Chapter

Introductory Chapter: Crosstalk Approach for a Deeper Understanding of the Biological Processes

Mohamed A. El-Esawi

1. Introduction

Molecular signaling has been widely studied in the recent years in order to investigate the different biological processes in living organisms. Information provided by this approach has been utilized to unravel the various functions of different molecules or organs in cells, which in turn facilitate the understanding of the molecular mechanisms underlying the physiological and biochemical processes in these organisms. Therefore, nowadays it is much easier to understand how the biological processes are regulated and controlled inside the organism cells. Understanding the crosstalk and molecular signaling pathways could also help to understand the gene regulatory networking. In plants, studying the signaling processes and crosstalk at the physiological, biochemical, and molecular levels would definitely help to improve the plant growth, development, survival, and productivity as well as to adapt plant crops to the challenging environmental conditions including abiotic and biotic stresses [1–5]. Furthermore, in animals and human, revealing the crosstalk in the biological processes leads to understanding how diseases can be controlled and treated. Therefore, more studies should discuss this matter at the different levels within living organisms. Such kind of information will definitely help to develop different advanced strategies to understand and control the cellular biological processes at different levels.

2. Crosstalk in biological processes

Several earlier studies have reported the crosstalk approach in understanding biological processes in different living organisms. For example, in plants, El-Esawi et al. [1] revealed that Trp triad substitution mutants at W400F and W324F positions can be photoreduced in whole cell extracts, albeit with reduced efficiency. The flavin signaling state (FADH°) has been shown to be stabilized in an in vivo context. These results confirmed that in vivo modulation by metabolites in the cellular environment could has a key role in cryptochrome signaling and is discussed with regard to the possible impacts on the conformation of the C-terminal domain to create the biologically active conformational state. Furthermore, El-Esawi et al. [2] addressed that the blue-light induced biosynthesis of reactive oxygen species may contribute to the signaling mechanism of *Arabidopsis* cryptochrome. El-Esawi et al. [3] also addressed the processes of micropropagation technology and its applications in crop improvement. Nonzygotic embryogenesis and somatic hybridization processes have been explained and assisted in plant development and crop improvement [4, 5]. Moreover, studying the physiological, biochemical, and molecular processes in plants helped to understand the plant development and to develop improved crop varieties tolerant to different environmental stresses [5–15]. In addition, earlier studies reported the importance of crosstalk in understanding the biological processes in other living organisms such as animals and humans. These approaches and processes could be discussed for further understanding and improvement.

Author details

Mohamed A. El-Esawi
Botany Department, Faculty of Science, Tanta University, Tanta, Egypt

*Address all correspondence to: mohamed.elesawi@science.tanta.edu.eg

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