enabling easy site-to-site transfer. MAM allows to follow efficiently the biologics process development in a fast and cost-effective way. We will present our MAM platform including automated sample preparation, LC-MS, data treatment automation, the inter-sites comparability, examples for batch analysis, cell culture, and purification development.

9:00 A Rapid and Routine-Friendly Multi-Attribute Method (MAM) for the Monitoring of Critical Quality Attributes in Biotherapeutic Monoclonal Antibodies
Somar Khalil, PhD, Scientist, Analytical Development Sciences for Biologicals, UCB
Monitoring the critical quality attributes (CQAs) of therapeutic proteins to ensure their quality, safety, and efficacy is essential. Bottom-up LC-MS is a versatile methodology that could be added to the routine QC toolbox for monitoring degradative events of therapeutic antibodies. Here, we present a rapid and QC-friendly multi-attribute method that can accomplish identity testing, N-glycan mapping, sequence variant analysis, and the monitoring of a variety of PTMs.

9:30 Challenges and Solutions in MAM-Based Workflows – Recent Case Studies from a Biopharmaceutical Development Lab
Dan Bach Kristensen, PhD, Principal Scientist, Symphogen, Denmark
Multi-attribute method (MAM) using mass spectrometric detection and quantitation of biopharmaceutical quality attributes, at the amino acid level, is used extensively in biopharmaceutical development and increasingly for cGMP testing. At Symphogen challenges are regularly observed with conventional trypsin-based MAM workflows, due to poor LC MS performance of critical tryptic peptides of some products. Case studies highlighting challenges using conventional MAM, and solutions using alternative approaches, will be presented.

10:00 All-in-One Solution to Measure Molecular Interactions? The Bruker SPR Pro Series
Sven Malik, Senior Application Specialist, Applications, Bruker Daltonics SPR
Here we describe the possibilities of the Pro series instruments from Bruker that empowers the scientists with many tools or ways to perform their work. The systems use a valve-less microfluidic system enabling fast transitions from sample to buffer, state-of-the-art sensitivity and robustness to allow for the analysis of all types of samples, from ions to crude samples. High flexibility in assay development is ensured by individual sensor spot addressing options.

10:15 Automating Biopanning in Phage Display and Determining Immunogenic Affinity in Whole Blood with FO-SPR.
Filip Delport, PhD, CTO, Systems Research & Development, FOx BIOSYSTEMS
SPR turned inside out with an optical fiber dip sensor enables binding characterization in crude samples and on large particles. Large particle sensing, including isolation, is presented in semi-automated biopanning on phage-display, and provides immediate readout in panning cycles and in kinetic characterization. Highlighted by a study on COVID samples FO-SPR allows kinetic affinity measurement in whole blood samples, potentially applied to clinical severity of disease or response to therapies.

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

12:10 Chairperson's Remarks
Dan Bach Kristensen, PhD, Principal Scientist, Symphogen, Denmark

9th Annual

ANALYTICAL CHARACTERISATION OF BIOTHERAPEUTICS Developing Well-Characterized Novel Biologics

12:15 KEYNOTE PRESENTATION: Building Analytical Platform to Enable Efficient Drug Development

Bernice Yeung, PhD, Head of Analytical Development, Chemistry, Biogen

Platform analytical approaches lead to higher efficiency during drug development which has been evident with the development of mAbs in the past two decades. Recently, the advent of other therapeutic modalities, such as gene therapy and antisense oligonucleotide-based products, has brought on a desire to apply the same strategy in standardizing their analytical approach. The emerging analytical platforms and their application will be discussed for these modalities.

12:45 Faster Titer and Impurity Analysis with Automated Immunoassays

Jose L. Moreno, PhD, Field Application Specialist, Engineering, Gyros Protein Technologies AB

Immunoassay platforms are utilized for bioanalysis in biotherapeutic development, and the critical need to generate high quality data, support efficient method development and release tests for both CMC and final product manufacturing remains. The Gyrolab technology, automating immunoassays like ELISA, has been identified to be a reliable and robust platform for high-throughput titer and impurity analysis, contributing to an increased productivity and reduced hands-on time.

13:15 Session Break

13:20 LUNCHEON PRESENTATION I: Integrating The Carterra LSA High-Throughput SPR Array in to UCB's Antibody Discovery Platform

Oliver Zaccheo, PhD, Senior Group Leader, SPR and Biophysical Assays, UCB

Surface Plasmon Resonance (SPR) provides a key screen to identify and characterise high-affinity, species cross-reactive antibodies generated by UCB's Core antibody discovery platform. We have performed a head-to-head comparison of the Biacore 4000 and Carterra's LSA (high-throughput SPR array) and shown that the LSA is well-suited to the challenge of generating high-quality, high-throughput antibody binding data from individual b-cells. We have now incorporated the LSA to our routine workflows to guide molecule selection based on kinetic binding data and epitope binning.

13:50 LUNCHEON PRESENTATION II: Binding Kinetics with WAVEsystem for Innovative Drug Development

David Moreno Delgado, PhD, Group Leader, Early Drug Discovery, Galapagos

Binding kinetics are important parameters enabling and extending the understanding of small molecule and target interactions. In Galapagos, we have used RAPID mode in WAVEsystem to determine kinetic constants but also to investigate different modes of action. Come and discover the story of how we used WaveRAPID and its impact in our drug discovery programs.

14:20 Session Break

ADVANCED TECHNIQUES AND SOLUTIONS FOR CHARACTERIZING NOVEL MODALITIES

14:30 Chairperson's Remarks

Bernice Yeung, PhD, Head of Analytical Development, Chemistry, Biogen

14:35 Applications of a Real-Time, Optical Technique for Quantifying Proteins Directly within Mixtures

John Hales, PhD, Biochemical Engineering, University College London, United Kingdom

We have developed a novel, label-free optical technique for quantifying proteins directly within mixtures in real-time. Applied to chromatographic separations, the elution profiles of two biophysically-similar proteins can be tracked independently even when there is overlap in their elution profiles. We are also developing ligand-binding assays based on our virus laser technology. In this talk, I will explore applications of the technologies including the characterisation of bispecific antibodies.

15:05 Combining Mammalian Libraries and Microfluidics for Versatile Antibody Hit Discovery and Optimization

Achim Doerner, PhD, Principal Scientist, Protein Engineering & Antibody Technologies, Merck Healthcare KGaA

POC studies applying mammalian libraries for both antibody optimization (screening for manufacturability and selectivity), as well as microfluidics-assisted high-throughput cellular binding or functional screening, exemplify the versatility and powerful options when combining these two emerging technologies.

15:35 Automated Assessment of Multiple Attributes of Monoclonal Antibodies Using Multidimensional LC-MS

Jelle De Vos, Senior Scientist, RIC biologics, RIC group

Unraveling the structural complexity of monoclonal antibodies demands for a range of complementary analytical tools. Using multidimensional LC (mD-LC), several of these methodologies can be combined in one automated platform allowing simultaneous assessment of different structural characteristics. In this presentation various mD-LC-MS protein analyzers will be discussed and their application to real life samples will be demonstrated.

16:05 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:00 Microfluidic Characterisation of Extracellular Vesicles

Paolo Arosio, PhD, Assistant Professor, Chemistry & Applied Biosciences, ETH Zurich

We present a microfluidic device capable of simultaneously characterizing multiple properties of extracellular vesicles (EVs) such as size, concentration, composition, presence of specific subpopulations, and purity. The method requires a limited amount of material and minimal sample handling.

17:30 Botulinum Toxin Structural Dynamics Using Hydrogen/Deuterium Exchange Mass Spectrometry

David Spencer, Director of Product Characterisation and Formulation, Ipsen Biopharm

Botulinum toxins are inherently dynamic and are therefore highly suited to hydrogen/deuterium exchange mass spectrometry (HDX-MS) studies. The work presented describes the HDX-MS workflow for Botulinum toxin and investigates structural changes that occur upon binding to the toxin receptor SV2c. By furthering our understanding of botulinum toxin structure and mechanism of action we can further optimise this class of molecules as biopharmaceutical products.

