

Can We Peak Distance Runners?



Florida Track and Field Clinic 2015

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. Last 5 years with USTFCCA.
- USA World Cross Country Team Leader 2003 and 2008.



“I am happy. My coaches had me ready in my mind and my body felt so light.”

Kenenisa Bekele 12:37.35



Outline of Florida Peaking Presentation

- Scientific Theory of Tapering and Peaking
- Case Study Evidence in Peaking
- Training Design Application
- Conclusion

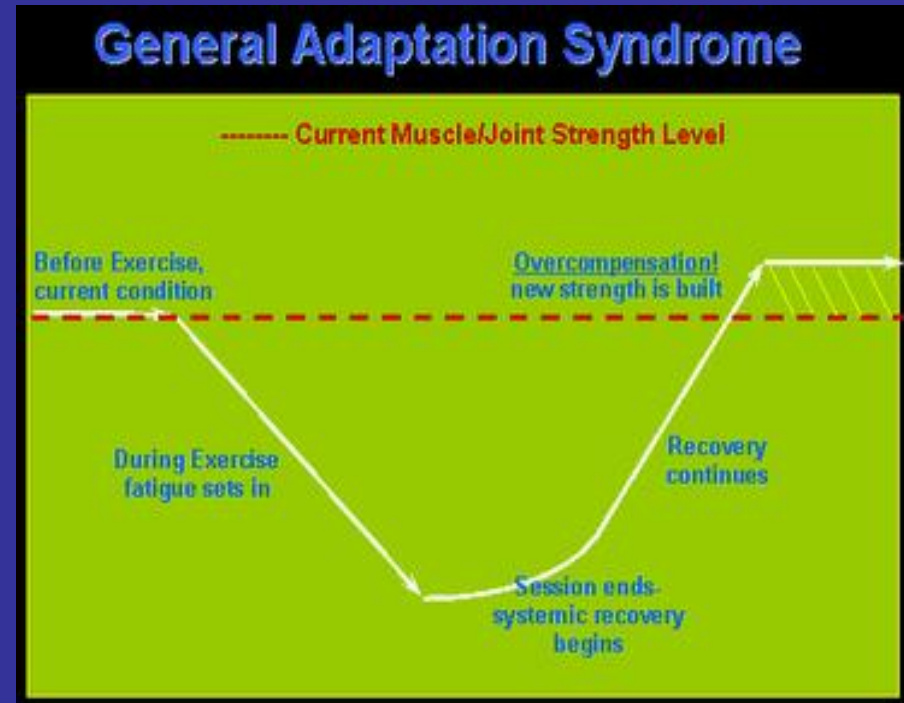
The Peak is Multi-Variate

- Fitness is at a peak.
 - Strength is at a peak.
 - Stamina is at a peak.
 - Hormones are at a peak.
 - Enzymes are at a peak.
 - Rest is at a peak.
-
- Aerobic system needs strong stimulus every 4 days.
 - Anaerobic system needs strong stimulus every 3 days.



A Description of Peaking

- Expect a 2% time improvement at most
- High workout intensity
- Low microcycle volume
- Psychological as much as physical



Training Effects Entering The Peaking Period

- Some physiological effects after 24 hours.
- Full physiological effects after 18-20 days.
- Periodize and sequence the workouts so they fit the championship race schedule.
- The body is very resilient when at a high fitness level.
- Watch for muscle trauma caused by too much testosterone.

Planning the Peak Period

- A switch from efficiency work to capacity work.
- A change from interval runs to repetition runs.
- A decrease in total volume of all work.
- A conceptual move from pre-competitive to competitive periods.

Physiological Functional Levels During Peaking

- High Lactate Value Responses (LVR).
- High maximal oxygen uptake values ($\text{VO}_2 \text{ max}$)

$VO_{2\text{ max}}$ During Taper Period?

“Runners who reduce their training by about 50-60% for 15 to 21 days show no loss in $VO_{2\text{ max}}$ or related aerobic performance”.

