The advent of metal-induced biomimesis in metabolism-related (patho)physiologies.

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The prospect of developing soluble and bioavailable metal-complex forms with physiological substrates, capable of influencing (patho)physiological aberrations, emerges as a challenge in the case of metabolic syndromes and the associated disease of Diabetes mellitus. To that end, pH-specific synthetic efforts on binary/ternary [Zn(II), Cr(III), V(IV,V), Ti(IV)]-(α-hydroxycarboxyclic acid) systems, involving natural physiological chelator ligands (2-hydroxy isobutyric acid, D-quinic acid, 2-ethyl-2-hydroxybutyric acid) in aqueous media, led to the successful isolation of and physicochemical characterization of binary/ternary crystalline materials.

The ensuing cytotoxicity profile of the new materials formulated their use in cell differentiation experiments, thereby a) unraveling their structure-specific adipogenic and osteogenic potential, and b confirming through an arsenal of molecular biological methods the functional status of metal ions in bioprocesses linked to glucose catabolism and reduction of hyperglycemia. Collectively, for the first time, well-defined atoxic metal complexes, bearing bound physiological substrates, emerge as competent inducers of cell differentiation, intimately associated with cell maturation (Fig. 1), thereby a) associating the adipogenic (insulin mimetic properties) and osteogenic potential (mineralization), and b) meriting further investigation into the development of a new class of multipotent metallodrugs.

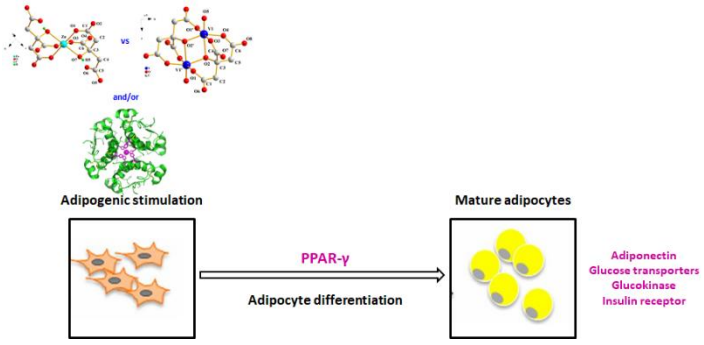

Figure 1: Schematic presentation of the employed experimental protocol in the case of metal-induced adipogenesis .

References:

1. O. Tsave, M. P. Yavropoulou, M. Kafantari, C. Gabriel, J. G. Yovos, A. Salifoglou, J. *Inorg. Biochem.* **163** 323-331 (2016)
2. O. Tsave, M.P. Yavropoulou, M. Kafantari, C. Gabriel, J.G. Yovos, A. Salifoglou, *J. Inorg. Biochem*. **186** 217-27 (2018)
3. O. Tsave, A. Salifoglou, *J. Inorg. Biochem*. **214** 111290 (2021)