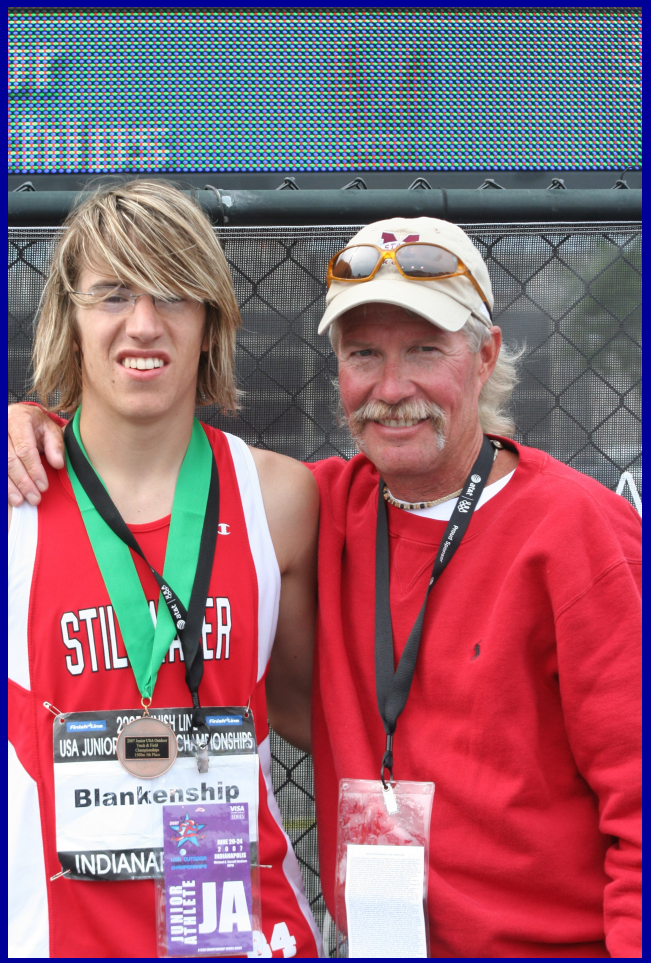
Profiling Endurance Runners: The Foundation

Georgia Track and Field Clinic 2019

Scott Christensen

- Stillwater, Minnesota, head coach for 33 years.
- 1997 National High School Champions (*The Harrier*).
- Four Stillwater alumni have broken 4:00 in the mile since 2003.
- Fourteen year USATF Level 2 Lead Instructor in Endurance. Past 5 years with USTFCCCA.
- USA World Cross Country Team Leader 2003 and 2008.



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"Coaching distance runners has always been my calling. It is not what I do, it is what I am."

Joe Vigil
USA Olympic Coach

Outline of Georgia Distance Foundation Presentation

- Introduction to Distance Science
- Scientific Principles and Theory
- Introduction to Training Technique
- Conclusion

Scientific Principles and Theory

Role of Science in Understanding Distance Training

- To understand growth and development issues.
- To select and sequence appropriate and timely workouts.
- To apply the principles of exercise physiology to workout selection.

Scientific Concerns in Developing Distance Runners

- Energy systems
- Muscular system
- Psychological issues
- Athletic lifestyle
- Perspective

Growth and Development

- The training program for the young distance runner must be designed to work in concert with the natural maturation process.
- Age may be the most important variable to consider when determining the appropriateness of training activities.

Age Appropriate Distance Training (15 and over)

- Athletes in late adolescence (age 15-19) are ready for more specific and demanding training, as well as higher training volumes.

- Boys and girls are both developing quickly at these ages, and are capable of performing more complex activities.
  - More advanced anaerobic training can be done at these ages.

Maturation

- Young distance runners mature at different rates, so it is wise to ascertain the degree of readiness of each athlete to undertake each type of training activity.
- Profiling each athlete is important in preventing injuries and controlling mental fatigue seen in young distance runners who are trained at very high levels.

Gender

- There is little difference between age appropriate training for young male and female distance runners.
- The distance coach should provide equal opportunities for both genders to participate, and be sensitive to developmental differences.

Energy for Movement

- Energy molecules are necessary for contracting muscles.
- Energy source is the food eaten.
- Some foods provide energy more readily than others. 9 KCAL vs 4 KCAL/gram
- The two main energy systems in the body differ by RATE of energy production.

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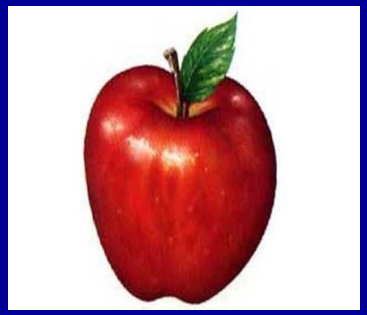