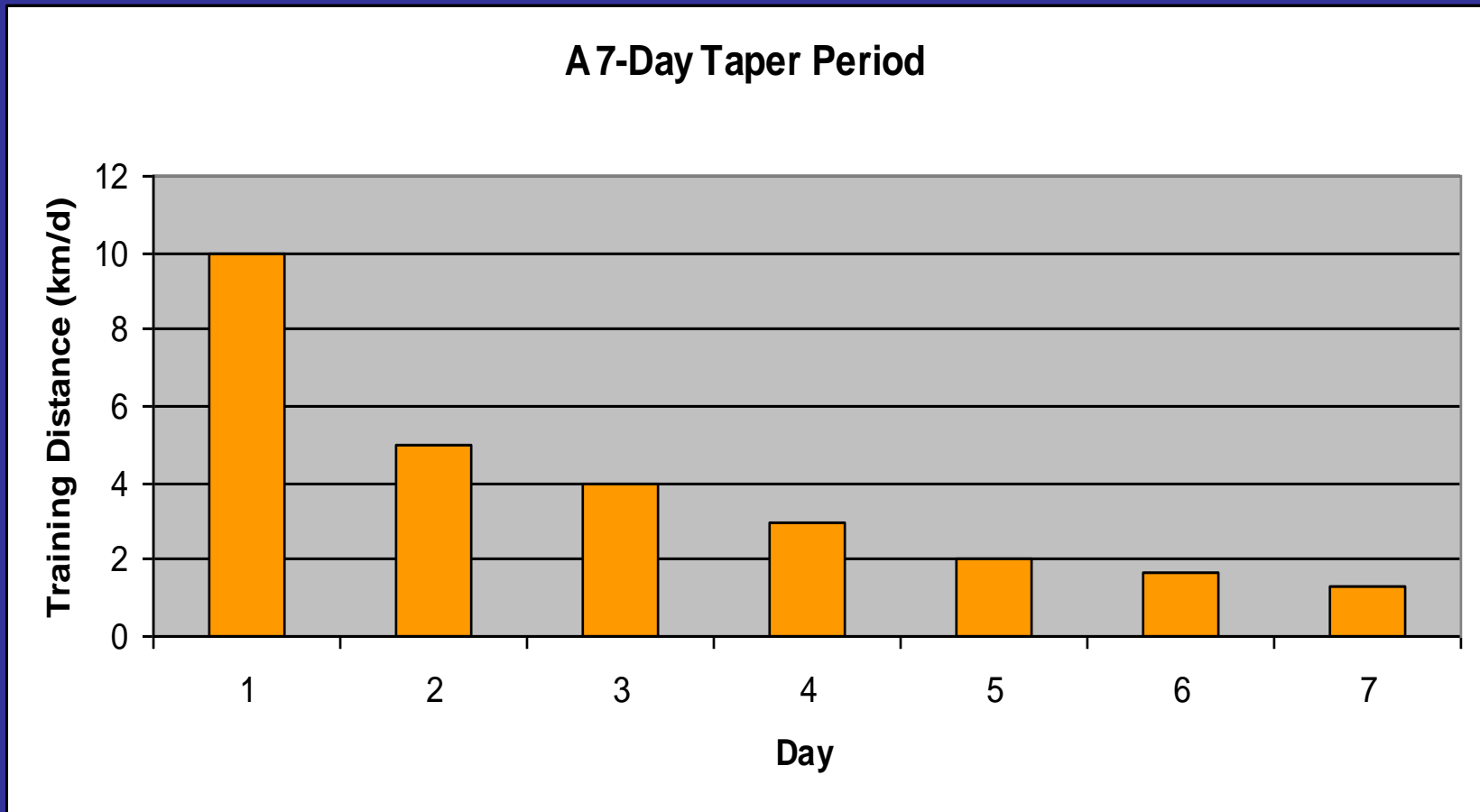
David Costill Ph D

Peaking Timeframes

- The aerobic peak occurs once per macrocycle and has a broad base (4-5 weeks).
- Structurally based.
- The anaerobic peak occurs as multiple peaks during the competitive period (4 weeks).
- Bio-chemically based.

