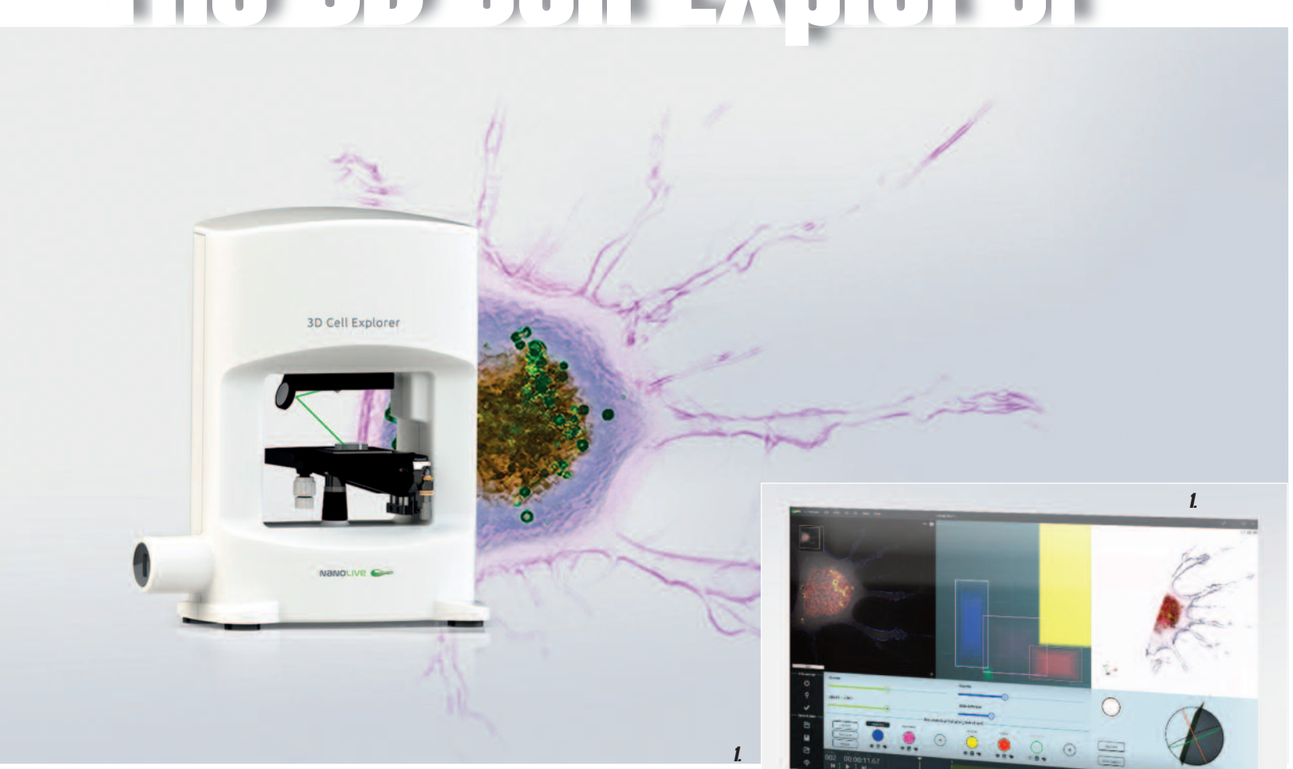
Visualizing cells has always been challenging because of cell's small dimensions and transparent nature. All techniques available are invasive and operate on dead or genetically modified cells. This article presents a novel approach for non-invasive, quantitative, 3D imaging.