18:00 AAV Characterization by Multi-Wavelength Analytical Ultracentrifugation

Amy Henrickson, Research Associate, Biochemistry, University of Lethbridge

Multi-wavelength analytical ultracentrifugation offers two highlyprecise and orthogonal characterization methods in one experiment to identify the ratio of any loading state of AAV virions, ranging between empty capsids to overfilled capsids. This method is able to detect contaminants such as protein aggregates and free nucleic acids. I will present examples, and discuss the experimental approaches used to characterize viralvectors and their nucleic acid cargo load by multi-wavelength analytical ultracentrifugation.

18:30 The Biophysical Characterisation of a SARS-CoV-2 Self-Amplifying mRNA Vaccine

Daniel Myatt, PhD, Senior Analytical Scientist, Biologics, Center for Process Innovation Ltd.

The current COVID-19 pandemic has accelerated the development of mRNA vaccine technology. The production of these large mRNA vaccine molecules has required concomitant development of novel analytical characterisation techniques. In this talk, I describe the use of several biophysical techniques, including DLS, CD, and SEC-SAXS to determine size, shape, and structure of an RNA vaccine molecule.

19:00 Close of Analytical Characterisation of Biotherapeutics Conference

9th Annual

PROTEIN STABILITY & AGGREGATION

Advances in Particle Analytics and Stability Prediction

SUNDAY 13 NOVEMBER

14:00 Recommended Short Courses*
SC1: Developability of Bispecific Antibodies
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Fallin 9

TACKLING PROTEIN AGGREGATES

8:25 Chairperson's Opening Remarks
Karoline B. Bechtold-Peters, PhD, Senior Strategy & Technology Leader, Pharmaceuticals & Biopharma Process, Novartis Pharma AG

8:30 Assessing the Isothermal Aggregation of Partially Unfolded Antibodies during Candidate Selection and Formulation Development
Hristo Svilenov, PhD, Associate Professor, Ghent University, Belgium
In this presentation, I will explain the importance of studying the aggregation of partially unfolded antibodies during candidate selection and formulation development. Furthermore, I will present and discuss orthogonal analytical approaches to study this phenomenon.

9:00 KEYNOTE PRESENTATION: A Structure-Based Approach to Tackle Protein Aggregation in Parkinson's Disease
Salvador Ventura, PhD, Professor & Chair, Biochemistry & Molecular Biology, University Autonoma De Barcelona
a-Synuclein aggregation is a key driver of neurodegeneration in Parkinson's disease. Here, we have exploited the structural properties of toxic oligomers and amyloid fibrils to identify a family of peptides that bind to these a-synuclein species with low nanomolar affinity, without interfering with the monomeric functional protein. This activity is translated into a remarkable anti-aggregation potency and abrogation of oligomer-induced cell damage, with important therapeutic and diagnostic implications.

9:30 Measuring Change in Secondary Structure and Oligomeric State for a mAb in Stress and In-Process Testing with MMS and SEC
REDSHIFTBio See change
Daniel Myatt, PhD, Senior Scientist, Analytical Group, Centre for Process Innovation
Microfluidic Modulation Spectroscopy (MMS) is a new type of Mid-Infrared (MIR) spectroscopy with better sensitivity than traditional MIR and the ability to automate the measurement of samples over a large concentration range. In this talk, we examine the use of MMS to determine the secondary structure of stressed and in-process mAb samples and link these changes to aggregation of the target mAb as seen by size-exclusion chromatography (SEC).

9:45 Some Like it Hot – Thermal Ramp and Isothermal Stability Testing on Uncle
UNCHAINED LABS
Joanna Winkler, PhD, Marketing Application Scientist, Unchained Labs
When developing a biologic, thermal ramps are fast and loaded with information (T_m and T_{agg}), but the full stability story needs results from long-term isothermal tests. Uncle – the all-in-one stability platform – now packs 5 isothermal apps to take the hassle out of long-term testing, so you can tackle it in early-stage screening. We'll show data for proteins in several formulations and check out rapid viscosity data delivered from Honeybun.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

PROTEIN SELF-ASSOCIATION AND AGGREGATION PROPENSITY

10:45 Development of New Methods for Characterization of Antibody Self-Association and Non-Specificity
Nikolai Lorenzen, PhD, Principal Scientist, Biophysics and Injectable Formulation, Novo Nordisk AS
The propensity of antibodies for non-specific interactions and self-association are some of the most important developability parameters. I will present highlights from ongoing collaborations with research groups at ETH Zürich and University of Cambridge, on the development of new methodologies that can help us to reliably measure and obtain a better understanding of these phenomena. The methodologies include custom-made microfluidics and A4F and they provide important data that complement existing methods.

11:15 3D-DLS: Benchmarking an Optical Microrheological Viscometer for Biologics Development
Joy Puthawala, Principal Research Associate, Sanofi
A key hurdle when developing high-concentration biotherapeutics is the manifestation of high viscosity at therapeutic concentrations, which is problematic for both product manufacturing and final administration. Current standard methods, such as capillary rheometry, can be of limited use due to their sample consumption requirements. This presentation explores 3-Dimensional Dynamic Light Scattering optical microrheology as an attractive alternative to current development paradigms while considering its potential applications and practical limitations.

11:45 Biophysical and Functional Characterisation of IgG1 Antibodies with Engineered Hexamerization Propensity
Simone De Haij, PhD, Director Functional Characterization & Bioassays, Genmab BV
Mutations stimulating hexamerization can potentiate complement activation and clustering of cell surface receptors. Fc-Fc interactions are enhanced selectively at the cell surface and not in solution (controlled oligomerization). Case studies will be discussed with special emphasis on development of assays demonstrating hexamerization potential, functional and biophysical behavior during long-term stability, and impact of formulation.

12:15 Single Use Fluoropolymer Systems for Biomanufacturing: From Bench to Clinic
Entegris
Julien Muzard, Field Applications Engineer, Life Sciences - EMEA, Entegris
Disposable technologies are now widely accepted as gold standard in the industry covering every single steps of the biomanufacture process. This presentation examines the benefits of fluoropolymer film that cope with a wide scope of applications (e.g. cell banking, cell & gene therapy, vaccinology, purified proteins

9th Annual

PROTEIN STABILITY & AGGREGATION

Advances in Particle Analytics and Stability Prediction

at various scales. This presentation will be illustrated with recent case studies on carefully selected molecular entities (e.g. lactalbumin) and submicron particles of biopharmaceutical interest.

12:30 Fast, Simple and Convenient Solution to Monitor the Protein Functionality During Your Stability Studies

Ruizhi Wang, PhD, CEO & Founder, HexagonFab

We will showcase the protein binding assay to assess the functionality of your protein in as little as 25 min to aid your stability studies. Current protein analysis instruments predominantly use optical technology and thus require sophisticated and bulky equipment that leads to high running costs and maintenance schedules. HexagonFab's first product, Bolt, runs automated protein binding assays with minimal hands-on time, by dipping electrical sensors in your samples of interest.

12:45 Session Break

12:50 Luncheon Presentation *(Sponsorship Opportunity Available)* **or Enjoy Lunch on Your Own**

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Assessment of Self or Non-Specific Interactions of Therapeutic Proteins and ADCs (IN-PERSON ONLY)

Bernhard Valldorf, PhD, Principal Scientist & Lab Head, Formulation Development, EMD Serono

- *In silico* molecular descriptors – how well can we predict aggregation behavior of mAbs or fusion proteins? Where are the limitations?
- What is your favorite method/tool to characterize self-association and why?
- How do conjugation sites and methods influence self or non-specific interactions?
- What kind of short-term dataset is required to predict long-term stability? High-concentrated formulations – how can we prevent aggregation with new excipients or technical solutions?

BREAKOUT DISCUSSION: Polysorbate Challenges in Biotherapeutic Formulations (IN-PERSON ONLY)

Camille Dagallier, PhD, Senior Formulation Scientist, Biologics Drug Product Development & Manufacturing, Sanofi R&D

- Root causes for polysorbate degradation
- Mitigation strategies against polysorbate degradation
- Alternative approaches and surfactants?

