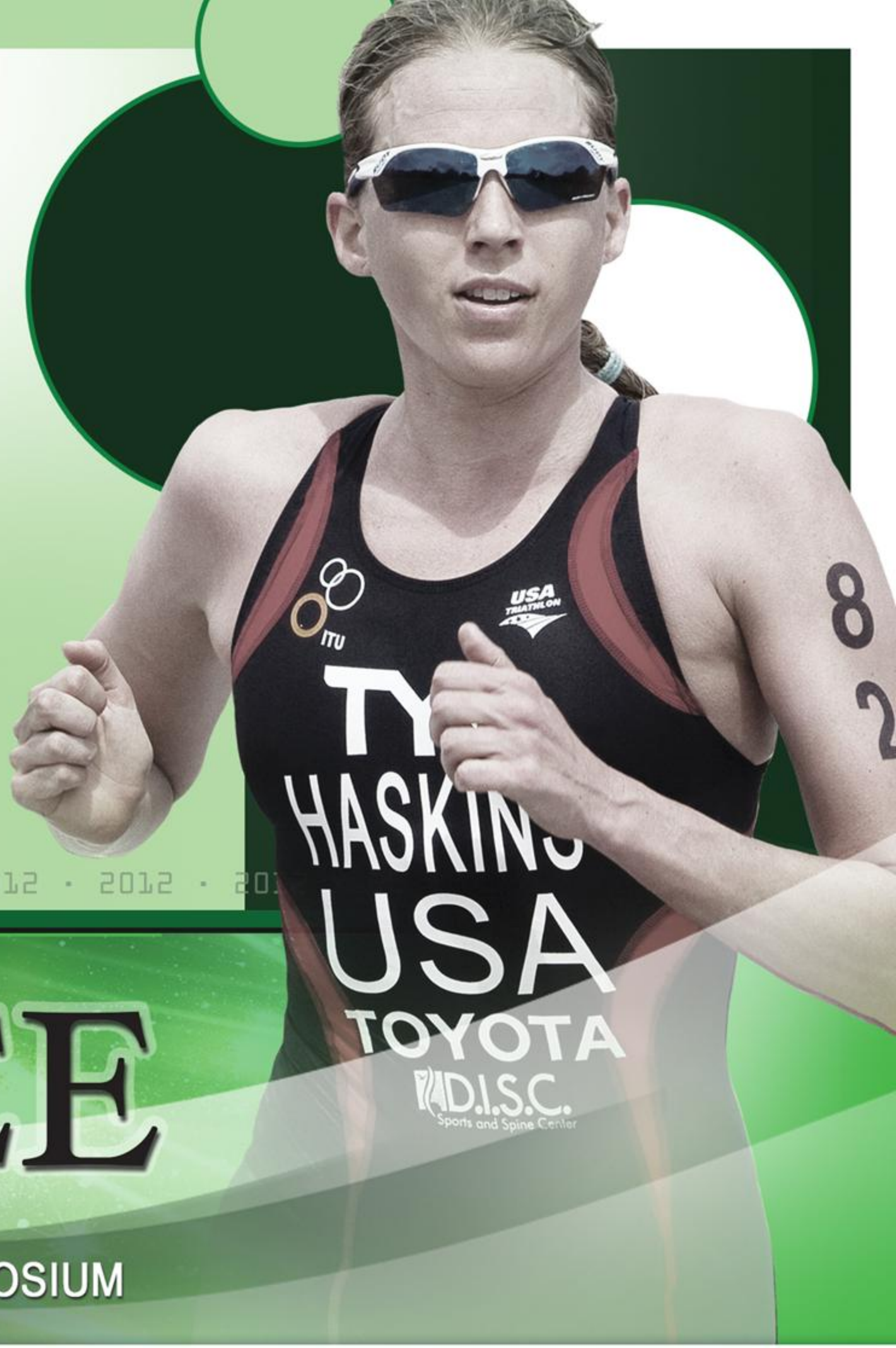
USA TRIATHLON

2012 · 2012 · 2012 · 2012 · 2012 · 2012

Art & SCIENCE OF TRIATHLON

2012 INTERNATIONAL COACHING SYMPOSIUM



Time Constrained Training:

Implementing strength and conditioning for a triathlete when time is limited

By Derek Grabert, MS, CSCS,*D

Objectives

- Triathlon needs analysis
  - Priorities
    1) Swim, bike, run
    2) Everything else
  - Benefits of strength/power to triathletes
  - Injury prevention and muscle imbalances
  - Time management
- Sample programs

