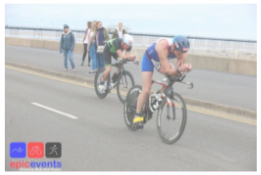
JOE BEER

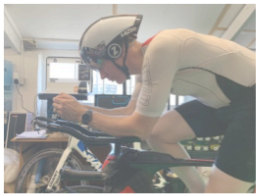
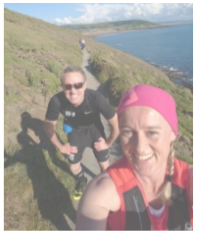
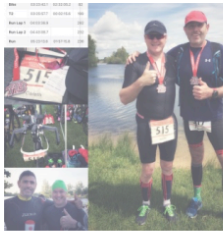
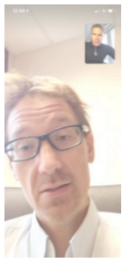
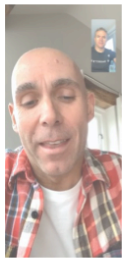
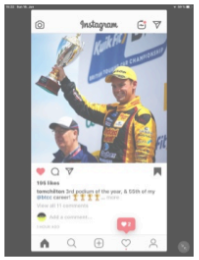
TRIATHLON SHOW: LONDON 2019

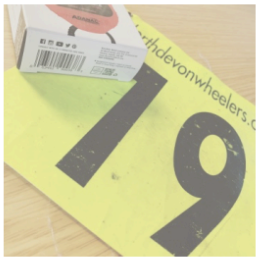
COMBINING TRAINING & NUTRITION FOR BETTER FITNESS AND PERFORMANCE

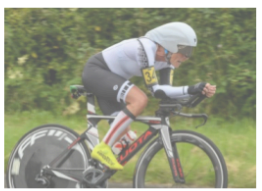
Combining Training & Nutrition for better fitness & Performance

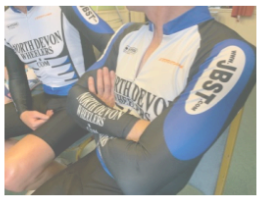


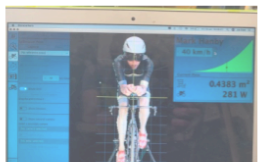
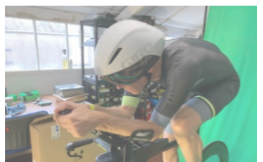
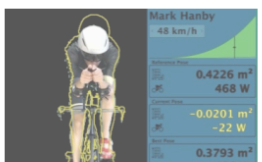


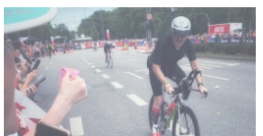









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YOU WILL LEARN

> How TESTS.

> The most effective TRAINING sessions for endurance

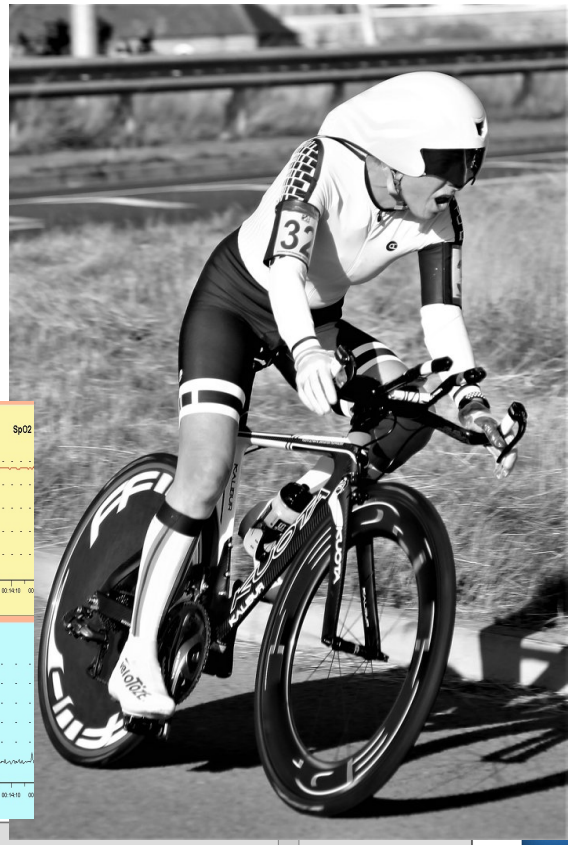
> TRAINING efforts that are truly intervals for “better”

> Data to show the route to FUELLING better

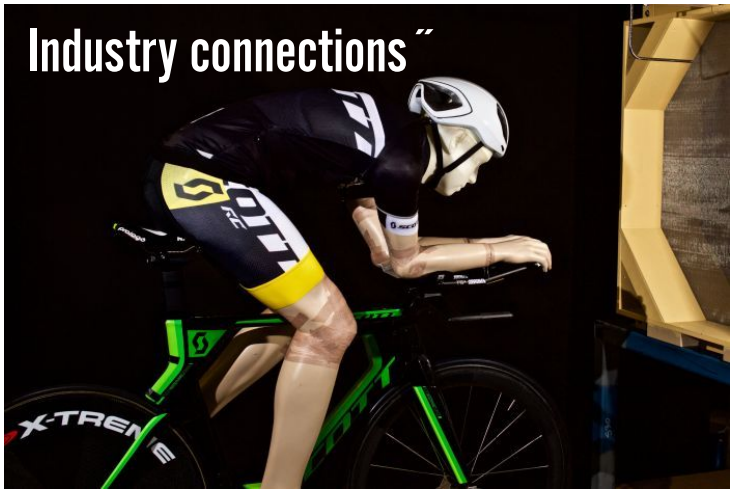
> Optimise key NUTRITION game changers

HOW have I learned?

