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Live Cell Fluorescence Microscopy

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BACKGROUND

The lab of Prof. Osman at the Ludwig-Maximilian University in München, Germany is interested in understanding the power plants of cells – mitochondria – and the way their functionality and network activity is maintained during cell division. The underlying process of ensuring that the mitochondrial DNA is correctly distributed between cells undergoing cell division so that cells can produce the required proteins, is the lab's goal. The team developed a tool which allows them to track in yeast mitochondrial DNA, in the least-possible invasive manner, with high-speed live-cell fluorescence microscopy.

“The Prime 95B camera provides the required sensitivity that is needed to image our yeast cells with as little excitation light as possible.”

CHALLENGE

The lab's research organism is yeast, which is notoriously challenging to image as samples are small and low in fluorescence. Moreover, as the process of cell division and the function of mitochondria is very sensitive to exposure with light (in particular with wavelength in the UV and blue end of the spectrum), the research team would like to use a light dose, as low as possible, for excitation. This allows them the ability to image samples under physiological conditions. Additionally, the events to be observed can be relatively rare, and therefore it is important to image as many cells as possible in one attempt to achieve optimal statistics.

SOLUTION

Prof. Osman is using two Prime 95B 25mm Scientific CMOS cameras with a new TwinCam which is suited for the 25 mm diameter light path of the Nikon Eclipse Ti2 microscope. "The Prime 95B camera provides the required sensitivity that is needed to image our yeast cells with as little excitation light as possible. This prevents phototoxic effects and allows us to maintain cells under physiological conditions throughout long imaging experiments," Prof. Osman shares. The TwinCam allows the ability to image two channels simultaneously without having the need to switch filters in-between which leads to losing temporal resolution.

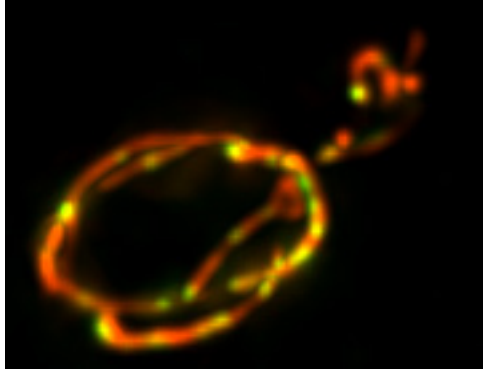


Figure 1: Maximum intensity projection of 45 planes showing live yeast mitochondria labelled with mKate2 and mitochondrial DNA with tandem-mNeonGreen. Image was taken with a Prime 95B 25mm CMOS camera on a Nikon Eclipse Ti2 microscope.

Learn more about Prof. Osman's lab at the Ludwig-Maximilian University:
http://www.cellbiology.bio.lmu.de/research_groups/osman/index.html