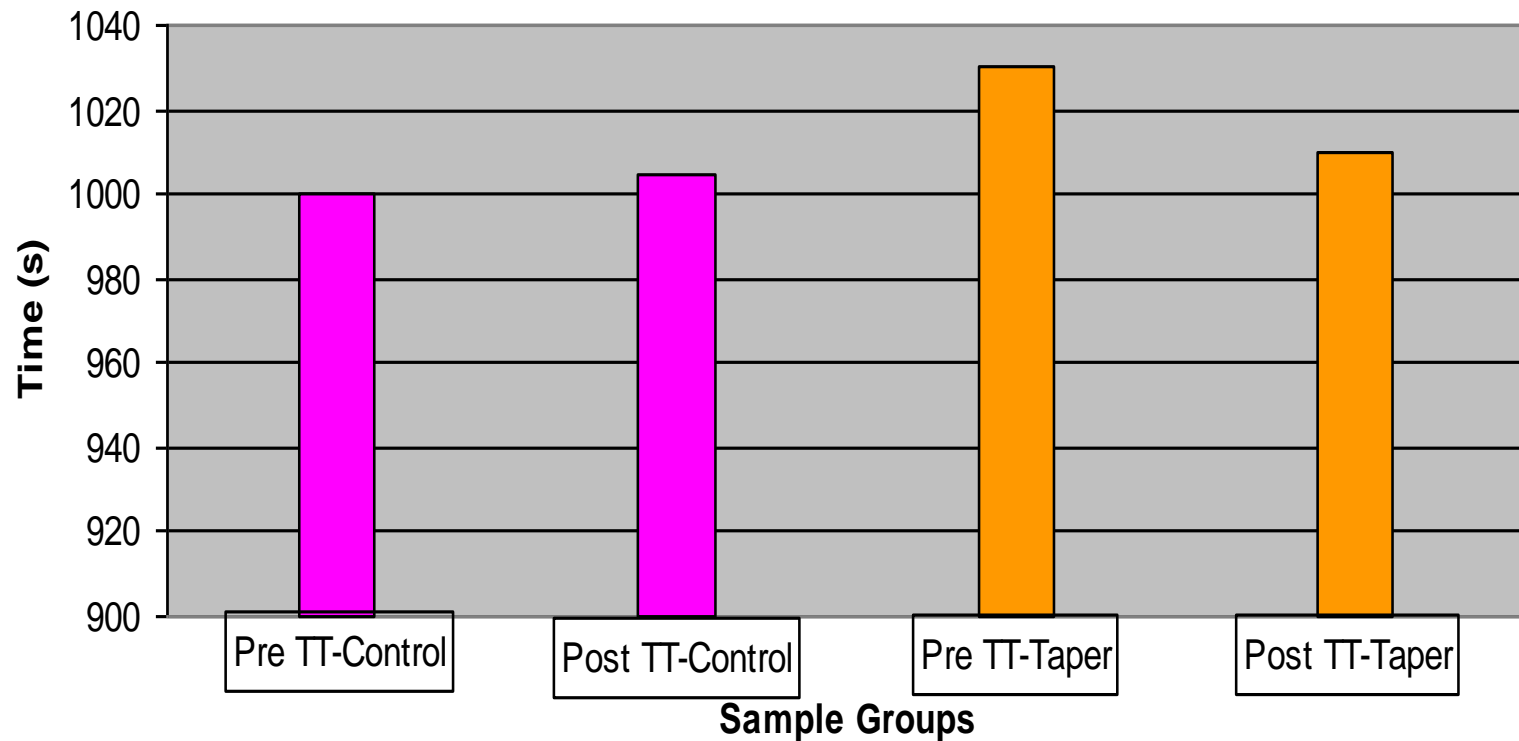
Case Study Evidence

Tapering Study (Wilmore and Costill 2004)