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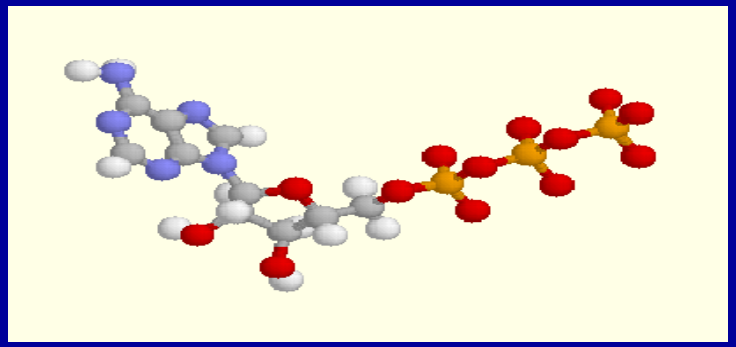
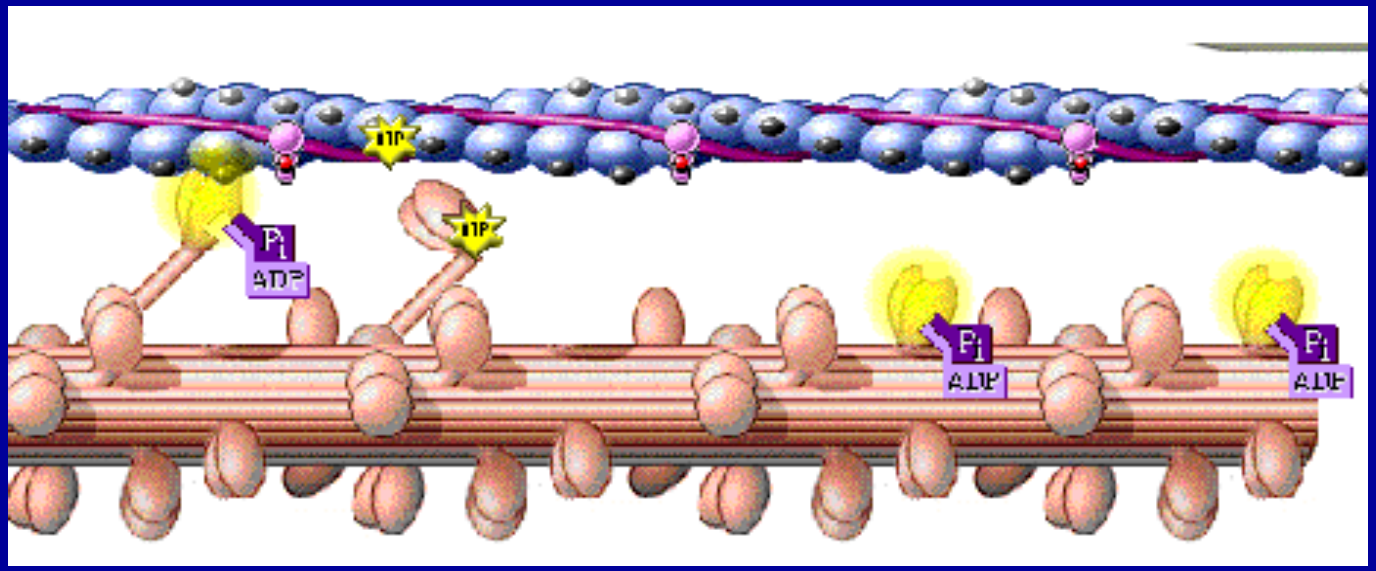


Two Energy Systems

- Aerobic: with oxygen, low force, high endurance. Few fibers.
- Anaerobic: without oxygen, high force, low endurance. Many fibers.



Combined Zone Races

All races longer than 800 meters have an aerobic and anaerobic component of energy contribution, and are called combined zone races.

Combined zone races have a comfort zone and a critical zone. The critical zone is where the race is won or lost.

A Variety of Training is Necessary for Combined Zone Races

Race Distance:	% Aerobic derived energy	% Anaerobic derived energy
800 Meters	50%	50%
1600 Meters	70%	30%
3200 Meters	87%	13%
5000 Meters	92%	8%

Transitioning to a Higher Dependence on Anaerobic Energy

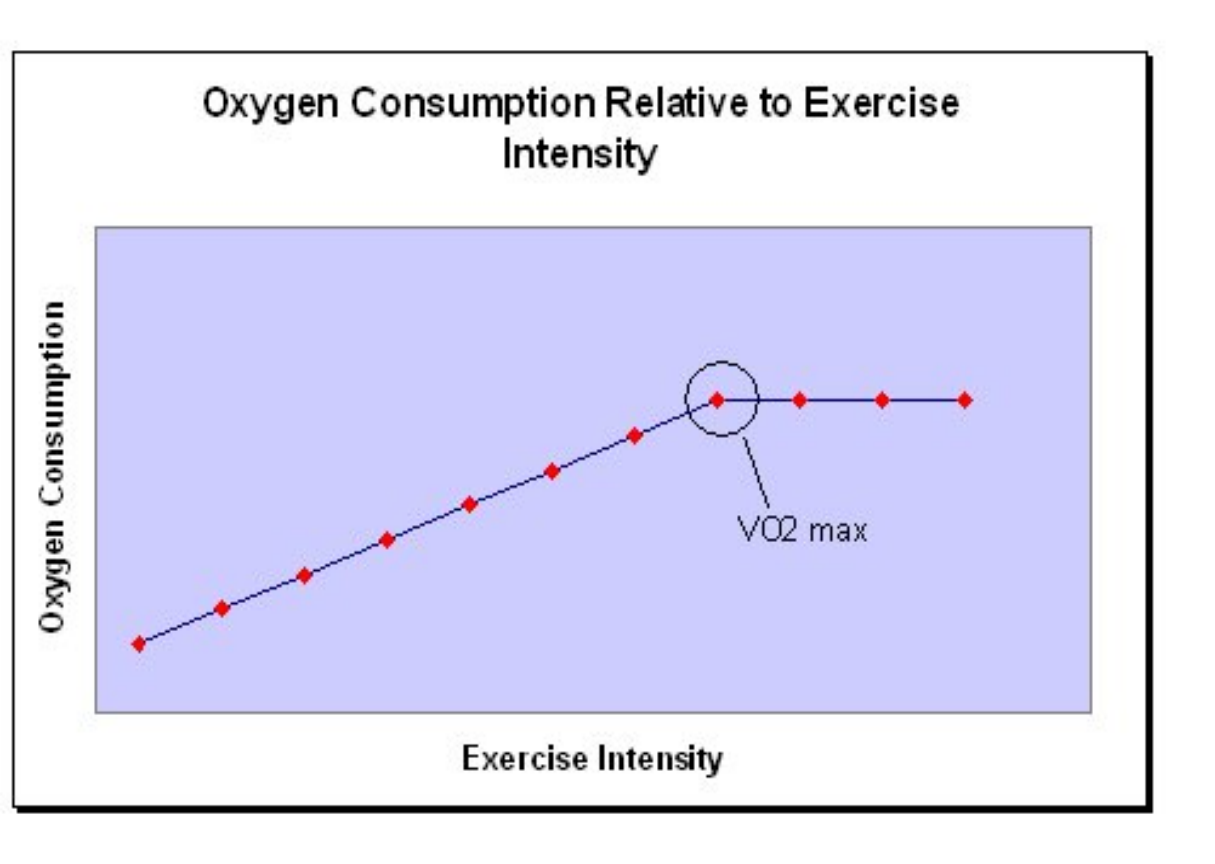
- As we have seen the faster and shorter the race (the intensity), then the greater the contribution of anaerobic energy.

