

Preface

REGULAR EXERCISE IS AMONG THE most powerful health-promoting and disease-modifying behaviors readily available to humans who live in “modern” low-activity, high-calorie cultures. “If exercise were a drug, what would it be worth?” is a simple rhetorical question that illustrates this point. While this question is simple, understanding the many mechanisms responsible for the powerful health-promoting biological effects of exercise is not.

That events associated with skeletal muscle contractions can have profound effects on essentially every organ system at every scale of biological integration is remarkable. What other biological phenomenon can modulate gene action in cells, generate a host of short- and long-term signaling mechanisms with diffuse extracellular effects, evoke powerful whole-body responses to defend homeostasis, cause marked anatomical remodeling over time, and ultimately extend life by years?

With the scale of these responses in mind, we developed *The Biology of Exercise* by first recognizing that biology is broadly defined as the multilevel study of life that encompasses many subdisciplines from the molecular to the ecological. Our second task was to recruit thought-leading content experts to detail what exercise does at each biological level, the magnitude of what is happening, and its time course. Our third task as editors was to organize the book in such a way that pulls the information in each chapter together to explore the totality of exercise. In this task, we asked the authors to highlight the many context-dependent factors that influence the biological responses to exercise, including the type of exercise, aging, sex differences, and the physical environment.

In this context, *The Biology of Exercise* is designed to serve as a resource for people working at higher levels of biological integration as they seek to understand the cellular and molecular events associated with exercise. Importantly, it is also designed as a resource for people who study the cellular and molecular responses to exercise as they seek to understand the whole body and population consequences of exercise. If *The Biology of Exercise* facilitates this sort of intellectual cross talk, our efforts as editors will have, in a small way, mimicked the biological cross talk that drives the physiological responses to and health benefits of exercise.

JULEEN R. ZIERATH
MICHAEL J. JOYNER
JOHN A. HAWLEY