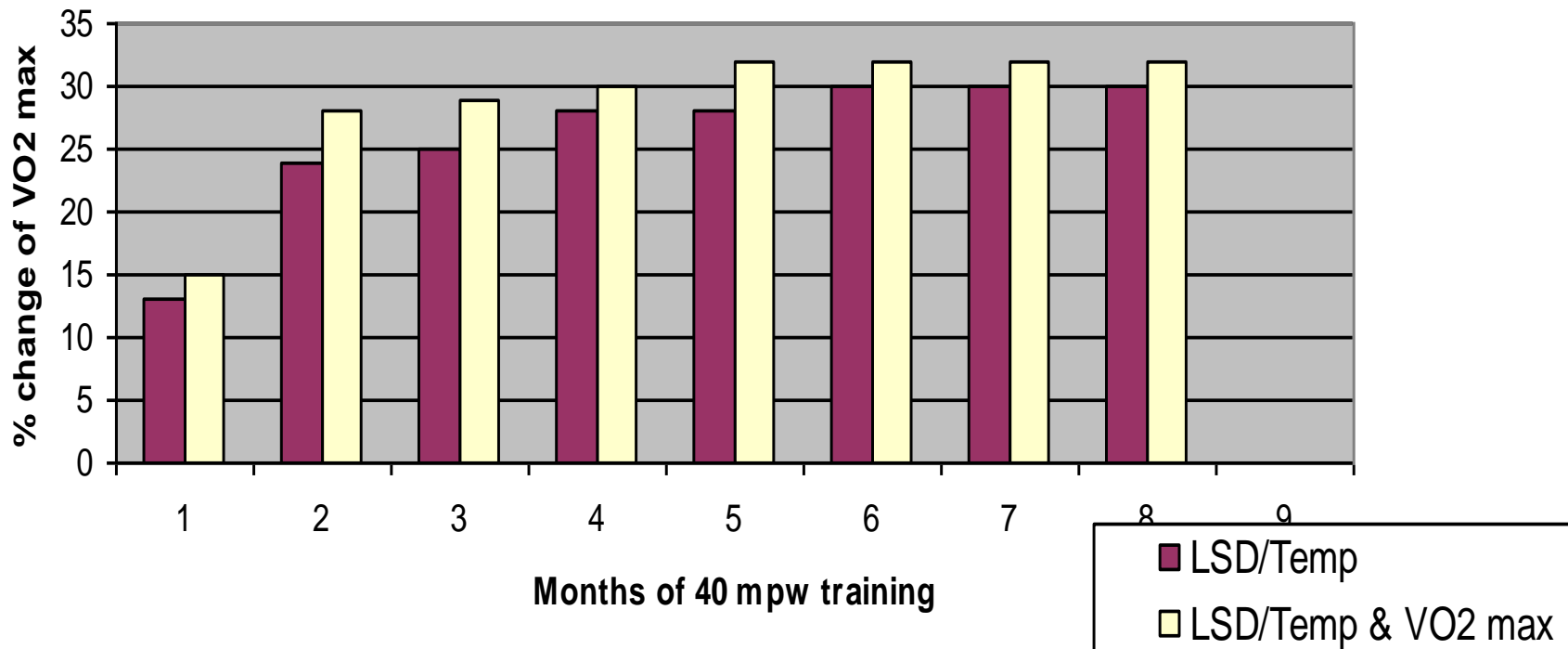
Tapering Study (Wilmore and Costill 2004)

Effect of a 7-Day Taper on 5-km Time Trials



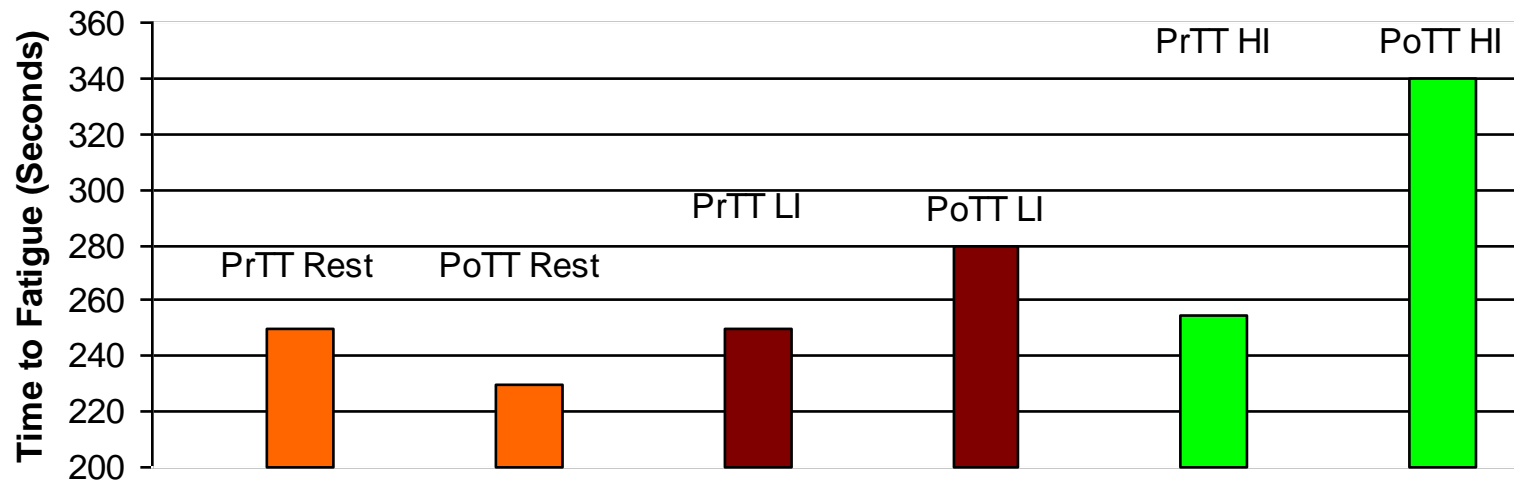
Long Aerobic Development Leads to Long Aerobic Peak

