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Strength and Conditioning Considerations for Triathletes

Triathlon Ontario Coach Conference

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Session Overview

1) Introduction
2) Literature Review
3) Practical Application
4) Conclusions / Discussion

Introduction

Physiological Characteristics 80s to today

33:06 vs 29:07 (Surian and Bishop, 2010)

Introduction

Mark Allen's Top 12 Strength Exercises

- lat pulldowns
- leg extensions
- leg curls
- bench press
- squats
- lateral raises
- calf raises
- pullovers with DBs
- lunges
- biceps curls
- triceps extensions
- leg press

Introduction

Strength Needs of Triathletes

- based on movement patterns
- based on contraction types
- based on injury assessment

Introduction

Injury Concerns

- as many as 75% of triathletes experience overuse injuries
- 2.5 injuries / 1000 hrs training during preseason

- 4.6 injuries / 1000 hrs training during competition

(Burns et al., 2003)

Introduction

Injury Concerns

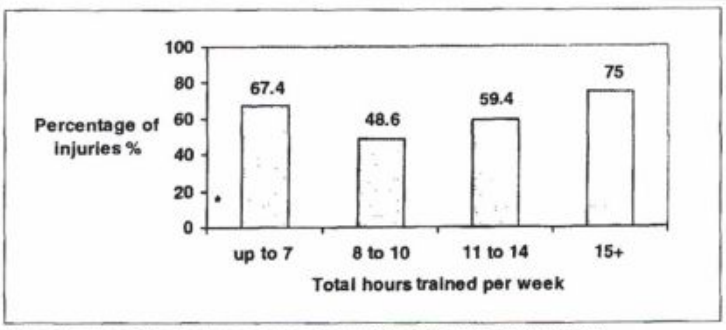
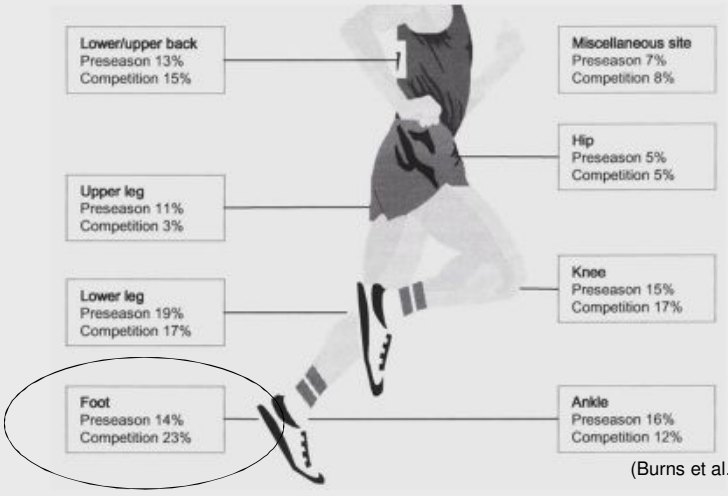


Figure 1: Association between sustaining an injury and total hours trained.

(Shaw et al., 2004)

Introduction

Injury Concerns



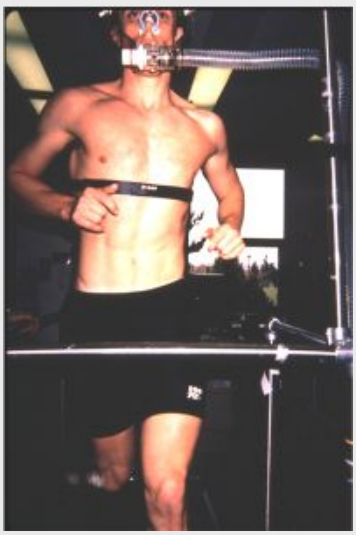
(Burns et al., 2003)

Introduction




Introduction

- aerobic capacity ($\dot{V}0_2$max)
- lactate threshold (LT)
- performance time trials (TT)
- time to exhaustion (TTE)
- economy / efficiency (E)



Introduction

- repetition max (RM)
- max repetitions (MR)
- lean body mass (LBM)
- vertical jump (VJ)
- (fibre type distribution - type I vs. IIa vs. IIb)