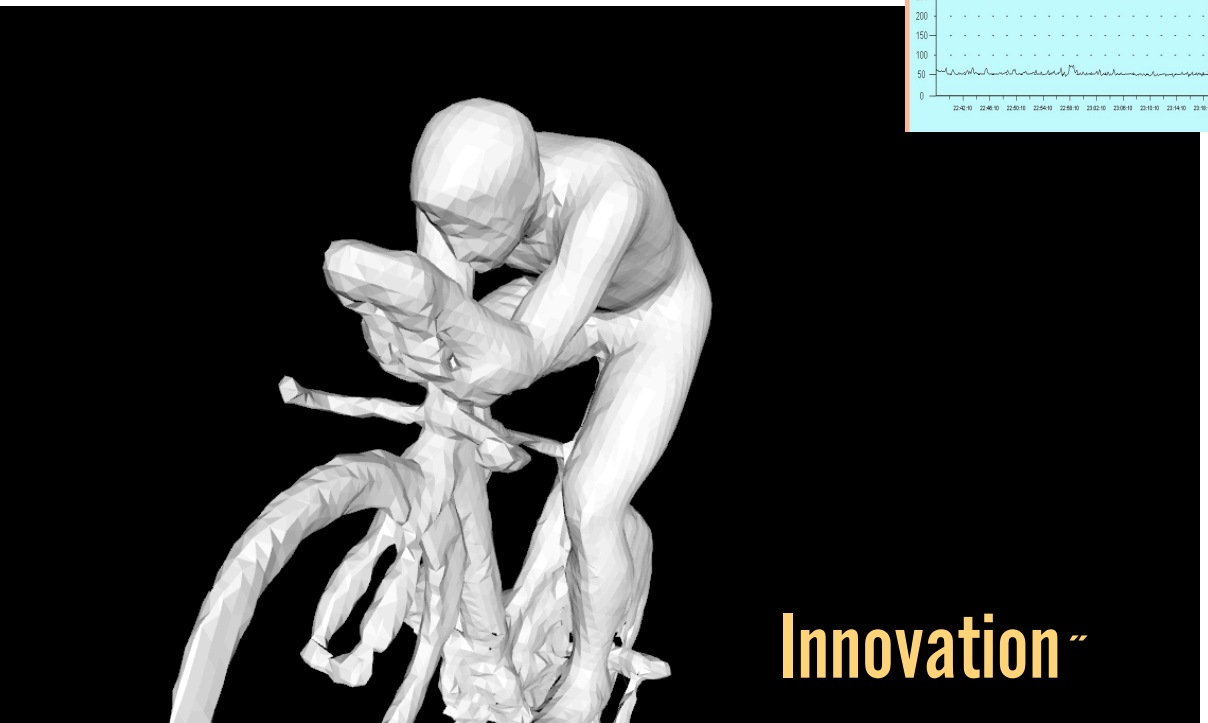
Coaching, full-time˝



Industry connections˝



Trying things…˝



Innovation˝

Testing athletes˝

Hunches...

Reading...

Integrative Biology of Exercise

John A. Hawley,[1,2,*] Mark Hargreaves,[3] Michael J. Joyner,[4] and Juleen R. Zierath[5,6,*]
[1]Exercise & Nutrition Research Group, School of Exercise Sciences, Australian Catholic University, Fitzroy, Victoria 3065, Australia
[2]Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Merseyside L3 5UA, UK
[3]Department of Physiology, The University of Melbourne, Parkville, Victoria 3010, Australia
[4]Department of Anesthesiology, Mayo Clinic, Rochester, MN 55905, USA
[5]Department of Molecular Medicine, Karolinska Institutet, von Eulers väg 4a, 171 77 Stockholm, Sweden
[6]The Novo Nordisk Foundation Center for Basic Metabolic Research, Faculty of Health and Medical Sciences, University of Copenhagen, 2200 Copenhagen, Denmark
*Correspondence: john.hawley@acu.edu.au (J.A.H.), juleen.zierath@ki.se (J.R.Z.)
http://dx.doi.org/10.1016/j.cell.2014.10.029

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-induced increases in muscle energy and oxygen demand. The 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.