- The aerobic system gets "maxed out" as the intensity of the race increases to a critical point. This point is called $VO_{2\ max}$. It is important to train at that point often.

Training Index

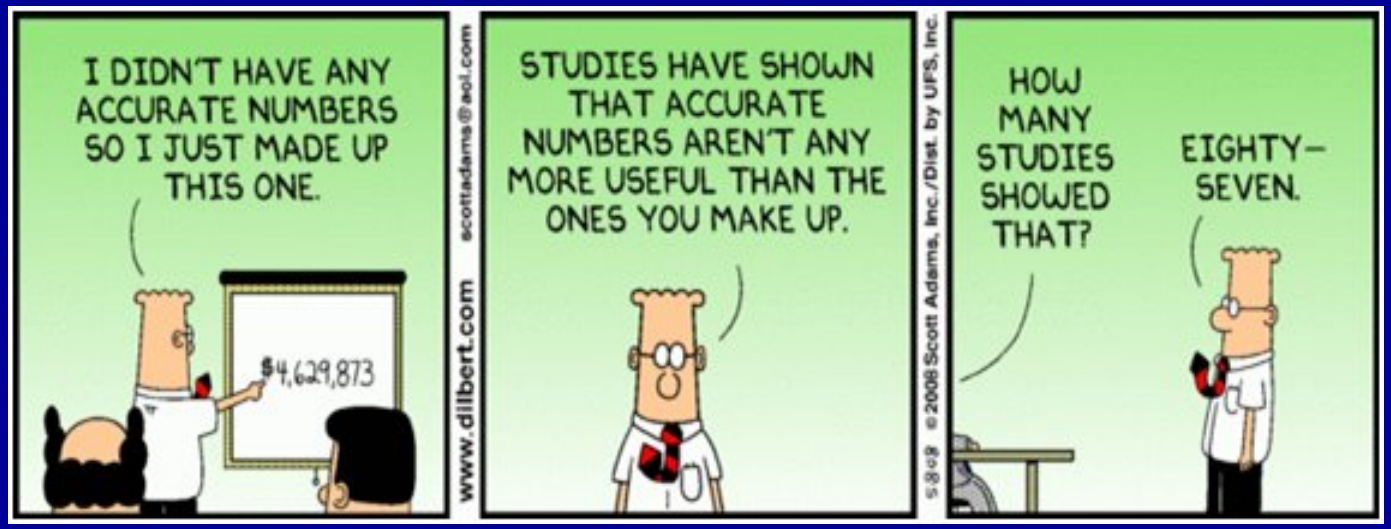
- Aerobic workouts use date pace $vVO_{2\ max}$ as the index.
- Anaerobic workouts use date pace 400 meters and/or PR 400 meter times as the training index.

What is $VO_{2\ max}$?



$VO_{2\ max}$ Field Tests for Coaches

- *Astrand protocol*: 2 miles at exhaustive pace yields a time we call date pace. Divide this time in half to get per mile training pace. Date pace index value.



Training at Key Points of Pace

- $vVO_{2\ max}$ pace improvement occurs at 97-101% of date pace aerobic power fitness (Astrand test).

- Aerobic threshold pace occurs at about 70% of $VO_{2\ max}$ pace. The long run..