STABILITY PREDICTIONS

15:25 Chairperson's Remarks

Salvador Ventura, PhD, Professor & Chair, Biochemistry & Molecular Biology, University Autonoma De Barcelona

15:30 Long-Term Stability Predictions of Therapeutic Proteins in Solution from Short-Term Stability Data

Matjaz Boncina, PhD, Associate Director, Biologics Drug Product, Technical Research and Development, Global Drug Development, Novartis

Stability data are key aspects of drug development and although being relatively simple on one hand they are very time-consuming on the other hand. Achieving robust and reliable long-term stability predictions from accelerated stability studies would be a holy grail of biologics development. In this presentation, I'll demonstrate accurate long-term stability predictions of multiple quality attributes for some proteins from short-term accelerated stability studies by using simple kinetic models.

16:00 Impact of Conjugation Site Selection & Method on the Stability and PK of ADCs

Christian A. Schroeter, PhD, Associate Director, ADCs & Targeted NBE Therapeutics, Merck KGaA

Appropriate selection of conjugation sites and conjugation technologies is now widely accepted as crucial for the success of antibody-drug conjugates (ADCs). Herein, we present ADCs conjugated by different conjugation methods to different conjugation positions being systematically characterized by multiple *in vitro* assays as well as *in vivo* pharmacokinetic (PK) analyses in transgenic Tg276 mice.

16:30 The Use of Osmolality in Assessing Protein Stability and Aggregation

Kendal Studd, Scientific Support Specialist, Application Sciences, Advanced Instruments LLC

Understanding the causes of protein instability and aggregation is critical in the biomanufacturing space. One method that is showing renewed interest in biomanufacturing, is osmolality. This well-established technique for measuring the concentration of a solute, has been shown to be impactful in a number of applications; AAV manufacturing, mAb production and downstream UF/DF processes. Today's seminar will provide insights on the use and benefit of osmolality in protein stabilization and aggregation.

FORMULATION AND ITS IMPACT ON STABILITY

17:00 Highly Concentrated SubQ Formulations and Tackling Protein Aggregation

Karoline B. Bechtold-Peters, PhD, Senior Strategy & Technology Leader, Pharmaceuticals & Biopharma Process, Novartis Pharma AG

Subcutaneous administration of therapeutic proteins has gained increasing importance and allows many benefits for patients. However, since application volumes are limited compared to IV, much higher protein concentrations must be achieved, which promote protein-protein interactions and possibly protein aggregation. Recent developments target excipients that prevent this or completely different technical solutions, namely concentrated suspensions instead of solutions. SubQ application should be in mind already in the design phase of drugs.

9th Annual

PROTEIN STABILITY & AGGREGATION

Advances in Particle Analytics and Stability Prediction

17:30 The Polysorbate Challenges in Biotherapeutic Formulations – Digging into the Mechanism of Metal-Catalyzed Oxidation of PS80 & mAb to Develop Mitigations

Camille Dagallier, PhD, Senior Formulation Scientist, Biologics Drug Product Development & Manufacturing, Sanofi R&D

Polysorbates commonly used as surfactants in biotherapeutic formulations are known to be prone to degradation, mainly by oxidation or enzymatic hydrolysis. Results of a study that examined the oxidation of polysorbate 80 (PS80) and of a monoclonal antibody (mAb) are presented. In particular, the impact of different conditions and factors was evaluated, focusing on different formulation components and on the presence of iron contaminants.

18:00 Understanding Protein-Protein Interaction in Protein Coformulation Drug Product

Jing Song, Associate Principal Scientist, Analytical Enabling Capabilities, AR&D, MSD

Development of co-formulated protein products is one of the enhanced formulation strategies to obtain a better product aiming to overcome resistance, eliminate co-administration errors, reduce cost in clinics and provide patients with convenience. Potential protein-protein interactions in the co-formulated products, however, cause potential risks in product stability, safety, and efficacy. Thus, a risk assessment and phase-appropriate approach for protein-protein interaction characterization will be proposed.

18:30 Close of Summit

5th Annual

CELL LINE AND SYSTEMS ENGINEERING

Expanding the Protein Expression and Production Toolbox

SUNDAY 13 NOVEMBER

12:00 Registration Open

14:00 Recommended Short Courses*
SC3: Use and Troubleshooting of Eukaryotic Expression Systems
*Separate registration required. See short courses page for details.

MONDAY 14 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Group Lounge

TOOLS FOR CELL LINE ENGINEERING AND DEVELOPMENT

8:25 Chairperson's Opening Remarks
Johan Rockberg, PhD, Professor, Antibody Technology and Directed Evolution, KTH Royal Institute of Technology, Sweden

8:30 Design and Engineering of Mammalian Cell Expression Systems Using Synthetic Biology
Adam J Brown, PhD, Associate Professor, Chemical & Biological Engineering, University of Sheffield
A genetic expression vector encodes not only the product, it also harbours other DNA sequences that direct the rate of cellular synthetic processes acting in concert to massively impact the functional performance of the engineered cell and product manufacturability. Our genetic parts toolbox is however rather limited; new parts and engineering strategies are required to enable product-specific design of mammalian expression systems.

9:00 Materials Science Solutions to Enable Co-Culture of Organisms with Different Growth Rates and Specialisations
Karen M. Polizzi, PhD, Professor of Biotechnology, Department of Chemical Engineering, Imperial College London
Co-culture of multiple organisms in the same vessel can be used to facilitate bioproduction or to integrate living cells as analytics in bioprocessing. However, growing organisms together that have different growth rates can lead to one type of cell outcompeting the others. Here we discuss a materials science solution to enable co-cultures by using cell encapsulation to contain the fast-growing population, allowing cells to grow together in harmony.

9:30 Genome Editing-Based Approaches to Facilitate the Purification and Characterization of Human Macromolecular Assemblies
Arnaud Poterszman, PhD, Research Director, Integrated Structural Biology, IGBMC, France
Macromolecular complexes are cornerstones of most biological processes and their preparation in quantity and quality is often a bottleneck. After an overview of widely used recombinant expression approaches, we will illustrate the potential CrispR/Cas9 edited cell lines where the target protein is fused to an affinity tag to facilitate the isolation of endogenous macromolecular complexes. Benefits and limitations of this approach will be discussed.

10:00 Automated Workflow for Screening of CRISPR-Edited Cell Lines and Analysis of Monoclonality
Carola Mancini, PhD, Application Scientist, BioPharma Division, Molecular Devices
CRISPR/Cas9 technology has revolutionized targeted gene editing within different applications, including disease model development. We describe an automated workflow integrating different devices to streamline cell line editing. We used CRISPR technology to knockdown the p53 protein in HEK293 cell line. Edited cells were imaged for monoclonality assessment. Measurement of the apoptotic marker Annexin V showed that p53-knockdown cells has decreased cellular apoptotic activity on induction of apoptosis.

10:15 Optimizing Cell Line and Cell Culture Processes
Julian Riba, PhD, CEO, CYTENA
There is an ever-growing need to make the CLD process more efficient in order to keep up with the demand for better therapies. I will present the benefits of the UP.SIGHT, CYTENA's new single-cell cloning and plate imaging instrument that achieves a probability of clonality >99.99% using 3D Full Well Imagining. I will also introduce a new, automated work station for screening hundreds of clones without user interaction.

10:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

11:15 Enhanced Metabolism and Negative Regulation of ER Stress Support Higher Secretion of Glycoproteins in HEK293
Johan Rockberg, PhD, Professor, Antibody Technology and Directed Evolution, KTH Royal Institute of Technology, Sweden
Recombinant protein production burdens cell metabolism which may affect titer and quality. Stable HEK293 clones producing either secreted erythropoietin or GFP at different rates were subjected to multi-omics characterization. EPO producers displayed both a shift in oxidative phosphorylation and in ribosomal structure compared to host and GFP. A super producer clone of EPO displayed high expression of negative regulation of ER stress genes which was functionally validated to increase titer.

