NEWSLETTER

of the European Society for Animal Cell Technology

March 2012

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ESACT legal issues and procedures for GA

ESACT goes legal

Most ESACT members might not be aware of the following: ESACT was never a legal entity in the eyes of the European fiscal bodies. However, a legal entity in form of a society that serves public needs is a pre-requisite to avoid tax payment. Another reason to become a legal society concerns the stringency by which European banks are controlled. The latter has made it difficult to deposit ESACTs savings. To overcome these problems we intended to establish ESACT as a legal entity. Since the tax authorities from most European countries accept such entities amongst each other, the registration could have been done at any country. For a number of practical reasons, we choose Germany and the city of Frankfurt for registration. Frankfurt is a central hub in Europe and a significant part of the ESACT membership is German. Further, the ESACT board often includes a German individual. The constitution is established in English and German (the latter is needed for legal reasons). The „new" society is called ESACTe.V.. „e.V." stands for „eingetragener Verein" and is nothing more than „a registered society". For practical reasons we will use the traditional term ESACT. The procedure for installing the legal society required that a few people (the former ESACT executive committee) started the endeavour as founding members and, in a second step, adopted all other ESACT members. These steps were discussed and agreed at the last General Assembly in Vienna. The final step in this procedure was that the founding members of ESACT e.V. at their first General Assembly decided to adopt all former ESACT members to the legal society. This has happened and, thus, since 1st of January 2012 we are all members of the new society.

In establishing the new society, we have tried to keep everything as it was before. However, due to legal reasons a few changes were unavoidable. Here, one major change will be brought to your attention: The General Assembly (GA).

The General Assembly has to take place once per year. As you know, in the past, the GA was always scheduled to the Tuesdays of the biannual ESACT Scientific meetings in order to allow maximal participation. We intend to keep this tradition and organize the General Assemblies during the ESACT meetings (in years when the ESACT meeting is held e.g 2013). All essential discussions will be on the agenda of these biannual GAs. The legally required GAs held during the intervening years (e.g. 2012) will show a minimal agenda and will be announced two months in advance to all members. We expect, however, that the required minimal quorum (40 members) might not be reached and, in such circumstances, a new date (at least 4 weeks later) will be defined and announced. For the second date, no quorum is required and the attending members will have a formal GA – however – without the power to make decisions that profoundly affect the society. This procedure, although cumbersome, is unavoidable. We expect that the GAs held in even years will only be attended by board members and decisions will be restricted to board issues. In summary, in future during the even years you will receive invitations to GAs that you might ignore.

Martin Fussenegger and Hansjorg Hauser

ESACT Meetings

Update on ESACT 2011 Vienna

In May 2011, the 22nd ESACT Meeting took place in the Hofburg in Vienna. Drawn by the unusually splendid location, a record number of 1012 registered participants crowded the former Imperial Palace. More than 60 exhibitors and 350 posters demonstrated both the economic and scientific importance of Animal Cell Technology. The programme spanned different aspects of ACT from Cell stability and differentiation, to Cells as Therapies and Stem Cells, to Biopharmaceutics and Vaccine Production and several sessions on the topic of how to achieve a better understanding of complex cellular processes, including protein production, secretion and processing. The newly introduced poster prize session gave young scientists the opportunity to highlight their work in short presentations, which were the basis for the poster prize selection by the audience. This procedure was introduced to stress the importance of the poster session and to give the audience a higher control over the prize selection. The procedure this year was a test run, which revealed some hitches, such as the necessity to communicate the precise procedure in more detail. Nevertheless, the overall response from the audience was very positive, so that the concept of short poster presentations will be followed up again in the 2013 meeting in Lille.

The social programme included an outing to Schloss Hof, a palace near Vienna, where participants list to a concert of baroque music followed by drinks on the terrace. Despite the unfortunate fact that food ran short and some were left hungry, the evening ended in best humour in the disco in the Palace stables. The conference ended with the traditional Gala Diner and Party at the Vienna Prater with plenty of food and dancing until the early hours.