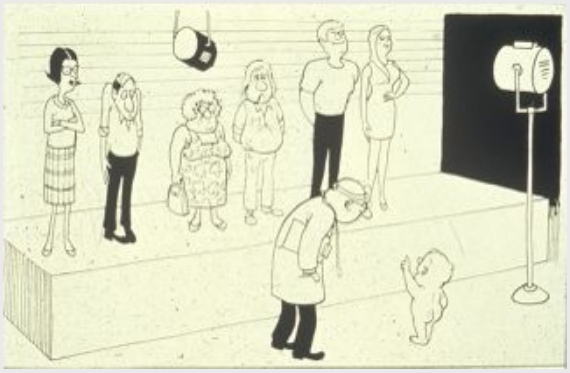
Introduction

Introduction

- increased body mass
- decreased $\dot{V}0_2max$
- decreased performance (TT, races, etc.)
- become less flexible (muscle bound)

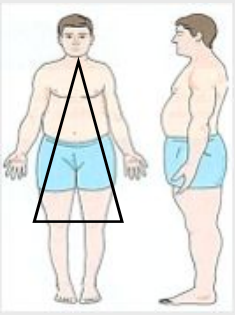
2) Literature Review – Myths?

Increased body mass?

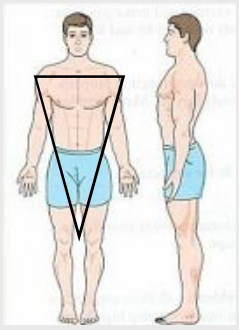


2) Literature Review – Myths?

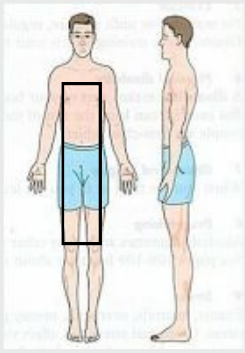
Increased body mass?



Endomorph



Mesomorph



Ectomorph

(Sheldon, 1940)

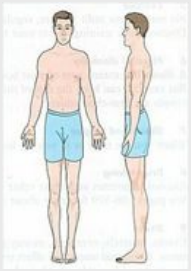
2) Literature Review – Myths?

Increased body mass?

- strength development 1 – 6 RM (neural)
- hypertrophy + strength 6 – 12 RM
- endurance development 12 + RM

Endomorph

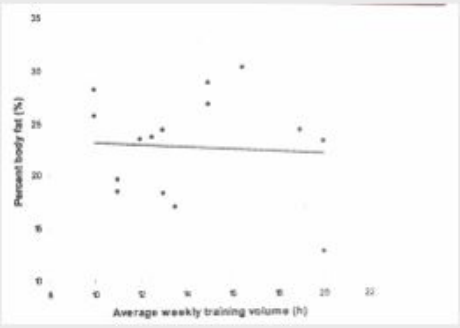
Mesomorph

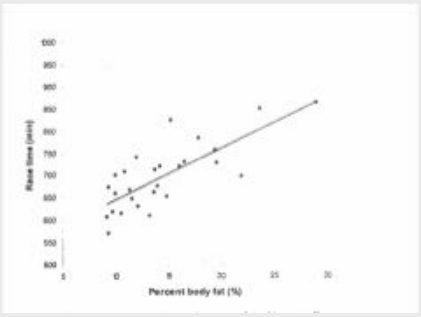


Ectomorph

2) Literature Review – Myths?

Body Types





(Knechtle et al., 2010)

2) Literature Review – Myths?

Decreased $\dot{V}0_2$max?

- plyometrics and light weights for 9 weeks,
- muscle power increased 7%
- no change in $\dot{V}0_2$max

Paavolainen et al. (1999)

2) Literature Review – Myths?

Decreased $\dot{V}0_2$max?

- distance runners
- strength increased in the experimental groups
- 8 – 16 weeks of resistance training did not hinder $\dot{V}0_2$max

Jung (2003)

2) Literature Review – Myths?

Decreased performance?

