Preface

In the late 1970s medical science was beginning to understand that exercise training, while normally an extremely positive physiological stimulus, could also have some drawbacks. Landmark research studies by scientists such as Dr. Barbara Drinkwater, Dr. Anne Loucks, and Dr. Michelle Warren, as well as others, demonstrated that exercise training could be a causative factor in disrupting the endocrine control of a woman’s reproductive system leading to the development of “athletic amenorrhea” (secondary amenorrhea). This medical condition is now recognized as part of the conditions associated with the Female Athletic Triad.

The basic premise of the research work on the development of athletic amenorrhea in women can be conceptualized as follows:

Exercise → Female Reproductive Hormones → Physiologic Consequences (negative)

That is, aspects of exercise and exercise training modulate the functioning of the female reproductive hormones. This modulating influence can be highly negative, leading to low estrogen and progesterone states and disruption of normal ovary function and menstruation. Contemporary research has demonstrated that the critical aspects initiating the sequence of such events are energy availability (i.e., development of a low energy availability state; recently designated as part of the Reduced Energy Deficient in Sports conditions [REDS] by an International Olympic Committee medical commission).

As a young professional I found the research on athletic amenorrhea an exciting and fascinating aspect of exercise endocrinology. But my curiosity also caused me to think about the relationship in a different fashion and ask the question—If exercise affects reproductive hormones, could the reproductive hormones have physiological effects unrelated to reproduction that influences the capacity of women to exercise? This seemed a logical question to me as many hormones have more than
one physiological effect/impact, and structurally many reproductive hormones have chemical structures similar to many metabolic and water balance hormones. In other words I wondered:

Female Reproductive Hormones $\rightarrow$ Exercise $\rightarrow$ Physiologic Consequences
(negative/positive?)

After studying the research literature, it was apparent that animal researchers had been asking this question and seeing that the female reproductive hormones did affect physiological systems and processes that affected exercise capacity. At that time, nearly 30 years ago, the human-based literature was extremely sparse. With that, I and a number of other researchers began to pursue the question of whether the female reproductive hormones have physiological impacts on the bodily systems that are essential to the exercise capacity of women exercisers.

In asking this question, to myself, the underlying premise was not to examine women to see why in some activities men are better. But, more to understanding the unique physiology of women and whether female sex hormones might account for some of the variance in physiological performance between amenorrheic and eumenorrheic women, and within women across the age span as they experience menarche to menopause. That has been my interest in pursuing this absorbing topic and why I wanted to develop this book.

This book was developed with hope that the select group of professionals writing the various chapters could address this last question. Like nearly all written works, this one could be improved and be made better, but I am extremely proud and thankful to the authors who contributed and put forth so much hard work. Each discussed topic provides current insight into the state-of-the-art research in the respective topic area. It is hoped the reader will be as excited and fascinated after reading the individual topics as the authors were in writing them. I also hope the insights provided here will inspire new researchers to ask questions about the roles of female sex hormones in exercise and pursue investigations to seek answers to those questions.

Chapel Hill, NC, USA

Anthony C. Hackney, PhD, DSc
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