Overall it was a great pleasure to host you in Vienna!

Hermann Katinger and Nicole Borth

2013 - ESACT Meeting in Lille, France

Better Cells for Better Health

In June 2013, after Vienna, the 23rd ESACT Meeting of the series will take place in France, at the Congress Centre of Lille (*Lille Grand Palais*). Lille is a beautiful city, born "out of the water" at around 1000 AD (L'isle (old French) = the isle). Initially a Flemish city, it changed hands a few times to become Burgundian, then Spanish, and finally French in 1667. In the 19th century Lille was an industrial power and thrived in the metalwork, chemistry and textile industries. Today, Lille is the 4th largest French metropolitan area, an artistic and historic city, but also a centre of economy, higher education and R&D. Lille is easily accessible by fast intercity train, car or plane, from Brussels, London and Paris international airports. More than 2000 hotel rooms are available within walking distance from the Congress Centre.

For the Lille ESACT meeting, the Scientific Committee decided that the sessions will not be organized on the basis of "traditional topics", but transversally around technology. The general idea would be driven by a **"Systems approach: from prediction to production"** and will aim at **"bringing together the basics and technology"**. To reflect the rapid advances in the field of animal cell culture, the Scientific Committee aims at evolving the setup for the plenary sessions to better integrate cell and engineering sciences and all their technological applications. To achieve this, the final outline of the individual session will only be determined once abstracts have been selected for oral presentations. This will also ensure that the meeting will give the best possible overview of the state of the art in the field in 2013, including the most recent developments.

The Organizing Committee is currently selecting the traditional social events and will particularly focus on the gastronomical and nutritional quality of this event and will also take into account the sustainable development in its organization.

The Scientific and Organising Committees cordially invite you to this event and look forward to meeting old friends, introducing newcomers to the area of animal cell technology and experiencing lively interactions and discussions on the newest hot topics of the field.

The Lille meeting web site will be progressively uploaded with more and more information and become fully operational (*i.e.* registration, accommodation, information for abstracts, posters, bursaries, …) as from October 2012 (visit www.esact.org for more details). Deadline for abstract submission will be January 15, 2013.

See you in Lille!

Yves-Jacques Schneider

ESACT Courses

1st edition of the Animal Cell Technology course organised by ESACT - 2011

Coordinators: *Francesc Gòdia (UAB, Spain) and Paula Alves (IBET, Portugal)*

The first course on Animal Cell Technology organized by ESACT took place in Hotel Terramar, in Llafranc (Girona, Spain), from October 2nd to 6th. This was an introductory course, providing an overview of the field, from the more basic aspects to the final application. It was targeted to those starting their research activity in Animal Cell Technology, both from academia or industry. It was also of interest to those wishing an up-date of the state-of-the-art of Animal Cell Technology in a short intensive Course.

ESACT ACT Course 2011 – group at Llafranc

The course was well attended, with a total of 23 people, both from academy and industry, from nine countries. Six lecturers covered the four days intensive program of lectures: Elephterios Papoutsakis (U. Delaware, US), Manuel Carrondo (IBET, Portugal), Hansjörg Hauser (HZI, Germany), Paula Alves (IBET, Portugal), Ashraf Amanullah (Genentech, US) and Francesc Gòdia (UAB, Spain). The days in Llafranc were bright and pleasant, and the cosy atmosphere made interaction very easy among lecturers and participants. The feedback from the participants was excellent, and the Course will be continued in future editions.

2012 Upcoming ESACT Events

2nd edition of the Animal Cell Technology course organised by ESACT - 2012

Coordinators: *Francesc Gòdia (UAB, Spain) and Paula Alves (IBET, Portugal)*

The second course on Animal Cell Technology organized by ESACT will be in Llafranc (Girona, Spain) from September 30th to October 4th 2012. The course comprises lectures covering the main topics of Animal Cell Technology:

1. Cell line development
2. Cellular mechanisms
3. Post-translational modifications
4. Bioreactor design
5. Downstream processing
6. Genomics and proteomics
7. Bioreactor scale-up and scale-down. Single use bioreactors
8. Process Analytical Technology
9. Economical aspects of ACT bioprocesses
10. Integrated bioprocess for protein production
11. Integrated bioprocess for stem cells

A limited number of grants, including the Course fee and travel support are provided by ESACT. The full announcement and web of the course is already in place in our website www.esact.org. Make plans to come!!