Needs Analysis

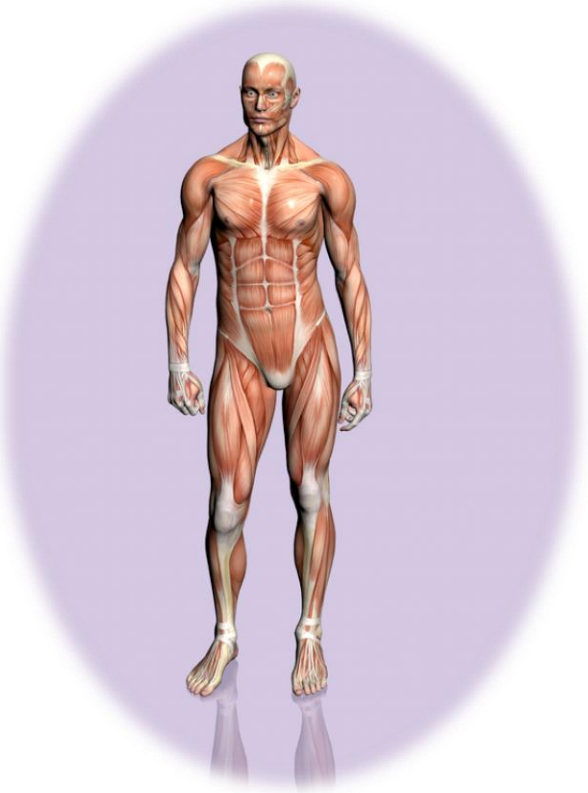
- Evaluate sport and athlete
  - Physiology
    - Aerobic and anaerobic components
    - Lactate threshold
  - Injury
  - Movement/biomechanics
  - Training status
    - Novice/intermediate/advanced
- Determine training priorities and goals

Training Priorities

- Will vary amongst athletes
- Aerobic capacity will likely be a strength*
- Body composition not usually a problem
- Swimming often the most difficult component
- Endurance training (biking and running) usually trumps resistance training
- Flexibility training is frequently ignored

Common Errors for Training Endurance Athletes

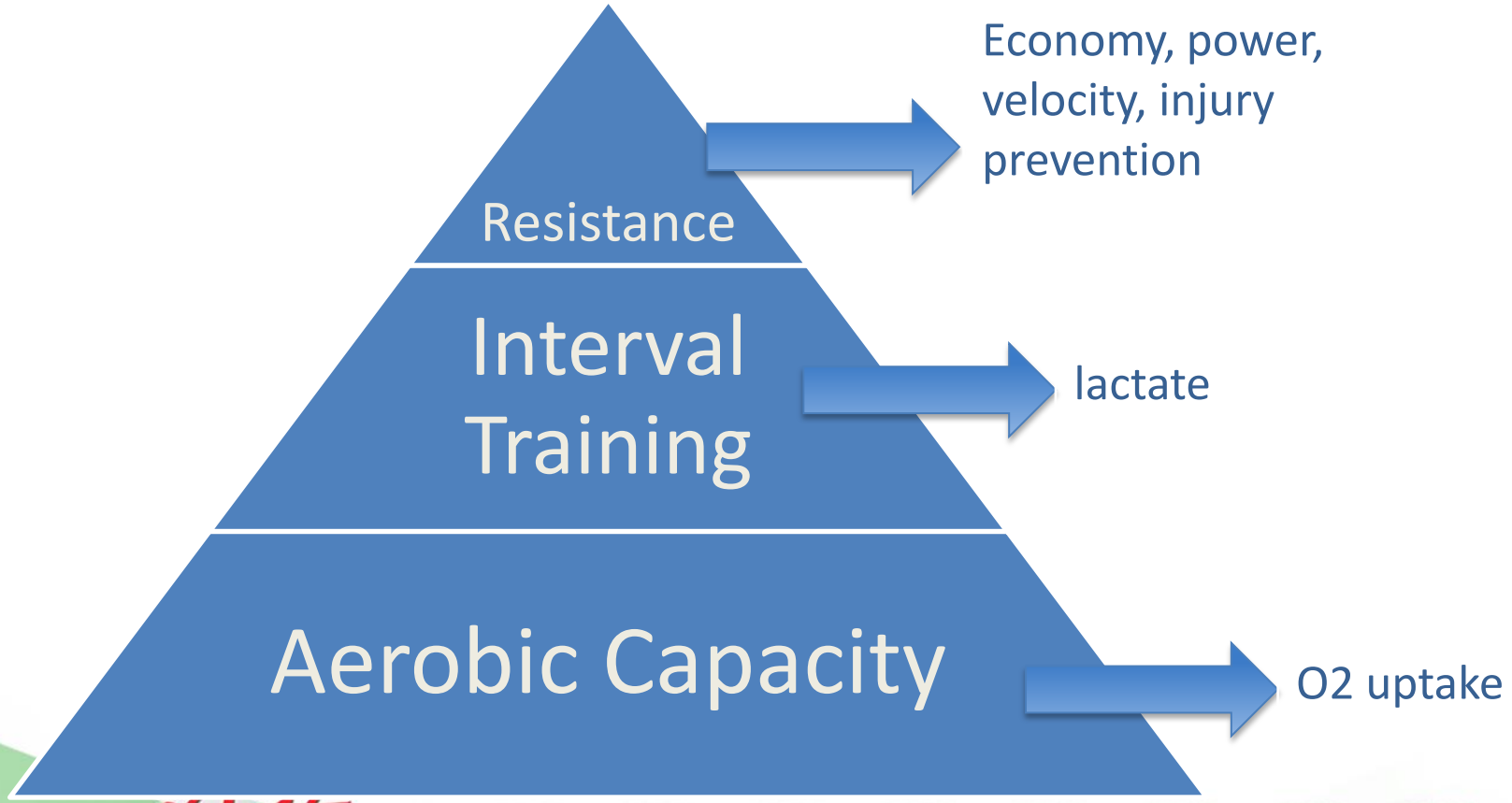
- Too much:
  - muscular endurance training
  - anterior chain strengthening
- Not enough:
  - posterior chain strengthening
  - load
  - flexibility training
  - rest
  - tapering



