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Increasing the Understanding of Molecular and Cellular Disease

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Introduction

Despite abundant evidence of the numerous physiological benefits conferred by frequent PA, the precise molecular pathways by Tools to facilitate clinical research to elucidate the mechanisms of PA, integrative physiological mechanisms by which PA benefits multiple tissues and organ systems, role of tissue stress in the benefits of PA, role of mitochondria in the mechanisms underlying the benefits of PA, and discovery tools to identify circulating and tissue signals. Progress toward a better mechanistic understanding of the extraordinary relationship between PA and health outcomes could lead to transformative biomedical discoveries that reveal potential novel molecular and cellular therapeutic targets for disease prevention/treatment and support the development of personalised approaches to health optimization [1].

Description

In response to Modern technology's sophistication and potential, the terrain of basic life sciences research has shifted away from traditional biological reductionism and toward a much more integrative, holistic systems approach. Rapid technological progress has increased awareness 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. Pathophysiology and the development of complex diseases are caused by biological networks' incapacity to maintain homeostasis, whereas biological adaptations that improve network flexibility and produce functional reserve impart stress tolerance and promote health [2-3].

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

Conclusion

A full understanding of the integrated regulatory processes that operate within and between horizontal and vertical levels inform a model that may be used to create and test hypotheses experimentally. The second tier considers intrinsic genetic, sex, height, and other factors, as well as acquired age, environment, fitness level, disease status, and other factors. Individual variability affects first tier network dynamics. The development and application of this model advances biomedical science's ultimate goal of successfully preventing, forecasting, treating, and controlling human disease on an individual basis by integrating knowledge of inherent regulatory architecture with well-defined adaptive, homeostatic processes. Deciphering the molecular pathways underlying PA's health benefits begins with establishing the extent to which PA upsets homeostasis. in various cell types, as well as how certain cells respond to those challenges It is yet unclear whether PA-induced alterations in homeostasis are shared or differentiated among cell types, and how much the type of exercise influences the responses. Does, for example, endurance exercise boost the rate of energy turnover in cell types other than skeletal.

Conflict of Interest

None.

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