2nd edition of the Stem Cell Technology Course: Stem Cells – From Generation to Application organized by ESACT

Coordinators: *Tobias Cantz (MHH, Germany), Francesc Gòdia (UAB, Spain) and Hansjörg Hauser (HZI, Germany)*

The second Stem Cell Technology course organized by ESACT will take place in Llafranc (Girona, Spain) from September 26 – 30, 2012. The course comprises lectures covering key topics in this broad field as overview lectures. The program demands for an active participation of the attendees in paper presentations and group discussions. Topics to be presented and discussed include:

1. Generation of induced pluripotent stem cells (iPS)
2. De-differentiation, differentiation and trans-differentiation
3. Isolation of murine and human stem and precursor cells
4. Properties and quality of cells
5. Cultivation – small and large scale
6. Bioreactors
7. Regulatory aspects, GMP
8. Patenting, business and career options
9. Application areas: Human treatment and pharmacology

A limited number of grants, including the course fee and travel support are provided by ESACT. More details can be found on our website www.helmholtz-hzi.de/stemcells which will be continuously updated.

Other upcoming events related with ESACT

25th Annual and International JAACT 2012

Invitation to the 25th annual and international meeting of the Japanese Association for Animal Cell Technology (JAACT 2012), November, 27-30, NAGOYA, JAPAN

It is our great pleasure to announce that the 25th Annual and International Meeting of the Japanese Association for Animal Cell Technology (JAACT 2012) will be held at Nagoya Congress Center in Nagoya, Japan, on November 27-30, 2012. The meeting motto is "Back to the Basics". During the 25-year history of JAACT meetings, the animal cell industry has developed tremendously - involving health care, foods, pharmaceutical production, regenerative medicine, and various cell-based applications. This 25th anniversary meeting will focus on basic and advanced animal cell science and engineering, including traditional and state-of-the-art technologies, and provide a new paradigm for academic and industrial scientists/engineers.
Tentative programs:

Plenary Speakers

- Yoshinori Fujiyoshi, Japan (Kyoto University, Nagoya University)
- Wei-Shou Hu, USA (University of Minnesota)
- Martin Fussenegger, Switzerland (ETH Zürich)
- Hansjörg Hauser, Germany (Helmholtz Centre for Infection Research)
- Florian Wurm, Switzerland (école Polytechnique Fédérale de Lausanne)

Symposia

- Biosciences on water and life
- Cutting-edge technologies in single cell-based analyses and measurements
- Application of new cell technology for assessment of food function and safety
- Cell culture technologies for stem cells
- Recent advances in CHO-omix technologies
- Advanced engineering in biologics production

Provisional schedules

- Deadline for applying presentation: **July 30**
- Deadline for abstract submission: **August 31**
- Deadline for early registration: **September 15**
- Updated information will appear on the home page.
- Please visit our website! http://jaact2012.jaact.org/

We would like to invite animal cell scientists/engineers from all over the world to make the JAACT 2012 truly successful and scientifically fruitful.

Nagoya is located around the center of Japan; 90 min from Tokyo and 60 min from Osaka by Nozomi super express; and 40 min from Kyoto, one of the oldest cities in the world. Nagoya has outstanding features both from historical and modern aspects. In the 16th century, three Samurai heroes - Nobunaga, Hideyoshi and Ieyasu - were born near Nagoya. At present, Nagoya is a center of various industries with a population of 2.2 million (4th largest city in Japan). The oldest and most modern city in Japan waits your visit.

We look forward to seeing you in Nagoya.

