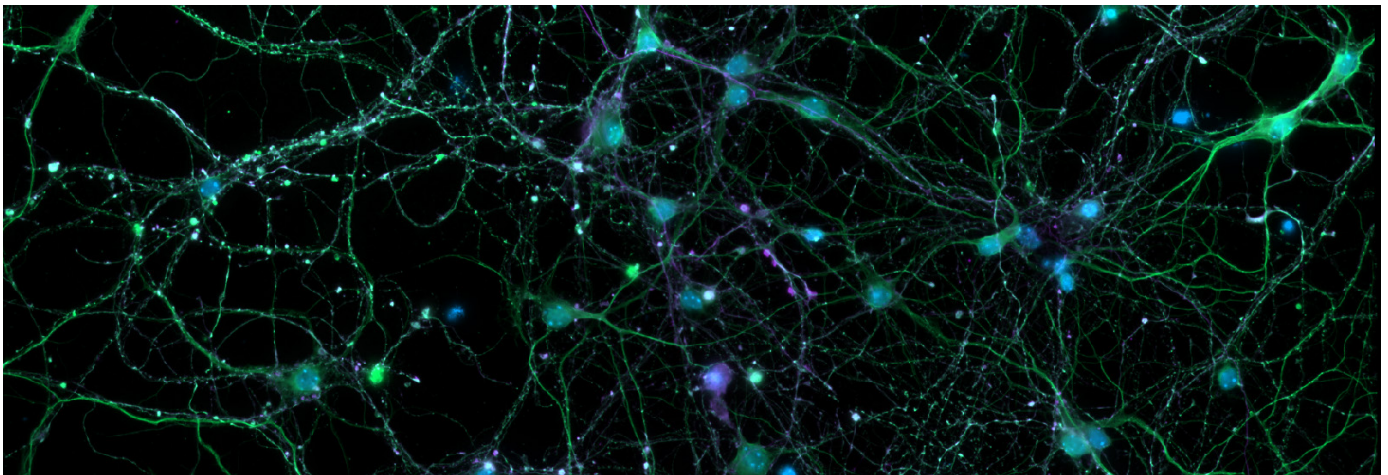# Matching the environmental conditions of life

ZEISS Axio Observer Bundle for Live Cell Imaging

Cortical neurons stained for DNA, microtubules and microtubule-associated proteins. Sample Courtesy of Laura Behrendt, Fritz Lipmann Institute

In-vivo experiments yield new insights to dynamic biological systems. Some processes take less than a millisecond while others require days or even weeks to complete. Stem cell differentiation, cell migration, or the observation of molecular processes can only be studied on living samples—requiring conditions that correspond to their natural environment. Deviations would change the behavior of the specimen, leading to less conclusive results. So, matching the physiological conditions is crucial for live cell experiments; however, microscope components can be affected by these same environmental parameters, especially temperature.

The ZEISS Bundle for Live Cell Imaging

The ZEISS Axio Observer bundle was designed for fast acquisition of dynamic processes and includes components selected to ensure both stable environmental conditions and highest image quality at different temperatures.

Hardware

- Illumination: Colibri 7 with seven excitation wavelengths and filters sets cover the entire visible range, enabling fast multispectral imaging.
- Camera: Axiocam 705 allows to image large fields of view with reduced excitation power to minimize phototoxicity.
- Environmental control: The incubation equipment provides homogeneous temperature, precise control of pH and atmosphere, easy startup, and maximum experimental flexibility. All parameters can be controlled and recorded using the ZEN software.

Software

- In live imaging, time series and z-stacks, multi position experiments, and combinations of these imaging modes create enormous amounts of data. 3Dxl helps to visualize and export these data with ease.
- The Physiology module allows to evaluate large time series for changes in intensity and to calculate and visualize ratios. The environmental data is stored together with the image data, ensuring full traceability.
- Third-party hardware can be triggered and the export to third-party software as well to the APEER platform is integrated. APEER is a community-based platform, allowing to create customized analyses with minimal effort by using a workflow-based approach.

ZEISS Axio Observer for Live Cell Imaging
The Bundle Components

Microscope
- Axio Observer 7
- Scanning stage 130 × 100
- Mot. condenser NA 0.55
- Definite Focus 3

Light source / camera
- Colibri 7
- Filter sets HE LED 90, 91, 112
- Axiocam 705 mono

Objectives
- Fluar 5×/0.16
- LD LCI Plan-Apochromat 25×/0.8 Imm Corr DIC
- C-Apo 40×/1.2 W Corr

Environmental control
- Incubator PM S1
- Temp module S1
- CO_2 module S1
- Heating device Humidity S1

Workstation
- Z6 Workstation with 32 GB RAM and nVidia Quadro RTX4000 8 GB

ZEN software modules
- Z stack: Acquire Z stacks with the help of a motorized focus drive.
- Time Lapse / APEER Time Lapse: Acquire images over a period of time.
- Tiles & Positions: Generate precise, high-resolution images through automatic scanning of predefined regions and positions of a sample.
- Deconvolution: Use 3D deconvolution algorithms to enhance your 3D image stacks.
- Physiology: Use an interactive and flexible way to measure fast ion fluctuations such as intracellular calcium in living specimens.
- Software Autofocus: Determine the optimum focus position of the specimen.
- 3Dxl: Visualize 3D/4D image stacks.

0h | 16h | 27h

53h | 96h

▶ Click here to view this video
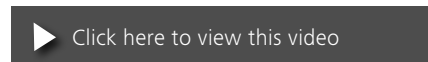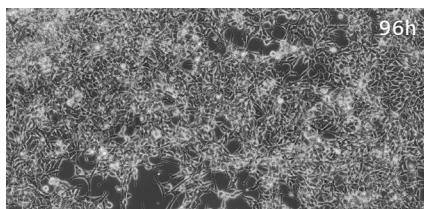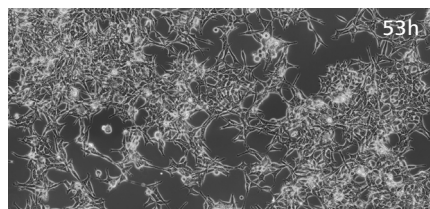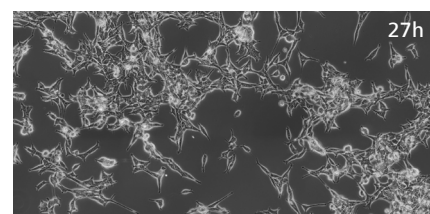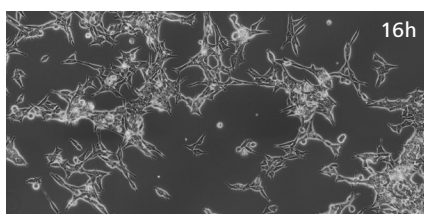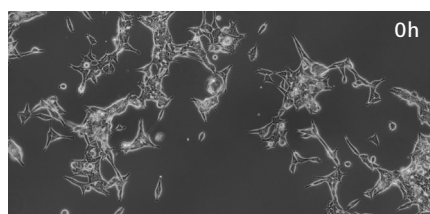
HEK 293 cells imaged with phase contrast microscopy. Long-term time lapse recording of 3×3 tiles with 240 s interval.

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Seeing beyond