11:45 A Cell-based Receptor Discovery Platform Enables the Identification of Host Factors Specifically Targeted by the SARS CoV-2 Spike
Bushra Husain, PhD, Director, Biologics Engineering, AstraZeneca
Coupled to tetramer-based screening for increased binding avidity, we developed a high throughput cell-based platform that enables systematic interrogation of receptor-ligand interactomes. Using this technology, we characterized the cell surface proteins targeted by the receptor binding domain (RBD) of the SARS-CoV spike protein. Host factors that specifically bind to SARS CoV-2 but not SARS CoV RBD were identified, including proteins that are expressed in the nervous system or olfactory epithelium.

12:15 The Leap-in Transposase Platform: Past, Present and Future
Oren Beske, PhD, Amalgamator of Business and Biology, ATUM
Launched only a few years ago, the Leap-In Transposase platform has rapidly become an industry standard technology for the generation of CHO cells for the manufacturing of antibodies and other

5th Annual

CELL LINE AND SYSTEMS ENGINEERING

Expanding the Protein Expression and Production Toolbox

biologics. This presentation will highlight achievements and case studies of the platform including high titer mAb manufacturing, rapid anti-COVID responses, and some novel, next-generation applications.

12:45 Session Break

12:55 LUNCHEON PRESENTATION I: Accelerating Upstream Process Development with Direct CQA and Media Analysis Feedback

Nick Pittman, Marketing Manager, Global Biopharmaceutical Business, Waters Corporation

Real-time product attribute and spent media information is important to upstream bioprocess optimization, analysis results are often lagging by weeks. Engineers can now take decisions faster by producing their own at-line quality data, accessible workflows coupling small bioreactors like Sartorius Ambr systems to Waters' BioAccord LC-MS system. Drug quality and yield can be maximized, and downstream impurities minimized. Development is accelerated from weeks to days, saving resources from multiple optimization cycles.

13:25 LUNCHEON PRESENTATION II: Efficient Therapeutic Development Using the Pelican Expression Technology Platform

Diane Retallack, Senior Vice President, Platform Technology and Innovation, Pelican - A Ligand Technology

The Pelican Expression Technology platform (formerly Pfenex Expression Technology) is a robust, cost-effective, commercially validated, P. fluorescens-based platform for recombinant protein production, with four approved products utilizing the technology. Case studies are presented demonstrating the extensive Pelican toolbox of genetic elements, host strains, and automated strain screening that enabled rapid screening and development of several candidates including enzymes and challenging antibody formats.

13:55 Session Break

CHO CELL LINE ENGINEERING AND DEVELOPMENT

14:15 Chairperson's Remarks

Bjørn Voldborg, MSc, Head, National Biologics Facility, DTU Bioengineering, Technical University of Denmark

14:20 Reprogramming of CHO Cells towards Enhanced Protein Secretion

Mauro Torres, PhD, Research Associate, Manchester Institute of Biotechnology, University of Manchester

A robust secretory phenotype is fundamental for the high-level production of biopharmaceuticals, particularly for those with complex molecular architecture. However, the current CHO cell platforms present deficient protein secretion rates (when compared to dedicated secretory cells). Here, we will discuss the use of regulatory transcription factors as tools for reshaping cellular phenotype and show their potential for engineering CHO cells towards an increased protein secretion.

14:50 Generation of Superior Host Cell Lines for Biomanufacturing Using Plasmid Design & Cell Line Engineering Technologies

Anett Ritter, PhD, Investigator III, Cell Line Screening & Development, Novartis Pharma AG

The presentation covers recent advances of Novartis Cell Line Development toolbox of plasmid elements and novel engineered CHO cell lines, which resulted in increased clone productivity and genetic stability as well as an improved product quality for complex therapeutic proteins. Combining vector technologies with a robust CHO cell line, an accelerated cell line development process was developed for antibodies with significantly reduced efforts for the generation of high-producing CHO clones.

15:20 Engineering and Validation of a Dual Luciferase Reporter System for Quantitative and Systematic Assessment of Regulatory Sequences in CHO Cells

Serif Senturk, PhD, Research Group Leader, Functional Cancer Genomics Group, Izmir Biomedicine and Genome Center, Dokuz Eylul University

Selecting potent regulatory sequences with robust transgene expression is critical for CHO cell line engineering. This talk summarizes the development and validation of a dual luciferase reporter system for quantitative interrogation of such sequences in transient and stable transfectants of CHO cells. Functional execution of this toolkit was achieved with several known constitutive promoters. Together, the reporter system is a viable tool for selecting established or identifying novel regulatory sequences.

15:50 StoCellAtor: A Bacterial Cell Modelling Framework Linking Resource-Based Stochastic Translation to the Optimal Design of Synthetic Constructs

Peter Sarvari, MEng, MSci, eTrading Quant, Global Markets, BNP Paribas

We built StoCellAtor, a bacterial whole-cell modelling (WCM) framework that entails a detailed, codon-level translation model combined with the stochastic version of an existing WCM. StoCellAtor can be used to link a synthetic construct's modular design (promoter, ribosome binding site, and codon composition) to protein yield and cellular burden during continuous culture, with a particular focus on the effects of low-efficiency codons and their impact on ribosomal queues.

16:20 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:05 Tailored Glycosylation, Improved Quality and Faster Cell Line Development

Bjørn Voldborg, MSc, Head, National Biologics Facility, DTU Bioengineering, Technical University of Denmark

Through targeted and systematic CHO cell line engineering, we have developed CHO cell-based platforms, enabling rapid production of tailored glycoforms on therapeutic proteins, with improved protein quality and predictable cell line development. With the glycoengineered CHO platform (geCHO), the effect of N-glycans on therapeutic proteins can be screened, to determine the optimal glycoform which can then be manufactured using the geCHO cell lines.

17:35 The GlycomiR Toolbox: A Novel System for Glycosylation Engineering by Natural and Artificial miRNAs

Florian Klingler, MSc, Researcher, Kerstin Otte Laboratory, Biberach University of Applied Sciences

N-linked glycosylation is a critical quality attribute of many biopharmaceutical products that needs to be controlled. A screening of a miRNA library identified 82 miRNA sequences capable of altering galactosylation, sialylation, and fucosylation. Subsequent validation provided insight into the intracellular mode of action of miRNAs regulating cellular glycosylation pathways. Moreover, a multiplex modulation approach and rational design of artificial miRNAs demonstrated the potential of miRNAs to fine tune expressed glycosylation patterns.

18:05 Welcome Reception in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

19:05 Close of Cell Line & Systems Engineering Conference

15th Annual

OPTIMISING EXPRESSION PLATFORMS

Employing Cell Factories for the Enhanced Production of Biotherapeutic Proteins

SUNDAY 13 NOVEMBER

14:00 Recommended Short Courses*
SC3: Use and Troubleshooting of Eukaryotic Expression Systems
*Separate registration required. See short courses page for details.

TUESDAY 15 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Group Lounge

OVERCOMING EXPRESSION AND PRODUCTION CHALLENGES OF DIFFICULT-TO-EXPRESS PROTEINS

8:25 Chairperson's Opening Remarks
Eva-Kathrin Ehmoser, PhD, Head of Institute for Synthetic Bioarchitectures, NanoBio Technologie DNBT, University of Natural Resources & Life Sciences

8:30 Cell-Free Protein Synthesis of Viral (Membrane) Proteins for Structural Studies
Anja Böckmann, PhD, Research Director, Biology & Chemistry of Proteins, MMSB CNRS, Université de Lyon
Cell-free protein synthesis (CFPS) systems present an excellent approach for the structural studies of complex viral proteins, and we here show here how especially the eucaryotic wheat-germ CFPS can be implement for structural investigations, notably using solid-state nuclear magnetic resonance (NMR). We present applications for the expression of several difficult-to-produce viral proteins of Hepatitis B, C, and D viruses, SARS-CoV-2, and Congo-Crimean hemorrhagic fever virus.