Takeshi OMASA, Ph.D.
Prof., The U of Tokushima
Visiting Prof., Osaka U.
Chairperson of JAACT 2012

Other:

Organized by ECI (www.engconfintl.org):

Cell Culture Engineering – April 2012, Arizona, USA

Vaccine Technology – May 2012, Albufeira, Portugal

Metabolic Engineering – June 2012, Biarritz, France

Second Industrial Cell Culture Technology Conference:

June 2012, Schloss Großlaupheim, Germany

15th European Congress on Biotechnology:

September 2012, Istanbul, Turkey http://www.ecb15.org/

Latin-American Seminar on Animal Cell Technology:

(SLATCC), October 2012, Santa Fé, Argentina

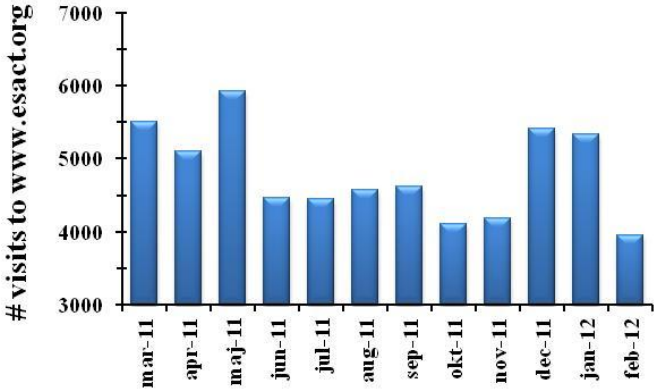
ESACT Membership

ESACT welcomes the following new members (period Apr 2011 – Feb 2012):

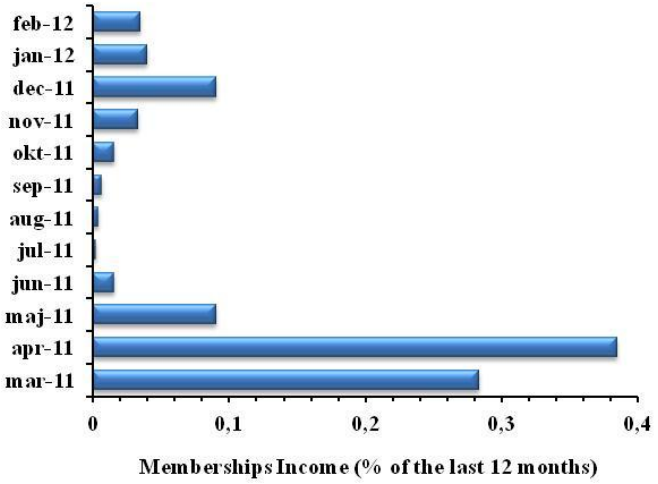
- Alberto D'Avino – DSM Biologics, Netherlands
- Berthold Szperalski, Roche Diagnostics GmbH, Germany

Reminder: In order to activate/renew your membership, please do not forget to pay your subscription as described in the e-mail you have received.

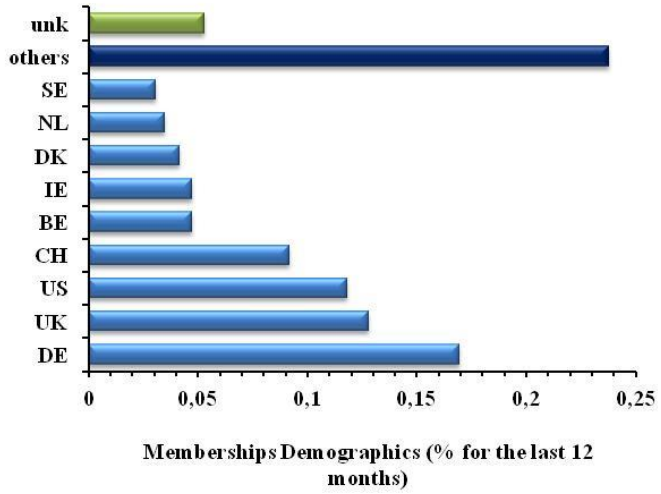
The following graphs are purely informative. The first one reports the number of visits **our website** has received from Mar 2011 – Feb 2012.



