

PREFACE

The ability to sense and respond to changes in oxygen partial pressure represents a fundamental property for assuring balanced cellular oxygen supply. The ubiquitous pathway of the hypoxic induction of the transcription factor “hypoxia inducible factor” (HIF) is pivotal. Stability and activity of HIF are regulated as a function of oxygen but also in response to hormones, growth factors, oncogenes and as a result of redox-changes related to the production of superoxide or nitric oxide. HIF, in turn, coordinates gene and protein expression profiles that promote compensatory shifts in anaerobic metabolism, oxygen delivery and adaptive processes to coordinate systemic, local and cellular responses to hypoxia.

Research on hypoxia currently focuses on how cells sense changes in oxygen availability to coordinate genomic and proteomic responses, how HIF affects normal development and physiology, how hypoxia can lead to diseases in close association with human pathologies such as inflammation or cancer, and which of the targets can be approached for potential therapeutic interventions. Although the discovery of molecular details on HIF stability regulation has revealed an unexpectedly direct connection between molecular oxygen and responses to hypoxia, major problems in the field include understanding multiple intracellular changes that occur upon oxygen deprivation. This volume of *Methods in Enzymology* brings together expertise from various disciplines to shed light on recent developments, methodological approaches and biomedical aspects in the field of Oxygen Biology and Hypoxia.

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