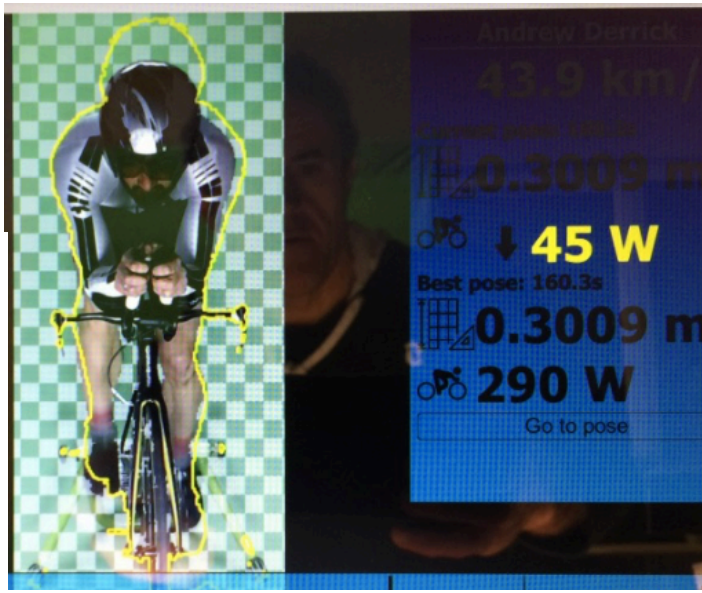
Introduction

Superior locomotive ability was once essential for human survival and a fundamental reason that *Homo sapiens* evolved and prospered. Physical activity was obligatory for evading predators and food procurement. Evolutionary theory describes the mechanism of natural selection as "survival of the fittest," the underlying supposition being that the "fit," as opposed to the "unfit," had a greater likelihood of survival. Modern day humans run faster, jump higher, and are stronger than at any time in history. Yet exercise, particularly when undertaken to an individual's maximum, is a complex process involving the synchronized and integrated activation of multiple tissues and organs at the cellular and systemic level. Though the reductionist approach of dissecting biological systems into their constituent parts has been valuable in explaining the basis of many biochemical processes, for exercise biologists, this approach has severe limitations: the integrative biology of exercise is extremely complex and can be neither explained nor predicted 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 O_2 demand. In this "muscle-centric" view of exercise, the systemic (cardiovascular, respiratory, neural, and hormonal) responses are viewed as "service functions," supplying the contracting muscles with fuel and O_2 to sustain a given level of activity. The fundamental premise is that multiscale and redundant responses simultaneously operate to blunt the many challenges to whole-body homeostasis 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 pathways involved in these exercise responses. Recent discoveries offer perspectives on the role played by skeletal muscle in numerous homeostatic processes and on the mechanisms by which muscle "communicates" with other organs such as adipose tissue, liver, pancreas, bone, and brain.

...an awful lot of reading˝

Development



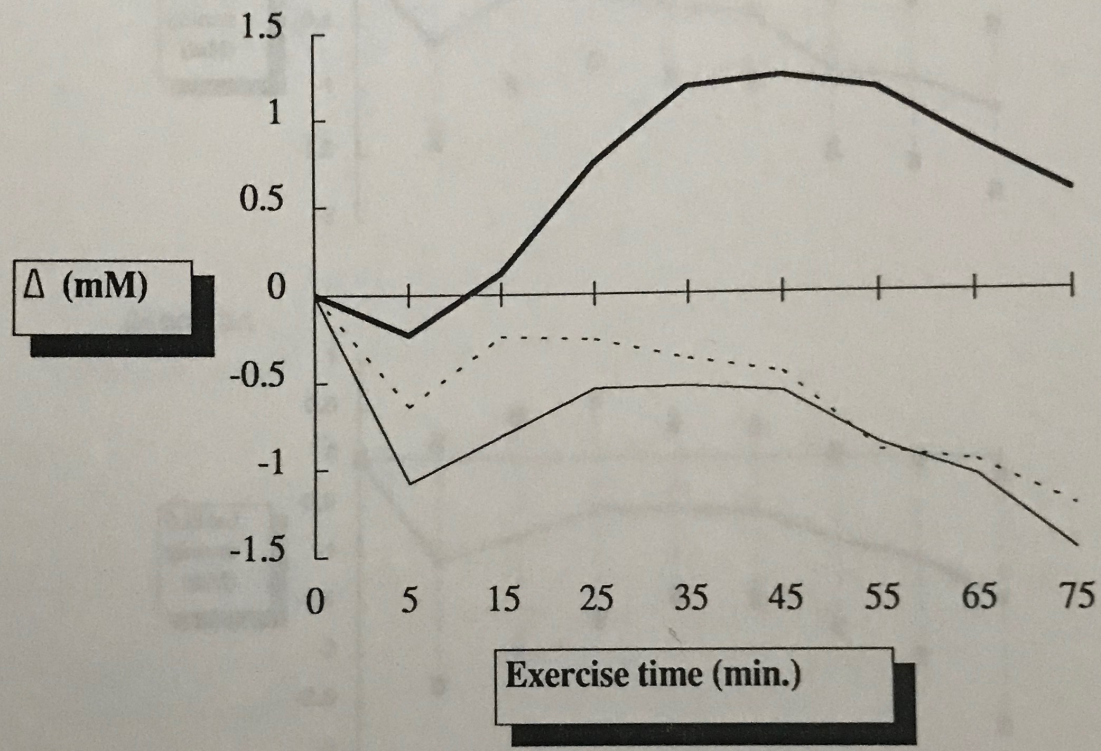
Pro friends...

Writing & talking "the walk"

1990
(2nd Ironman race)

2018
(Sprint Tri)

