

Assessing T-cell viability without trypan blue and real-time monitoring of apoptosis and necrosis via optical absorption spectroscopy with reduced sampling requirements

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Ensuring the quality of cell cultures, especially for Advanced Therapy Medicinal Products (ATMPs) production, often involves assessing cell viability. Traditionally, trypan blue is used to distinguish between live and dead cells and requires handling small cell samples from the bioreactor. However, this process poses contamination risks and results in delayed viability assessments due to frequent handling. Moreover, the limited sample size leads to less precise viability estimations.

The production of specific ATMPs relies on leveraging necrotic and apoptotic bodies generated by T-cells previously exposed to X-rays. Assessing necrosis and apoptosis rates typically involves analyzing small sample volumes through flow cytometry.

In our presentation, we introduce white-light spectroscopy techniques for evaluating T-cell culture viability without the need for trypan blue. Additionally, we demonstrate a method for estimating necrosis and apoptosis rates in a specific ATMP production scenario. These approaches offer the potential for real-time assessment and eliminate the need for sample handling, improving accuracy and efficiency in quality control.

Keynote details



Dr Bruno WACOGNE
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Speaker



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Trainees: Céline Codjiova, Jovanne Palvair and Naïs Vaccari

Biographies

Dr Bruno Wacogne is a CNRS Research Director at the FEMTO-ST Institute (one of the biggest Science and Technologies laboratory in France) where he was the head of the "Photonics for medical instrumentation" team before to join the BioMicroDevices group and then the BIND group. He created the Biom'@x transversal axis "Science et technology for personalized medicine" within this Institute. In 2010, at the request of Besançon University Hospital, he applied and has been awarded a Translational Research Fellow position from the National AVIESAN Alliance. This is a supplementary position that allows him to be at the interface between the health activities at the FEMTO-ST Institute and the Clinical Investigation Center in Technological Innovation at Besançon University Hospital. At the hospital, he is now the technological supervisor of the institution and the head of "Microsystems and biological qualification" unit.

His research interests concern translational research, science and technology for health and more precisely immuno-combined medical devices, biological qualification devices and biomedical optics. He is author or co-author of about 230 communications among which 9 patents, 1 invited paper and about 30 invited conferences and keynote lectures. He is regularly chairman in international conferences and he co-organized the 14th International conference BIODEVICES in 2021. He has been awarded several times: Gold Micron at the International MICRONORA Workshop, Best Poster Award at the 2nd International Conference on Bio-sensing Technology, Amsterdam, The Netherlands. With his co-authors including A. Frelet-Barrand, he received the Best Paper Award at the 13th International Conference BIOSTEC in 2020.

Dr Annie FRELET-BARRAND studied biochemistry at the University of Franche-Comté (France) and was graduated as MS in 1998. In 2006, she received her PhD degree on membrane proteins (MP) characterization at the Institute of Plant Biology, Zurich. During her postdoctoral fellowship (CEA Grenoble, France), she developed *L. lactis* system for functional characterization of MPs. In 2009, she became CNRS Researcher at CEA Saclay, studying MPs involved in liver detoxification. In 2015, she integrated the Institute FEMTO-ST and is now producing and characterizing by biological, biochemical and biophysical techniques diverse biological elements from MPs, vesicles to bacteria and mammalian cells. She published 22 research articles and 4 book chapters (h=17).

During his studies, Alain Rouleau specialized in Biology including immunology, physiology, oncology and the design of devices for in vitro diagnostics. He currently works at the femto-st institute (Besançon, France). He is involved in bio-interaction projects (SPR), development of sensors for the detection of biological elements (biointerfaces) as well as their characterizations (optical, biochemical and biophysical). He is also technical manager of the CLIPP proteomic platform in Besancon.

As an engineer in Biotechnology (ESBS, Strasbourg), Dr Mélanie Couturier enriched her expertise with a PhD obtained in 2012 during which she studied the behaviour of plasmacytoid dendritic cells in inflammatory settings such as graft-versus-host disease. She then joined Dr Sylvain Perruche's team (UMR1098, Besançon, France) and dedicated her research work to the development and characterization of pro-resolutive macrophages and their specialized secretome. With the therapeutic potential of their drug candidate Resolvix®, subject of two patents, she co-founded MED'INN'Pharma in 2017, a company dedicated to the development of innovative secretome-based therapies. She is now in charge of the CMC unit as Chief Technical Officer at MED'INN'Pharma.