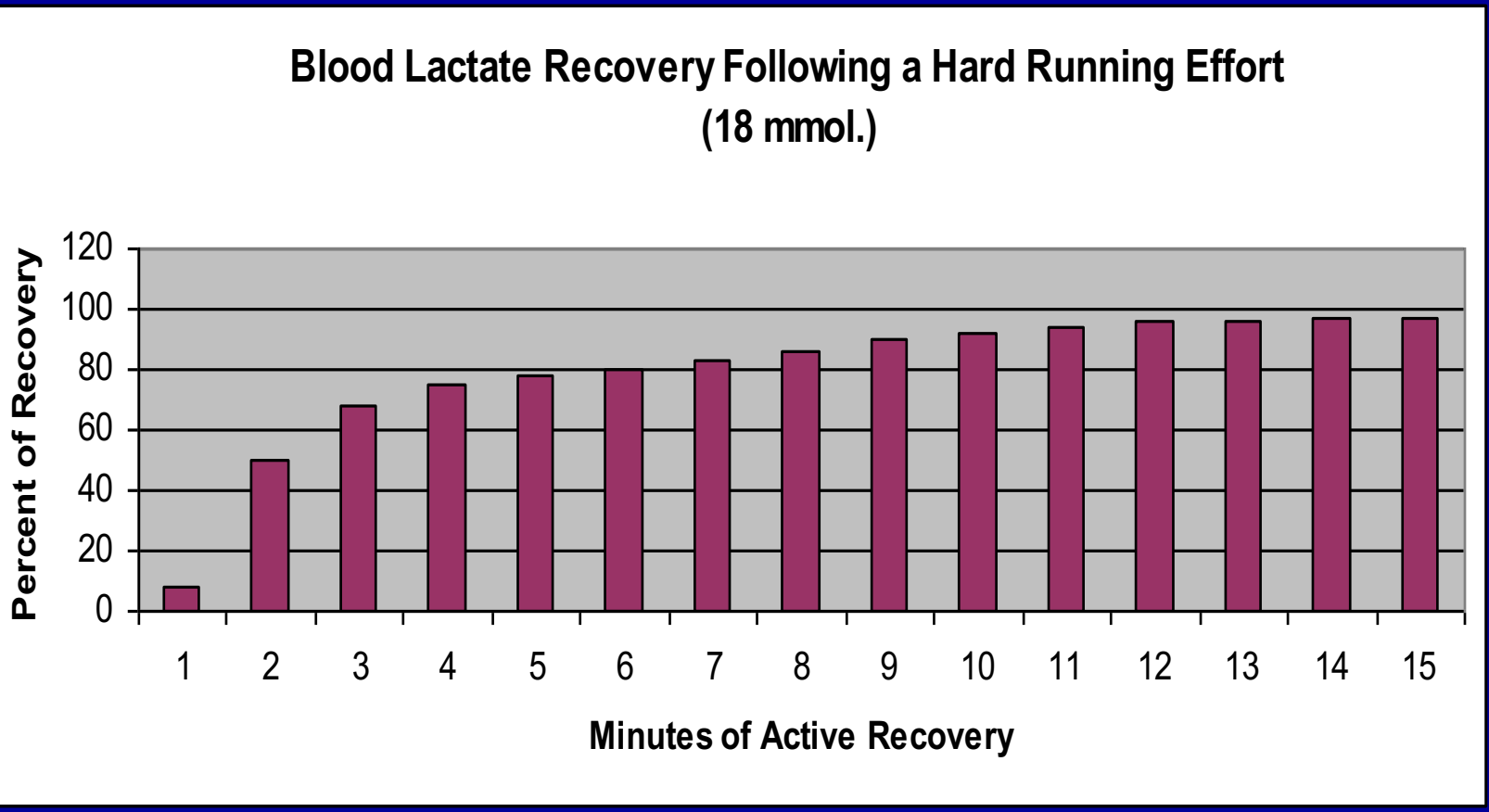
- Lactate threshold pace occurs at about 85% of $VO_{2\ max}$ pace. The tempo run.

Recovery Issues

Acute Recovery – within the workout

Chronic Recovery – time after the workout

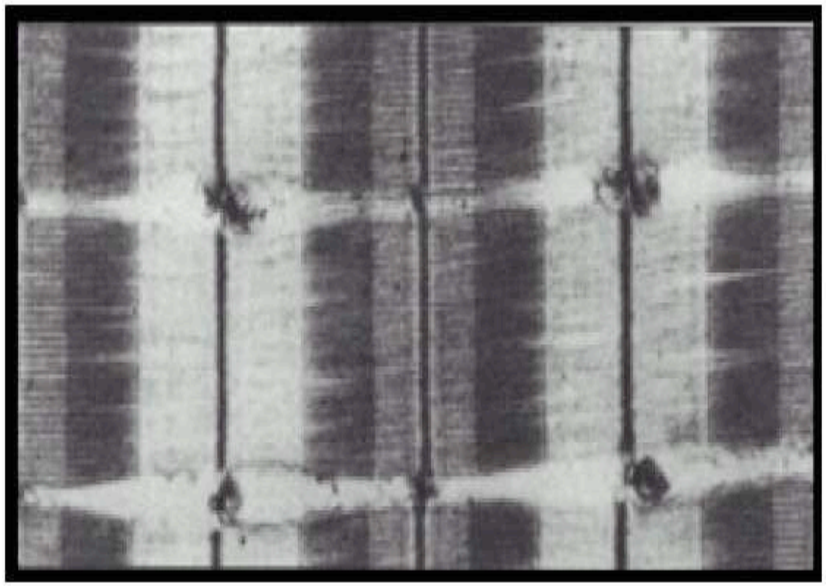
Recovery Principles
(Wilmore and Costill 2004)



