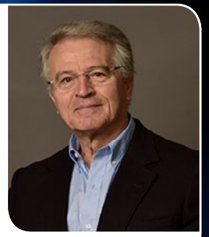
SPEAKER SPOTLIGHT:

Bioprocessing for Cell & Gene Therapies

As the utilisation of cell and gene therapies develops into useful cures, increased demand will be coupled to improved processes permitting sharp cost reductions, as happened previously with monoclonal antibodies. This includes improved integration between upstream and downstream processing, as well as the implementation of novel technologies and tools, from continuous processing to new chromatographic and non chromatographic options. iBET is dedicated to the bioprocessing of a variety of gene therapy and cell-therapy productions, as well as the development of advanced 3D cell models, with the aim to facilitate faster dissemination of these novel and promising modalities.

Manuel Carrondo

Vice President, iBEt, Professor of Chemical and Biochemical Engineering, FCT-UNL (jubil.)



Manuel is a professor in Chemical and Biochemical Engineering, Faculty of Sciences and Technology, University Nova de Lisboa. He is also the founder (1988) and earlier president and CEO (currently Vice-President) of IBET. Over the course of his career he has been member and Vice- Chairman of the External Advisory Group "Cell Factory" (Research Directorate General, European Commission) (1998-2002), CEVEC Pharmaceuticals, Köln (2007-2017), PBS Biotech, California (2009-...), CNIC - Spanish National Center for Cardiovascular Research Carlos III, Spain (2011-2015), Masthercells - Manufacturing Synergies for Therapeutic Cells, Belgium (2012-2016), Nanotechnology and Converging Technologies - (2014-2018), iNOVA4Health - Advancing Precision Medicine, Portugal, Unit Coordinator – (2015-...), IBMT - Fraunhofer Institute for Biomedical Engineering, St. Ingbert, Germany and Max Planck Inst. Dynamics Complex Technical Systems, Magdeburg (2008-2013).

Manuel has supervised thirty-four Ph.D. students and has published over two hundred and forty papers in refereed international journals; he was also Associate-Editor of Journal of Biotechnology (2000-2017), editorial board member of Biotechnology and Bioengineering, Current Gene Therapy and Biotechnology Letters; referee of Biotechnology Progress, Cytotechnology, Applied Microbiology and Biotechnology, and Enzyme and Microbial Biotechnology.

Q1: What is iBET and what is your main role within it?

iBET is a private non-for-profit research-oriented organization dedicated to the bioprocess and in-depth characterization of ATMPs and new cell models (www.ibet.pt). Our portfolio includes bioprocessing of a variety of gene therapy and cell-therapy products and the development of advanced 3D cell models of different tissues such as liver, CNS, cardiac and cancer (including immuno-oncology). In addition, iBET has a GMP-certified analytical services unit and facilitated access to GMP-certified manufacturing facilities (an iBET spin-off, www.genibet.com). As vice-president of iBET I am responsible for all business development activities and for the "Engineering Cellular Applications Laboratory". Here, I coordinate a team of highly skilled scientists who use engineering and mathematical tools to improve production and purification of complex biopharmaceuticals.

Q2: What are some of the key accomplishments of iBET within the past few years?

In the past few years iBET has strengthened its position as a research-intensive organization in the field of bioengineering of Vaccines and ATMPs. I'd like to highlight the coordination of the DIVINE Eur. Union Project (https://divineproject.eu) aiming to improve downstream process of vaccines using novel affinity chromatography while developing greener processes, iBET's participation in Transvac2 (http://transvac.org) or malaria candidate vaccine with Japanese teams (PfRipr5 - https://www.ghitfund.org/investment/portfoliodetail/detail/139/en). Also noteworthy is one major project with a startup for the development of a production, purification and analitycals process for Oncolytic viruses. In the field of Cell Therapy, in the last years we have considerably expanded our toolbox for the production and purification of stem and somatic cells as well as the development of new advanced cell models for different tissues such as hepatic, cardiac, neuro and cancer.

Q3: You are presenting at the conference on novel downstream processing solutions for cell and gene therapy. What are your main priorities you are pursuing within this space? What challenges are you currently facing?

The overall challenge in bioprocessing development for both cell and gene therapies is to substantially improve product quality at lower cost of goods, to facilitate faster dissemination of these novel and very promising modalities.

These are very labile/fragile "products", much more complex than, e.g. Mab's, requiring major improvements in their biological knowledge exploitation (eg. vector improvement for GT, cell expansion for CT) as well as upstream- and downstream processing to achieve quality, dose and concentration/formulations that facilitate their clinical utilisation.

At iBET we work on all of these three aspects – biology, upstream-and downstream-processing for C&GT.

Thus, the presentation will cover three issues, with real data supporting our aims:

- Integrated, continuous steps for washing and concentration of both mesenchymal and iPS cells, conducive to sterile operations;
- Novel operations for downstream purification of oncolytic viruses, allowing for improved yields concomitantly with product quality;
- Showing the improved yields and robustness of continuous steps used for purification of viruses for GT.

Q4: There are many new technologies poised to impact bioprocessing. What technologies do you find particularly exciting at the moment?

Improved availability of single use options are becoming obvious and ubiquitous – and will keep expanding.

Continuous integrated operations are gaining ground – pushing and being supported by new tools for measuring, monitoring and modelling processes.

A key aspect, often not properly highlighted, is the development of new analytical tools, such that the traditional "biological analyticals" for ATMP's, often taking days and even weeks to yield the result, can be substantially reduced to at least, hours and, hopefully, minutes allowing automatic control of the processes.

Q5: Going forward, what do you think the industry will be – or should be – prioritising in the bioprocessing space?

The industry, both the ATMP and other biopharmaceuticals producers, as well as the "tool providers" are already well aware of the need to manage the whole, complex, process. Meaning that improvements are being searched at all the levels described above and the top research and development teams at companies and organisations like iBET have the capacity to "zoom out – zoom in" and thus improve the individual steps in ways conducive to advance the whole process. New knowledge and better tools are being searched from all angles: biology, materials, chemistry, informatics/AI, mathematics....

This is a phenomenal time for creative thinkers, excellent doers and fundamental learners!

Q6: Why are you attending the 8th Annual Cell Culture & Bioprocessing Congress? What do you look to achieve from such meetings?

I will attend the 8th Annual Cell Culture & Bioprocessing Congress to interact with those thinkers, doers and learners moving the field forward and allowing dissemination of the new biopharmaceuticals targeting the unmet medical needs of our age. It also allows me to identify and conceptualize how to tackle the new challenges that are always popping up, which are sometimes discussed in the corridors of the congress, after the presentation.