zenCELL owl

Application Note - Quality Documentation

Documentation of cell culture quality using the 24-channel microscope zenCELL owl

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Introduction

In order to conduct reproducible, significant and objective experiments it is essential to ensure consistent cell culture quality. The base for standardizable analysis is formed by defined and stable environmental conditions including temperature, CO_2-supply and the humidity inside the cell incubator. To ensure comparability of growth conditions it is necessary to use standardized processes, defined by Standard Operating Procedures (SOP).

The zenCELL owl is a 24-channel microscope designed for fast and automated cell culture microscopy. Combining stability and small size it is perfectly suitable for use in incubators. The zenCELL owl ensures standardized monitoring of quality und documentation of the cell culture. It provides a label-free and non-invasive approach for long-term monitoring of cell morphology and growth behavior without removing cells from the incubator. This not only guarantees a reproducible quality of cell culture but also economizes resources.

Data recording is performed continuous and automated with individually defined intervals. Additionally, manual analysis of cell cultures can be conducted on demand. The software can be directly controlled with the PC connected to the zenCELL owl. Data recording takes place manually and variable at user-defined intervals. Information about cell coverage, cell count and cell morphology are recorded and analyzed. Data is stored on the local PC for subsequent analyzes and documentary purpose.

Figure 1: zenCELL owl. 24-channel microscope with 24-well cell culture plate.

Documentation cell growth and culture quality

Seeding and cultivation of the cells can be carried out following an individual SOP. Documentation and analyzes of cell culture quality is performed with zenCELL owl incubator microscope (Figure 1) at individually determined intervals. The following example shows manual data acquisition for documentation of a cell culture during the growth phase. L929 mouse fibroblast cell line was seeded in 24-well plates at a density of 80000 cells/well, inserted in zenCELL owl and grown for around 90 hours. Incubation environment was maintained at a constant 37°C and a constant 5% CO_2 in air in a humidified cell incubator.

The first recording was carried out 34 hours after cell seeding, at the beginning of growth period (Figure 2). The second recording was carried out 86 hours after seeding, immediately bevor removal of the cell culture for subsequent experiments (Figure 3).

zenCELL owl software provides several options for presentation of cell morphology, cell coverage and cell count of the 24 cell cultures. The window “Overview” shows a direct comparison of the pictures of all 24 wells (Figure 2a, 3a). This provides a quick overview and evaluation of the quality of the cell cultures by:

- *Cell density and regularity of seeding.*
- *Cell morphology, that allows conclusions about the cell vitality.*

Selection of the window “Well History” provides further information about the single cell culture wells (Figure 2b, 3b). Shown are:

- *Status of cell confluence (cell coverage) of the well.*
- *Number of attached cells and optionally detached cells.*

The comparison of the 24 wells with each other with different parameters (cell morphology, cell coverage, cell count) and the comparison at different, individual points in time by the zenCELL owl microscope, provide a useful tool for determination and documentation of cell culture quality.

*Further information is provided in the instruction manual.

