Teaching cell biology with live cell imaging at Avans University of Applied Sciences **[Case study]**

Teachers from Avans University of Applied Sciences have used live-cell imaging to show students the effect of an infection inside a culture flask.

Introduction

Contamination is a common observation in research which often causes unreliable experiment results. In most cases this creates a need for repeated experiments, costing valuable time and resources. Contamination can occur in different ways but is mainly influenced by good aseptic work, and sterility of the used reagents and equipment. Improving cell culture techniques of researchers in an early stage of their career, can reduce the chance of contamination. Martie Verschuren, Margaretha Kaijen-Lambers, and Kelly Raets; teachers from Avans University of Applied Sciences have set up an experiment using the CytoSMART Lux2* mini live-cell imager. With this experiment they want to show students that contamination can occur as a consequence of their incorrect actions.

Challenges

Up until now, students get familiar with the concept of contamination in theory (photo) and by recognizing cloudy or yellow colored medium. However, to develop a better conception of the actual consequences on a cell culture, a time-lapse video will be helpful. By creating a visualization of contamination during cell culture, students can actually see how cell behavior will be affected (e.g. increase of microorganisms and decrease of eukaryotic cells).

"We created some interesting time-lapse videos, that are informative for both students as well as for ourselves!"

Results

HeLa cells were seeded in a T25 flask and provided with contaminated RPMI1640 medium supplemented with Glutamax and 5% FCS without antibiotics. The bacteria that were present in the culture became more visible over time. On day 3, the number of bacteria has grown significantly and can be easily identified as an increased turbidity (Figure 1C). On day 4, the presence of bacteria is assumed to cause most of the cells to die (Figure 1D).

Benefits

During this experiment, the cells were kept inside the incubator for the entire culture period. This significantly reduced the chance that cells died because of environmental factors. The experiment was started on day 0 and subsequently monitored remotely. In this way, teachers were able to show a time-lapse video of contamination via the CytoSMART cloud-based software in the classroom. The effects of contamination could be explained more efficiently. Furthermore, thanks to remote monitoring, students can identify contamination in an earlier stage while being at home. Moreover, the infected culture can be removed from the incubator immediately after the live observation of contamination, to prevent any negative consequences for other cell cultures.

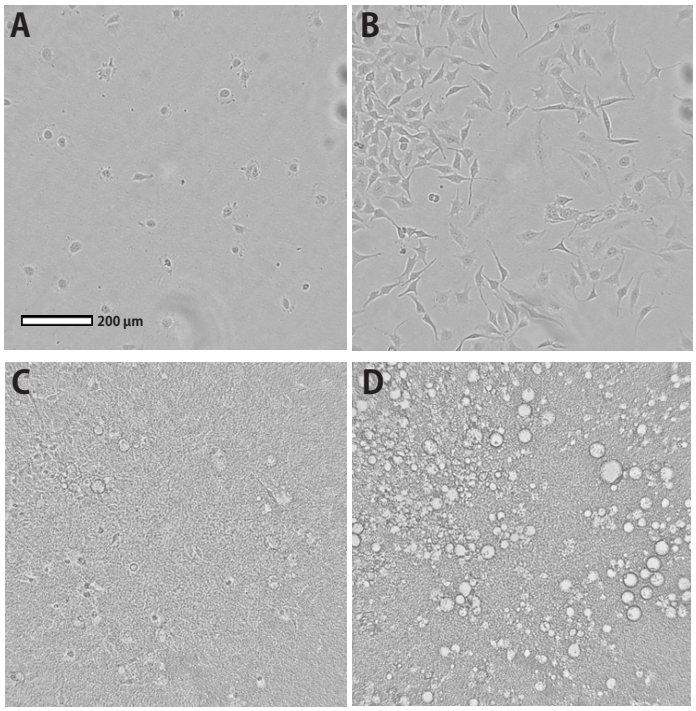

Figure 1. HeLa cells infected with bacteria at 0 (A), 48 (B), 72 (C) and 96 (D) hours after infection. The amount of bacteria becomes clearly visible after 72 hours of incubation, while cells start to die at this timepoint. After 96 hours, most of the HeLa cells are dead.

More information: https://cytosmart.com/live-cell-imaging-in-a-classroom
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