

Automated fluorescence imaging inside your incubator

CytoSMART™ Lux3 FL

Improve your research with fluorescence live cell imaging

Using fluorescence live-cell imaging, researchers can get more relevant data about their experiments. The CytoSMART Lux3 FL is a small fluorescence live-cell imager equipped with one brightfield and two fluorescent channels (green and red). The device enables researchers to unravel cellular processes in real-time, providing lots of valuable data about the experiments.

The CytoSMART™ Lu3 FL:

- + **Integrated image analysis** of bright-field and fluorescence area or fluorescence object count.
- + **Time lapse movies** to investigate the development of cellular processes.

- + **Improved research** with expanded number of variables for analysis.
- + **Full remote access:** no need to enter the lab to inspect cell cultures.
- + **Small, portable** and **easy-to-use** device.

Analyze cells in their desired culture environment

Kinetic fluorescent imaging of cellular processes requires environmental control throughout the experiment. Because of its small size, the Lux3 FL fits inside any standard incubator. This enables you to perform fluorescent live-cell imaging experiments parallel to your regular cell cultures.



Applications

The use of fluorescence live-cell imaging has become increasingly valuable in the fields of drug discovery, tissue engineering, immunology, immunotherapy, and cancer research. With the CytoSMART™ Lux3 FL you have a big advantage over your colleagues and competitors. With our cloud-based solution, you have access to the following application anywhere and anytime you need it:

- + Cell viability (Fig. 2)
- + Cellular processes (Fig. 3)
- + Hypoxia / oxidative stress markers (Fig. 5)
- + Transfection (Fig. 6)
- + Co-culture
- + Nanoparticles
- + and more

However, you are not limited to these applications or the CytoSMART™ image analysis software. All images and movies can be downloaded from the CytoSMART™ Cloud environment so you can use other (custom) image analysis algorithms if necessary.

Research area / Application	Drug discovery	Tissue engineering	Immune response	Cancer research
Cell viability	Investigate the effect of drugs on viability	Investigate the viability of the (3D) cellular construct	Study the influence of infections on immune cell viability	Test survival rate of cancer cells to several drug concentrations
Transfection	Examine the effect of drugs on specific genes	Distinguish different cells in tissue engineered constructs	Investigate the influence of certain genes in immunology	Investigate the influence of certain genes on cancer development
Co-culture	Investigate mitigating/inhibiting effects of drugs on other cells	Investigate the development of blood vessels in a tissue construct	Investigate cross-talk between immune and epithelium cells during infection	Study the influence of immune cells on cancer cell viability
Cellular processes	Study drug induced morphological changes	Investigate cellular migration into biomaterials	Examine migration towards immunological triggers	Investigate the abnormal cell cycle
Oxidative stress markers	Examine the effect of the drug that is influenced by environmental gradients	Study consequences of disruptions in oxygen or nutrient levels	Monitor activation of immune response by oxidative stress	Study pathophysiologic environment of human tumour tissues
Nanoparticles	Study localized drug delivery	Improve cell specific properties of biomaterials	Study the use of nanoparticles as inflammation mediator	Investigate targeted treatment of cancer cells

Figure 1. Examples of how you can apply fluorescence live-cell imaging in your research.