# The 3D Cell Explorer

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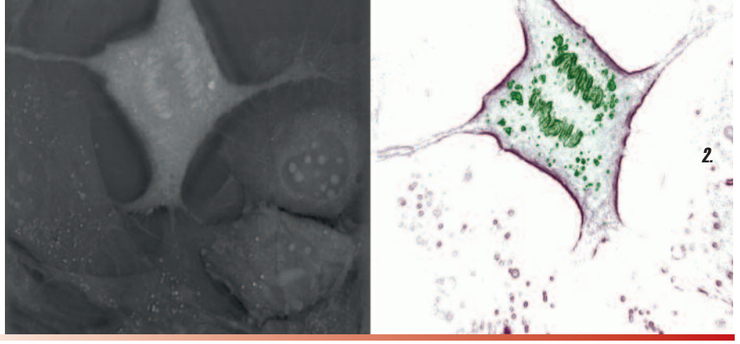

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**What are the principles behind Nanolive?**
The combination of holography and rotational scanning allows the reconstruction of the internal three-dimensional structure of the cell in a non-invasive fashion. Furthermore, this technique allows quantitative measurements with a resolution much below the diffractive limit of light proposed by the Rayleigh criterion.

The sample is positioned between a high-numerical-aperture air objective beneath the sample and a rotational illumination arm above. Green light (520 nm) from a laser diode is split into sample and reference beams. The sample is illuminated with a laser beam inclined at 45° which rotates around the sample 360°. A series of holograms is recorded on a digital camera by combining the beam that has passed through the sample with the reference beam. The holograms are raw data which are incomprehensible for the user. Nanolive's processing technique, based on complex deconvolution, treats these data and displays a comprehensible 96 z-stacks cell image in grey scale every two seconds. Furthermore, it corrects for many imaging errors that otherwise would require extremely expensive optical components and ultra-precise alignment.

**Unprecedented observing potential without sample invasion or preparation. Use the dedicated software STEVE to digitally color your cells' images.**
The Nanolive's 3D Cell Explorer offers earlier unmet insights into the living cell: no need for any special procedures, which require intensive and long preparation. The observation is completely non-invasive to the cell, and allows resolving the cell's parts in 3D down to 200 nm.

For visualization purposes, it is possible, thanks to a dedicated software, to segment the 3D refractive index matrix to identify a particular organelle, and assign to it a numerical but not chemical marker.

This unique software called STEVE allows the user to mark and label certain parts of the cells in 3D based on their refractive index. STEVE automatically detects all regions with same refractive index characteristics (different organelles have different optical properties) and digitally stain them with the same color. This process is quantitative and can be applied for a limitless amount of colors. Changes to digital stains are shown in real time in both 2D slices and 3D view.

**Revisiting old worlds!**
The 3D Cell Explorer is a tool for discovery and we are just at the beginning of exploring all its potential. It allows the measurement of cellular processes and kinetics in real-time enabling multi parameter analysis at single-cell and sub-cellular scale.

Applications for the Nanolive technology include: cell cycle monitoring, cell division and cell death analysis, cell-cell interactions, nanoparticles internalization, trafficking, cell motility monitoring, histopathology and many others.

The product was officially launched in the market during ASCB2015 in San Diego in December 2015 after the company started delivering the first microscopes last summer.

www.nanolive.ch

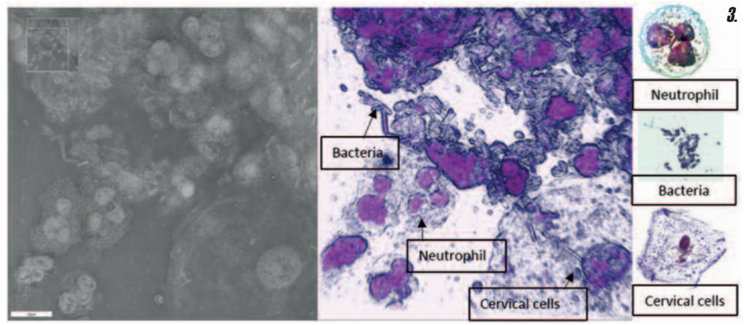
*1. The new holographic tomographic microscope for quantitative and non-invasive 3D live cell imaging and its software STEVE.*

*2. Mitosis of a mouse fibroblastic reticular cell, time-lapse.*

*3. Pap test: a method of cervical screening used to detect potentially pre-cancerous and cancerous processes in the cervix.*

**«The 3D Cell Explorer has the great potential to revolutionize all the rules in the fields of education, biology, pharmaceutics and cosmetics in universities, hospitals and industries.»**

*Yann Cotte, PhD in Physics*
*CEO and Co-Founder*

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