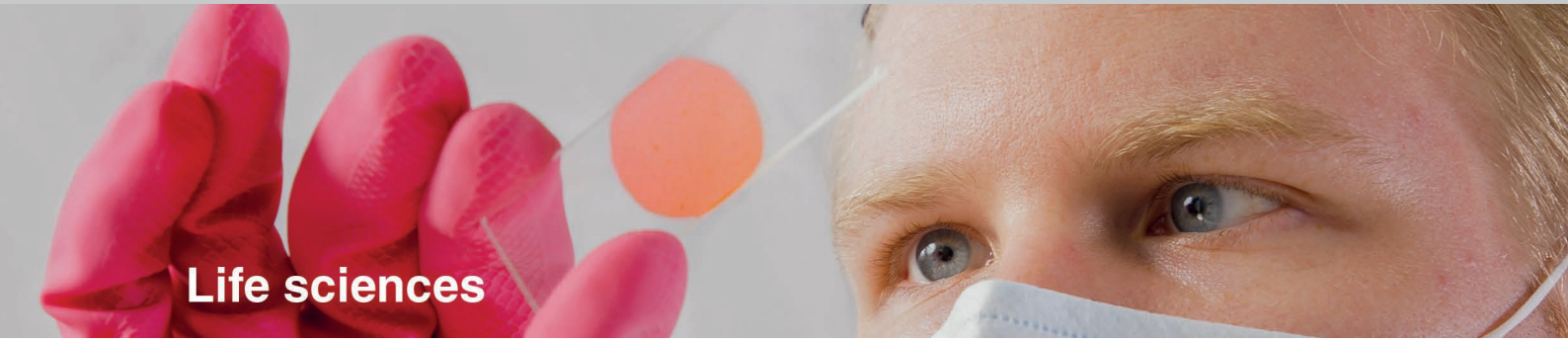
RENISHAW
apply innovation™

Cell imaging with the inVia™ confocal Raman microscope



Distinguishing cell types and resolving subcellular structures—without altering a cell's biochemistry—are now possible, with Raman imaging. This label-free, non-contact and non-destructive analytical technique requires minimal sample preparation, making it ideal for live cell analysis and imaging.

With Renishaw's inVia confocal Raman microscope you can identify and characterise samples to provide chemical, spatial and structural information on multiple types of molecule, without labelling. It provides rich, detailed, chemical images and highly specific data at high spatial resolution, making it ideal for studying cells.

Identify and characterise cells using their complete chemical profile

- Raman spectra reveal the overall cellular molecular composition
- No need for specific fluorescent labelled targets
- The cellular molecular profile enables comparisons between cell types and particular organelles
- Determine heterogeneity within a cell population

See fine cellular details without labelling

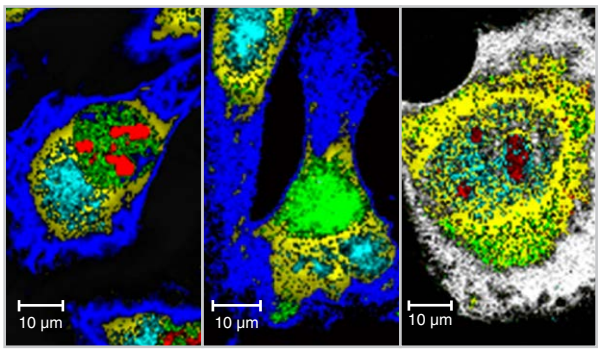
- Raman imaging produces detailed (sub-micrometre) chemical images
- Visually present the spatial relations of the biomolecules and organelles
- Enable the relationship between biomolecules/organelles' size and distribution, and cell function, to be investigated

Live cell analysis and imaging

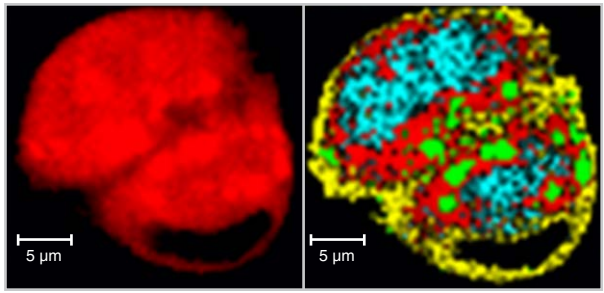
- For life time studies, use the inVia with an incubator, providing temperature, CO_2 and humidity control
- Alter the conditions to study the cells' response and biochemical changes

Acquire information-rich 3D chemical images

- Gain axial biochemical information
- Provide valuable three-dimensional insight into the distribution of chemical species
- Estimate organelles' volumes



