Simple and Easy Monitoring of Tube Formation and Migration Assays with the CytoSMART™ Live Cell Imaging System

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1. Introduction

Movement of cells plays a critical role in the development of cancer. Analyzing the motility of cells in vitro is therefore important for many cancer researchers.

Live cell imaging, and in particular label-free live cell imaging, is well suited to capture dynamic processes in cell culture without potential side-effects of used markers or dyes on the cells. In this poster we show the suitability of the CytoSMART™ System for the analysis of different cancer-relevant assays.

2. The CytoSMART™ Lux 10X System

The CytoSMART™ Lux 10X System (Lonza) is an easy-to-use live cell monitoring system. The small footprint is ideal for placing into a standard cell culture incubator. The CytoSMART™ Lux 10X System (Lonza) is an easy-to-use live cell monitoring system. The images and videos can be monitored anytime and anywhere, via smartphone, tablet or computer with the integrated cloud functionality.

3. Tube Formation Assays

The formation of new blood vessels is required to ensure sufficient nutrient and oxygen supply and to allow solid tumors to grow beyond a certain size. This process can be mimicked in cell culture in so-called tube formation assays.

Human Umbilical Vein Endothelial Cells (HUVEC; Lonza, P/N: C2553A) were seeded on 150 µL Basement Membrane Extract (BME; Matrigel®, Corning, P/N: 356257) in standard 48-well cell culture plates. The formation of endothelial tubes was monitored live in selected wells.

Cell aggregation into tube-like structures started immediately after seeding of cells and defined tube-like structures became visible after 4–6 hours. Tubes were stable for up to 24 hours. Understanding the kinetics of tube formation by live cell imaging allowed finding the optimal time-point for the quantitative analyses of the effect of Suramin [Sigma, P/N S5272] on tube formation.

4. 2D Cell Migration Assay

Movement of cells plays a critical role in the development of cancer. Analyzing the motility of cells in vitro is therefore important for many cancer researchers.

The human colorectal carcinoma cell line HCT 116 (ATCC, P/N CCL-247) was seeded into 48 well plates. Cells were captured 18 hours after seeding in 3 different positions of each well by using the CytoSMART™ Lux 10X System like a standard cell culture microscope.

The human, presumably glioblastoma cell line U-87 MG was plated into round-well ultra-low attachment plates (Corning, P/N: 7007). After 3 days spheroids have formed and were overlaid with BME cell invasion matrix (Trevigen, PN: 3500-096-K). Invasion of cells into the surrounding matrix was monitored with the CytoSMART™ Lux 10X System under constant temperature and CO2 levels and without agitating the cultures. The migration properties of individual cells could be observed in real-time.

5. 3D Invasion Assay

Migration of cancer cells in vivo often requires the movement through extracellular matrix. This process can be mimicked by embedding cancer cells into a three-dimensional (3D) matrix and monitoring their invasion into the 3D matrix.

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6. Conclusions

The CytoSMART™ System is an easy-to-use, live cell imaging system suitable for analysis of different cancer-relevant assays. Individual cells can be recognized in the resulting images. Therefore they can be quantified using software tools like ImageJ or the CytoSMART® Analysis Software.

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