## Integration of XAS and NMR Techniques for the Structure Determination of Metallo-proteins. Examples from the Study of Copper Transport Proteins

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NMR is a powerful technique for protein structure determination in solution. However, when dealing with metallo-proteins, NMR methods are unable to directly determine the structure of the metal site and its coordination geometry. The capability of X-ray absorption spectroscopy (XAS) to provide the structure of a metal ion bound to a protein is then perfectly suited to complement the process of structure determination. This aspect is particularly relevant in structural genomic projects where high throughput of structural results is the main goal.

We have recently exploited the synergism of the two techniques in the structure determination of bacterial copper transport proteins [1,2]. The synergism extends, in favourable cases, to the detection of metal-mediated protein-protein interactions leading to the formation of functional protein complexes. Examples will be provided about proteins involved in the assembly of the  $Cu_A$  and  $Cu_B$  sites of cytochrome *c* oxydase.

[1] Banci L., Bertini I., del Conte R., Mangani S., Meyer-Klaucke W., *Biochemistry* 2003, **42**, 2467. [2] Arnesano F., Banci L., Bertini I., Mangani S., Thompsett A.R., *Proc. Natl. Acad. Sci. USA*, 2003, **100**, 3814. **Keywords: NMR, XAS, structural genomics**