VO2 max Evolution with Training



Short Anaerobic Development Leads to Short Anaerobic Peak

Time to Fatigue Before and After Each Taper Procedure
(Rest-Low Intensity-High Intensity) [F=15 mmol lactate]



Pre and Post Time Trials (3 weeks apart)

Types of Taper

What Should Be Used In Endurance?

- Lots of rest days?
- Low intensity taper?
- High intensity taper?

The runners carrying on into the most important races for the most part are the most skilled runners.

Training Design Application

Maintaining Peak Fitness

- Peak fitness is a combination of (aerobic) structural changes and (anaerobic) biochemical changes that have reached a physiological ceiling based on the genome, training age, and chronological age of the runner.
- The ceiling, or peak, should be most influenced by the specific physiological demands of the race.

Adaptation Dilemma in Training

- Specificity in training is reflected in adaptations at the cell level in such things as enzymes.
- Anaerobic training raises anaerobic enzyme volume and decreases aerobic enzyme volume.
- Aerobic training raises aerobic enzyme volume and decreases anaerobic enzyme volume.
- It is crucial this concept applies to the tapering period as well as training periods.

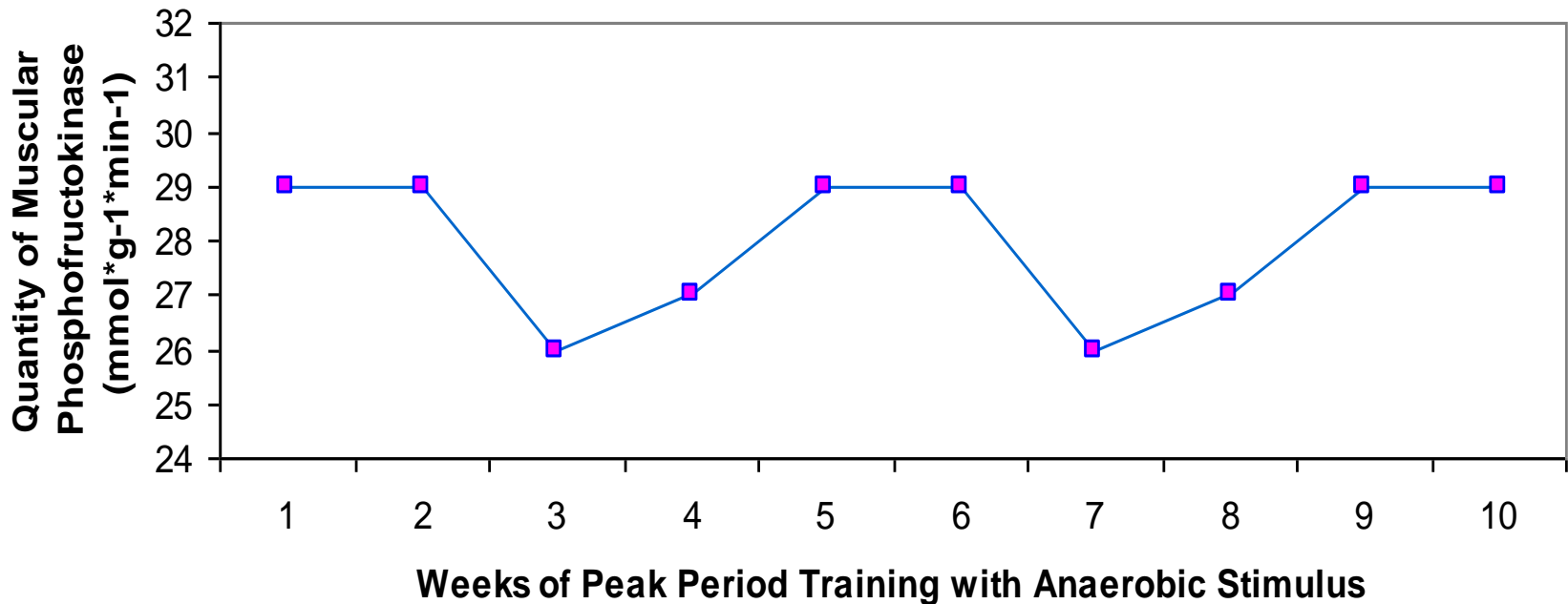
Enzyme Paradox in Training

Aerobic Enzyme	Untrained	Anaerobically Trained	Aerobically Trained
Succinate dehydrogenase	8.1 (mmol*g ⁻¹ *min ⁻¹)	8.0	20.8
Malate dehydrogenase	45.5	44.0	65.5
Anaerobic Enzyme			
Phosphofructokinase	19.9	29.2	18.9
Lactate dehydrogenase	766.0	811.0	621.0

Key Marker For Anaerobic Fitness

(Hargreaves 2007)

Anaerobic Enzyme Fluctuation During Peaking Period