What influences triathlon performance?

- Schabort et al. *Med Sci Sports Exerc.*
  - Top 3 factors affecting overall performance in national level triathletes:
    1. oxygen uptake
    2. blood lactate concentration
    3. running velocity
- Question: How do you improve these factors?

Priority List for Tri Performance

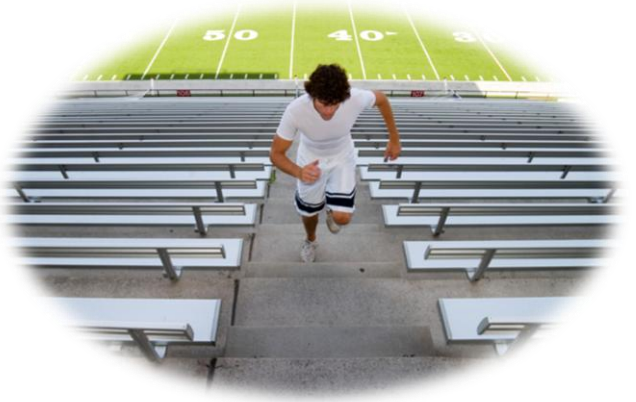


Aerobic Training

- Swim, bike, run
  - Long slow-distance (LSD)
- Interval Training -% HR/VO_2 training intensities) and recovery periods
- Goal is to improve/maintain aerobic capacity

Interval Training

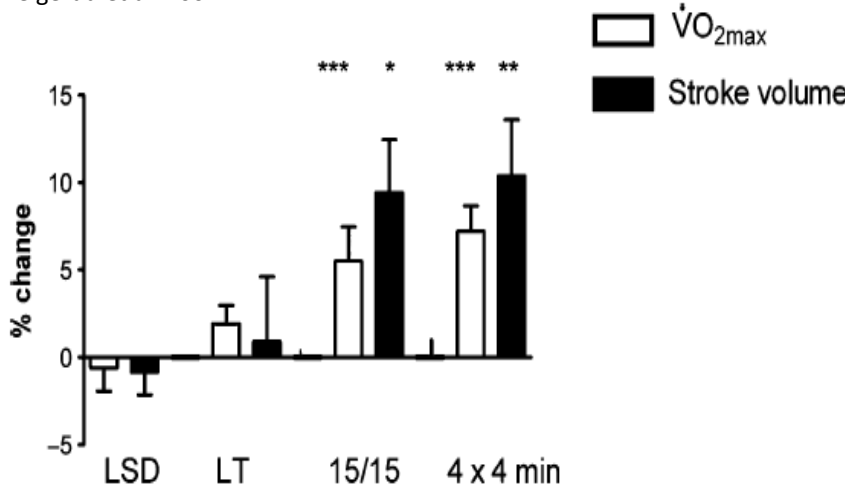
- Assists with ability to tolerate and clear lactate
- Cycling cadence and power
- Running velocity
- Intensity calculated by several methods
  - %VO_2 max
    - Range of 60-170%? (Laursen et al.)
  - %Max heart rate
    - Correlates almost linearly with VO_2 (Achten et al.)
  - Lactate threshold
  - Anaerobic threshold
  - RPE

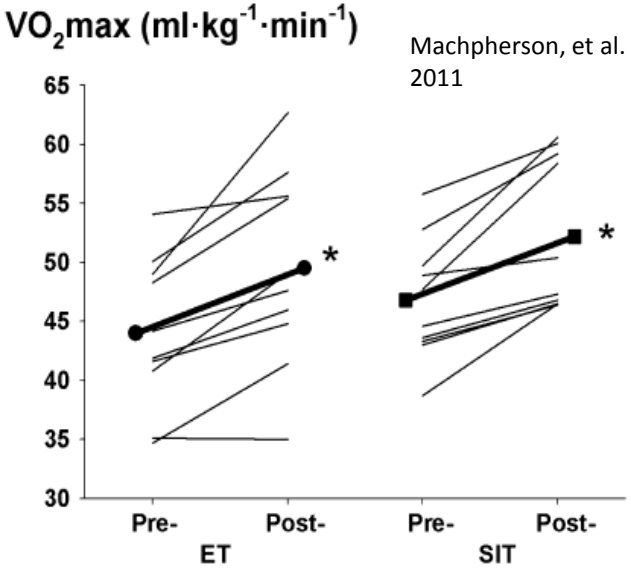


Achten and Jeukendrup, 2003
Balardi et al. 2007
Laursen and Jenkins, 2002

Interval Training (cont.)

