

Tertiary and quaternary effects in the allosteric regulation of animal hemoglobins

By: [Ronda, L](#) (Ronda, Luca)<sup>[1]</sup>; [Bruno, S](#) (Bruno, Stefano)<sup>[1]</sup>; [Bettati, S](#) (Bettati, Stefano)<sup>[2,3]</sup>

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Abstract

In the last decade, protein allostery has experienced a major resurgence, boosted by the extension of the concept to systems of increasing complexity and by its exploitation for the development of drugs. Expansion of the field into new directions has not diminished the key role of hemoglobin as a test molecule for theory and experimental validation of allosteric models. Indeed, the diffusion of hemoglobins in all kingdoms of life and the variety of functions and of quaternary assemblies based on a common tertiary fold indicate that this superfamily of proteins is ideally suited for investigating the physical and molecular basis of allostery and firmly maintains its role as a main player in the field. This review is an attempt to briefly recollect common and different strategies adopted by metazoan hemoglobins, from monomeric molecules to giant complexes, exploiting homotropic and heterotropic allostery to increase their functional dynamic range. This article is part of a Special Issue entitled: Oxygen Binding and Sensing Proteins. (c) 2013 Elsevier B.V. All rights reserved.