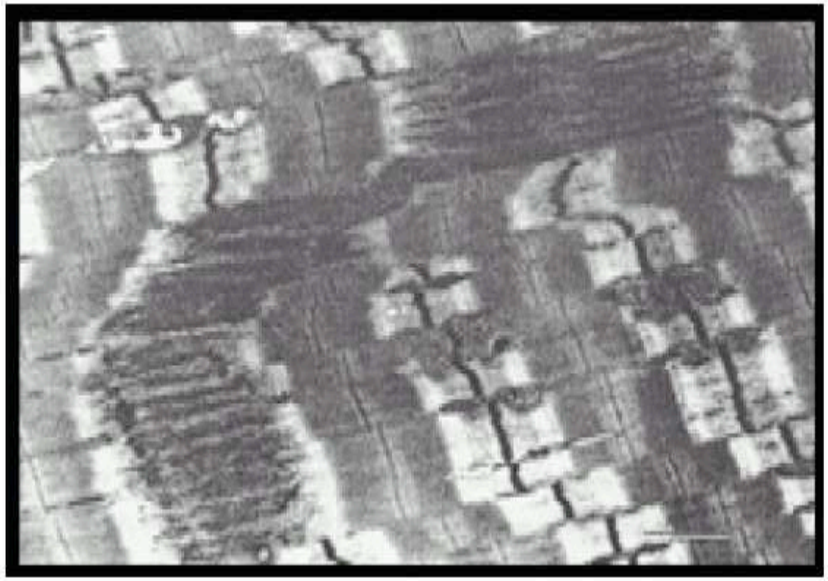
Tear and Repair

Before 5 x 500

After 5 x 500



Pre-training



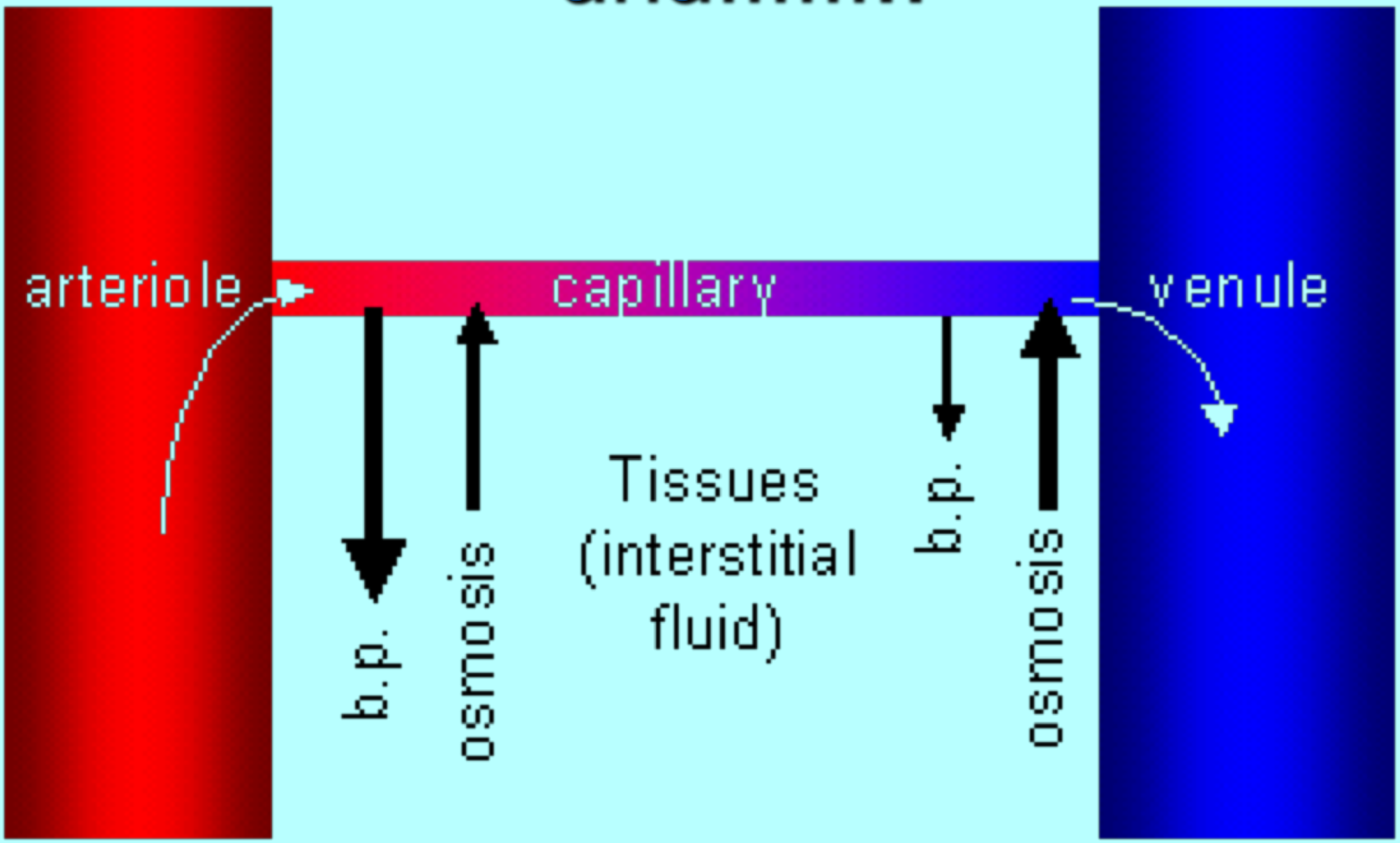
Post-training

Athlete Profiling

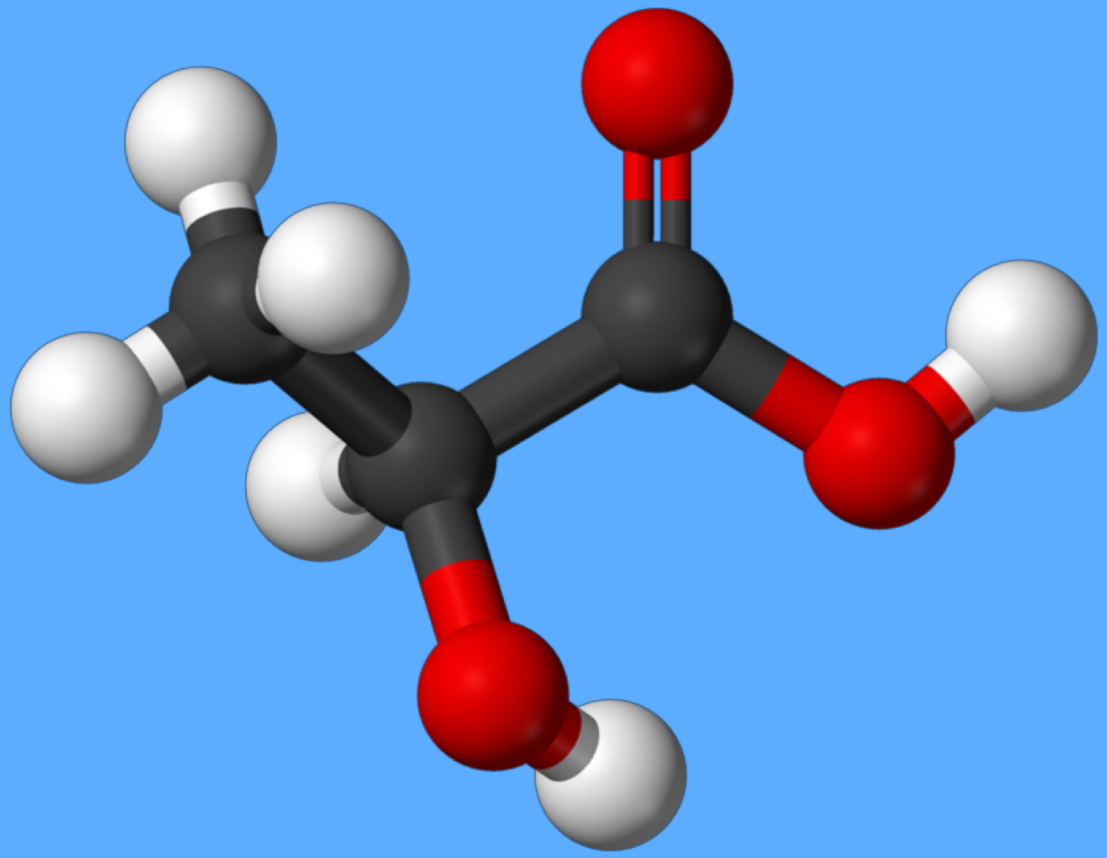
- $vVO_{2\ max}$ pace [date]
- vAT pace [date]
- vLT pace [date]
- 400 pace [date]
- 400 pace [PR]
- Econ pace [date]