Helgerud et al. 2007





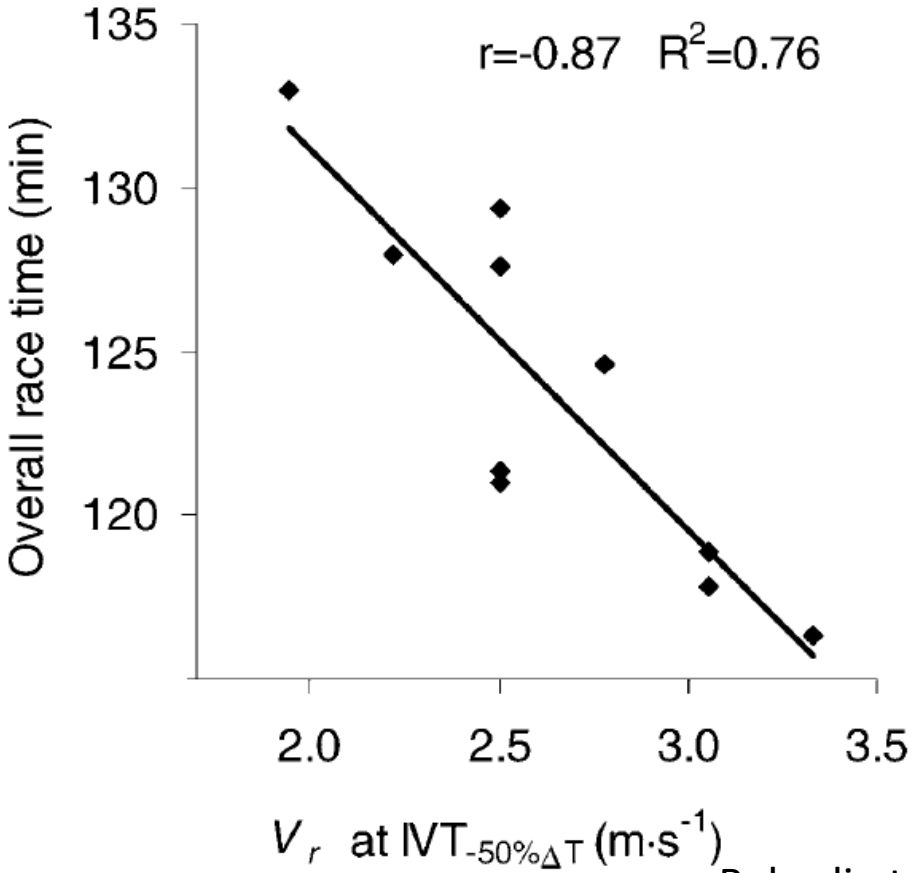
Machpherson, et al. 2011

- Inconclusive evidence on the effects of LSD aerobic activity versus interval training at improving VO2 max
  - Too many variables to account for (work, rest, distance, etc.)
- Time limitations may warrant more interval training
- 1:1 work:rest ratio improves V02 max

Burke et al. 1994
Helgerud et al. 2007
Machpherson et al., 2011

Lactate

- Highest running velocity during active recovery = best time in short/Olympic triathlon
- IVT-50%ΔT is the percentage of anaerobic threshold ideal for lactate clearance



Balardi et al. 2007

Resistance Training

- Power emphasis (speed)

  OR

- Strength emphasis (load)
- Periodization
- Tapering

Resistance vs. Endurance Training

Adaptation	Resistance Training	Endurance Training
Mitochondrial Density	↓	↑
Capillary Density	↓ or ↔	↑
Muscle Fiber Hypertrophy	↑	↑ Type I or ↔
Aerobic Capacity	↔	↑
Muscle Force	↑	↓

Tanaka et al., 1998

Benefits of Resistance Training for Triathletes

- Strength and power output
- Running and cycling economy
- Muscle cell size and properties
- Recovery

"Since faster, larger and stronger (muscle) fibres generate more force, resistance-trained (athletes) may be able to exercise longer at each absolute submaximal work rate by reducing the force contribution from each active myofibre or by using fewer of them." -Tanaka & Swensen

Generating Strength and Power

- Strength training may counteract the effects of endurance training
  - Endurance training lowers force-generating capabilities

