



## Energy System Considerations in Designing Training Programs!

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CSCCa National Meeting 2011  
[www.vermontfit.com](http://www.vermontfit.com)

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### Today's Talk

- Identify the Energy Systems.
- Define the time parameters.
- Understand the limitations.
- Design appropriate programs.
- Show your creative genius!
- Target the Systems.
- Understand recovery.
- Putting it into Practice.

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### Simple assumptions?

- There are endurance events!
- There are speed/Power events!
- Endurance events are aerobic!
- Speed events are anaerobic!
- Aerobic events burn fat!
- Anaerobic events burn carbohydrate!
- PERFORMANCE vs FITNESS

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### Learn from other sports!

- What are your peer sports?
- Rugby?
- Lacrosse?
- Basketball?
- Football?
- Wrestling?
- Boxing?

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### Video Clip

- [http://www.youtube.com/watch?v=MTn1v5TGK\\_w](http://www.youtube.com/watch?v=MTn1v5TGK_w)

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### Why the collapse?



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### Track & Field World Records

- 100m = 9.58 secs Usain Bolt



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- 200m = 19.19 secs Usain Bolt



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- 400m = 43.18secs Michael Johnson



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- 800m = 1.41.11 Wilson Kipketer



www.sporting-heroes.net



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- 1500m = 3.26.00 Hicham El Guerrouj
- 1600m = 3.43.13 Hicham El Guerrouj



www.sporting-heroes.net



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- 3000m = 7.20.67 Daniel Komen



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- 5000m = 12.37.35  
Keninise Bekele



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***What is the relationship?***

- 100m = 9.58 secs Usain Bolt
- 200m = 19.19 Usain Bolt
- 400m = 43.18 Michael Johnson
- 800m = 1.41.11 Wilson Kipketer
- 1500m = 3.26.00 Hicham El Guerrouj
- 1600m = 3.43.13 Hicham El Guerrouj
- 3000m = 7.20.67 Daniel Komen
- 5000m = 12.37.37 Keninise Bekele

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***It's a metabolic relationship!***

- 2 x 100m (9.58) = 19.16
- 2 x 200m (19.19) = 38.38
- 2 x 400m (43.18) = 1.26.36
- 2 x 800m (1.41.11) = 3.22.22
- 2 x 1600m (3.43.13) = etc, etc.

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It's also a conditioning relationship!

**Haile Gebrselassie**                      **Maurice Green**

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Are these body types a result:

- Of genetics?
- Of training?
- Of diet?

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It's also the metabolic systems that are most commonly employed!

Energy System	@ Power Kcals.min <sup>-1</sup>	Time	Capacity Kcals
ATP-PC	72	9-10 sec	11
Anaerobic Glycolysis	36	80-90 sec	48
Aerobic System	7.0-19.0	>90sec	360+

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### 3 energy systems

- The body differentiates between these 3 systems as a function of time and intensity.
- ATP-PC (<10 secs)
- ANAEROBIC GLYCOLYSIS (10-90 secs)
- AEROBIC (>90 secs)

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- These systems vary in substrates, recovery, level of energy produced and stored.
- ATP-PC (regenerates @97% in 3 minutes)
- Anaerobic (4-5 mins, but cumulatively 24-48 hours)
- Aerobic (24 hours)

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Well, the intensity & type of exercise will determine the energy substrate used during that exercise but more importantly over the long run the type of adaptation that occurs in the system!

This has far reaching implications on an individual level in areas such as:

- hormones,
- fiber types,
- vascular density,

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### Substrate Depletion

- Depends on energy system
  - Phosphagens
  - Glycogen
  - These systems are both time dependent in the short term and nutrition dependent over the long term.

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### Applications to training

- Too many athletes do not train the correct metabolic system!
- What energy systems pre-dominates in the sport?
  - How long does performance last?
  - Select appropriate training protocols, intervals, vs combination training etc.

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### What's your responsibility?

- "Safety and Conditioning Coach"
- Preparation for performance.
- Reduction of injury.
- Recovery from Performance.
- Recovery from Injury.

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### Ok, (Power) Needs Analysis?

- Warm-up (aerobic/anaerobic/skill).
- Tackles/Blocks.
- Injury Prevention.
- Understand the unique demands.
- Recovery (how much time?)  
(Aerobic  Anaerobic)

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- Average DB:
  - 5'11", 200lbs.
  - 4.56 sec 40yds.
  - Applies 1600lbs force in tackle.
  - Getting hit >100-150gs.

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### Rugby Tackle Videos

- How do you condition for that?

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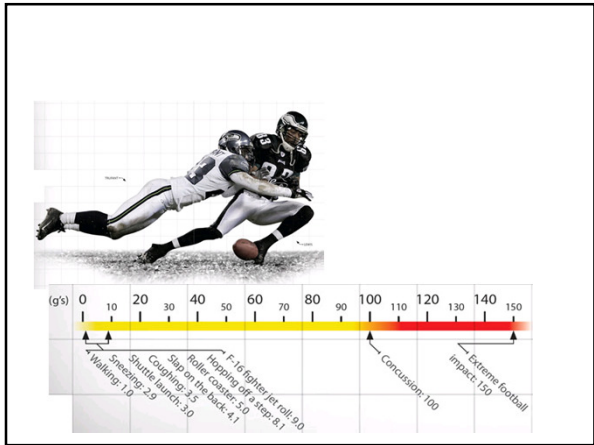
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### Metabolic Needs Analysis

- Smart & Specific vs Big & Strong
- What's the aerobic- power – anaerobic balance?



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- The time spent training an energy system should reflect the demands placed upon that system.
- This doesn't mean per week, it means per training program!

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**Building Your Program**

- Safe
- Progressive
- Challenging
- Achievable
- Specific Creativity
- THINK OUTSIDE THE WEIGHT'S ROOM!

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**Ulster Rugby Training Video**

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**What is the average Play length in American Football?**

- 0.5 sec snap?
- 2.6 sec release?
- 1-4 sec hand off?
- 2-5 sec run?
- Actual 4-6 sec?
- Short Gain ~3-4 sec?
- Long Gain ~6-10 sec?

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**Application in Training?**

- Sprints are easy!
- How many reps?
  - To simulate your desired goal!How long does 6 hang cleans take?  
How long does 6 squats take?  
How long does 6 clean & press take?

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**Remember max effort =RM**

How long does 6RM hang cleans take? 18-24 secs  
How long does 6RM squats take? 13-20 secs  
How long does 6RM clean & press take? 24-30 secs

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### Ok other challenges

- Tackles
- Push
- Pulls
- Recovery?
- Back peddling

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### Train the Athlete NOT the Body!

- Irish Eddy

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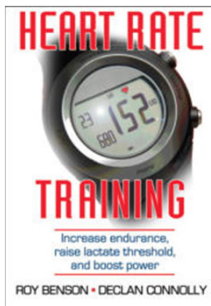
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Thank you!



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