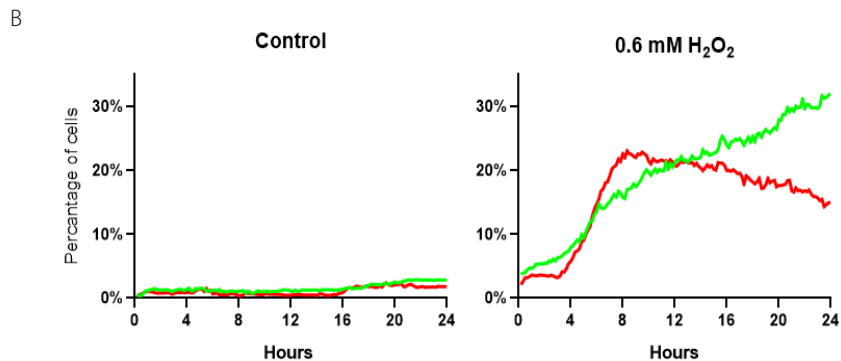
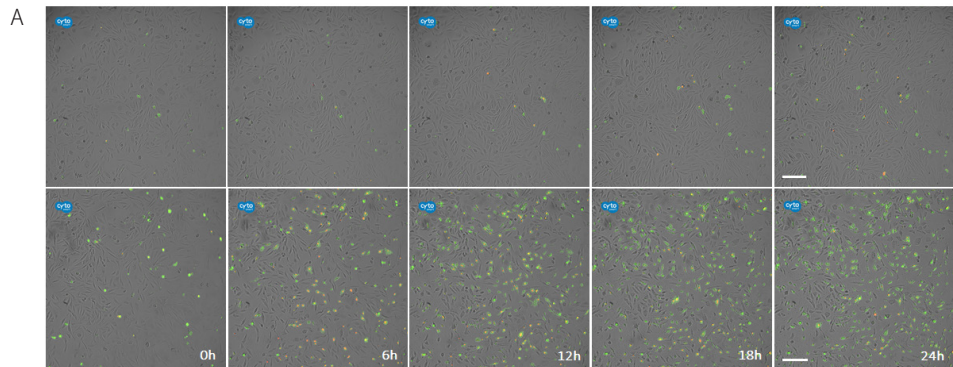


Figure 2. A) Fluorescence live cell imaging after 0h, 6h, 12h, 18h and 24h using pSIVA™-IANBD (green) and Propidium Iodide (red). Cells display a green fluorescence when undergoing apoptosis. Red fluorescence in the nucleus indicates that the apoptotic pathway is completed. Snapshots are shown of the control group (top, no treatment) and of the treated group (bottom, 0.6 mM H₂O₂). Images were captured every 10 minutes for a period of 24 hours. Scalebar indicates 200 μm.

B) Automated data acquisition. Percentage of cells displaying green and red fluorescence over a period of 24 hours. Left; control group, right; cells treated with 0.6 mM H₂O₂.

Live insight in cellular processes

The CytoSMART Lux3 fluorescence live-cell microscope automatically creates time-lapse movies that contain many cellular features. The videos are made from inside the incubator without disturbing your cells and can be immediately accessed and analyzed remotely via the CytoSMART Cloud, providing real-time updates on your cell cultures and running experiments.

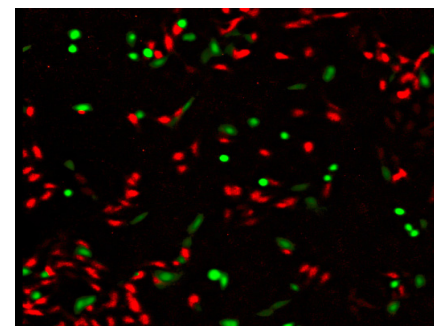


Figure 3. Co-culture of 3T3 cells stained with CellTracker Green (green) and C6 cells stained with CellTracker Orange. Get the whole story and observe the development of cellular processes while they occur with integrated image analysis.

Simultaneous analysis of multiple cell features

Using CytoSMART Lux3 FL, you can analyze green and red fluorescent tags simultaneously with your brightfield images. This not only saves you time but also provides tools to distinguish cells from each other or distinguish labeled structures within the cells. By tracking changes in the fluorescent signal over time, cell number changes or fluorescently tagged cellular components can easily be identified.

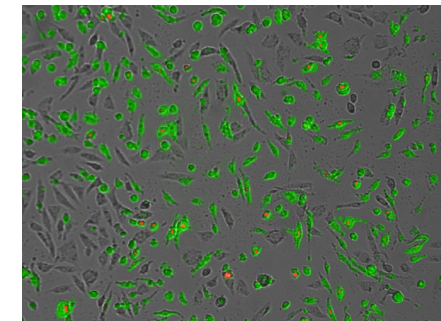


Figure 4. Expand the number of variables you can analyze in your cell culture using brightfield, green and red fluorescence channels simultaneously.

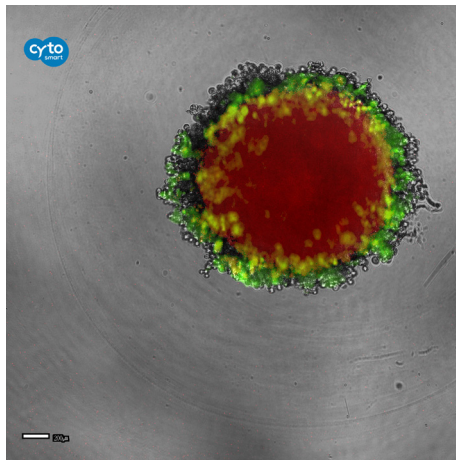


Figure 5. Proliferating cells in 3D tumour spheroid indicated by green fluorescence. Red fluorescence represents the drug infused in tumour spheroid. The drug uptake and effect on proliferation of the tumour cells are followed using the CytoSMART™ Lux3 FL.

