Confocal Laser Scanning Microscopy Unit

Introduction

The confocal microscope has the ability to focus on one level and reject light deflected from levels out of focus (Fig. 1). Scanning one level after the other, the computer reconstructs the three-dimensional structure of the sample by processing the images from all levels. The confocal microscope functions similarly to the computerized tomography, which is used for diagnostic purposes and electronically sections the human body in sequential levels. Of course, the confocal microscope uses much smaller samples, even one single cell. This system has wide applications in contemporary molecular biomedical research.

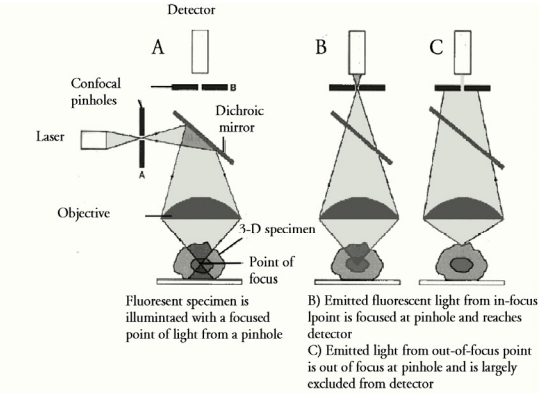

Figure 1. The confocal scanning microscope.

Facilities & Infrastructure

A Confocal Laser Scanning Microscope is installed in the School of Medicine. This system (Fig. 2) consists of:

1. An inverted immunofluorescence microscope (LEICA DM IRB E) equipped with all the necessary lenses and other accessories.
2. A laser scanning unit (LEICA TCS SP). This unit is the specialized part of the system and has the following main parts: 3 Confocal R/FI detectors, 1 monitor diode, 1 transmitted light channel (HF, PH) and an Argon/Krypton laser.
3. Control Unit. This unit includes the computer system with all the software for image analysis.
4. Documentation unit. This unit consists of a high quality professional printer (Pictography 3000).

Figure 2. General view of the Confocal Laser Scanning Microscope Unit.

Services

The Confocal Microscopy Unit provides services to research groups of the University of Ioannina, other Universities and research Institutes.

Staff & Contact Information

A Scientific Committee, consisting of staff members of the University of Ioannina is responsible for the Confocal Laser Microscopy Unit. Information can be obtained from Prof. T. Fotsis:

Postal address: Laboratory of Biological Chemistry, School of Medicine, University of Ioannina 451 10 Ioannina, Greece
Tel: +30-26510-07560
E-mail: thfotsis@uoi.gr

Representative Publications

1. Papanikolaou, A., Papafotika, A., Murphy, C., Papamarcaki, T., Tsolas, O., Drab, M., Kurzchalia, T.V., Kasper, M., and Christoforidis, S. (2005). Cholesterol-dependent lipid assemblies regulate the activity of the ecto-nucleotidase CD39. J Biol Chem *280*, 26406-26414.
2. Karetsou, Z., Martic, G., Sflomos, G., and Papamarcaki, T. (2005). The histone chaperone SET/TAF-Ibeta interacts functionally with the CREB-binding protein. Biochem Biophys Res Commun *335*, 322-327.
3. Martic, G., Karetsou, Z., Kefala, K., Politou,

A.S., Clapier, C.R., Straub, T., and Papamarcaki, T. (2005). Parathymosin affects the binding of linker histone H1 to nucleosomes and remodels chromatin structure. J Biol Chem *280*, 16143-16150.

4. Dialynas, G.K., Makatsori, D., Kourmouli, N., Theodoropoulos, P.A., McLean, K., Terjung, S., Singh, P.B., and Georgatos, S.D. (2006). Methylation-independent binding to histone H3 and cell cycle-dependent incorporation of HP1beta into heterochromatin. J Biol Chem *281*, 14350-14360.
5. Dialynas, G.K., Terjung, S., Brown, J.P., Aucott, R.L., Baron-Luhr, B., Singh, P.B., and Georgatos, S.D. (2007). Plasticity of HP1 proteins in mammalian cells. J Cell Sci *120*, 3415-3424.
6. Ritou, E., Bai, M., and Georgatos, S.D. (2007). Variant-specific patterns and humoral regulation of HP1 proteins in human cells and tissues. J Cell Sci *120*, 3425-3435.
7. Markaki, Y., Christogianni, A., Politou, A.S., and Georgatos, S.D. (2009). Phosphorylation of histone H3 at Thr3 is part of a combinatorial pattern that marks and configures mitotic chromatin. J Cell Sci *122*, 2809-2819.
8. Matragkou, C., Papachristou, H., Karetsou, Z., Papadopoulos, G., Papamarcaki, T., Vizirianakis, I.S., Tsiftsoglou, A.S., and Choli-Papadopoulou, T. (2009). On the intracellular trafficking of mouse S5 ribosomal protein from cytoplasm to nucleoli. J Mol Biol *392*, 1192-1204.
9. Kotoglou, P., Kalaitzakis, A., Vezyraki, P., Tzavaras, T., Michalis, L.K., Dantzer, F., Jung, J.U., and Angelidis, C. (2009). Hsp70 translocates to the nuclei and nucleoli, binds to XRCC1 and PARP-1, and protects HeLa cells from single-strand DNA breaks. Cell Stress Chaperones *14*, 391-406.
10. Batsi, C., Markopoulou, S., Kontargiris, E., Charalambous, C., Thomas, C., Christoforidis, S., Kanavaros, P., Constantinou, A.I., Marcu, K.B., and Kolettas, E. (2009). Bcl-2 blocks 2-methoxyestradiol induced leukemia cell apoptosis by a p27(Kip1)-dependent G1/S cell cycle arrest in conjunction with NF-kappaB activation. Biochem Pharmacol *78*, 33-44.
11. Bellou, S., Hink, M.A., Bagli, E., Panopoulou, E., Bastiaens, P.I., Murphy, C., and Fotsis, T. (2009). VEGF autoregulates its proliferative and migratory ERK1/2 and p38 cascades by enhancing the expression of DUSP1 and DUSP5 phosphatases in endothelial cells. Am J Physiol Cell Physiol *297*, C1477-1489.
12. Noutsopoulos, D., Markopoulos, G., Vartholomatos, G., Kolettas, E., Kolaitis, N., and Tzavaras, T. (2010). VL30 retrotransposition signals activation of a caspase-independent and p53-dependent death pathway associated with mitochondrial and lysosomal damage. Cell Res *20*, 553-562.