CONFOCAL MICROSCOPY CORE UNIT

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**Titulado Superior* (Advanced Degree)

OVERVIEW

Optical microscopy has traditionally been an indispensable tool in cell biology studies. In fact, one of the main challenges in oncology research is the study of specific markers, expression patterns or individual cells in the tumour environment.

The Confocal Microscopy Unit provides the CNIO Research Groups with all the standard methodologies as well as the latest advances in microscopy, offering access to state-of-the-art equipment and software packages related to confocal microscopy, including technical and scientific advice and support to the CNIO scientists. The Unit is also actively involved in developing, testing and implementing new microscopy technologies, tools and imaging applications that could be of interest to the Research Groups at the CNIO. Training activities are also an essential component of our mission.

"The Confocal Microscopy Unit is fully committed to disseminating advanced microscopy methodologies that are useful for cancer research and society at large; we have organised courses, talks and visits, always with the aim of increasing our understanding of cell biology and the disorders of cells that lead to cancer."

RESEARCH HIGHLIGHTS

The Confocal Microscopy Unit is equipped with: 3 laser scanning confocal systems (Leica SP5) that incorporate UV and multiphoton excitation, as well as a white light laser and Hybrid Detection; and 2 wide field systems (a Deltavision 4D deconvolution station and a Leica DMRI6000 system, equipped with microinjection and microfluidics control). All the microscopes are automated and equipped with incubators for live cell imaging.

In addition, the Unit has implemented the use of high throughput technologies applied to confocal microscopy using 2 different systems:

- An Opera (Perkin Elmer) High Content Screening (HCS) system, which allows running HCS experiments on fixed and live cells in multiwell plates, and enables the monitoring of cell dynamics (translocation, cell division, etc.) through the use of fluorescence.
- A Matrix Screening Application integrated into the SP5 confocal systems, enabling high throughput feeding of the instrument, not only in multiwell plates but also in tissue sections.

These advances enable us to increase the level of information obtained from a sample as well as carry out the automated screening of cell behaviour under different treatments.

The Confocal Microscopy Unit continues to dedicate significant efforts towards the development and implantation of High Content Screening technology at the CNIO. In 2018, we successfully organised the 'HCS week', which included the HCS South European meeting, generating a great discussion forum on the latest trends in the field. Additionally, during the same week, we launched the first edition of CNIO's HCS School with the aim of teaching future experts in HCS the latest applications and informatics tools.

The Unit is promoting and helping with novel sample preparation protocol development, bringing knowledge in tissue clearing as well as in expansion microscopy. Moreover, Microfluidics, used for live cell assays in perfusion chambers, has also experienced a great increase in performance and demand. Intra-vital microscopy experiments are available at the Unit and we are now running several projects for studies of metastasis, skin alterations and the immune system response. ■

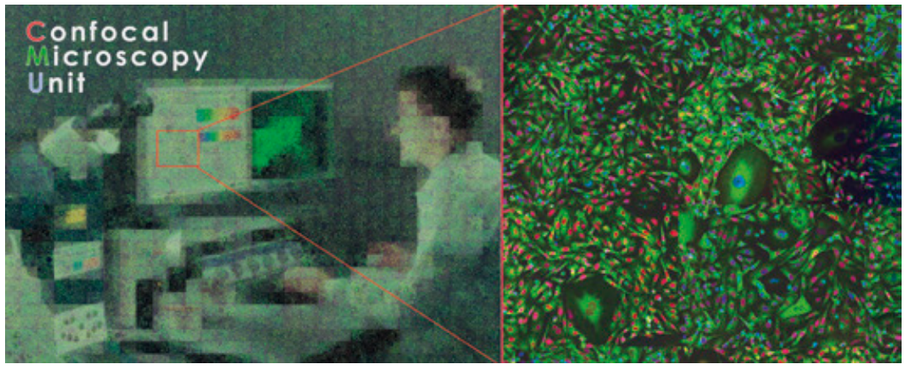

Figure Confocal microscope mosaic image composed of thousands of fluorescent images acquired at the Unit.

PUBLICATIONS

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