(Untrained=19.9)



Effects of Taper on Endurance Performance (Neary et al. 2003)

“The major finding in this study was that metabolic adaptations occurred at the single muscle fiber level after the 7-day taper, and that significant and differential effects were observed in both Type I and II fibers. This is the first study to our knowledge to demonstrate that the enzymatic activity of multiple (metabolic pathway) enzymes can be altered in single muscle fibers after a taper.”

Peak Period Training Strategies

- Slightly increased training intensity.
- Reduced summative training volume to 50-70% of pre-competitive level.
- Maintained training frequency at about 80% of pre-competitive numbers.

Intervals v. Repetitions

	Intervals	Repetition Running
Focus	Rest	Work
Recovery	Incomplete	Near Complete
Intensity	High	Very High
Work Length	Fraction of Race	Near Race Distance
Total Volume	Varies with Rest	= or > than Race Distance

Taper v Non-Taper Training

	Taper	Non-Taper
Frequency	80%	100%
Perceived Intensity	80-100%	60-80%
Volume	50-60%	100%
Recovery	90-100%	40-60%
Strength Indicators	95-100%	60-80%

Anaerobic Capacity Work

- Repetition running is the type of work.
- Parameters of the load is near max with long recovery.
- Rest as a vital component.
- Watch out for “OVERDOING” the effort.



Anaerobic Capacity Workouts

1. 4 * 500 with 15 min rest
2. 6 * 200 with 8 min rest
3. 4 * 600 on grass with 10 min rest
4. 3 * 300 with 9 min rest
5. 2 * 600 with 15 min rest
6. 5 * 400 with 4 min rest

- Special Endurance 2
- Special Endurance 1
- Intensive Tempo
Repetitions
- Special Endurance 1
- Special Endurance 2
- Extensive Tempo
Repetitions