First documentation of cell growth and culture quality

a) Overview

b) Well History

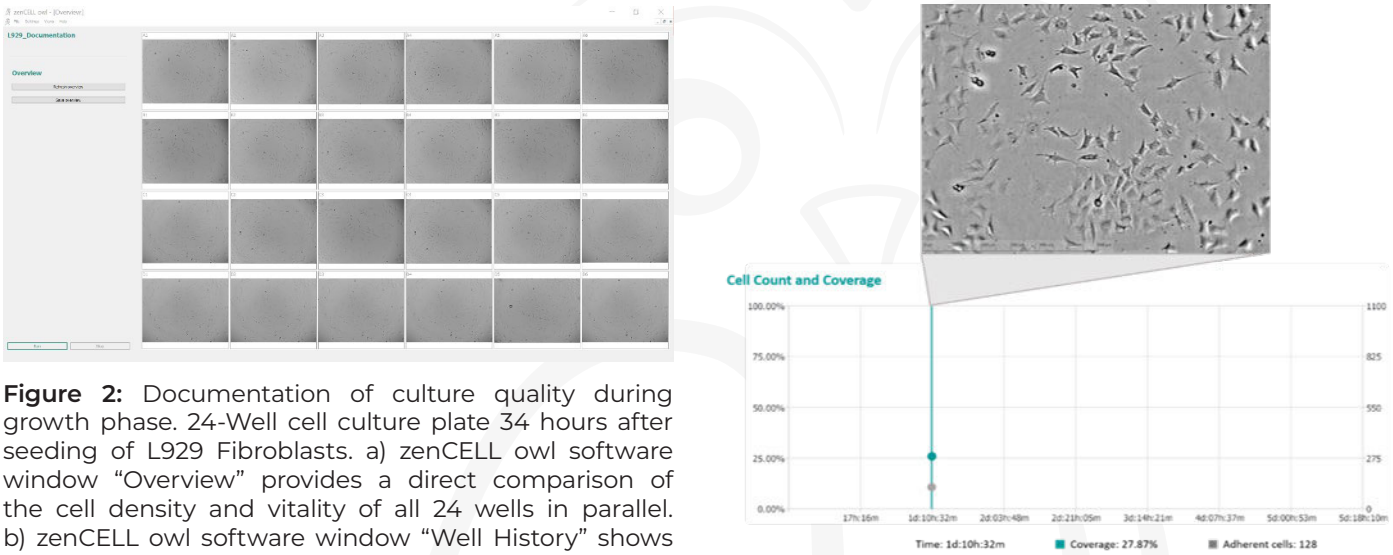

Figure 2: Documentation of culture quality during growth phase. 24-Well cell culture plate 34 hours after seeding of L929 Fibroblasts. a) zenCELL owl software window “Overview” provides a direct comparison of the cell density and vitality of all 24 wells in parallel. b) zenCELL owl software window “Well History” shows the parameter cell coverage, adherent cell number, cell morphology for each single culture well in detail.

Second documentation of cell growth and culture quality

a) Overview

b) Well Histroy

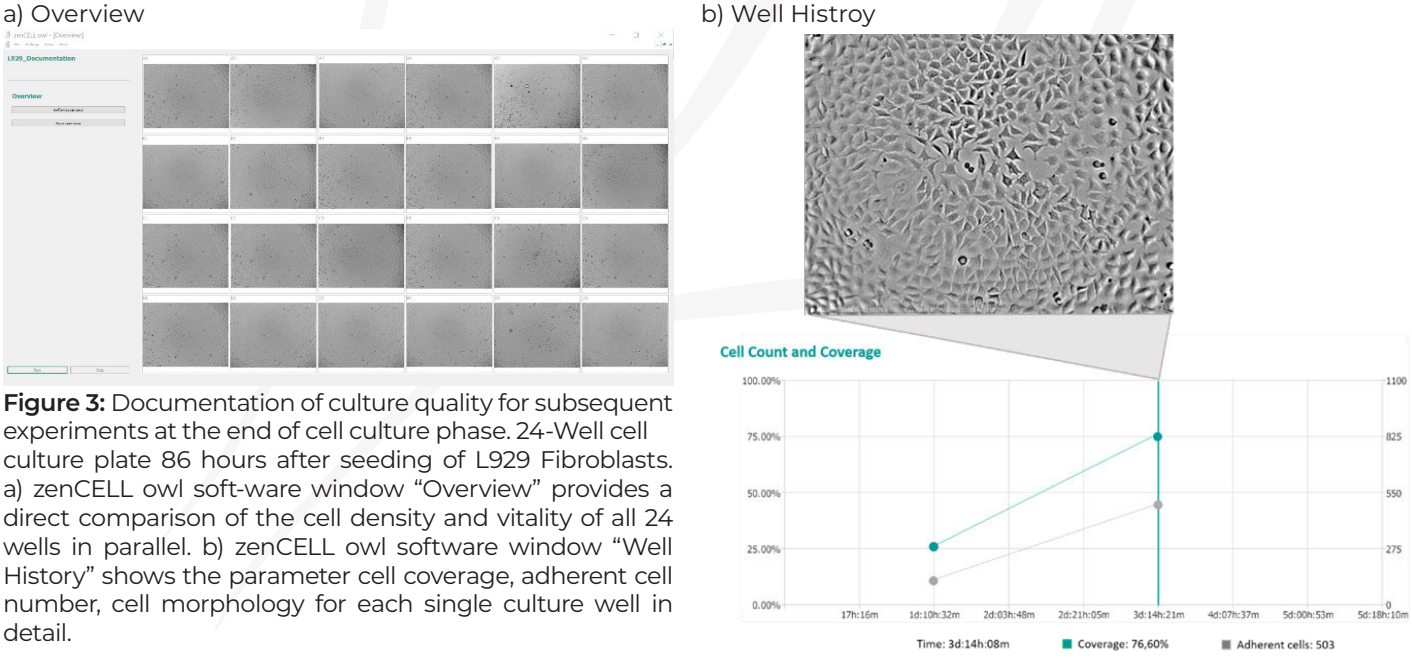

Figure 3: Documentation of culture quality for subsequent experiments at the end of cell culture phase. 24-Well cell culture plate 86 hours after seeding of L929 Fibroblasts. a) zenCELL owl soft-ware window “Overview” provides a direct comparison of the cell density and vitality of all 24 wells in parallel. b) zenCELL owl software window “Well History” shows the parameter cell coverage, adherent cell number, cell morphology for each single culture well in detail.

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