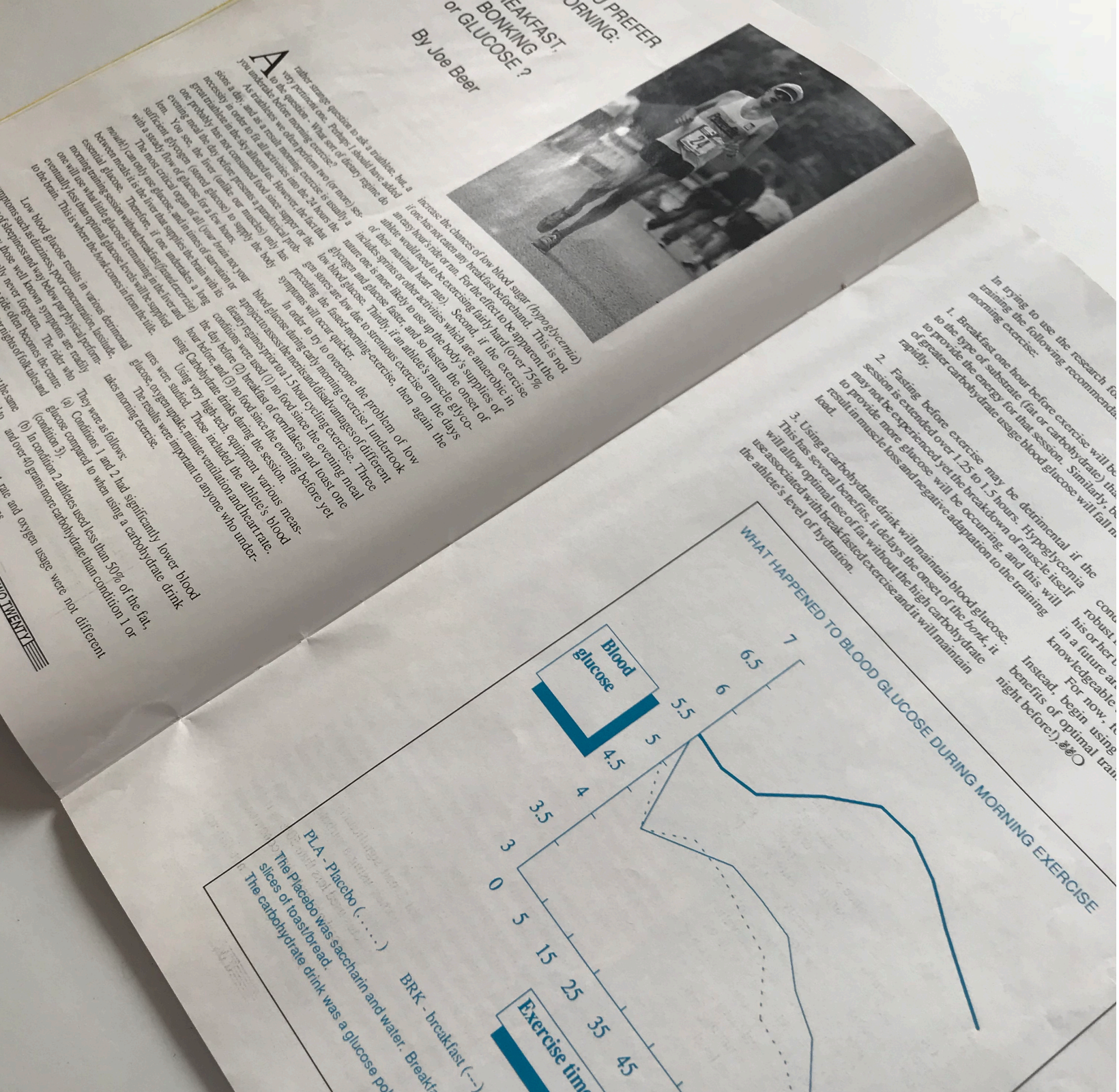
FIGURE 9 Mean changes in blood glucose (Δ mM) from resting levels during subsequent endurance cycling in three different dietary conditions. (N=5)



PLA - placebo (---);BRK - breakfast (——);CHO - glucose polymer feeding (—).

1991

(Degree Research into glucose polymers)



1992

(Research becomes first magazine article in 220 Triathlon)

2019

(Product innovation work for Science in Sport NPD)

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TRAINING

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ROTOR BIKE · COMPONENTS

> How you can do the best indoor power **TEST**.

> The most effective **TRAINING** sessions for endurance

> **TRAINING** Efforts that are truly intervals for “faster”

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> Optimise key **NUTRITION** game changers

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

Espen Tønnessen[1]*, Øystein Sylta[2], Thomas A. Haugen[1], Erlend Hem[1], Ida S. Svendsen[3], Stephen Seiler[2]

1 The Norwegian Olympic Federation, Oslo, Norway, **2** Faculty of Health and Sport Sciences, University of Agder, Kristiansand, Norway, **3** School of Sport, Exercise and Health Sciences, Loughborough University, Leicestershire, United Kingdom

Abstract

Purpose: To describe training variations across the annual cycle in Olympic and World Champion endurance athletes, and determine whether these 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} $\dot{V}O_{2max}$, 7 female, 25±4 yr, 73±3 mL. min^{-1}. kg^{-1} $\dot{V}O_{2max}$) 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. year^{-1} of sport-specific training. Ninety-four percent of all training was executed as aerobic endurance training. Of this, ~90% was low intensity training (LIT, 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 primary portions executed at or above the first lactate turn point. Training volume and specificity distribution conformed to a traditional periodization model, but absolute volume of HIT remained ... phases. However, HIT training patterns tended to become more polarized in the competition phase. Training ...tensity remained unchanged from pre-peaking to peaking period, but there was a 32±15% (P< ...ation period to peaking phase.

...d World champion XC skiers and biathletes conforms t... ...uring the competition phase, training bec... ...not follow suggested tapering pra... ...a rest day during the fina...

Scand J Med Sci Sports 2010: 20 (Suppl. 2): 1–10
doi: 10.1111/j.1600-0838.2010.01184.x

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

Review

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

P. B. Laursen[1,2,3]

[1]New Zealand Academy of Sport, Auckland, New Zealand, [2]Sport Performance Research Institute New Zealand (SPRINZ), Sch... of Sport and Recreation, Auckland University of Technology, Auckland, New Zealand, [3]School of Exercise, Biomedical and He... Sciences, Edith Cowan University, Joondalup, Western Australia, Australia
Corresponding author: Paul B. Laursen, New Zealand Academy of Sport North Island, PO Box 18444, Glen Innes, Auc... 1743, New Zealand. Tel: +64 9 477 5427, Fax: +64 9 479 1486, E-mail: paul@nzasni.org.nz

Accepted for publication 4 March 2010

Performance in intense exercise events, such as Olympic ... swimming, kayak, track running and track cycling ...less energy contribution from aerobic and anae... ...erobic energy supply dominates the total ... ~75 s of near maximal effort, ... for improvement with train... ...e events is generally ...sity. A short-... of high-...

formance of 2–4% in well-trained athletes. The ... high-volume training is less discussed, but its ... should not be downplayed, as high-volume ... induces important metabolic adaptations. W... bolic adaptations that occur with high-volu... high-intensity training show considerable ... lecular events that signal for these ada... different. A polarized approach to ... ~75% of total training volume is ... intensities, and 10–15% is performed ... ties, has been suggested as an optim... ...ibution for elite athletes who pe...