- economy better predictor of performance than $\dot{V}0_2$max
- improved efficiency during ground contact (ssc)

Jones & Bampouras (2007)

2) Literature Review – Myths?

Decreased performance?

- Con. group increased $\dot{V}0_2$max but got slower
- Exp. group no change in $\dot{V}0_2$max got faster
- 5km running time improved (3%), by improving running economy (7%), and muscle power (7%)
- 9wks of strength training and plyometrics

Paavolainen et al. (1999)

2) Literature Review – Myths?

Decreased performance?

- 15 elite triathletes for 14 weeks of strength training
- con group increased squat 4%
- ex group increased squat 25%
- no significant change in $\dot{V}0_2$max
- ex group's running economy improved (3000m)

Millet et al. (2002)

2) Literature Review – Myths?

Decreased performance?

- there is no evidence to suggest that resistance training will hinder $\dot{V}0_2$max or have a negative influence on endurance performance

Laursen et al. (2005)

2) Literature Review – Myths?

Decreased flexibility?

- 10 week program
- Con. group just did body weight exercises
- Exp. group used weights and significantly increased flexibility at 5 sites (neck, shoulders, hip, knee, ankle)
- If done properly weight training can ***increase*** flexibility

Swank et al. (2003)

3) Practical Application

Sample Conditioning Session

Balance	2 - 5 mins
Warm up	3 - 5 mins
(Agility / drills	5 - 10 mins)
(Plyometrics	5 - 10 mins)
Strength Training	15 -20 mins
Cool down	5 - 10 mins

TOTAL TIME RANGE 35 – 60MINS

3) Practical Application

Sample Conditioning Session

Balance 2 - 5 mins

- Eyes open on the floor
- Eyes closed on the floor
- Pillow, bosu, wobble or balance board
- NON FATIGUED TO START

3) Practical Application

Sample Conditioning Session

Agility / drills 5 - 10 mins

3) Practical Application

Sample Conditioning Session

Plyometrics 5 - 10 mins

- can improve neuromuscular recruitment following transitions (Bonacci et al., 2011)
- Squat jumps
- Bounding
- Box jumps
- Prescribe based on individual's experience!

3) Practical Application

MACRO	DECEMBER - NOVEMBER				
	OFF	**PRE**	**IN-SEASON**		**POST**
	I	**II**	**III**	**IV**	**V**
MESO	(DEC)-FEB	MAR-MAY	JUNE-AUG	SEP-NOV	(DEC)
OBJECTIVE	BASE (if needed) STRENGTH ENDURANCE	ENDURANCE SPEED	MAINTAIN TAPER / PEAK COMPETE IMPROVE	SOME DOWN TIME SPEED COMPETE	DOWN TIME
RUN	1 - 3	3	3	3	3 - 1
BIKE	1 - 2	2 - 4	4 - 3	3 - 2	2 - 1
RESIST	2 - 3	3 - 1	1 - 2	2 - 1	1 - 2
SWIM	2 - 4	4 - 3	3 - 2	2 - 1	1 - 2
X-TRAIN	3 - 1	1 - 0	0	0 - 1	1 - 3

numbers represent frequency per week for each mode in each phase

3) Practical Application

Strength Training 15 -20 mins

MESO	OFF SEASON	PRE SEASON	IN SEASON	POST SEASON
Times /WEEK	2 - 3	1 - 3	1 - 2	1 - 2
SETS	2 - 3	2 - 3	1 - 3	1 - 3
REPS	A 12 - 15 B 6-10	A 15 - 20 B 10	A 15 B 5-10	A 12 - 15 B 10
TEMPO	(2,1,2)	(1,0,2)	(1,0,1)	(2,0,2)

A = endurance weights B = strength weights

3) Practical Application

MESO	OFF SEASON
Times /WEEK	2 - 3
SETS	2 - 3
TEMPO	(2,1,2)

Recovery between sets

WORKOUT "A" = 30 – 60 seconds

WORKOUT "A" OFF SEASON (at home)	
lunges	2 x 12
free body squat	2 x 15
standing tube rowing	2 x 15
close grip push ups	2 x MAX
abdominal variety	3 x vary
lower back variety	3 x vary
lying hip flexion	2 x 15
lying hip extension	2 x 15
calf raises	2 x 15

