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Real-time and Dynamic Monitoring of Virus-mediated Cytopathogenicity with Roche's xCELLigence System

To understand overall infectivity, virus progression and disease-onset it is important to perform a detailed examination of cytopathogenic effects. Depending on the type of virus and cells as well as the time point of infection (e.g. during the growth or the stationary phase) different cytopathogenic effects might be observed. One of the most common methods for measuring lysogenic/lytic activity of viruses is the plaque test, a labor-intensive end-point assay which cannot provide information about the onset of cytopathic effects and the kinetics of the viral replication.

In a study of Spiegel et al. (Institut für Virologie, Universität Göttingen) the xCELLigence system from Roche Applied Science was used for testing of virus-mediated cytopathogenicity (Biochemica 3, 2008, in print). The assay described addresses several of the limitations of e.g. a plaque test, and provides a facile, easy platform for identification and further characterization of virus-mediated cytopathic effects. Two cell types, "VeroE6" (kidney culture cells of African green monkey with deficiency of the interferon system) and "293" (human embryonic kidney culture cells with intact interferon system) were infected with Vesicular Stomatitis Virus (VSV).

The heart of each xCELLigence System is a micro-electronic biosensor which is built into each well of the standard 96 well E Plate microtiter plates. A cell which has contact with the sensor changes the electrical impedance between the microelectrodes. Effects influencing the status of the cells – for example, changes in cell adhesion, cytotoxicity, cell proliferation, cell–cell interactions, and morphological changes – lead to changes in the impedance measurements and can therefore be easily and quickly detected in real time. Labelling of the cells, which can induce non-physiological changes in the cells, is not necessary. The system is label free and requires no reporters.

The cell-based assay system perfectly integrates micro electronics and cell biology and has a number of advantages in comparison to conventional cell analysis systems. It is suitable for uninterrupted monitoring of processes in living cells and for monitoring real-time kinetics. The system supplies a densely concentrated stream of information and shows excellent sensitivity and reproducibility when monitoring the overall cell population of a cell culture.

The xCELLigence Real-time Cell Analyzer system was originally invented by US-based ACEA Biosciences, is co-developed by Roche and ACEA, and marketed exclusively by Roche. The design of the electronic sensor, innovative techniques to collect and assess data and optimised instrumentation make the system a unique platform for cell-based assays and provide a benchmark potential for cellular and molecular biology. For more information on the technology, please visit www.xCELLigence.roche.com

About Roche

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