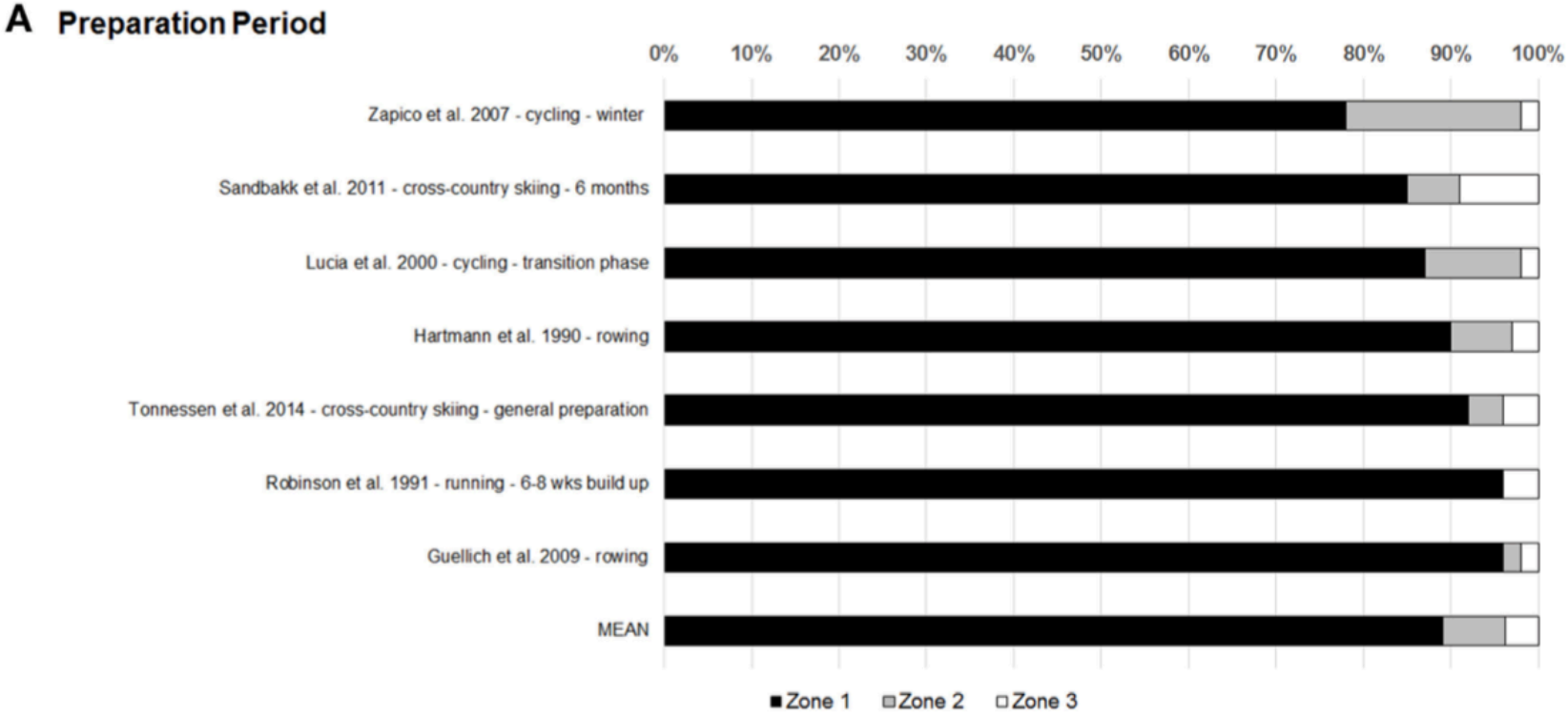
BRIEF REVIEW

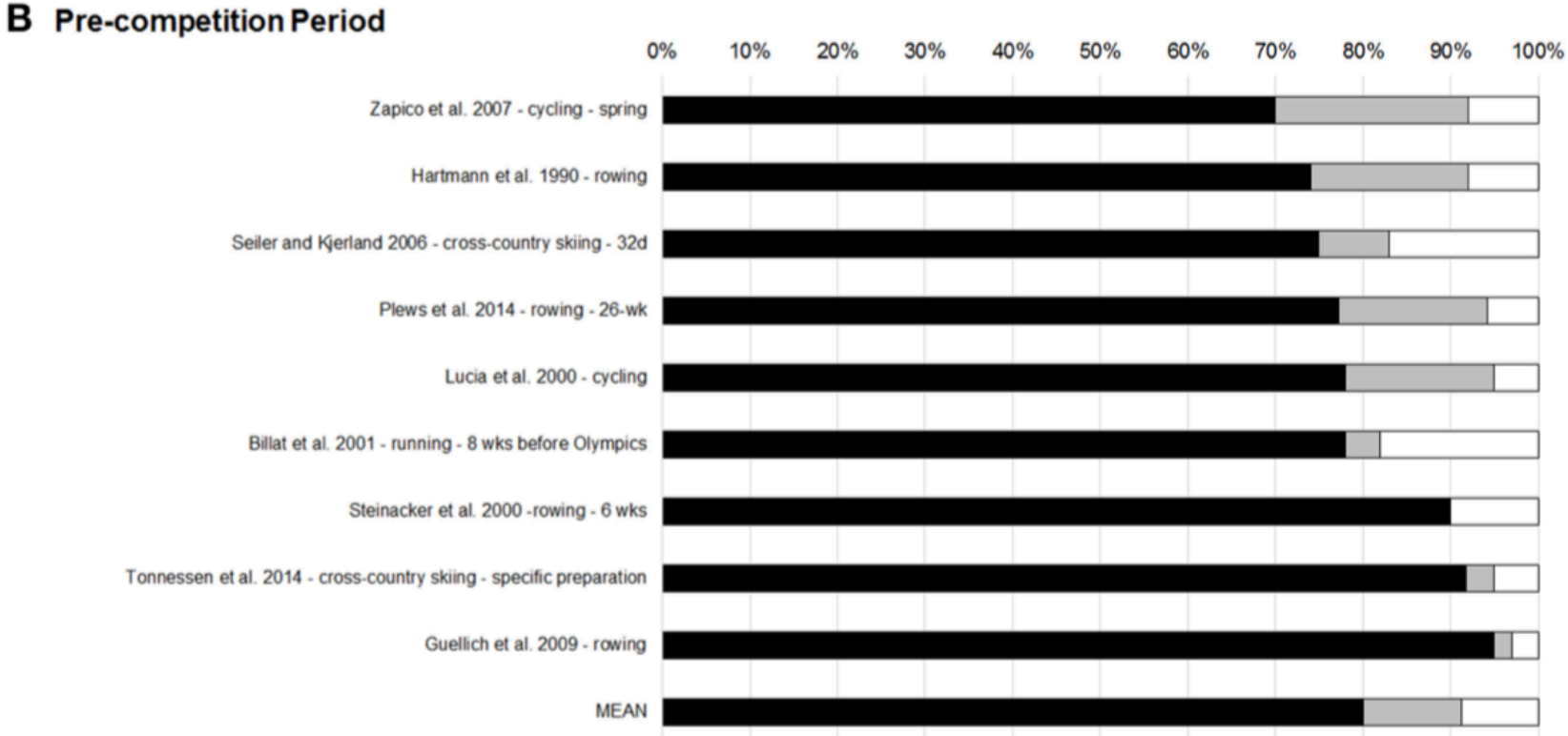
International Journal of Sports Physiology and Performance, 2010, 5, 276-291

What is Best Practice for Training Intensity and Duration Distribution in Endurance Athletes?

Stephen Seiler

Successful endurance training involves the manipulation of training intensity, duration, and frequency, with the implicit goals of maximizing performance, minimizing risk of negative training outcomes, and timing peak fitness and performances to be achieved when they matter most. Numerous descriptive studies of the training characteristics of nationally or internationally competitive endurance athletes training 10 to 13 times per week seem to converge on a typical intensity distribution in which about 80% of training sessions are performed at low intensity (2 mM blood lactate), with about 20% dominated by periods of high-intensity work, such as interval training at approx. 90% VO max. Endurance ... to self-organize toward a high...


A Preparation Period
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Zapico et al. 2007 - cycling - winter
Sandbakk et al. 2011 - cross-country skiing - 6 months
Lucia et al. 2000 - cycling - transition phase
Hartmann et al. 1990 - rowing
Tonnessen et al. 2014 - cross-country skiing - general preparation
Robinson et al. 1991 - running - 6-8 wks build up
Guellich et al. 2009 - rowing
MEAN
Zone 1
Zone 2
Zone 3


B Pre-competition Period
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Zapico et al. 2007 - cycling - spring
Hartmann et al. 1990 - rowing
Seiler and Kjerland 2006 - cross-country skiing - 32d
Plews et al. 2014 - rowing - 26-wk
Lucia et al. 2000 - cycling
Billat et al. 2001 - running - 8 wks before Olympics
Steinacker et al. 2000 -rowing - 6 wks
Tonnessen et al. 2014 - cross-country skiing - specific preparation
Guellich et al. 2009 - rowing
MEAN

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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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TECHNOLOGY