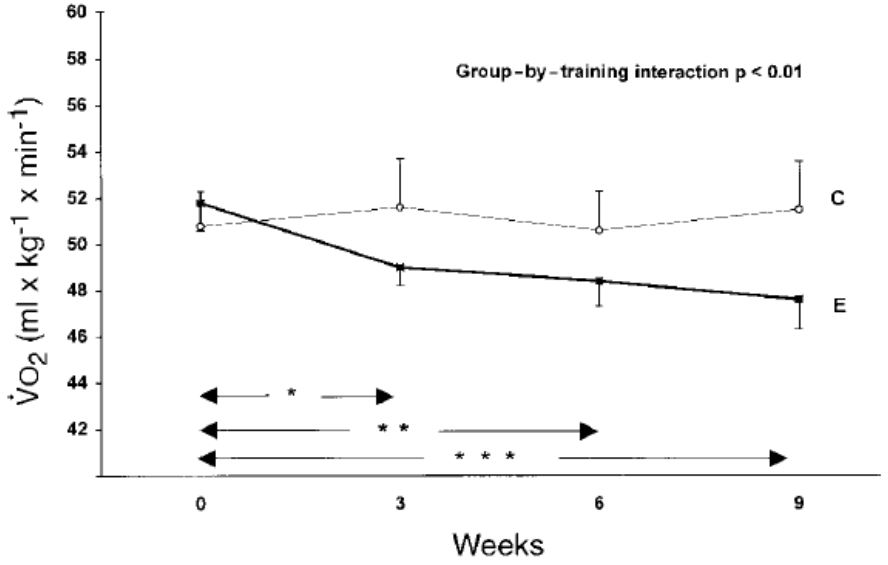
Strength training leads to more efficiency/economy in running and cycling

- Paton et al. 2006
- Paavoleainen et al. 1999
- Johnston et al. 1997

Tanaka et al., 1998

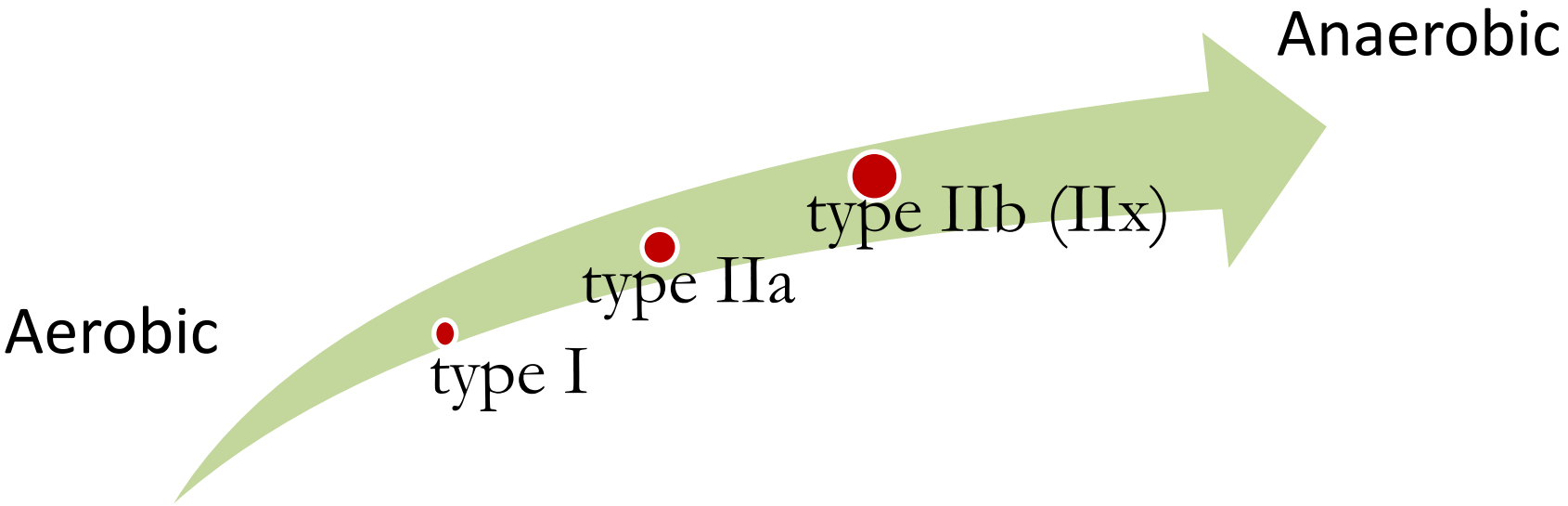
Economy

- Economy = efficiency
- Submaximal running on a treadmill
  - Measure stable oxygen uptake and heart rate
- Decrease in submax $V0_2$ denotes an effect



Saunders et al. 2004
Paavoleainen et al. 1999

Muscle Fiber Characteristics



- Strength training **AND** endurance training cause Type IIb (IIx)→ Type IIa transformation
- Strength training can benefit endurance training without detriment; endurance training is catabolic and negatively impacts strength/power

Tanaka et al., 1998

Injury Prevention

- Common injuries
  - lower back injury
  - Knee (patellofemoral, medial tibial,
  - shoulder
  - IT band
  - plantar fascitis
  - stress fracture
- May be caused by muscle imbalances
- Core training
- Posterior chain exercises
- Hip and shoulder mobility
- Warm up/Cool down
- RECOVERY