The graph below shows how the ESACT membership income is distributed along the last 12 months. The Top-4 months (months with highest membership payments) were March, April, May and December 2011.



This third and last graph describes how ESACT memberships are distributed per country (last 12 months statistics). The Top-3 countries are DE (Deutschland), UK (United Kingdom) and US (United States of America).



Off-line Payments of Memberships

Following up a first e-mail sent to all ESACT members on January 11th 2012, we are hereby informing you that ESACT is officially registered in Germany as a "Verein" (Association) carrying the registration number VR14787 of the District Court of Frankfurt am Main and the tax number 04525055699 of the Tax Office of Frankfurt am Main.

The official postal address of ESACT e.V. is:

ESACT
The European Society for Animal Cell Technology e.V.
c/o SK Frankfurt
Zeilweg 42
60430 Frankfurt/Main
GERMANY

The ESACT e.V. bank account information is:

Deutsche Bank
Account Nr: 0189191
BLZ: 27070024
IBAN (EUROS): DE55 2707 0024 0018 9191 00
IBAN (GBP): DE28 2707 0024 0018 9191 01
BIC: DEUTDEDB270

Please note that for transfers in Euros within Germany the Account Nr and BLZ are needed while for transfers outside Germany IBAN and BIC are needed.

IMPORTANT:

All ESACT accounts in Belgium, Switzerland and the UK to which ESACT members **were used to transfer their membership fees have been closed**.

Effective immediately, for future payments of membership fees please use the ESACT e.V. bank account provided above.

All bank transfers should be in Euro or GBP. Membership fees are 20€/year or 17GBP/year and all costs associated with the transfers should be assumed by the members.

Payment by PayPal remains unchanged.

PLEASE TAKE NOTE OF THESE CHANGES TO AVOID COMPLICATIONS WHEN PAYING MEMBERSHIP FEES ONLINE

Thank you in advance and very best regards,

Stefanos Grammatikos (Treasurer)
Antonio Roldao (ESACT Office)

ESACT website (www.esact.org) will have a "new look"

☺ *We are working on it* ☺

Contribution Articles

Building a UK research community "BRIC by BRIC" ...

… supporting high quality, innovative research of strategic importance

The strap-line above refers to the Bioprocessing Research Industry Club (BRIC) jointly supported by two UK Research Councils – Biotechnology & Biological Sciences Research Council (BBSRC) and Engineering & Physical Sciences Research Council (EPSRC) – and a consortium of leading companies since 2006 (http://www.bbsrc.ac.uk/business/collaborative-research/industry-clubs/bric/bric-index.aspx). This research and technology club has developed a unique format to fund pre-competitive research that underpins the manufacture of biopharmaceuticals and presents a successful (and interesting) paradigm for effective industrial-academic collaboration. Priority areas for support include bioprocessing research challenges for protein products and their host cell producers, high-throughput bioprocess development, effective modeling of whole bioprocesses, robust and effective analytics for bioprocessing and bioprocessing research for cellular products. The first phase of BRIC (BRIC1) funded 25 research projects (with £13.2M support) and a second phase (BRIC2) has begun with a further investment of £10M over 5 years.

As an individual who has been involved with BRIC since its initiation, I have seen the value of the "club" format at close range. The regular dissemination events have brought together a vibrant community of researchers, many of whom failed to realize the potential their research and technologies might have for the bioprocessing sector prior to their engagement with BRIC. Representatives of each BRIC member company attend dissemination events and display genuine interest in enhancing the knowledge base of the sector as a whole. BRIC has had a number of significant consequences for the UK bioprocessing sector. In addition to the high quality of research and publications arising from grants, BRIC has resulted in a large number of other outputs arising from the activities supported by BRIC funding. These include extension into further funding opportunities (grants and studentships), new collaborations, development of spin-out companies and patent applications, award of academic prizes, invited lectures, poster presentations and outreach activities that have engaged the public with the industrial production of biological medicines. Several of the young scientists have emerged from the training developed on their BRIC-funded project to permanent employment in the industrial sector. The early exposure to senior industrialists (and academics) is very rare and the regular informal dissemination events have enabled BRIC-funded research staff to develop their future careers. Indeed BRIC has seeded a new generation of young industrial (and academic) scientists who have built up a broad network of contacts via BRIC dissemination events. The quality of the BRIC experience for research staff has led to an extension to PhD training, with a BRIC PhD programme involving BRIC member companies being initiated in 2011 (http://www.bbsrc.ac.uk/business/collaborative-research/industry-clubs/bric/bric-doctoral.aspx). At academic PI level , the "club" format of BRIC has enabled informal discussions that have matured to an extensive number of individualized research collaborations between companies and academics.