The Peaking Period is About Minimizing Training Stress

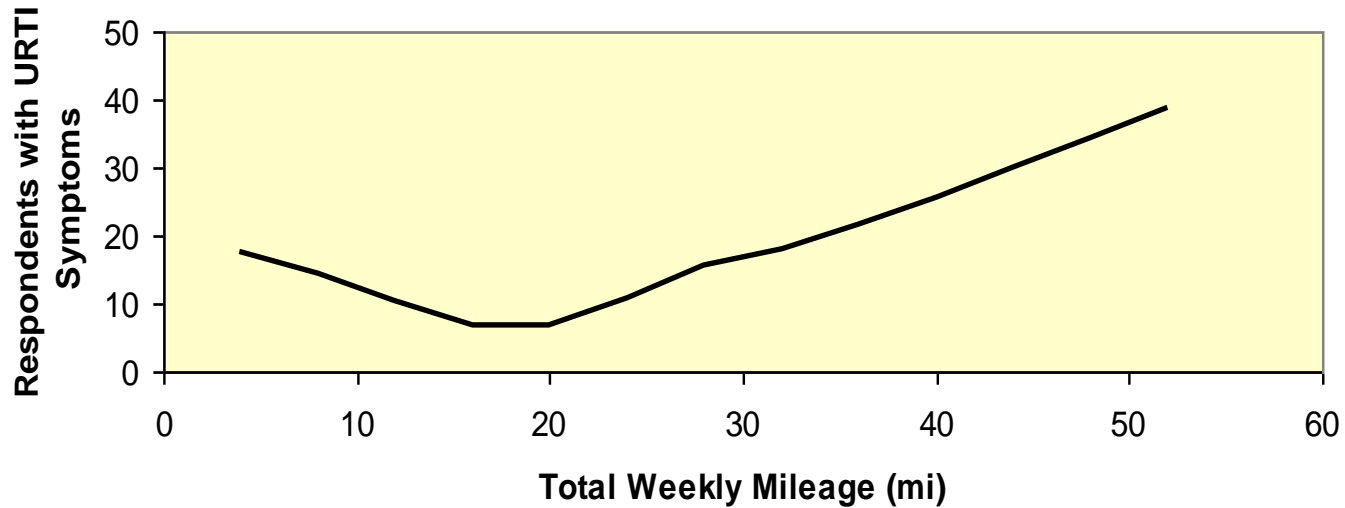


Post Workout Procedure and Protocol

- Follow stress run with gradual 8 – 10 minute cool down run.
- Take in 16 ounces of water immediately from your water bottle not the fountain.
- Follow with 4 –5 minutes of general leg stretching
- Elevate legs 6 – 10 minutes
- Take 12 – 16 ounces of glucose polymer/electrolyte drink
- Massage stick then 10 minutes of ice therapy
- Eat proper meal within 2-4 hours
- Drink 24 ounces of additional fluid
- Sleep 8 –9 hours, in bed normal time

URTI in Distance Runners

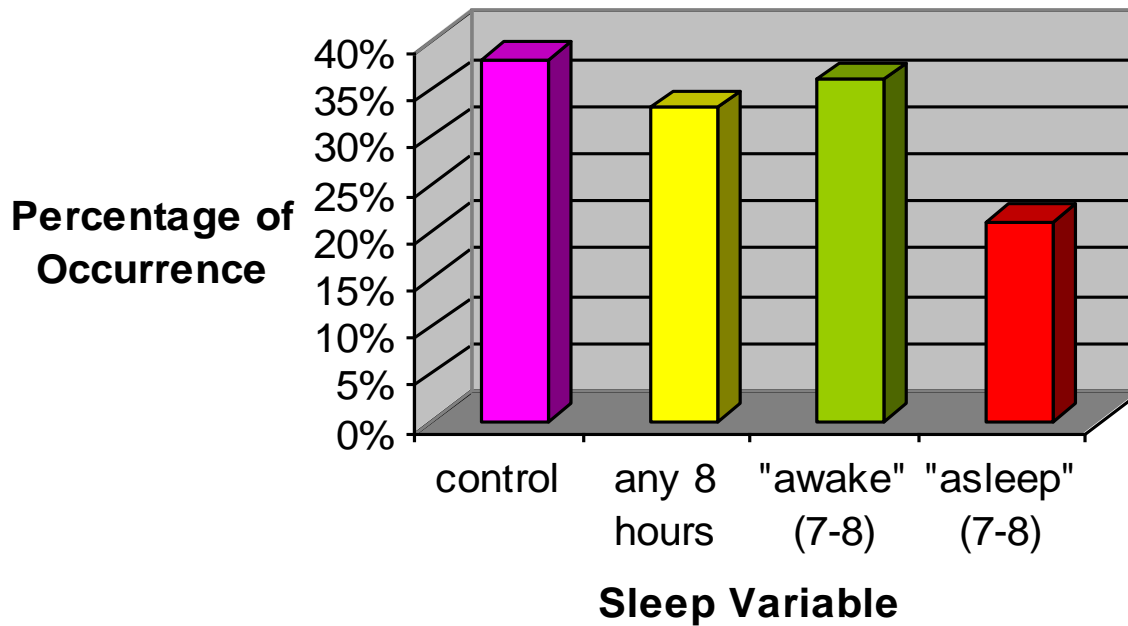
Dose-Dependent Effect of Exercise on the Risk of URTI
(Martin et al. 2009)