Manninen and Kallinen, 1996
Cosca and Navazio, 2007

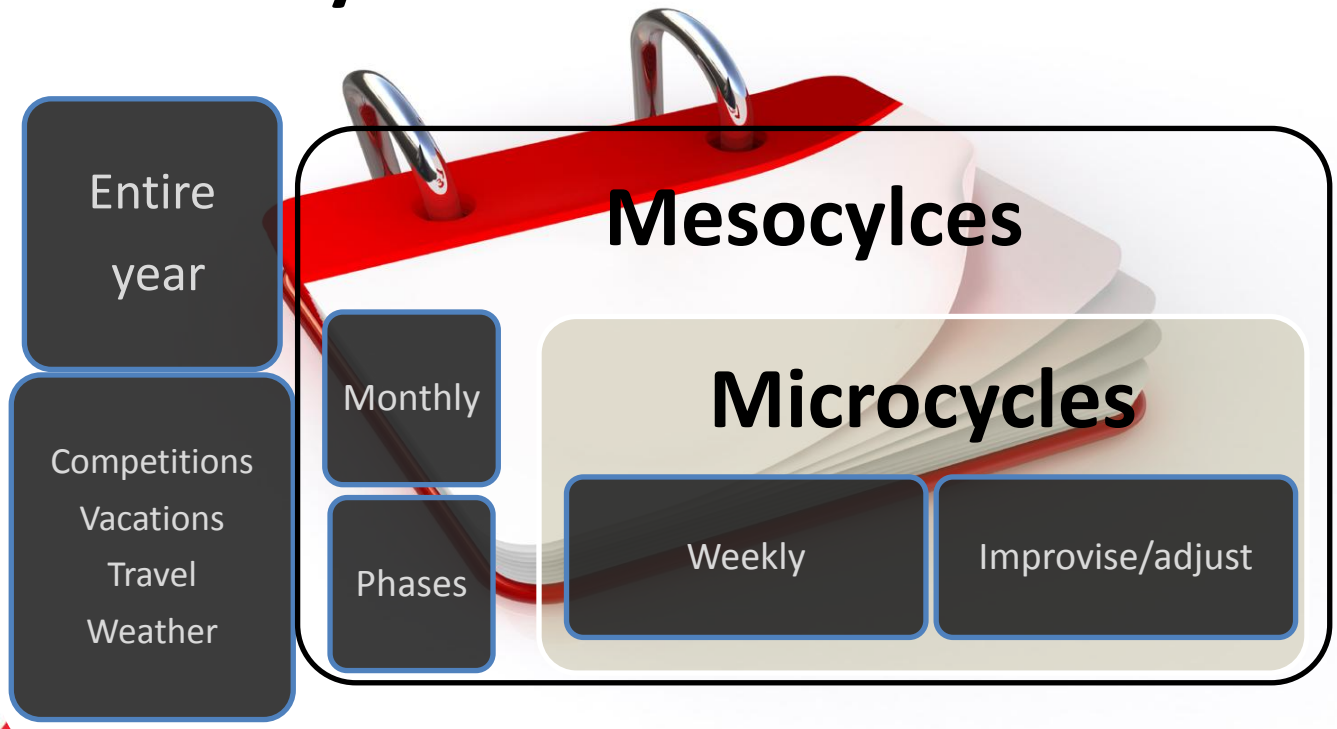
Example Resistance Training Program Pre/Off-season

Day 1	
General warm-up variety of hip mobility, ankle mobility, scapular mobility, glute activation and hamstring activation	5-7 minutes
Specific warm-up: -Glute bridges -inverted row (or resistance band row)	 3 x 12 3 x 10
Core Lifts Power clean (or power loaded jumps)	 5 x 4
Jump Squat (or plyometric depth jumps)	5 x 6
Accessory Lifts *DB Press	 3 x 8-10
*Bent over row	3 x 8-10
*Planks, med ball throws	30 seconds per exercise

Day 2	
General warm-up Similar to day 1	5-7 minutes
Specific warm-up: -1 leg squats -push-ups	 3 x 8 each leg 3 x 12
Core Lifts Squat or alt (barbell, dumbell, leg press, step up)	 5 x 6
Deadlifts or alt (single leg, double leg, Romanian)	5 x 6 per leg
Accessory Lifts *Dips or tricep extensions	 3 x 10-12
*Lat-pull downs or pull-ups	3 x 8-10
*Russian twists, side planks	30 seconds per exercise