Understanding Distance Training Through Graphs and Charts

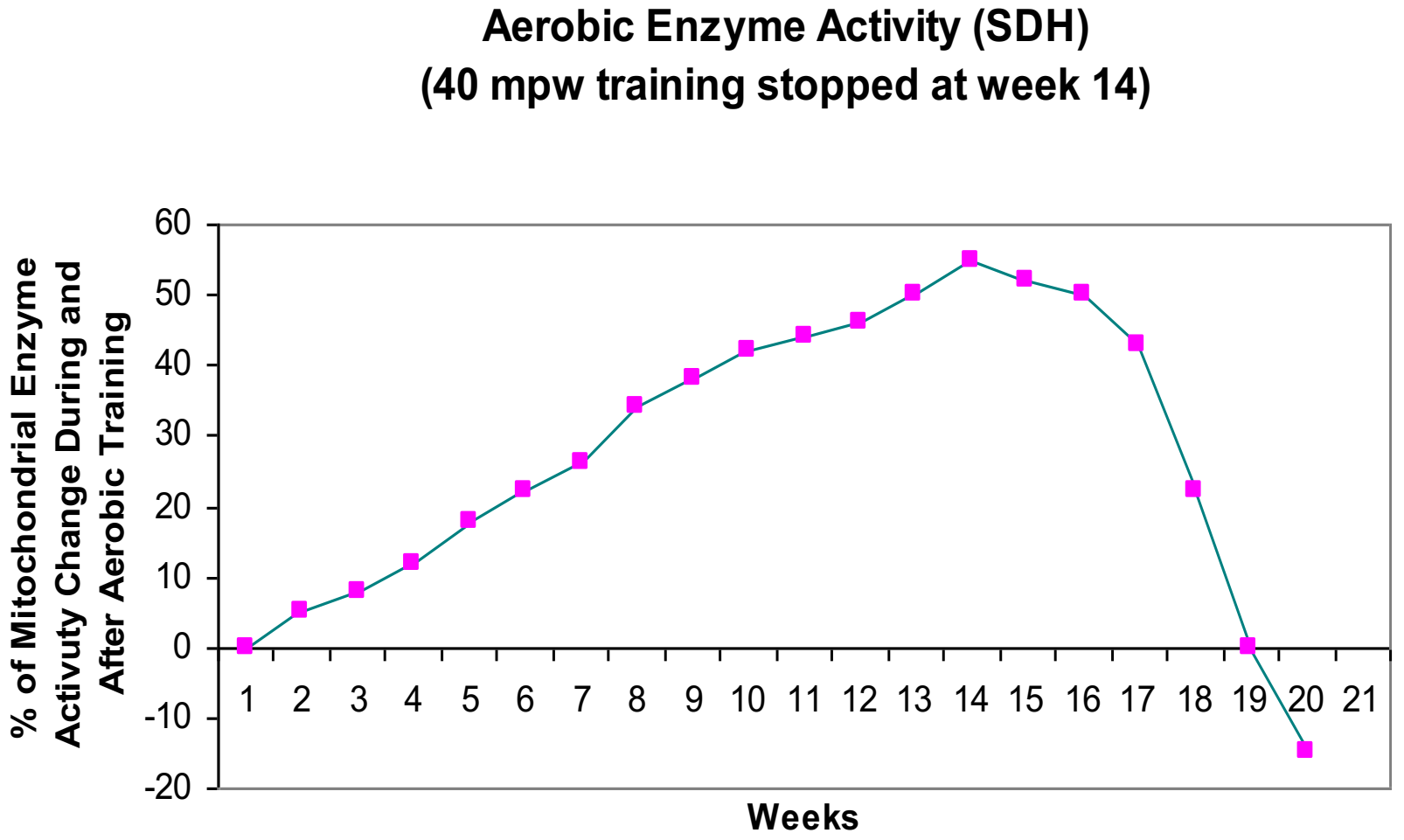
Successful racing in the combined zone relies on delivering oxygen and.....



