COMBINING TRAINING & NUTRITION FOR BETTER FITNESS AND PERFORMANCE
Combining Training & Nutrition for better fitness & Performance
YOU WILL LEARN

> How TESTS.

> The most effective TRAINING sessions for endurance

> TRAINING efforts that are truly intervals for “better”

> Data to show the route to FUELLING better

> Optimise key NUTRITION game changers
HOW have I learned?

Coaching, full-time"  

Industry connections"  

Innovation"  

Testing athletes"  

Trying things..."
Hunches...

Pro friends...

Reading...

Integrative Biology of Exercise

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Exercise represents a major challenge to whole-body homeostasis provoking widespread perturbations in numerous cells, tissues, and organs that are caused by or are a response to the increased metabolic activity of contracting skeletal muscles. To meet this challenge, multiple integrated and often redundant responses operate to blunt the homeostatic threats generated by exercise-induce increases in muscle energy and oxygen demand. This application of molecular techniques to exercise biology has provided greater understanding of the multiplicity and complexity of cellular networks involved in exercise responses, and recent discoveries offer perspectives on the mechanisms by which muscle “communicates” with other organs and mediates the beneficial effects of exercise on health and performance.

Introduction

Superior locomotor ability was once essential for human survival and a fundamental reason that humans evolved and prospered. Physical activity was obligatory for meeting predation and food procurement. Evolutionary theory describes the mechanism of natural selection as “survival of the fittest,” the underlying assumption being that the “fit,” have a greater likelihood of survival. Modern humans run faster, jump higher, and are stronger than at any time in history. Yet exercise, particularly when undertaken to an individ-ual’s maximum, is complex process involving the unison and integrated activation of multiple tissues and organs in the cellular and systemic realm. Through the reductionist approach of dissecting biochemical systems into their constituent parts has been valuable in elucidating the basis of many biochemical processes; however, the complex nature of exercise as a whole and the interactions of its components is better understood by studying the individual components of various entities.

Skeletal muscle. To meet this challenge, multiple integrated and redundant responses operate to blunt the homeostatic threats generated by the increased energy and O₂ demand. In this “muscle-centric” view of exercise, the systemic (parasympa-thetic, respiratory, renal, and hormonally) responses are viewed as “nuisance factors,” supplying the contracting muscles with fuel and O₂ to sustain a given level of activity. The fundamental premise is that multiple and redundant responses simultaneously operate to blunt the many challenges to whole-body integrity caused by the demands of the contracting muscles. The application of molecular biology techniques to exercise biology has provided a better understanding of the multiplicity and complexity of cellular networks involved in these exercise responses. Recent discoveries offer perspectives on the role played by skeletal muscle in numerous homeostatic responses and on the mechanisms by which muscle “communicates” with other organs, such as adipose tissue, liver, pancreas, bone, and brain.

Pro friends...

Development

...an awful lot of reading

Writing & talking “the walk”
1990
(2nd Ironman race)
2018
(Sprint Tri)
FIGURE 9  Mean changes in blood glucose (Δ mM) from resting levels during subsequent endurance cycling in three different dietary conditions. (N=5)

PLA - placebo (---); BRK - breakfast (—); CHO - glucose polymer feeding (—).
1992
(Research becomes first magazine article in 220 Triathlon)
2019
(Product innovation work for Science in Sport NPD)
TRAINING
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The most effective training sessions for endurance?

Zone 1 (Z1/Z2) 55% to 80% of max heart rate

Approx 40% to 60% of Peak Power

This predominates in all phases of the year
The Road to Gold: Training and Peaking Characteristics in the Year Prior to a Gold Medal Endurance Performance

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Abstract

*Purpose:* To describe training variations across the annual cycle in Olympic and World Champion endurance athletes, and determine whether the athletes used tapering strategies in line with recommendations in the literature.

*Methods:* Eleven elite XC skiers and biathletes (4 male; 28 ± 1 yr, 85 ± 5 mL min⁻¹ kg⁻¹; 7 female; 25 ± 4 yr, 73 ± 3 mL min⁻¹ kg⁻¹; 1 VO₂max) reported one year of day-to-day training leading up to the most successful competition of their career. Training data were divided into periodization and peaking phases and distributed into training forms, intensity zones and endurance activity forms.

*Results:* Athletes trained ~800 h/500 sessions year⁻¹, including ~500 h/yr of sport-specific training. Ninety-four percent of all training was executed as aerobic endurance training. Of this, ~90% was low intensity training (UT, below the first lactate threshold) and 10% high intensity training (HIT, above the first lactate threshold) by time. Categorically, 23% of training sessions were characterized as HIT with minimal portions executed at or above the first lactate turn point. Training intensity and specificity distribution conformed to a typical periodization model, but absolute volume of HIT remained unchanged from pre-peak to peaking period, but there was a 32 ± 15% (P < 0.05) reduction in sport period to peaking phase.

Training for intense exercise performance: high-intensity or high-volume training?