Plan for the Long Term

Macrocycle



Training Volume

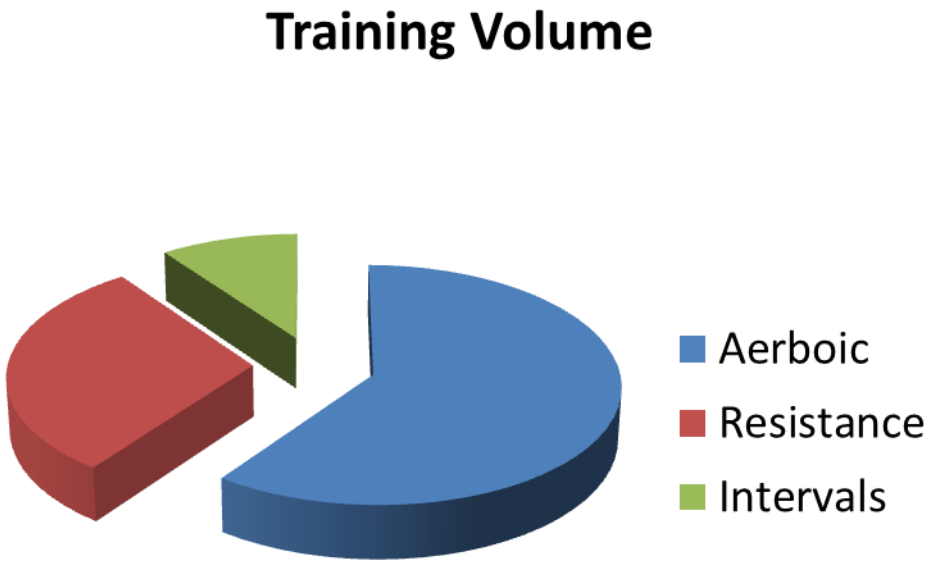
- Olympic level triathletes are training 500-700 hours/year
- 60-70%→ endurance and over-distance training
  - Aerobic metabolism
  - Fat oxidation
  - Mitochondrial density
- 30-40%→ interval training, strength training, power training, flexibility training
- Hours per week (more appropriate for off-season)
  - Beginner: <10 hrs
  - Intermediate: 10-15 hrs
  - Advanced: >15 hours

Sleamaker and browning, 1996.

Off-season

~28 weeks

- Focus is on base building and strength development
- Aerobic exercise is composed of long distance, slower than race pace
- Highest volume of resistance training

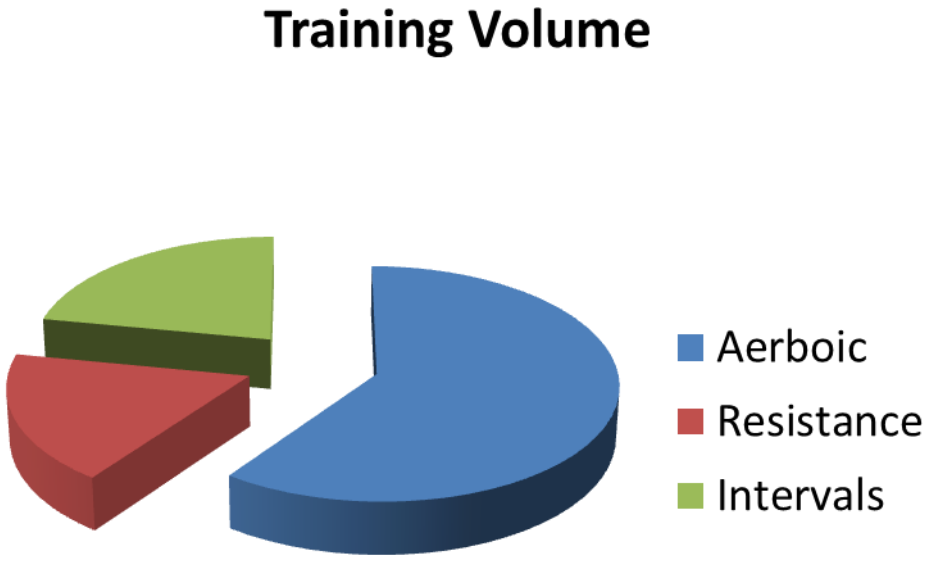


Sleamaker and Browning, 1996

Pre-season

4-8 weeks

- Slight decrease in resistance training
- Increase sport specific interval training
  - High intensity hill climbs, sprints, 50-100m swims
  - 1:1 work:rest ratio
- Low-intensity aerobic training volume remains similar

