

(Multicolour) Single Molecule Tracking for Studying Interactions amongst Membrane Receptors in living Cells

TIRF microscopy will be used to study dynamics, stoichiometry and interactions of labelled membrane receptors in living cells.

Depending on the student interest, thesis work could involve cell culture, transfection, and biochemical assays; implementation and optimization of a multi-colour TIRF setup; and/or implementation and development of algorithms for data analysis and simulation.

- [1] "Single particle tracking of acyl carrier protein (ACP)-tagged TrkA receptors in PC12nr5 cells", A. Callegari, S. Luin, L. Marchetti, A. Duci, A. Cattaneo, and F. Beltram, *short communication in Journal of Neuroscience Methods* **204**, 82-86 (2012); doi: 10.1016/j.jneumeth.2011.10.019.
- [2] "Ligand signature in the membrane dynamics of single TrkA receptor molecules", L. Marchetti, A. Callegari, S. Luin, G. Signore, A. Viegi, F. Beltram, A. Cattaneo, *Journal Of Cell Science*, **126**(19), 4445-4456 (2013); doi: 10.1242/jcs.129916.
- [3] "Site-specific labeling of neurotrophins and their receptors via short and versatile peptide tags", L. Marchetti, T. De Nadai, F. Bonsignore, M. Calvello, G. Signore, A. Viegi, F. Beltram, S. Luin, A. Cattaneo, *PLoS one* **9**(11), e113708 (2014); doi: 10.1371/journal.pone.0113708.
- [4] "Ligand-Induced Dynamics of Neurotrophin Receptors Investigated by Single-Molecule Imaging Approaches", L. Marchetti, S. Luin, F. Bonsignore, T. de Nadai, F. Beltram, A. Cattaneo, *International journal of molecular sciences* **16**(1), 1949-1979 (2015); doi: 10.3390/ijms16011949 (review).
- [5] "Precursor and mature NGF live tracking: one versus many at a time in the axons", T. De Nadai, L. Marchetti, C. Di Rienzo, M. Calvello, G. Signore, P. Di Matteo, F. Gobbo, S. Turturro, S. Meucci, A. Viegi, F. Beltram, S. Luin and A. Cattaneo. *Scientific Reports* **6**, 20272 (2016).
- [6] "An Optimized Procedure for the Site-Directed Labeling of NGF and proNGF for Imaging Purposes", P. Di Matteo, M. Calvello, S. Luin, L. Marchetti and A. Cattaneo. *Frontiers in Molecular Biosciences* **4**, 4 (2017). doi:10.3389/fmolb.2017.00004
- [7] L. Marchetti[#], F. Bonsignore[#], F. Gobbo[#], R. Amodeo, M. Calvello, G. Signore, C. Schirripa Spagnolo, D. Porciani, M. Mainardi, F. Beltram, S. Luin^{§,*}, A. Cattaneo^{§,*}. *A lonely dance of p75NTR monomers regulates different neurotrophin signaling pathways*, Proc. Natl. Acad. Sci. U.S.A., 10.1073/pnas.1902790116 (2019) [[#] joint first; [§] joint last; * corresponding].
- [8] R. Amodeo, R. Nifosi, C. Giacomelli, C. Ravelli, L. La Rosa, A. Callegari, M.L. Trincavelli, S. Mitola, S. Luin, and L. Marchetti, *Molecular insight on the altered membrane trafficking of TrkA kinase dead mutants*. *Biochimica et Biophysica Acta (BBA) - Molecular Cell Research* (2019) 118614. Doi: 10.1016/j.bbamcr.2019.118614.

Organic Nanoparticles for Theranostic: Interactions with Immune Cells

The student will help in producing organic nanoparticles. They will study their interactions with immune cell lines using confocal and/or transmission microscopy, by visualizing labelled nanoparticles and/or their load, or by looking at some biological response.

"Targeting Inflammation With Nanosized Drug Delivery Platforms in Cardiovascular Diseases: Immune Cell Modulation in Atherosclerosis", A. Cervadoro, R. Palomba, G. Vergaro, R. Cecchi, L. Menichetti, P. Decuzzi, M. Emdin, S. Luin, *Frontiers in bioengineering and biotechnology* **6**, 177 (2018). doi:10.3389/fbioe.2018.00177