IN-CELL NMR FOR THE UNDERSTANDING OF PHYSIOLOGICAL PROCESS AT MOLECULAR LEVEL

Lucia Banci

CERM and Department of Chemistry, University of Florence, Sesto Fiorentino, Italy

In-cell NMR, i.e. high resolution NMR spectra of biomolecules in intact, living cells, represents one of the highest impact applications of magnetic resonance.

These experiments allow to obtain information on the conformational and functional properties of biomolecules at atomic resolution in conditions as close as possible to the physiological ones. In-cell NMR allows also to monitor protein-protein interactions and to follow functional processes, as well as protein maturation and post-translational modifications. A further striking application is its use for drug screening in real time at cellular level, in human living cells.

Methodological aspects and innovations will be discussed and a few examples of the striking power of this approach for the characterization of the metal transport processes, for the assessment of the protein redox state in the cellular environment, and for the study of effective drug screening will be presented. Particular focus will be on the cellular uptake and target binding in the cellular milieu of drugs and leads and on the meaningful differences observed between drug-target binding in living cells versus in vitro.

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