Compare the size and distribution of organelles and biomolecules, in normal and abnormal cells, using StreamHR Raman imaging – normal, autophagic and apoptotic MG-63 cells are shown from left to right



Characterise cells over time using live cell imaging - a dividing HaCat (human epithelial) cell (left) with its cellular details (right)

Renishaw plc

Spectroscopy Products Division
New Mills, Wotton-under-Edge,
Gloucestershire GL12 8JR
United Kingdom

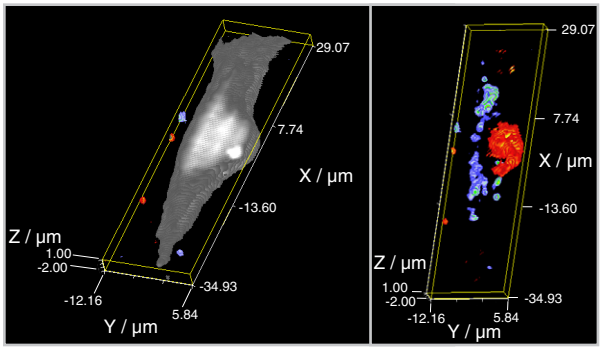
T +44 (0) 1453 524524
F +44 (0) 1453 524901
E raman@renishaw.com

www.renishaw.com/raman

RENISHAW
apply innovation™

Study morphological and chemical changes in cells with confocal Raman cell imaging, such as:

- Increase in nucleic acids content and nuclear size in cancer cells
- Augmentation in phospholipid level and the number of vesicles in autophagy-induced cells
- Membrane blebbing and DNA/RNA fragmentation in apoptotic cells
- Lipid polarisation in transit amplifying cells
- Lipid droplet accumulation and calcification during stem cell adipogenesis and osteogenesis, respectively
- Redox of haem proteins in relation to cell function
- Metabolic changes due to environmental stimuli
- Drug/drug carrier uptake in cells



Study the cellular architecture and gain axial information using Volume Raman imaging - glioma cell (left) and its organelles (right)

Confocal Raman imaging, the ideal technique for biological research

- Compare the morphology and biochemistry between cells
- Simultaneously provide chemical information on a range of biomolecules, e.g. lipids, proteins, nucleic acids, carbohydrates, minerals and pigments
- Monitor the effects of the molecular changes on the biological systems
- Reuse samples and collect correlative data with parallel techniques

The Renishaw inVia confocal Raman microscope

Renishaw inVia. Ideal for cell imaging with confocal Raman spectroscopy

- Highly sensitive confocal Raman microscope
- Maximum spatial resolution and confocality with StreamHR™ imaging to scrutinise small features
- StreamLine™ imaging technology for high speed mapping of cell populations via a line focused laser
- Slalom option with StreamLine imaging to collect chemical information from larger areas from whole cells to tissue sections
- Easy-to-use live cell incubator to maintain cells' health during live cell Raman analysis

Relevant reading:

i. Lau *et al*, 2014, A proof of principle study on the extraction of biochemical and biomechanical properties from the same tumour cells using 3D confocal Raman and atomic force microscopy imaging – Towards a better understanding of tumour progression, BSI 3(3): 237-47
ii. McAughtrie *et al*, 2013, 3D optical imaging of multiple SERS nanotags in cells, Chem. Sci., 4:3566-3572
iii. Brazhe *et al*, Mapping of Redox State of Mitochondrial Cytochromes in Live Cardiomyocytes Using Raman Microspectroscopy, 2012, PLoS ONE 7(9): e41990
iv. Konorov *et al*, 2011, Evidence of marked glycogen variations in the characteristic Raman signatures of human embryonic stem cells, J. Raman Spectrosc 42(5): 1135-1141
v. Kim *et al*, 2010, Raman chemical mapping reveals site of action of HIV protease inhibitors in HPV16 E6 expressing cervical carcinoma cells, Anal Bioanal Chem, 398:3051-3061

A range of related Renishaw literature is available. Please ask your local Renishaw representative for more information.

Renishaw. The Raman innovators

Renishaw manufactures a wide range of high performance optical spectroscopy products, including confocal Raman microscopes with high speed chemical imaging technology, compact process monitoring Raman spectrometers, structural and chemical analysers for scanning electron microscopes, solid state lasers for spectroscopy and state-of-the-art cooled CCD detectors, for both end-user and OEM applications.

Offering the highest levels of flexibility, sensitivity and reliability, across a diverse range of fields and applications, the instruments can be tailored to your needs, so you can tackle even the most challenging analytical problems with confidence.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

Please visit www.renishaw.com/cells for more information.