3) Practical Application

MESO	OFF SEASON
Times /WEEK	2 - 3
SETS	2 - 3
TEMPO	(2,1,2)

Recovery between sets

WORKOUT "B" = 1 to 2 minutes

WORKOUT "B" OFF SEASON (gym)	
Single leg press	3 x 6
vertical chest press	3 x 8
step ups	2 x 6
seated cable row	3 x 8
leg curls	2 x 10
lateral shoulder raise	2 x 10
abdominal variety	3 x 25
lower back (build to loaded)	3 x 10
calf raises (single leg)	3 x 10

3) Practical Application

MESO	IN SEASON
Times /WEEK	1 - 2
SETS	1 - 3
TEMPO	(1,0,1)

WORKOUT "A" IN SEASON (home)

lunges	15
standing tube rowing	15
abdominal	variety
lower back	variety
close grip tube press	15
calf raises	15

DONE AS CIRCUIT

Recovery between sets

WORKOUT "A" = 20 - 30 seconds

3) Practical Application

MESO	IN SEASON
Times /WEEK	1 - 2
SETS	1 - 3
TEMPO	(1,0,1)

WORKOUT "B" IN SEASON (gym)

Hang clean	3x 5
Split squats jumps	3x 5+5
Bent over or standing cable row	3x 5
Dead lift (single optional)	3x 5
Plyo push ups	3x Max
Plank on the ball	2-3x 25+25
Bird dog	2-3x 10+10

SUPER SETS are in pairs

Recovery between sets

WORKOUT "B" = 1 – 3 mins

3) Practical Application

Acute Hypothesis (Craig, 1991)

- residual fatigue from one "interferes" with the other
- timing and sequencing of training are essential

3) Practical Application

- 40min run impairs strength for up to 8 hours

(Sporer & Wenger 2003)

- no impairment on strength 8 hours after cycling

(Leveritt et al. 2000)

3) Practical Application

Non competition phase (off season)

SUN	MON	TUES	WED	THUR	FRI	SAT
am-S **pm-B**	**OFF**	**am-St** **pm-R**	**S** **(B)**	**am-St** **pm-LO RI**	**S** **OR** **OFF**	**LSD R** **(St)**

S = swim, B = bike, R = run, St = strength, LSD = long slow distance, ( ) = optional, I = interval

3) Practical Application

Non competition phase (off season)

SUN	MON	TUES	WED	THUR	FRI	SAT
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S = swim, B = bike, R = run, St = strength, LSD = long slow distance, ( ) = optional, I = interval

Competition phase (race season)

SUN	MON	TUES	WED	THUR	FRI	SAT
Rm **Stm**	**SOrp**	**Brp** **+** **RIrp**	**Sm** **Bm**	**Rm** **Stm**	**OFF**	**SOrp** **+** **Brp**

SO = open water swim, rp = race pace, m = maintenance, + = immediate

3) Practical Application

Bottom line for rec. to elite athlete

i) best if there can be 4-8 hours between weight bearing activity and full body weights if cardio done first

ii) if done back to back, order based on goals and time of season

3) Practical Application

Mark Allen's Top 12 Strength Exercises

- lat pulldowns
- leg extensions
- leg curls
- bench press
- squats
- lateral raises
- calf raises
- pullovers with DBs
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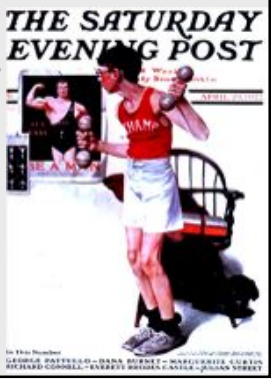
- leg press



4) Conclusions / Discussion

- What about Crossfit?

4) Conclusions / Discussion

scheduling of both strength and aerobic training ultimately depends on the goals of the individual and the demands of the activity

(Sporer & Wenger, 2003)

If properly prescribed, strength training will benefit triathletes of all ages, skill levels and body types

Thank you

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