

Using the Scientific Method to Determine Ways to Maximize Athletic Performance

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Application of the scientific method in the athletic setting in an attempt to achieve optimal performance is not new. Indeed, there is evidence to suggest that in ancient Greece, Galen (131-201) wrote 87 essays detailing performance-enhancement strategies while physicians routinely prescribed training programs and diets for the Olympic competitors. However, it is, perhaps, surprising that in the modern day, this long-held appreciation for science as the objective means for determining the best performance-enhancement strategies continues to be offset by a misguided respect for subjective dogma that often permeates the athletic setting. Simply stated, success commands attention and it is easy to fall victim to the assumption that the successful athlete must be doing it "the right way." Unfortunately, the strong influence of genetic predisposition combined with the impact of illegal performance-enhancement aids can render this assumption dubious at best. Moreover, the acute and chronic adaptations of the body systems in response to physical exertion are complex and conflicting findings in the research are not unusual. This adds to the confusion because even those who respect the need to prescribe performance-enhancement strategies in concert with what science has shown can find it difficult due to this lack of consensus.

The phrase "athletic performance" returns over 7000 results in the Pubmed database with over 4000 of those publications occurring in the past five years. This includes studies that have assessed periodization training models, nutrition and ergogenic aids, acclimatization and "warm up" preparatory strategies and manipulation of body composition to achieve optimal performance. Moreover, guidelines regarding cardiorespiratory conditioning regimens, musculoskeletal and neuromotor enhancement programs and psychological ergogenic interventions are also plentiful. Indeed, the never-ending search for ways to expand the boundaries of human work capacity in the athletic setting encompasses multiple disciplines and, therefore, requires a comprehensive integrative approach. In this special issue on sport science and performance, we have collected an array of articles that exemplifies this diversity. For example, readers will find information on psychological aspects of performance enhancement including how interpersonal interactions between coaches and players can enhance performance [1] while long-time participation and subsequent "burnout" can diminish it [2]. We also feature information on physiological assessments; for example, analysis of the athlete's autonomic nervous function via heart-rate variability [3] and how physical-fitness testing can be used to promote sport-related school activities in children and adolescents [4]. Actual aspects of performance will also be discussed including how body composition, anthropometry and physical fitness can be assessed to predict match performance for young soccer players [5] and how the best race-pace strategies can be defined to prescribe anaerobic training to enhance front-crawl performance during 100 and 200 meters for master swimmers [6]. Finally, we investigate how aspects of human resistance training can be better applied by considering a rodent training model, which elucidates cellular and molecular responses involved with muscle hypertrophy [7].

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