Image courtesy of Catarina Roma-Rodrigues, Luís R. Raposo, Prof. Pedro V. Baptista and Prof. Alexandra R. Fernandes, Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa, Portugal.

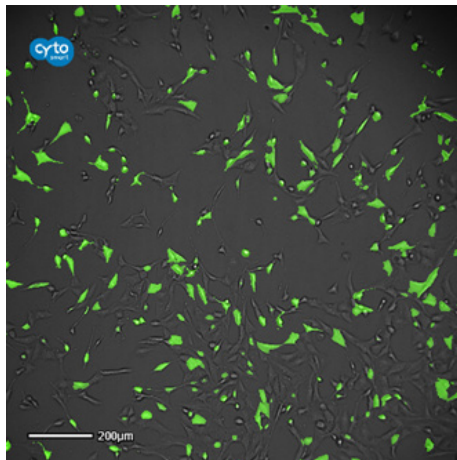


Figure 6. Overlay of green fluorescent and brightfield images of 3T3 cells transfected with CellLight Nucleus-GFP, BacMam 2.0. Images were taken 18 h after the start of the transfection process.

Figure 7. The open design of the CytoSMART™ Lux3 FL enables easy monitoring of cells cultured inside the incubator.



Easy data storage and image analysis

The CytoSMART™ Lux3 FL can be set to record images at specific intervals (between 5 min - 12 h.) for minutes, hours and days. In fact, it is one of the few systems that can run for weeks. The recorded images are sent to the CytoSMART™ Cloud where they are analyzed using our custom, cloud-based, image analysis software. You can select the appropriate image analysis algorithm, such as confluence detection, according to the experiment you are performing.

Online connection to inspect your cell cultures

Thanks to cloud data storage and cloud-based image analysis, you can access your recording and view the cell culture

in almost real-time from anywhere on any pc, laptop, tablet or mobile phone with internet access. All the recorded data such as images (.jpg files), time-lapse video (.mp4 files) or confluency data (.xlsx files) can be downloaded for further processing.



Plates, dishes, flasks or microfluidic chips

The CytoSMART™ Lux3 FL can image cells cultured in a wide range of culture vessels including T-flasks, petri dishes, well plates, culture slides and microfluidic chips. You can simply conduct an experiment in any culture vessel or microfluidic chip.

How to install

1. Place the CytoSMART™ Lux3 FL device in the incubator.
2. Connect the device's power cable and the USB3 cable to your PC or laptop.
3. Start the PC. Download the CytoSMART Lux3 FL application.
4. Open the app and you are set to go!

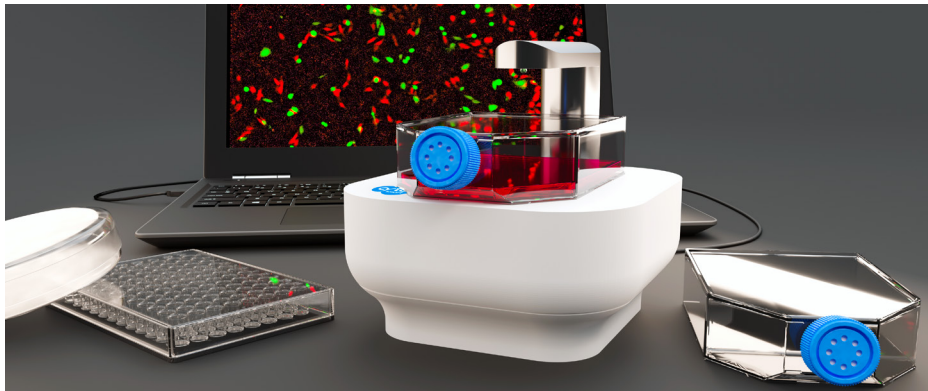


Figure 8. The CytoSMART Lux3 FL allows monitoring of a wide range of different culture dishes and flasks.