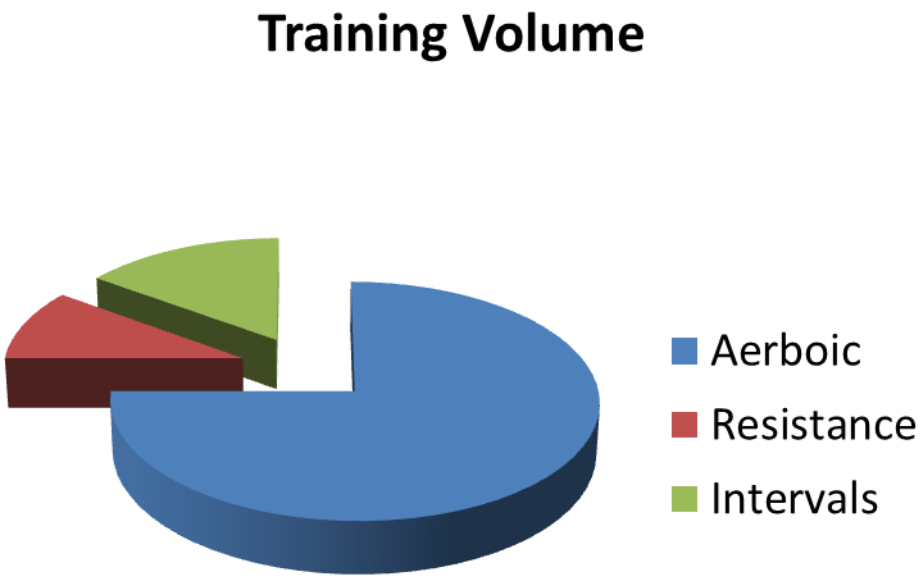


Sleamaker and Browning, 1996

In-season

12-16 weeks

- Small amount of resistance training
  - 1-2 hrs per week
- Recovery is important
- Maintenance phase

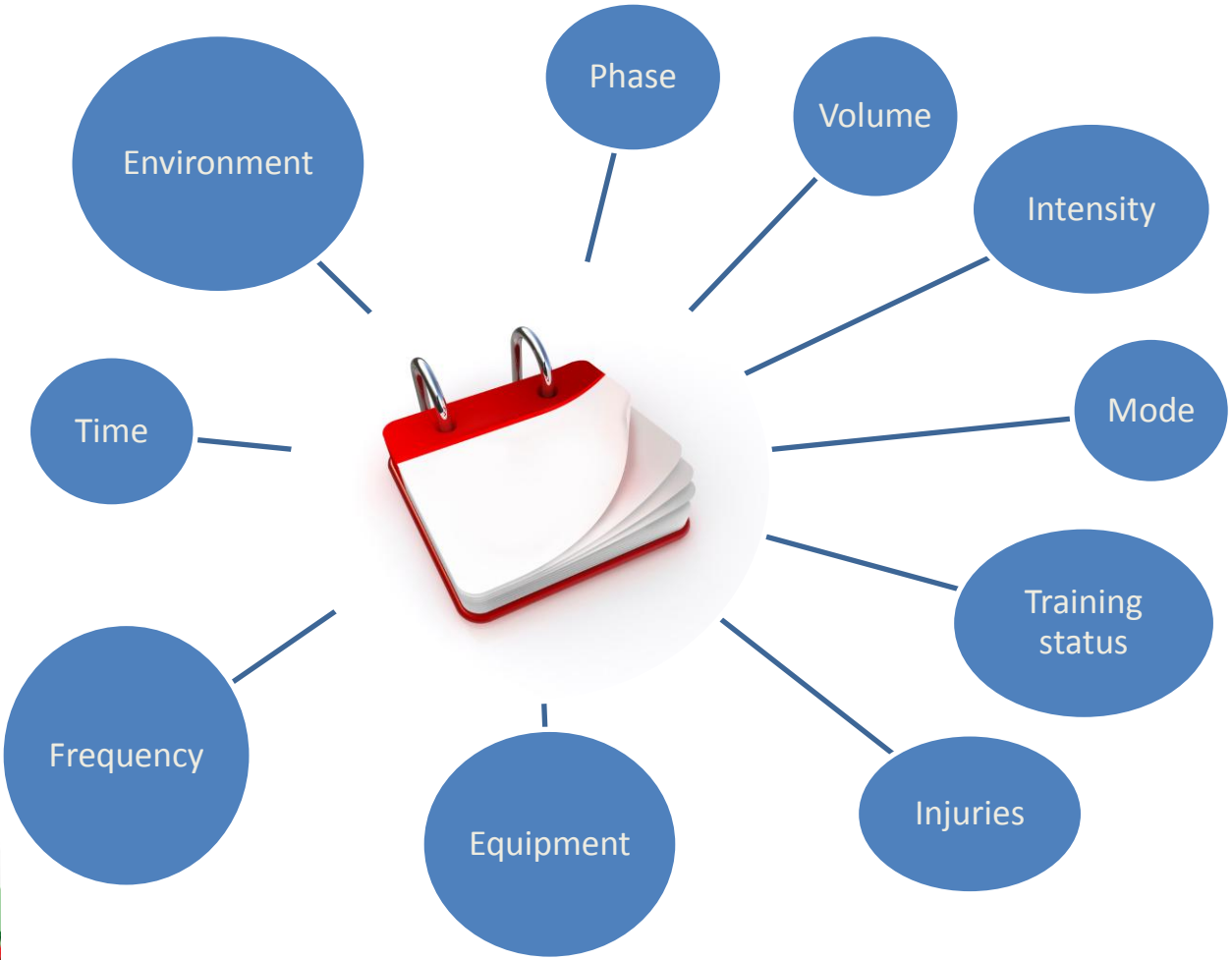


Sleamaker and Browning, 1996

Questions to Ask Under Time Constraints

- What is the season?
- When is the next competition?
- What is the training priority?
- Is there a risk of overtraining?
- How are the nutrition and recovery plans?

Final question: Can you account for “all” training variables?



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