

Running rhythm: the dance among structure, function and performance. Dr. Leo J. D'Acquisto, Professor, Department of Nutrition, Exercise and Health Sciences, Central Washington University.

Enhancing running performance is a key objective for any coach and athlete. The varying levels of running performance success during a cross country and track season is clearly observable and related to numerous factors such as inherent ability, motivation, opportunity and training. Coaches, in part, strive to enhance a runner's ability to tolerate and sustain a faster pace in training and competition by focusing on the following:

- appropriately training energy systems,
- reducing resistance to forward motion by working on good running form and transfer of energy,
- boosting the rate of muscular work during competition
- minimizing injury

The relationship between the probability of becoming injured and variations in training stimulus can be somewhat complex. However, understanding this connection with practical implications toward training and competitive performance outcomes brings to the forefront the importance of injury prevention work, especially for the developing High School runner.

The focus of this presentation will be to highlight the importance of injury prevention work by spotlighting the *relationship* among structure, function, common running injuries and running performance. The presentation will be academic in nature but with

a practical outreach encompassing applied science and running performance.

The following is an overview of key topics that will be discussed during the presentation:

Part I

- The connection among structure, function, injury prevention work and running performance.
- Variability in running performance
 - Speed and stride rhythm as measures of variability
 - Potential factors accounting for performance variability
- Training stimulus, adaptation, and minimizing set-back
- Manipulating training load: consequences?
- Repetitive loading, injury cycle, and compensation
- Running power: where does it come from?
 - Types of muscular action contributing to propulsion
 - Effective transfer of energy
 - Elastic energy from tissues

Part II

- Models explaining the interaction of skeleton, joints, muscle and running motion: traditional and contemporary perspectives
- Common structural and functional challenges among high school runners
 - Does pelvis instability impact foot mechanics?
 - Weak abdominals and compromise in stride length: is this connection possible?
 - More challenges to consider (plantar fasciitis, iliotibial band syndrome, shin splints, stress fractures)
- Energetics of running in high school and collegiate runners
- Interaction of maximal oxygen uptake ($\text{VO}_2 \text{ max}$), economy and efficiency: relative importance of these parameters in high school runners
- Does compensation in structure/function really impact economy and efficiency of running?
- Importance of injury prevention work: resources for the coach.