Frequently Asked Questions

Q: What is the CytoSMART Lux3 FL?

A: The CytoSMART Lux3 FL is a small fluorescence live-cell imaging microscope equipped with one brightfield and two fluorescent channels (green and red). The device allows users to track dynamic cellular processes with high specificity by taking high-quality fluorescence images to create real-time time-lapse movies. Experiments' data can be accessed and analyzed remotely via the CytoSMART Cloud portal.

Q: For what applications can I use the CytoSMART Lux3 FL?

A: The Lux3 FL can image and analyze various applications, for example, monitoring cell viability, determining transfection efficiency, investigation of co-cultures, and analyzing cellular processes. Researchers working in drug discovery, tissue engineering, immunology, immunotherapy, and cancer research fields can benefit from the fluorescence live-cell imaging.

Q: Is it possible to control the intensity of the Lux3 FL LED?

A: Yes, with the Lux3 FL, it's possible to set the intensity of the LEDs for red and green fluorescent channels according to users' preferences.

Q: What are the software requirements?

A: The CytoSMART Lux3 FL remote functionality runs on cloud-based software. In this cloud-environment, the images and videos are stored and can be accessed using user-specific login details. Next to unlimited data storage, automated image analysis can be performed in the CytoSMART Cloud portal.

Q: Which culture flasks and dishes are Lux3 FL compatible?

A: The CytoSMART Lux3 FL allows monitoring of a wide range of different culture dishes and flasks, such as: T-flasks: T-25 up to T-250, single well, multi-well plates (6, 12, 24, 96 well), microfluidic chips, flat tubes, petri dishes, slides. This is not an exhaustive list, so if your preferred equipment isn't on this list please get in touch.

Q: What is the Lux3 FL magnification?

A: Magnification is equal to a standard microscope with a 10X and 20X (digital magnification) lens.

Q: Can I specify the recording interval?

A: Images can be recorded at pre-defined intervals. At the start of a new experiment you can specify the interval rate anywhere between 5 min - 12 h.

Q: How do I clean the device?

A: The device is easy to clean using lint-free wipes and EtOH (70%) or IPA. Do not use Acetone to clean the device. Please be aware that the device cannot be autoclaved. After sterilizing with EtOH or IPA the device can be used in a cleanroom.

Q: Which fluorescent dyes are recommended to use with the Flux3 FL?

A: Many different fluorescent dyes can be used, as long as the fluorescent dye's excitation and emission spectra correspond with the fluorescent filters of the Lux3 FL (Green: Excitation: 452/45 nm, Emission: 512/23 nm. Red: Excitation: 561/14 nm, Emission: 630/90 nm). Some examples are RFP (red fluorescent protein), PI, and Cell Tracker Orange, for the red channel, and GFP (green fluorescent protein) and Cell Tracker green for the green channel.

Technical Specifications

Channels	Brightfield, green and red fluorescence channels
Magnification	10x fixed objective, digital zoom to 20x
Fluorescence filters	Green: Excitation: 452/45 nm, Emission: 512/23 nm Red: Excitation: 561/14 nm, Emission: 630/90 nm
Camera	6.4 MP CMOS
Data formats	JPG, XLSX, MP4
Image size	2072 x 2072 pixels
Field of view	1.45 x 1.45 mm
Culture vessels	well-plates, petri dishes, flasks, microfluidic chips and custom culture vessels
Computer requirements	Windows 10
Dimensions	166 x 140 x 135 mm (L x W x H)
Weight	1.3 kg
Operating conditions	5-40 °C, 20-95% humidity
Warranty	1 year parts & labor
Data storage	Unlimited cloud storage
	Research use only. Not intended for diagnostic purposes.

Ordering Information

Ordering information

at #	Product	Quantity
MAB-1008	CytoSMART™ Lux3 FL	1

[Request quote on www.cytosmart.com](http://www.cytosmart.com)



About CytoSMART

CytoSMART Technologies is a specialist in development and manufacturing of smart microscope systems for life science labs. The company was founded in 2012 by a team of biologists and engineers who were convinced that a new generation of miniaturized microscopes, powered by artificial intelligence for image analysis, would allow biologists to make discoveries more efficiently and at a larger scale.

In 2018 CytoSMART was selected by Microsoft for its prestigious Scale Up program.

CytoSMART's microscopy solutions are used in over a thousand laboratories around the world.



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