Luminescent Imaging of Live Cells

Olympus America introduced a benchtop commercial microscope system designed to acquire very low-light bioluminescence images. The LV200 stand-alone microscope system is already being used to capture images of living cells and tissues by researchers in Europe and Japan. When used with some of the latest luminescence probes, it can provide sub-second imaging with clarity and brilliance. Bio- and chemi-luminescence, natural phenomena in many living species, have been used in the life sciences for several decades. In some ways, luminescence resembles fluorescence, which is among the most widely used imaging methods for research microscopy. But unlike fluorescence, in which cells are labeled with probes that absorb excitation light at one wavelength and then emit light at another, luminescence relies on a chemical reaction occurring within the specimen. Bioluminescence occurs in a living cell when an enzyme (luciferase) reacts with a substrate (luciferin or another enzyme-specific substrate) to generate light.

Imaging cells by exploiting this reaction has several advantages over fluorescence. First, repeated exposure of living cells or tissues to fluorescence excitation wavelengths can harm or kill cells, while bioluminescence is not burdened by such phototoxic effects. Also, unlike fluorescence, bioluminescence imaging typically does not suffer from unwanted background signal. This is a major advantage when imaging samples with high native background fluorescence such as plants and some mammalian tissues. The resulting high signal-to-background ratio allows more straightforward signal quantification and more sensitive signal detection. Finally, the excitation light of fluorescence causes photobleaching of known fluorophores. Because no excitation light is required for luminescence imaging, photobleaching is not an issue.

Despite these advantages, applications for luminescence in live cell imaging have

been limited until now, primarily because luminescence is much dimmer than fluorescence. Even at its best, light emitted by luciferases is dim compared to light emitted by fluorescent probes. Luminescence has been used in a variety of ways, including bioluminescence resonance energy transfer (BRET) assays, in which the signal from thousands (or millions) of cells is collected and quantified. But until now, imaging single cells has been challenging; it demands a completely dark environment and requires relatively long exposure times.

Olympus designed the LV200 microscope with special optical elements and the shortest-possible light path from sample to detector to maximize light capture and minimize the loss of valuable luminescence photons from living cells. In addition, the space-efficient, benchtop microscope features a built-in live-cell incubator and a light-tight casing that prevents ambient light from interfering with imaging. Together, these design elements allow researchers to acquire much brighter luminescence images using much shorter exposure times, even over extended periods. The LV200 has been used successfully to image biological processes in chronobiology, neuroscience, developmental and plant biology, and more.

Olympus America Inc.

800-446-5967

www.olympusamerica.com/LV200

Source URL (retrieved on *03/10/2014 - 3:36am*):
http://www.biosciencetechnology.com/product-releases/2012/12/luminescent-imaging-live-cells