Biomolecular NMR spectroscopy

Nuclear Magnetic Resonance (NMR) Spectroscopy is one of the leading techniques in structural biology to investigate the structure and dynamics of small and large molecules and their interactions.

In this framework, intense research activities are carried out at the IBB where several ongoing projects concern with structural and dynamics investigation of proteins playing crucial functions under physiological or disease-related conditions (like cancer and genetic pathologies). Solution structural studies on well folded as well as disordered proteins are conducted with cutting-edge NMR techniques employing multidimensional experiments and uniformly or selectively $^{15}\text{N}$ and/or $^{13}\text{C}$ labeled samples under different buffer conditions or even in a cellular environment. Another active research area at IBB regards the analysis of conformational properties by NMR of bioactive peptides (including antimicrobial peptides), peptide amphiphiles and other aggregation-prone peptide-based systems, PNAs (Peptide Nucleic Acids), peptides conjugated to drugs for targeted drug delivery or peptide-based probes for targeted resonance imaging.

Nevertheless, molecular recognition processes (i.e., protein-protein and protein-ligand (peptides, nucleic acids and small molecules) interactions) are also investigated at IBB NMR laboratory either by canonical chemical shifts perturbation studies relying on observation of protein resonances (through for instances 1D $^1\text{H}$ experiments or 2D HSQC spectra) or employing NMR screening techniques - particularly appealing in the drug discovery field - based on ligand observation (including but not limited to STD, WaterLOGSY, transferred-NOESY).

References:


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