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RACING

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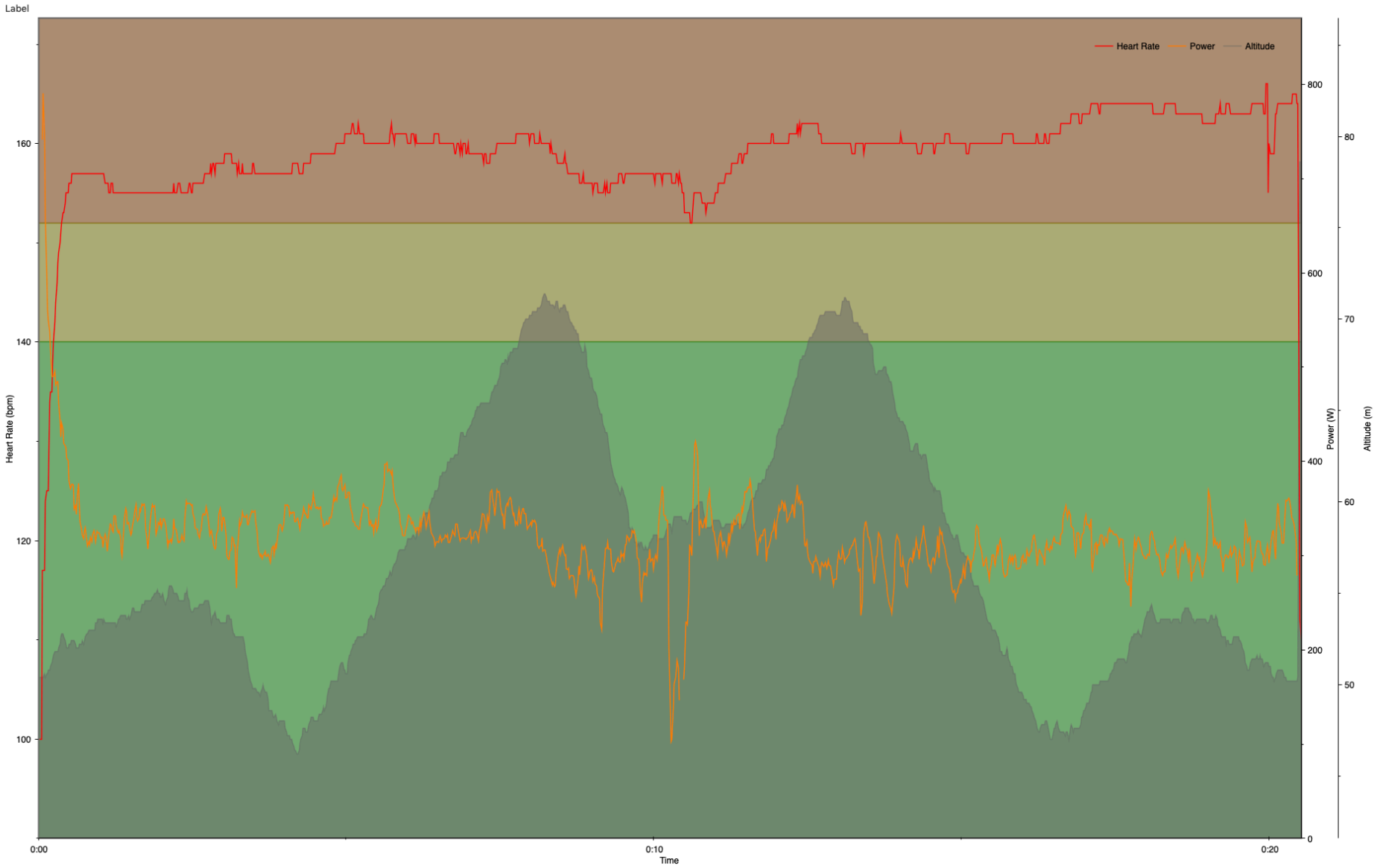
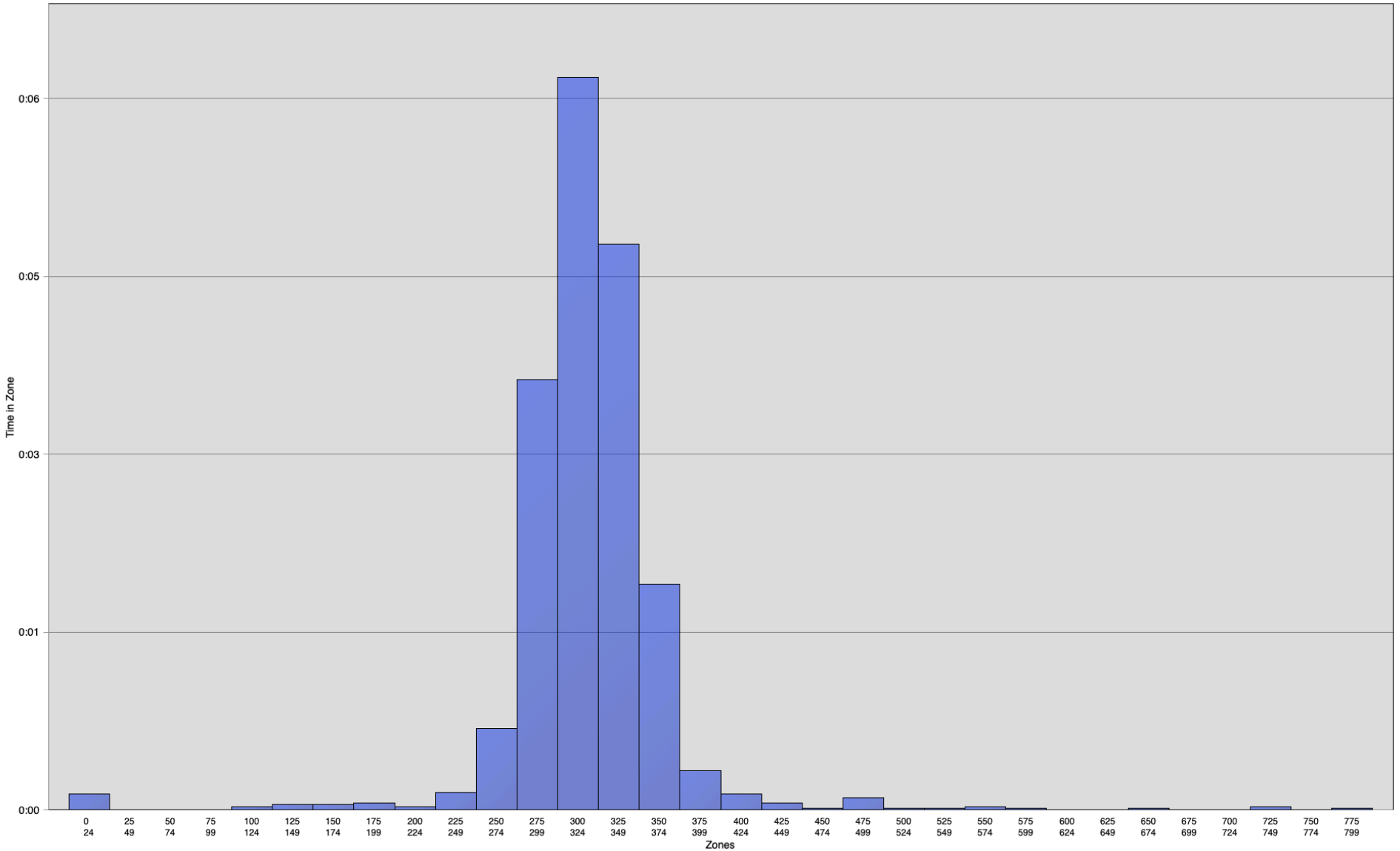