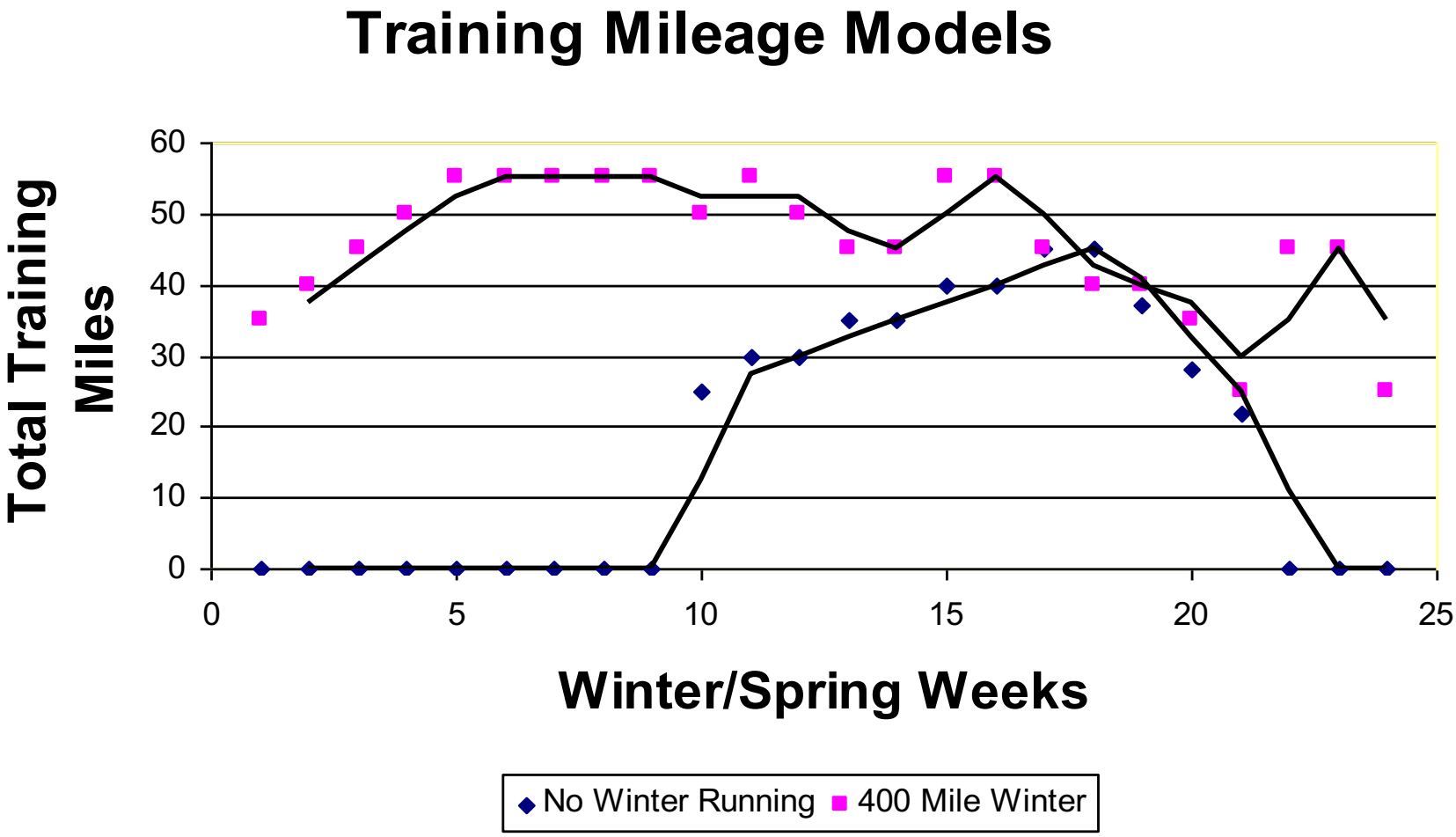
The toleration of disassociated Lactic Acid ($C_3H_5O_3^- + H^+$)