9:00 Enhancing the Cell-Free Expression of Native Membrane Proteins by *in silico* Optimization of the Coding Sequence – An Experimental Study of the Human Voltage-Dependent Anion Channel
Eva-Kathrin Ehmoser, PhD, Head of Institute for Synthetic Bioarchitectures, NanoBio Technologie DNBT, University of Natural Resources & Life Sciences
Studying biological systems represents a challenging task due to the inherent complexity of living cells. Attempts to create membrane proteins outside living cells, namely from cell lysates, have brought us to an alternative route of protein synthesis based on a translation initiation model for prokaryotic protein biosynthesis to assess and optimize the expression potential.

9:30 A Cost-of-Goods Modelling Analysis Comparing a Novel Cell-Free Platform to a Conventional Cell-Based Bioprocess for the Production of Highly Potent Neurotoxins
Williams Olughu, PhD, Senior Principal Scientist, Ipsen
A decisional tool was developed to evaluate a cell-free synthesis system's economic and operational performance compared to an *E. coli* process used to manufacture highly potent biotherapeutic proteins. The real-world simulated scenarios highlighted areas where the cell-free platform offered up to 35% savings. Ultimately, the advantage of identifying when the cell-free platform outperforms was equivalent to reducing process development times by up to 18 person-months—potentially accelerating life-saving medicines to patients.

10:00 Human IgG Fc Production through Methanol-Free *Pichia pastoris* Fermentation
eppendorf
Ying Yang, PhD, Eppendorf, Inc.
Therapeutic mAbs are predominantly produced with mammalian cell culture systems such as those using Chinese hamster ovary (CHO) cells. The yeast *P. pastoris* has become a substantial workhorse for recombinant protein production. However, the N-linked glycosylation in *P. pastoris*, namely high mannose glycosylation, is significantly different from that in CHO or other mammalian cells. This presentation showcases the potential of *P. pastoris* as a next-generation mAb production platform.

10:15 Rebuilding the Cell-Free System and the Applications for R&D of Biologics
GeneFrontier
Takashi Ebihara, PhD, COO, GeneFrontier Corporation
Our unique platform technology, PURExfrex, is a fully reconstituted (or rebuilt) cell-free protein expression system. It's easy to customize the system for various applications, and useful for high throughput screening of various kinds of biologics as well. Plus, we established robust ribosome display with customized PURExfrex and named PURExfrexRD, which has great advantage in screening of highly diversified library to generate new biologics such as antibodies or cyclic peptides.

10:30 Session Break and Transition into Plenary Keynote

ROOM LOCATION: Zafir

PLENARY KEYNOTE SESSION

10:40 Plenary Keynote Introduction

Ahuva Nissim, PhD, Professor, Antibody and Therapeutic Engineering, William Harvey Research Institute, Queen Mary University of London
E. Sally Ward, PhD, Director, Translational Immunology; Professor, Molecular Immunology, Centre for Cancer Immunology, University of Southampton

10:45 KEYNOTE PRESENTATION: Evolution of Antibody Technologies
Jane K. Osbourn, PhD, CSO, Alchemab Therapeutics Ltd.
It is nearly fifty years since the discovery of monoclonal antibodies, the first drug approval coming soon after in 1986. From this early success, approval rates took time to ramp up and significant efforts were focused on building a range of technologies to deal with the technical challenges of antibody-drug discovery. This talk will discuss how antibody technologies have evolved and consider where future innovation may lie.

11:30 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

12:15 Cell-Free Synthesized G-Protein Coupled Receptors for Structural Evaluation by Cryo-Electron Microscopy and Combined *in vitro/in vivo* Studies
Frank Bernhard, PhD, Lab Leader, Institute of Biophysical Chemistry, Goethe University
The cotranslational insertion of nascent GPCRs and other membrane proteins into MSP or SapA-based

nanoparticles by cell-free protein synthesis generates high-quality samples for functional and structural studies. We demonstrate strategies for cell-free GPCR/nanoparticle formation, their lipid-dependent functional analysis, and the cryo-electron microscopy characterization of GPCR/G-protein complexes. GPCRs were further transferred from nanoparticles into membranes of living cells to study their activity and interactions with endogenous proteins.

12:45 How to Reach Biopharma Quality and Productivity Goals? Having a Versatile Platform in Place

FyoniBio

Lars Stöckl, Managing Director, FyoniBio GmbH

- Versatile expression platform for different quality needs of biopharmaceutical: CHOnamite vs GEX
- Special emphasis on glycosylation from different host cell systems of crucial importance for biosimilar development
- Increase of quality (e.g., glycosylation) and productivity by process optimization

13:15 Session Break

13:20 LUNCHEON PRESENTATION I: Selexis DNA-FISH/Karyotyping Platform: An Industrial Platform For High-Throughput Data Analysis

KBI SELEXIS

Ghislaine Arib, PhD, Genomics Director, Cell Line Development R&D, Selexis

Speed and cost-effectiveness are the main features of Selexis' cytogenetics industrial platform for high throughput karyotype data analysis. It enables routine investigation of clonality assessment by overcoming the key limitations of the FISH (fluorescence *in situ* hybridization) and karyotyping assay.
FISH karyotyping can detect transgene integration sites and chromosomes rearrangements without performing a subcloning step, thus making it a suitable method for clonality assessment of randomly generated recombinant cell lines.

13:50 Luncheon Presentation *(Sponsorship Opportunity Available)* **or Enjoy Lunch on Your Own**

14:20 Session Break

OVERCOMING EXPRESSION AND PRODUCTION CHALLENGES FOR UNIQUE PROTEINS

14:30 Chairperson's Remarks

Richard Altman, MS, Field Application Scientist, Life Science Solutions, Thermo Fisher Scientific

14:35 Suitability of Transiently Expressed Antibodies for Clinical Studies

Sara Rodriguez Conde, PhD, Associate Director, Cell Culture & Fermentation Sciences, BioPharmaceuticals Development, R&D, AstraZeneca

Traditionally, transient gene expression (TGE) has been the technology used for production of therapeutic proteins at early drug development stages as it allows for rapid production of high-quality material. In this study, two anti-viral mAbs were produced using AstraZeneca's proprietary CHO-based transient expression system. To assess the suitability of transiently-generated material for clinical studies, batch-to-batch product quality consistency as well as process scalability were investigated.

15:05 Producing Challenging Protein Targets for Drug Discovery

Bryony Ackroyd, PhD, Senior Protein Scientist, Discovery Biology & Discovery Sciences R&D, AstraZeneca

Targets for drug discovery projects are becoming more diverse and challenging. They are chosen based on evidence linking them to human disease and not on the challenges, which need to be overcome to express these proteins in suitable quantity and quality to support drug discovery projects. A number of examples of recent AstraZeneca projects will be presented, in which difficult expression/purification challenges have been overcome.

15:35 Warp Speed: Scalable, 4-8 g/L CHO Production Processes in 8 Weeks

ExcellGene EXPECT GREAT SCIENCE

Joeri Kint, PhD, Head of Business Development, Marketing and Sales, ExcellGene

The development of cell lines and production processes for biologics has always been a painstakingly slow process. When the COVID-19 pandemic hit, companies and governments underwent pressure to adapt, and procedures that were seemingly cast in stone changed. Fortunately, we were at the front line during this paradigm-changing event. Here, we present our journey on how we reduced our timelines for our cell line and process development without compromising quality and yield.

16:05 Refreshment Break in the Hall with Poster Viewing (Verdi and Vivaldi 1&2)

17:00 Compartmentalisation of Transcription and Translation in Cell-Free Protein Synthesis Using a Membrane Reactor Design

Beatrice Melinek, PhD, Bioprocess Engineer, University College London

Advances in cell-free protein synthesis (CFPS) offer the prospect of industrially-relevant production processes for stratified and personalised protein therapeutics, with the potential for greater development and production speed, control over process environment, and improved consistency. We present studies of how a membrane reactor can be used to improve the economics, titre, and product quality, by recreating the localised enzyme concentrations seen in the cellular environment.

