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From protein structure to biological function through interactomics 2nd Edition

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Venue: Center for Neuroscience and Cell Biology – University of Coimbra
UC Biotech - Parque Tecnológico de Cantanhede, Núcleo 04, Lote 8
3060-197 Cantanhede – Portugal

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Website : http://www1.biocant.pt/Protein_Structure_to_Biological_Function/2018/index.html

Aim of the course:

Protein-protein interactions (PPIs) are key elements for the normal function of a living cell. The identification and quantitative and structural characterization of PPI networks allow for an integrated view and a better understanding of the functioning of a living cell or an organism. The course aimed to cover advanced experimental strategies and bioinformatic tools used to identify and characterize PPI networks commonly known as *interactomes*. The course extensively addressed the workflow of a protein interactomics project, consisting of: 1) the capture of a network of interactions and the identification of the protein involved in the network; 2) biological characterization of the network of interactions; 3) identification and structural characterization of protein binding sites; 4) modulation of protein-protein interaction by point mutations strategies and pharmacological approaches (all themes supported by published articles, tutorials and book chapters from the lecturers).

Outcome:

The integrative nature of the approach will allow for a better understanding of the work of living cells but also as an exercise in integration of data from multiple disciplines and methodologies such as biochemistry, molecular biology, protein chemistry, mass spectrometry and structural biology.

The course dedicated special emphasis to novel technical approaches, such as AP-SWATH (affinity purification followed by quantitative mass spectrometry), bioinformatic analyses for characterization of interactome networks and prediction of direct interaction and domain-domain interaction, definition of protein binding-sites through cross-linking approaches, and some auxiliary biophysical techniques used in the characterization of physical-chemical interactions. Recombinant protein production and purification were briefly addressed as they are required steps for the physical-chemical characterizations. By integrating protein interactomics approaches with the structural characterization of proteins and protein-protein interactions, this course provided students with a broad (highly versatile) and state of the art perspective on how to study proteins' function by addressing their network of interactors in either stable or dynamic protein complexes. The course was included in the PhD program in Experimental Biology and biomedicine (http://beb.cnbc.pt/det_courses.asp?id=926) providing ECTS (European Credit Transfer System); it also allowed course attendees to present their own work in a poster session and awarded two travel grants for best abstract and best poster.