This article is written from my personalized conviction of the influence the BRIC scheme has had, and continues to have, for the bioprocessing sector in the UK. The academic environment is vibrant and the interaction between industry and academia in stimulating greater and further innovative research.

But ….. what do you think ……. would such a research and technology "club" work more widely – would this format work trans-nationally? Let me know what you think.

Alan Dickson

2011 Events powered by ESACT

SPBACC 2011 – group at COPPE-UFRJ

November 2011 - 4th International School on Production of Biologicals using Animal Cell Cultures

SPBACC 2011 took place at the Federal University of Rio de Janeiro (Brazil) under the auspices of the Cell Culture Engineering Laboratory of UFRJ. Altogether 35 speakers plus 159 participants from 15 different countries participated of this intensive training course on animal cell technology. ESACT was one of the sponsors of the course and many ESACT members were among the speakers.

The course covered topics such as basic aspects of animal cell cultivation, cell line development, functional genomics, glycan analysis, medium design, bioreactors, cell retention devices, product purification, regulatory issues and much more (see www.peq.coppe.ufrj.br/biopharma). Beyond the single-session theoretical lectures, every day in the late afternoon several workshops run in parallel, giving the participants the opportunity to interact in smaller groups with the speakers and the other workshop participants. This event was the 4th edition of a biannual training course series that was initiated in 2004 in Rio de Janeiro, which has up to now trained more than 400 people in animal cell technology. The next edition will be held in Rio in 2013. Also in 2004 in Rio, additionally to the training course, the **"Latin-American Seminar on Animal Cell Technology (SLATCC)"** was created. After being held in Rio in 2004, in São Paulo in 2006, in Cuba in 2008 and in Uruguay in 2010, the 5th meeting of this Latin-American animal cell technology conference will take place in Santa Fe (Argentina) on October 25th-27th, 2012. More information on the conference can be obtained by e-mail at labcel@fbcb.unl.edu.ar.

Leda Castilho

September 2011 – 10th PEACE conference

10th Conference on Protein Expression in Animal Cells (PEACe), September 25-29, 2011 (Cascais, Portugal) – organizers overview

With great enthusiasm the 10th PEACe Conferences was held in the beautiful beach resort of Cascais, close to Lisbon in Portugal. It is therefore relevant to give a short historical overview of the conference series. The first meeting, organized by Alain Bernard and Ernst-Jürgen Schlaeger took place in Interlaken, Switzerland in 1992. The meeting focused on Baculovirus expression technologies as did the second meeting held in Pinehurst, North Carolina in 1995. Major developments in viral vector delivery and mammalian cell culture technologies resulted in the expansion of topics for the third meeting in 1997 in Jersey, Channel Islands. A general interest in improved gene delivery and gene therapy technologies had an impact on the choice of topics for the fourth and fifth conferences, which took place in 1999 in Lake Tahoe in California and in 2001 in Semmering in Austria, respectively. In 2003, the conference series saw a number of changes. Although the non-profit nature and voluntary organizing committee membership remained the cornerstones of the philosophy behind the conferences, more attention was paid to cell engineering and cell culture technologies although vector development and gene expression remained important topics. The organizers also introduced the new name "Protein Expression in Animal Cells (PEACe) and Hospitalité Quebec took on the responsibility for conference logistics for the sixth meeting in Mont Tremblant, Canada. The seventh meeting took place in Crete, Greece in 2005, the eight in Angra dos Reis, Brazil in 2007 and the ninth in Jackson Hole, Wyoming in 2009.