17:30 Cell-Free Expression of the Outer Membrane Protein OprF of *Pseudomonas aeruginosa* for Vaccine Purposes

JeanLuc Lenormand, PhD, Professor, Team Leader, University of Grenoble Alpes

The outer membrane protein OprF of *Pseudomonas aeruginosa* is a well conserved and immunogenic porin playing an important role in quorum sensing and in biofilm formation. We used a cell-free expression system to reconstitute OprF under its native forms and active open oligomerized state in liposomes and we demonstrated that the resulting OprF proteoliposomes can be used as a fully functional recombinant vaccine against *P. aeruginosa*.

18:00 POSTER HIGHLIGHT: A Unique Screening System to Develop *E. coli* Mutants for the Efficient Production of Difficult to Express Therapeutic Proteins

Michael Deghelt, PhD, de Duve Institute, University of Louvain

18:10 POSTER HIGHLIGHT: Chemical Filtering: A Post-Transfection Directed Evolution Strategy to Improve Productivity of Difficult-to-Express Antibodies in CHO Cell Lines

Chillel Jawara, Graduate Student, Chemical & Biological Engineering, University of Sheffield

18:20 PANEL DISCUSSION: Protein Production Lab Challenges: Methodologies, Strategies, and the Art of Managing Multiple Projects

Moderator: Richard Altman, MS, Field Application Scientist, Life Science Solutions, Thermo Fisher Scientific

This panel will focus on the following topics:

- Lessons learned from managing a protein production workflow during a pandemic.
- Strategies on how to manage multiple "top priority" projects.
- Strategies for supporting the professional growth and career development of direct reports.
- How do we make time for technical development and process optimization?
- Troubleshooting strategies or how much time should be spent before moving to the next option?

Panelists:

Nicola Burgess-Brown, PhD, Director of Enzymology and Protein Engineering, Exact Sciences Innovation
Peter Schmidt, PhD, Director, Recombinant Technologies, R&D, CSL Behring GmbH
Bjørn Voldborg, MSc, Head, National Biologics Facility, DTU Bioengineering, Technical University of Denmark

19:00 **Close of Optimising Expression Platforms Conference**

7th Annual

PROTEIN PURIFICATION TECHNOLOGIES

Innovating, Renovating, and Revising Processes to Keep Ahead of Demands

SUNDAY 13 NOVEMBER

14:00 Recommended Short Courses*
SC3: Use and Troubleshooting of Eukaryotic Expression Systems
*Separate registration required. See short courses page for details.

WEDNESDAY 16 NOVEMBER

7:30 Registration and Morning Coffee (Garden Room)

ROOM LOCATION: Group Lounge

EXPRESSION & PURIFICATION STRATEGIES FOR UNIQUE PROTEINS

8:25 Chairperson's Opening Remarks
Nicola Burgess-Brown, PhD, Director of Enzymology and Protein Engineering, Exact Sciences Innovation

8:30 Recombinant Proteins as Intermediate Reagents: Final Applications Will Require Alternative Protocol Design and Quality Controls
Ario De Marco, Associate Professor, Lab for Environmental & Life Sciences, University of Nova Gorica
Data reliability is a cornerstone of scientific work and the process to improve good practices for the evaluation and report of experimental results has been constant. Due to the extremely large variety of potentially alternative protocols, the identification of minimal sets of meaningful and implementable analyses suitable for recombinant protein quality assessment has been complicated. Further tests might become necessary when proteins are used for specific applications.

9:00 Sane in the Membrane – The Salipro Platform for GPCRs and Ion Channels for Drug Development
Jens Frauenfeld, PhD, Founder & CEO, Salipro Biotech AB
Membrane proteins are important drug targets (GPCRs, ion channels), yet are notoriously difficult to work with. We'll present case studies on our latest research on the prominent drug targets CXCR4 and TRPV3 with direct extraction from crude cell membranes into lipid Salipro particles. This direct approach enables entirely new possibilities for *de novo* development and characterisation of biologics and small molecules, including phage display, B cell sorting, and cryoEM.

9:30 How a Single Protein Tag Provides a Platform for Key Processes in Antibody Production iba
Fabian Mohr, PhD, Vice President Research & Development, IBA Lifesciences GmbH
Antibodies play an important role in immune responses and serve as treatment options for infections or diseases. The identification of well-working antibodies is a complex procedure involving several different steps: the initial production of the antigen, immunization of a host, retrieving the produced antibodies and screening for promising candidates. A protein tag can provide options to centralize these steps onto one platform, making the entire process more time- and cost-effective.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing (Verdi and Vivaldi 1&2)

10:45 Enhanced Stability of Detergent-Free Human Native STEAP1 Protein from Neoplastic Prostate Cancer Cells upon an Innovative Isolation Procedure
Luis Passarinha, PhD, Assistant Professor, Health Sciences Research Centre, Universidade da Beira Interior
The STEAP1 is a cell-surface antigen over-expressed in prostate cancer, which contributes to tumor progression and aggressiveness. However, the molecular mechanisms underlying STEAP1 and its structural determinants remain elusive. Here, we successfully purified native protein from LNCaP cells by exploring hydrophobic matrices followed by Co-Immunoprecipitation. The obtained sample was used to gather new insights regarding biophysical and secondary structural properties of STEAP1 by Thermal Stability Assay and Circular Dichroism Spectroscopy.

11:15 Accelerating Drug Discovery: A Refresh of the Lead Panel Generation Phase within Biopharm Discovery
Edward Coulstock, PhD, Associate Fellow & Scientific Leader, BMPD MDE, GlaxoSmithKline
This presentation discusses GSK's refinement of the Lead Panel mAb generation stage as part of our revised End-to-End approach to keep the discovery funnel wider, for longer; to enable us to express and purify panels of antibodies in a high-throughput, semi-automated manner; to enable parallel prosecution of biological and developability screens, thereby accelerating our drug discovery process.

11:45 KEYNOTE PRESENTATION: Why you Need Both Crystallography and EM to Study GPCRs and Design Drugs, and How to Get There
Andreas G. Plueckthun, PhD, Professor & Head, Biochemistry, University of Zurich
We developed several technologies that allow G-protein coupled receptors to be functionally expressed at much higher levels in a variety of hosts, and increase their stability. This has permitted us to determine structures of several receptors by both X-ray crystallography and cryo-electron microscopy, allowing us to study the full conformational range from inverse agonists to full agonists with and without trimeric G proteins, uncovering important aspects of drug structure and activity.

12:15 Automated, Integrated Workflows for Purification Process Development of New Molecular Formats Lonza
Jean Aucamp, Associate Director, R&D, Biologics • Research and Development, Lonza
New molecular formats (NMF) cover a multitude of therapeutic protein modalities of increased structural complexity. Diverse, yet unique, challenges are encountered with these entities during purification process development. Lonza developed a modular toolbox approach to meet these challenges. This presentation will focus on automated medium and high throughput workflows which were established for the rapid and reliable execution of early-phase development screens.

12:45 Session Break

12:50 LUNCHEON PRESENTATION I: TurboCHO Antibody Expression: For when Faster Speed and Higher Quality Matters GenScript
Robert Ford, PhD, Field Application Scientist, Commercial, GenScript Biotech (Netherlands) B.V.
Recombinant antibody expression in mammalian cells is crucial to ensure the reliable supply and batch-to-batch consistency of potential antibody drugs. The challenges of antibody expression projects are: 1) insufficient antibody yield 2) long time to completion 3) budget overruns. To ease these pain-points, GenScript has launched its proprietary TurboCHO platform, which offers higher yield performance within a

7th Annual

PROTEIN PURIFICATION TECHNOLOGIES

Innovating, Renovating, and Revising Processes to Keep Ahead of Demands

shorter time period to support all stages of the drug development pipeline.

13:20 LUNCHEON PRESENTATION II: Streamlining Biotherapeutic Development Programs with Next-Generation Transposon Vectors

Ana Rebocho, PhD, R&D Manger, Bioproduction, Horizon Discovery

The Horizon's CHOSOURCE expression platform has been recently improved by the introduction of the new CHOSOURCE TnT transposon technology. The TnT expression system takes advantage of transposases that allow the generation of stable high producing clones. The partnership of CHOSOURCE TnT with CHOSOURCE cell lines enables the implementation of a robust and safe cell line development pipeline with high productivity and stability, contributing to the acceleration of biologic development programs.