Sleep Studies and URTI

Van Clauter et al, 2004, MSSE

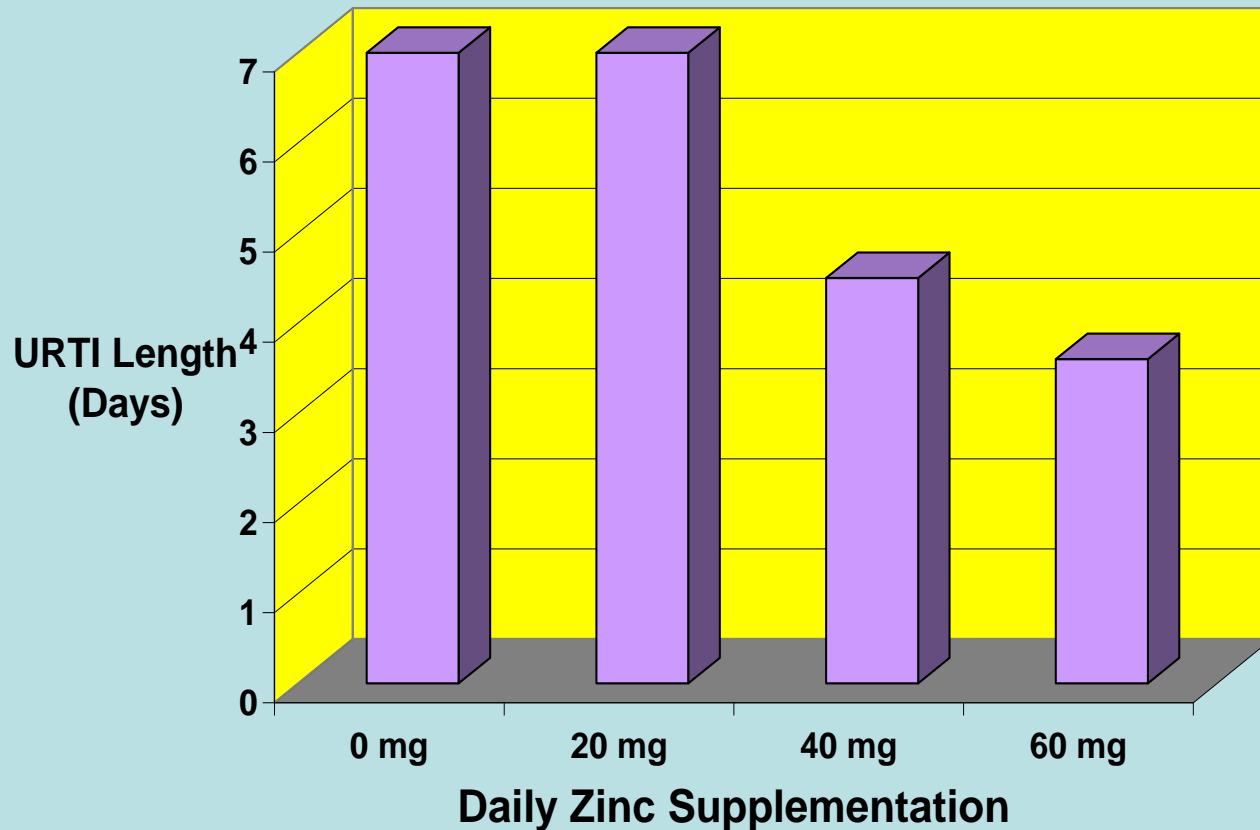
Incidence of URTI



Zinc Study and URTI Length

Keen and Gershwin, 1998, ARN

Zinc Supplementation Study



University of Nebraska/Lincoln & Stillwater Runners Study 2012

February 2 - April 12, 2012. 10 weeks

- 70 days training taking zinc or placebo
- Double-blind study
- Control. n=12. Dextrose placebo
- Experimental. n=12. 30 mg Zn
- 40 miles week training
- 2.3x training days were lost with placebo group
- P= 87 days/12 subjects
- E= 38 days/12 subjects

Conclusion

- Be very happy with a 2% improvement in performance
- Treat the aerobic peak as a separate entity
- Treat the anaerobic peak as a separate entity
- If you get greater than 2% improvement it is not a result of the peaking period

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

<http://completetrackandfield.com/scott-christensen>