It has been an absolute delight to reach the milestone of the tenth meeting. The 10th PEACe Conference in Cascais attracted about 140 attendees at the beautiful seaside resort in Portugal. To commemorate this special occasion the organizing committee included a one-day pre-meeting on Baculoviruses in the program. Otherwise, the topics of the main meeting covered.

Vector Design, Gene Regulation, Cell Engineering, Bioprocessing, Alternative Expression Systems and Expression System Development. Below is a short summary of some selected presentations from the meeting.

PEACE meeting – group visiting the western part of continental Europe

Vector design

Kenneth Shea (UC Irvine) discussed the technology for generating synthetic polymer receptors for peptides and proteins with antibody-like affinity for biological macromolecules. The recognition results from the cumulative effect of many weak interactions covered by a surface area of 300-800 $Å^2$. Synthetic polymer nanoparticles were used on imprint or template molecules to create 3D receptor sites in the resulting polymer. Epitope imprinting was achieved using a nonapeptide, a unique sequence in the exposed domain. In this context, cytochrome C (2B4Z) was targeted and photopolymerization of epitopes was imprinted on MIP film. The sensitivity of the system was demonstrated where single residue mismatches prevented the target protein (BSA) from being captured. Imprinted nanoparticles named plastic antibodies from the film can then act as nanoreceptors for proteins. The 26 amino acid peptide melittin from honey bee venom was given as an example. The imprinted nanoparticles demonstrated inhibition of melittin induced toxicity *in vitro* and neutralization of melittin toxicity in mice. Clear advantages of the approach of plastic antibodies are the rapid and low production costs, no need for animal models or even live cells, and good stability and storage properties. Plastic antibodies will find applications in *in vivo* toxin neutralization, as protein-peptide capture agents, for cell surface recognition (stem cell diagnostics, bacteria, viral particles), and inhibition of protein-protein binding.

Gene Regulation

Scott Tenenbaum (University of Albany-SUNY) gave a presentation on the application of RIP-Chip technology to study RNA-binding proteins (RBPs) and microRNA targeting. Methods were used to purify endogenously formed RNA-protein (RNP) complexes and with the aid of microarrays and next-generation sequencing technologies enabled genomic scale identification of targets of RBPs. The association of RBPs with coding and non-coding RNA was presented. Tenenbaum described structurally interacting RNAs (sxRNAs) and their natural identification. Applying informatics predictions it was possible to predict a three-way interaction of the histone stem-loop (HSL) binding site, the iron response element (IRE) and microRNA miR-363. Moreover, data suggested that RBPs can stimulate translation and particularly by endogenous histone stem loop binding protein. The potential applications of the described technology cover molecular tools (stem cell quality control, miRNA expression in cancer), studies on genetic disorders (cystic fibrosis, Duchenne muscular dystrophy, hemophilia, sickle-cell disease), tissue engineering (kidney and liver repair) and therapeutic interventions in cancer and vaccines.

Environmental Control / Bioprocessing

Robert Freedman (University of Warwick) explained the potential of targeting the oxidative protein folding pathway for cell engineering. Oxidative protein folding has been shown to be essential for secretory and cell surface proteins and might therefore provide an alternative approach to enhance recombinant protein yields. For example, in yeast PDI over-expression increased the secretion of SS-bonded proteins. In mammalian cells proteomics research suggests a higher degree of complexity of the ER folding machinery. The outcome from engineering PDI and BiP overexpression has been somewhat mixed in mammalian cells. For instance, no increase in productivity in CHO cells was observed in one study with 3-4 fold enhanced PDI levels. In contrast, in another study overexpression of PDI, but not BiP resulted in higher monoclonal antibody production in CHO cells. One reason for the discrepancy in the results could be the presence of multiple isoforms of the oxidative folding machinery in the mammalian ER. For instance, there are a large number of members of the PDI family, which share common domains and active sites. Likewise, the roles of Ero1 isoforms have not been established yet. In summary, although targeting the oxidative folding machinery sounds like an attractive approach to improve productivity, rational mammalian cell engineering has not been successful yet. The complexity of the mammalian machinery might be overwhelming. It might be preferable to engineer modules and not components of the system. Furthermore, the effects might be cell line specific.