13:50 Dessert Break in the Exhibit Hall & Last Chance for Poster Viewing (Verdi and Vivaldi 1&2)

14:45 Breakout Discussions

Breakout Discussions are informal, moderated, small-group discussions, allowing participants to exchange ideas and experiences and develop future collaborations around a focused topic. Each discussion will be led by a facilitator who keeps the discussion on track and the group engaged. For in-person events, the facilitator will lead while sitting with delegates around a table. For virtual attendees, the format will be in an online networking platform. To get the most out of this format, please come prepared to share examples from your work, be a part of a collective, problem-solving session, and participate in active idea sharing.

BREAKOUT DISCUSSION: Transient Protein Production Challenges IN PERSON ONLY

Richard Altman, MS, Field Application Scientist, Life Science Solutions, Thermo Fisher Scientific

We discuss challenges facing researchers as they try to meet an expanding demand for transiently produced recombinant protein.

- What are the current challenges to transient protein production?
- How do we optimize the whole protein expression process?
- What parameters can impact the quality or physical attributes of transiently produced proteins?

BREAKOUT DISCUSSION: High-Throughput (HTP) Protein Production IN PERSON ONLY

Nicola Burgess-Brown, PhD, Director of Enzymology and Protein Engineering, Exact Sciences Innovation

- Benefits of testing multiple constructs in parallel.
- HTP cloning or gene synthesis? HTP expression screening in multiple hosts: What scale, conditions, equipment, readout?
- How to screen intracellular, secreted and membrane proteins in HTP?
- Choice of purification tags for HTP screening.
- Challenges of working in HTP: What conditions to test first to increase success?

INNOVATING PURIFICATION PROCESSES

15:25 Chairperson's Remarks

Dennis Karthaus, PhD, Manager, Media and Processes, Sartorius Xell GmbH

15:30 Novel Strategies for Development of Affinity Purification Platforms

Sophia Hober, PhD, Professor, School of Biotechnology, KTH Royal Institute of Technology

Due to the costly and time-consuming production of biologicals, selective affinity purification methods are desirable. For effective elution from the matrixes, low pH is commonly used. These harsh conditions might compromise the yield of the biologic drug. Therefore, combinatorial libraries for selection of ion-dependent high-affinity binders have been designed. These libraries and how to utilize them for selection and development of efficient protein purification methods will be presented.

16:00 Design and Discovery of Affinity and Mixed-mode Adsorbents

Cecilia Roque, PhD, Associate Professor in Bioengineering, NOVA University of Lisbon

Small synthetic compounds, tailor-made for selected biological targets, can be used as ligands in bioseparation. In this talk, we will show how rationally designed chemical combinatorial libraries support the development of robust peptidomimetics that can be easily adapted to several targets and to chromatographic and non-chromatographic methods.

16:30 Simple Reactions – Radical Results; Cell-Free Protein Production Scaled According to Customer's Needs

Ricarda Finnern, PhD, CSO, LenioBio GmbH

ALiCE is a eukaryotic cell-free protein synthesis system that can be used to rapidly produce complex proteins at high yield and at a scale useful to protein manufacturing. We present case studies of cytosolic and microsomally expressed proteins produced by ALiCE, and describe their subsequent purification and characterization.

17:00 Purification of a Peptide Tagged Protein via an Affinity Chromatographic Process with Underivatized Silica

Friederike Eilts, PhD, Research Associate, Bioseparation Engineering Group, Mechanical Engineering, Technical University of Munich

In biotechnology, the use of a histidine tag that is molecularly fused to a target protein and forms a selective coordinative bond with traditional IMAC, NTA, or IDA functionalized materials to analyze and purify proteins quickly and specifically is well established. This talk introduces a new peptide tag that enables a novel affinity purification technique using underivatized silica.

17:30 Protein Tag Technology toward the Sustainable Production of Protein-Engineered Materials

Tatiana Q. Aguiar, PhD, Postdoc, Centre of Biological Engineering, University of Minho

The utilization of proteins to engineer materials has allowed the development of novel and advanced functional materials with great promise for broad applications. To guarantee the sustainable manufacturing of advanced protein-engineered materials, protein tag-mediated strategies that combine the purification and immobilization of recombinant proteins/peptides onto/into natural, synthetic, or hybrid materials in a single step are arising and attracting increasing interest. This talk will address progresses and challenges in this field.

18:00 PANEL DISCUSSION: Purification Tag Technologies

Moderator: Dennis Karthaus, PhD, Manager, Media and Processes, Sartorius Xell GmbH

Panelists:

Tatiana Q. Aguiar, PhD, Postdoc, Centre of Biological Engineering, University of Minho

Friederike Eilts, PhD, Research Associate, Bioseparation Engineering Group, Mechanical Engineering, Technical University of Munich

Nicola Burgess-Brown, PhD, Director of Enzymology and Protein Engineering, Exact Sciences Innovation

18:30 Close of Summit

SPONSORSHIP OPPORTUNITIES

Comprehensive sponsorship packages allow you to achieve your objectives before, during, and long after the event. Signing on earlier will allow you to maximize exposure to hard-to-reach decision-makers.

PODIUM PRESENTATIONS - AVAILABLE WITHIN MAIN AGENDA!

Showcase your solutions to a guaranteed, targeted audience through a 15- or 30-minute presentation during a specific conference program. Package includes exhibit space, on-site branding, and access to cooperative marketing efforts by CHI. Presentations do sell out early.

ONE-ON-ONE MEETINGS

Work with us to identify your target prospects and we will schedule meetings for you. Think of us as your inside sales team with all your hottest leads in close reach. Opportunities sold on a very limited basis.

INVITATION-ONLY DINNER / HOSPITALITY SUITE

Sponsors will select their top prospects from the conference preregistration list for an evening of networking at the hotel or at a choice local venue. CHI will extend invitations, conduct follow-up and confirm attendees. The evening will be customized to meet with your specific objectives.

EXHIBIT BOOTH SPACE (sold as part of sponsorship packages only)

Exhibitors will enjoy facilitated networking opportunities with 1,000+ qualified delegates, making it the perfect opportunity to launch a new product, collect feedback, and generate new leads from around the world.

ADDITIONAL SPONSORSHIP & BRANDING OPPORTUNITIES INCLUDE:

- Hotel Room Keys
- Track Receptions
- Game Card
- Footprint Trails
- Conference Tote Bags
- Literature Distribution (Tote Bag Insert or Chair Drop)
- Padfolios
- Conference Material Advertisement

HOW SPONSORING PROMOTES & BENEFITS YOUR BUSINESS:

- Generate qualified leads consisting of actual decision-makers from within your focus area
- Network with 1,000+ senior-level professionals and generate leads during dedicated exhibit hall hours, lunches, etc.
- Promote your company's participation in the Program Guide & Event Directory – including contact information and 50-word company description
- Increase your brand awareness and drive organic traffic to your website through our various marketing campaigns
- Increase Dedicated Networking Time in the Exhibit Hall

FOR ADDITIONAL INFORMATION REGARDING SPONSORSHIP AVAILABILITY, PLEASE CONTACT:

COMPANIES A-K
Jason Gerardi
Sr. Manager, Business Development
781-972-5452 | jgerardi@healthtech.com