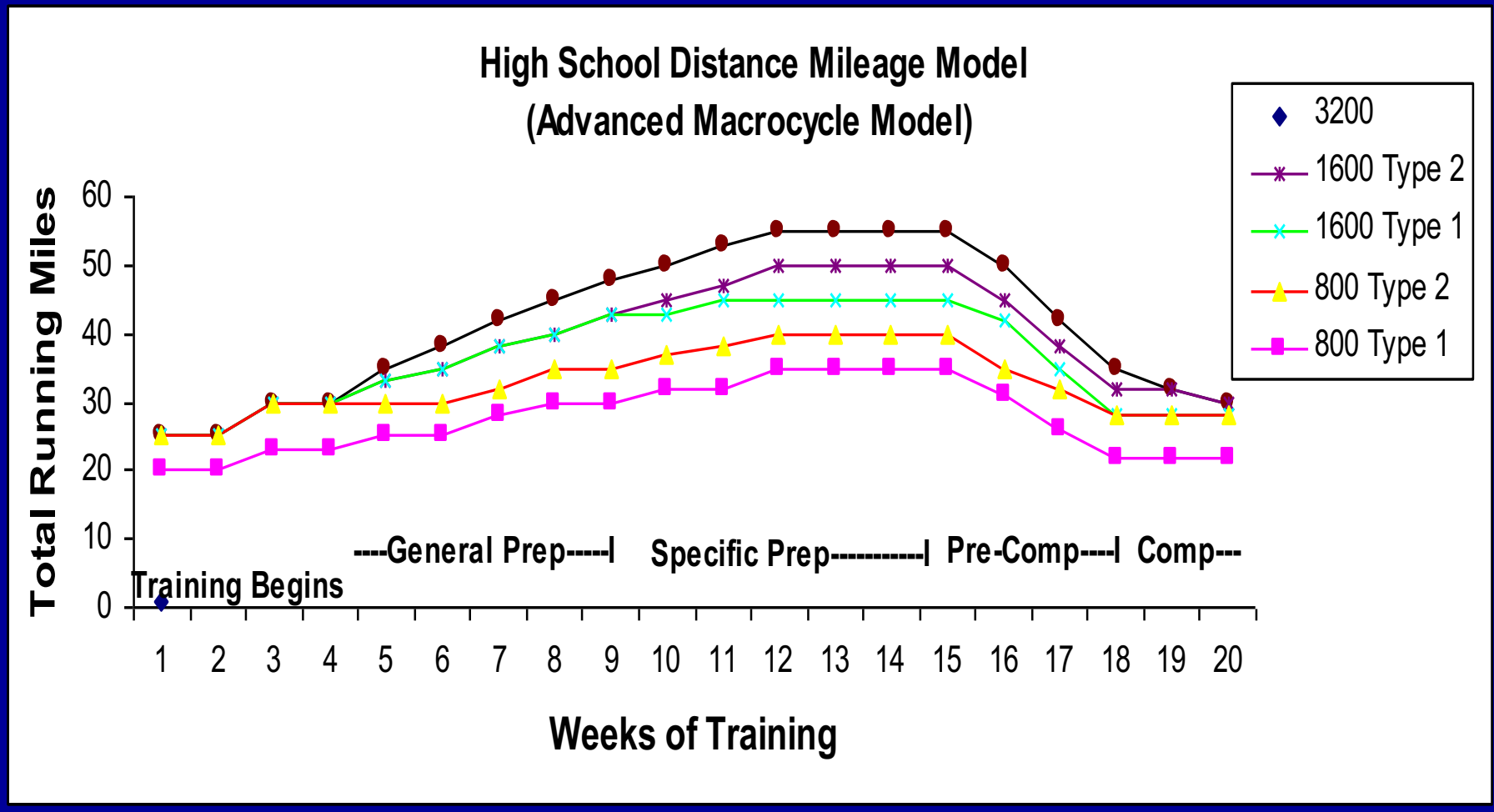
No Running and De-Training



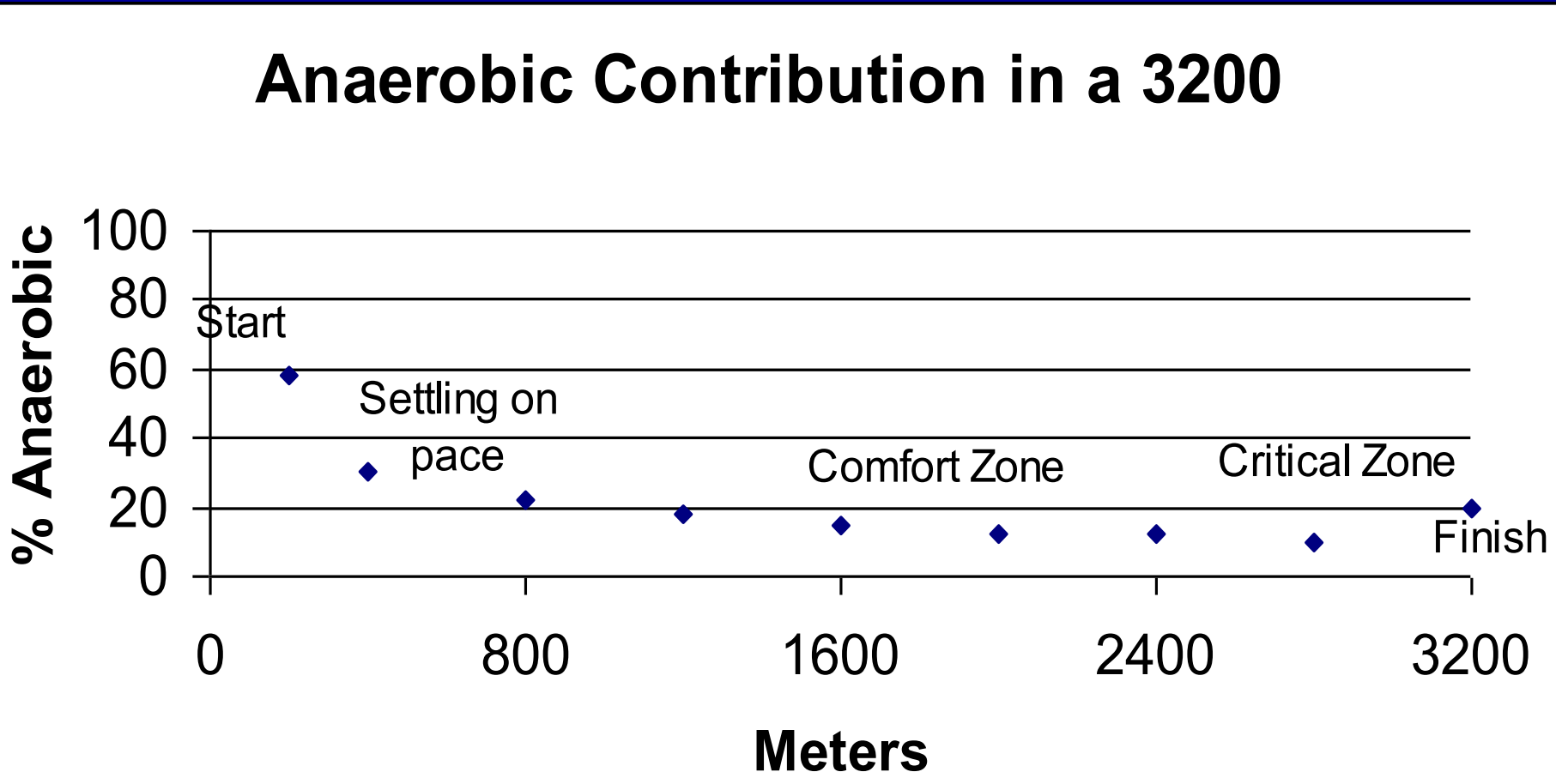
Endurance Training Volume
The Concept of a Training Base



Mileage Model as a an Event Marker



Where is the Distance Race Anaerobic?



Conclusion

- Design blocks of time and individual workouts that address both the aerobic and anaerobic development.
- Develop a written plan based around the calendar, date pace and athlete profile.
- Make sure the workout you design meets the physiological outcome desired.
- Educate yourself as to what the goal of the plan is to be.
- Do not be rigid. Adjust on the fly if needed.

For More Endurance Information

- *Reference Textbook:*
  The Complete Guide to Track and Field Conditioning for Endurance Events.

- *CD/Streaming Packages:*
  XC Theory and Application
  XC Complete Workout Program
  Mid-distance Theory and Application

By Scott Christensen
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