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Performance in intense exercise events, such as Olympic track running, track cycling, and weightlifting, is heavily influenced by the total energy contribution from aerobic and anaerobic sources. During intense exercise events, ~75% of total maximal effort, ~50% of anaerobic energy and ~25% of aerobic energy is utilized. The relationship between intensity and performance is generally linear, with small improvements in intensity resulting in large improvements in performance. A short-term increase in training intensity of 2-4% may be beneficial to well-trained athletes, but not to novice athletes. High-volume training is currently being discussed as a method to improve performance in intense exercise events, but the benefits of high-volume training need to be thoroughly investigated. In an international study, a group of athletes was randomly assigned to a high-volume or low-volume training regimen. The high-volume training group demonstrated a significant improvement in performance, while the low-volume training group showed no improvement. The study concluded that high-volume training is effective in improving performance in intense exercise events, but the optimal training volume needs to be further investigated.
BENCHMARKING
Measure effectiveness of training

Start with a very low effort warm up <80–100w for 5 minutes.

Start the test at 100 watts for 3 minutes to get a stable HR.

Increase 25 watts every 3 minutes getting stable HR.

Go to around 85% HR or 70–75% PPO... then cool down.

ANALYSIS: Compare to previous data to see if you are absorbing, tired or lacking training time.

ADJUST: training, diet, frequency, recovery etc “accordingly”.
Training efforts that are truly going to make you “better”?

Zone 1 HR // O.G.E. = 60% to 80% PPO @ 50-65 rpm
e.g. 3 x [8 minutes OGE+ 1-2 minutes spinning RI]

Zone 2 // Intervals = 70% to 80% PPO @ 85-95 rpm
e.g. 6 x [5 minutes @75% PPO + 3 minutes RI]

Zone 3 // HIIT = >75% PPO @ 85-120 rpm
e.g. 4 x [4 minutes @ 80% PPO + 4 minutes RI]
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Race Simulation...

Power based simulations to teach you to sustain your desired effort (or not) e.g. 190w x 5.5h.

Use varying courses and each years data to make your race day pace judgement more refined e.g. +/- 15w.

Use the data from MAX TEST to estimate pace as well as previous race power and HR data.

You must also feed/supplement at race levels if you are to sustain the effort
NUTRITION
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OPTIMISING NUTRITION

Stellingwerff (2014) Diet & supplementation can plug various areas of fatigue
Note: the correct place to supplement/target diet depends on the fatigue cause
Nutrients can tweak genes/results

Stellingwerff et al (2018)
Nutrients can tweak training gains

**FASTED ZONE 1**
Some fasted sessions help lean-burn ability but do compromise quality and the session must be controlled Z1

- e.g. 2h protein 20g before, midway and after

**QUALITY POWER SESSION**
Use carbohydrate drinks in or just prior to training

- Caffeine 1h before? (race day responder @ 2–3mg/kg?)

**CARB DELIVERY TRAINING**
Use carbohydrate drinks, gels, bars, real food

- e.g. 40g–100g/hour or 0.5 to 1.5g/kg/hr

- Also look to supplement with protein and fats if ultra endurance
Nutrients can improve results

CARB LOADING
Use carbohydrate drinks, gels, bars, real food to elevate glycogen for 3–5 days. e.g. 6–10g/kg per day
Also look to supplement water to aid the 2:1 storage ratio

FUELLING & HYDRATION
The greater the duration/heat challenge the more hydration and fuelling is a priority. Water: 400–600ml/hr. Carbs: 40–80g/hr

QUALITY EFFORT
Use caffeine 1h before or mid way through event. e.g. 3mg/kg 1h before or 50mg gels (1/hr for 5h)
Are you a responder or not?
PROTEIN
Regular protein intake helps "adaptation" – it’s building blocks e.g. quality protein foods, between main meals during travel.

QUALITY FATS
Essential fatty acids (EFA) via fish, nuts, oils – these help “adaptation” to fat burning, satiate and are important blocks e.g. in quality protein foods, drizzled on salad etc, supplement?

BLOOD PROFILING
Assessment of nutrient status is vital – no one can “look” inside. e.g. testing for Vitamin D, B12, Hbn, Testosterone and others to ensure RBC, immune and health optimisation (forthedge.co.uk)
Summary

> The best indoor power **TESTS:** RAMP MAX + SUBMAX

> Most effective **TRAINING** sessions for endurance are Z1

> **TRAINING** intervals for “faster” are quite simple to devise

> **RACING** better is about a **plan:** when to **pace**/when to **race**

> **OCP TECHNOLOGY** can help pedal skill sessions

> Optimise **NUTRITION** with simple feeding and diet
Take-aways

• Training <80% must be a central habit.
• Hard work, pacing & “resistance” sessions must be planned
• Nutrition timing and type impacts significantly
• Benchmarking is better than time–trial efforts
• Testing race pace for speed is vital “simulation”
• Blood profiling is not a “hack”, its vital
MYSTERY PRIZE

Q & A
Tri Camp 2020

Training Programme including:

- 6-Lanes of swimming 50m pool every session
- Support car on long rides
- Evening seminars & Q&A sessions
- Daily spot prizes for “smart” training
- End of camp meal with awards.

RESORT includes: On-site Supermarket, Spa, Restaurants, bars, On-site wifi, Internet Cafe, Bike Hire and Technical Assistance Bike workshop
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