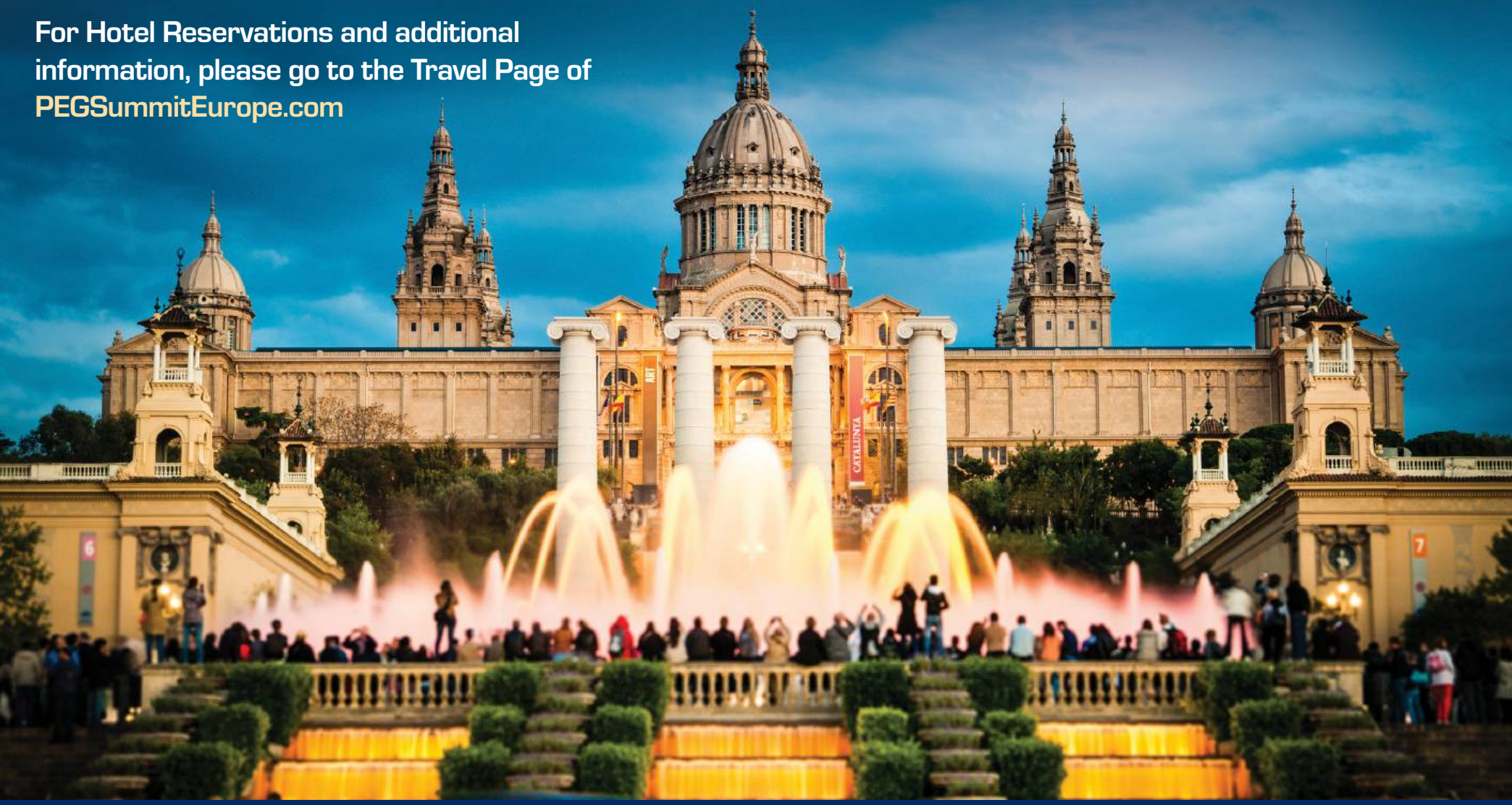
COMPANIES L-Z
Ashley Parsons
Manager, Business Development
781-972-1340 | ashleyparsons@healthtech.com

Join Us in Barcelona!

Conference Venue and Hotel:
InterContinental Barcelona
Avenida de Rius I Taulet, 1-3
Barcelona, 08004, Spain

Barcelona, the gateway to the Mediterranean! With its temperate climate, this dynamic city is filled with rich history and vibrant arts and culture that give it a reputation of being the business center in Southern Europe. An International City that has become a magnet for its exceptional dining, home-grown Catalan & contemporary architecture, like the architecture of Gaudi. A compact city easy to discover due to its linked-up local transport network of trains, metro, trams and buses that makes it convenient to see or explore nearby neighbourhood or district: wander the medieval streets of the Gothic Quarter, discover world class museums and galleries, treat the senses with local markets, and finally unwind in the many beautiful parks the city has to offer.

For Hotel Reservations and additional information, please go to the Travel Page of PEGSummitEurope.com



CONFERENCE PRICING

SHORT COURSES

	Commercial	Academic, Government, Hospital-affiliated
One short course	€629	€399

Sunday 13 November | 14:00 – 17:00
SC1: Developability of Bispecific Antibodies: Formats and Applications
SC2: The Tumour Microenvironment and Response to Cancer Immunotherapy
SC3: Use and Troubleshooting of Eukaryotic Expression Systems
SC4: Potency Assays and Comparability for Cell & Gene Therapies
SC5: Machine Learning Tools for Protein Engineering

IN-PERSON CONFERENCE PRICING

PREMIUM IN-PERSON PACKAGE - Includes live IN-PERSON access to ALL conferences and networking events Monday-Wednesday. Plus, On-Demand access to all conferences for one year. Excludes short courses.

Registration Rate after 14 October and on-site	€2999	€1399

	Monday 14 November	Tuesday 15 November	Wednesday 16 November
ENGINEERING	C1A: Display of Biologics	C1B: Engineering Antibodies	C1C: Machine Learning Approaches for Protein Engineering
TARGETS	C2A: Optimisation & Developability	C2B: Emerging Targets and Therapeutic Approaches	C2C: Antibodies Against Membrane Protein Targets
BISPECIFICS	TS3A: Introduction to Bispecific Antibodies (IN-PERSON ONLY)	C3B: Advancing Bispecifics and Combination Therapy to the Clinic	C3C: Engineering Bispecific Antibodies
IMMUNOTHERAPY	C4A: Modulating the Tumour Microenvironment	C4B: Winning Strategies for CAR T, TCR and TIL Therapies	C4C: Immunotherapy Safety & Efficacy
ANALYTICAL	C5A: Cell & Gene Therapy Analytics	C5B: Analytical Characterisation of Biotherapeutics	C5C: Protein Stability & Aggregation
EXPRESSION	C6A: Cell Line and Systems Engineering	C6B: Optimising Expression Platforms	C6C: Protein Purification Technologies

See website for details on Group discounts and On-Demand options

ALUMNI DISCOUNT 20% OFF
POSTER DISCOUNT €50 OFF*
POSTER DEADLINE: 14 OCTOBER 2022

WANT TO REGISTER BY PHONE?

Contact our Registration department at 781-972-5400 or Toll-free in the US 888-999-6288.

WAYS TO SAVE!

Alumni Discount - SAVE 20%: CHI appreciates your past participation at PEGS. As a result of the great loyalty you have shown us, we are pleased to extend to you the exclusive opportunity to save an additional 20% off the registration rate.

GROUP DISCOUNTS:
Have your colleagues or entire team attend! Purchase a full price registration and participants from the same organization will receive a 25% discount when registering through the Group Registration page. LEARN MORE
For more information on group discounts contact Elizabeth Lemelin at 781-972-5488.

POSTER DISCOUNT: €50 OFF*
POSTER SUBMISSION: Poster abstracts are due by 14 October 2022. Once your registration has been fully processed, we will send an email containing a unique link allowing you to submit your poster abstract and other materials. If you do not receive your link within 5 business days, please contact jring@healthtech.com.
**this discount does not apply to product or service providers*
CHI reserves the right to publish your poster materials in various marketing materials and products. LEARN MORE

POST-EVENT ON-DEMAND ONLY:
Includes post-event recorded access only. Does not include access to live Q&A or networking. LEARN MORE

ADDITIONAL REGISTRATION DETAILS
21% VAT will be added to each registration

**Alumni, Group, Protein Society or Antibody Society Membership, Twitter, LinkedIn, Facebook or any other promotional discounts cannot be combined. Discounts not applicable on Event Short Courses.*

VIDEO AND/OR AUDIO RECORDING OF ANY KIND IS PROHIBITED ONSITE AT ALL CHI EVENTS.

How to Register:
PEGSummitEurope.com
reg@healthtech.com
P: 781.972.5400
or Toll-free in the U.S.
888.999.6288
Please use keycode PGEF when registering