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Raising Awareness of Molecular and Cellular Disease

George Dickens*

Departments of Physiology and Kinesiology, University of Sydney, Sydney, Australia

Introduction

Despite the overwhelming evidence of the numerous physiological benefits brought about by regular PA, the precise molecular pathways by tools to aid clinical research to elucidate the mechanisms of PA, integrative physiological mechanisms by which PA benefits multiple tissues and organ systems, the role of tissue stress in the benefits of PA, the role of mitochondria in the mechanisms underlying the benefits of PA, and discovery tools to identify circulating and tissue signals, there is still much to learn about the physiological benefits of frequent PA. The development of individualised methods to health optimization could be supported by advances in the mechanistic understanding of the remarkable link between PA and health outcomes. These advancements could result in novel molecular and cellular therapeutic targets being revealed [1].

Description

Basic life sciences research has shifted away from traditional biological reductionism and toward a much more integrative, holistic systems approach in response to modern technology's sophistication and potential. The realization that living organisms are more than the sum of their parts and that interactions between cellular components and their environment are ultimately responsible for organismal structure, function, and phenotype has emerged as a result of rapid technological advancement. The inability of biological networks to maintain homeostasis is the root cause of pathophysiology and the onset of complex diseases [2,3]. On the other hand, biological adaptations that increase network flexibility and produce functional reserve impart stress tolerance and promote health.

PA provides a framework for producing a deeper and more complete understanding of those networks because it is an energetic and physical challenge that significantly affects the complex physiologic and metabolic networks of a multi-system organism [4,5]. A two-tiered conceptual framework is proposed to capture the integrative and hierarchical nature of network control in response to PA because PA affects all cells and tissues in the body differently depending on the type and intensity of activity, the individual's fitness, development, and disease. The multiple vertical levels at which hierarchical control is exercised and the molecular mechanisms that mediate this control make up the first tier.

Conclusion

A model that can be used to create and test hypotheses experimentally is based on a comprehensive understanding of the integrated regulatory processes that operate within and between horizontal and vertical levels. The second tier takes into account both acquired age, environment, fitness level, and disease status in addition to intrinsic genetic, sex, and height factors. First-tier network dynamics are influenced by individual variability. The ultimate objective of biomedical science is to successfully integrate knowledge of inherent regulatory architecture with well-defined adaptive, homeostatic processes to successfully prevent, forecast, treat, and control human disease on an individual basis through the development and application of this model. Identifying the extent to which PA disrupts homeostasis is the first step in deciphering the molecular pathways underlying PA's health benefits. it is still unknown whether PA-induced alterations in homeostasis are shared or differentiated among cell types, as well as how much the type of exercise influences the responses in different cell types.

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Conflict of Interest

None.

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***Address for Correspondence:** George Dickens, Departments of Physiology and Kinesiology, University of Sydney, Sydney, Australia; E-mail: georgedickensmn@gmail.com*

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