Alternative Expression Systems

Stefan Schmidt (ERA Biotech) had been invited to present some emerging technology for recombinant protein expression. The PEACe meetings have always been open for new technologies and also for "thinking outside the box". The application of plant expression systems has received renewed interest with the discovery of major storage proteins called zeins. In this context, the ɣ-zein was found to form aggregates in cells. However, fusion to eukaryotic proteins demonstrated a 2-10 fold increase in expression levels, improved stability and no negative effect on cell viability, growth and ER function. The Zera® fusions simplify the downstream processes. The StorPro® organelle isolation is simple and fast. The technology has been applied for single and multiple transmembrane proteins with impressive yields in comparison to other systems. Zera® fusions can be applied for vaccine development, showing strong cellular response without adjuvants, efficient antigen presentation and high stability during storage. Other applications are for large therapeutic peptides, which as Zera® fusions show improved activity, incorporation of post-translational modifications and multiple formulations can be obtained from a single construct. Finally, the technology allows good performance at real working conditions of readily immobilized purified industrial enzymes.

Expression System Development

John Birch (Lonza) gave a much appreciated review on mammalian cell culture technologies. The key technology development before the recombinant protein expression era were the establishment of the first mammalian cell line (murine L929) in 1943, the first suspension culture in 1953, polio vaccine production in primate cells in 1954 and development of CHO cell lines in 1958. Further indication was highlighted by the challenges for interferon production in the 1970s, where 4000 L of cell culture was needed to obtain 60 mg of interferon. The 1980s were characterized by the introduction of recombinant protein production with the milestones of the first license for recombinant insulin in *E. coli* in 1982 and the first license for a recombinant therapeutic protein (tPA) in mammalian cells in 1987. Today, approximately 80 different types of proteins have been licensed in the USA. Some 60% of the proteins are produced in mammalian cells and 40% in micro-organisms. In total, more than 250 products have been approved (more than 900 products in clinical development in 2011). The scale is quite impressive with 20,000 L bioreactors in place. The future trends indicate that mammalian cell lines will still play an important role in the production of biotherapeutics. However, strong competition is anticipated from microbial systems, which generally can provide a faster, simpler and cheaper process development with no risk of presence of animal viruses. Less product heterogeneity is also expected although the lack of post-translation modification processes needs to be evaluated. Other potential future development includes the increased use of cell-free protein synthesis, where it is already possible to generate 1 g/L levels in 10 hours at 100 L scale. Moreover, increased application of chemistry such as engineering chemically modified proteins and imprinted polymers (plastic antibodies) will affect the field.

Short Talk Sessions have been part of the program for a number of PEACe conferences to provide more junior scientists a possibility to present their work in the oral sessions and not only as posters. This time the topics covered mainly cell engineering and monoclonal antibody production. The Industrial Workshop contained talks by Life Technologies, DNA 2.0, Mirus Bio, Expre2ion Biotechnologies and CELLution Biotech. Although the company presentations addressed the development and application of their products it needs to be said that they reached a very high scientific standard.

Those of you who were unfortunate not to attend the 10th PEACe Conference in Cascais can still have access to certain presentations from the meeting at the conference website www.peace-conference.org in addition to the abstracts of all talks and posters. Another reason to regularly visit the website is to receive the latest information on the 11th PEACe meeting, which the Organizing Committee has agreed to put together for September 2013.

We look forward to seeing you again or for the first time at the 11th PEACe in 2013 in Kananaskis in the Canadian Rocky Mountains near Calgary!

Acknowledgements

Special thanks to Tom Kost for carefully reading the manuscript and making useful suggestions of improvements.

Kenneth Lundstrom

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