Label
Heart Rate
Power
Altitude
160
140
120
100
Heart Rate (bpm)
800
600
400
200
0
Power (W)
80
70
60
50
Altitude (m)
0:00
0:10
0:20
Time


0:06
0:05
0:03
0:01
0:00
Time in Zone
0 24
25 49
50 74
75 99
100 124
125 149
150 174
175 199
200 224
225 249
250 274
275 299
300 324
325 349
350 374
375 399
400 424
425 449
450 474
475 499
500 524
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575 599
600 624
625 649
650 674
675 699
700 724
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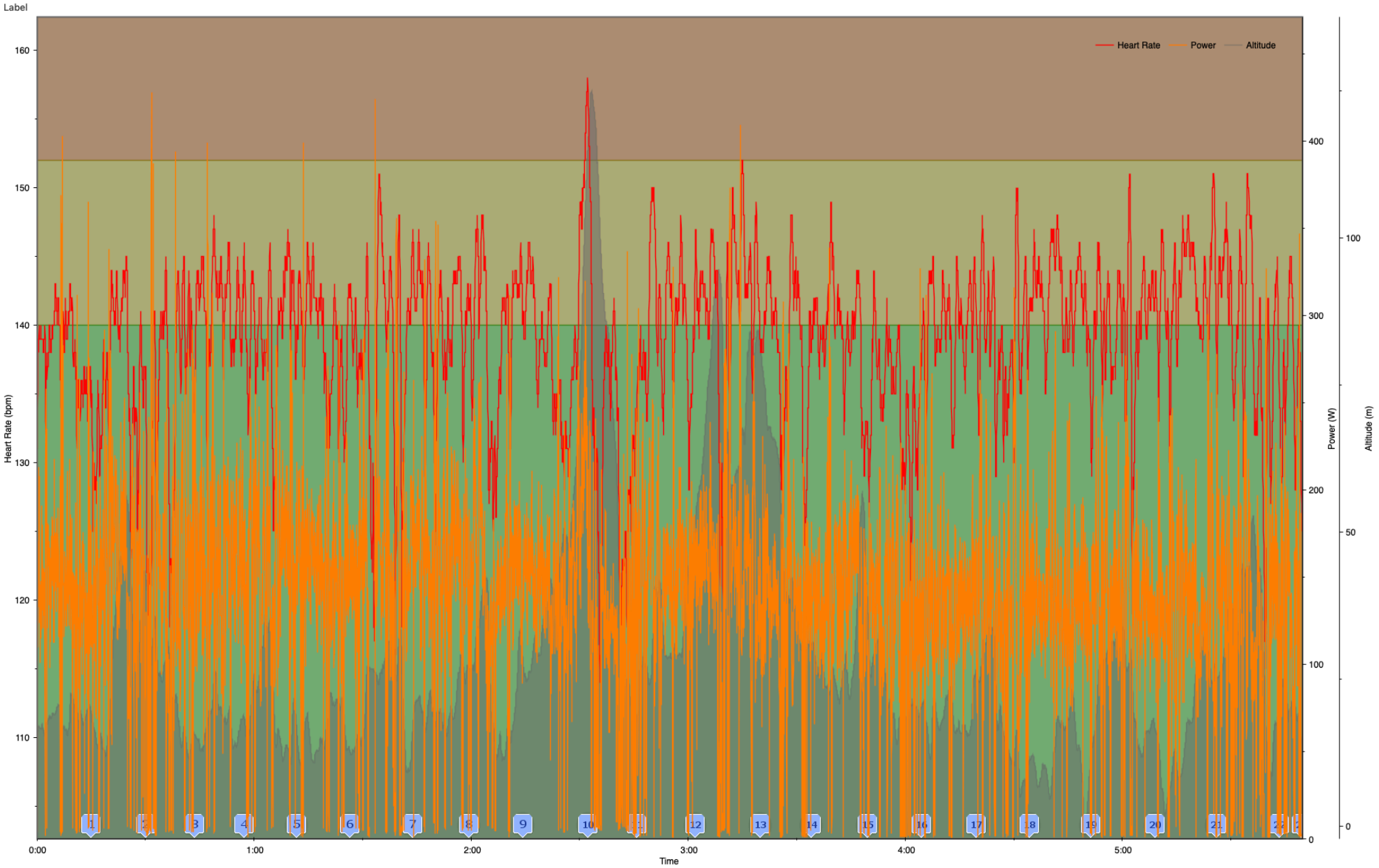
750 774
775 799
Zones


Label
Heart Rate
Power
Altitude
Heart Rate (bpm)
Power (W)
Altitude (m)
Time
160
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120
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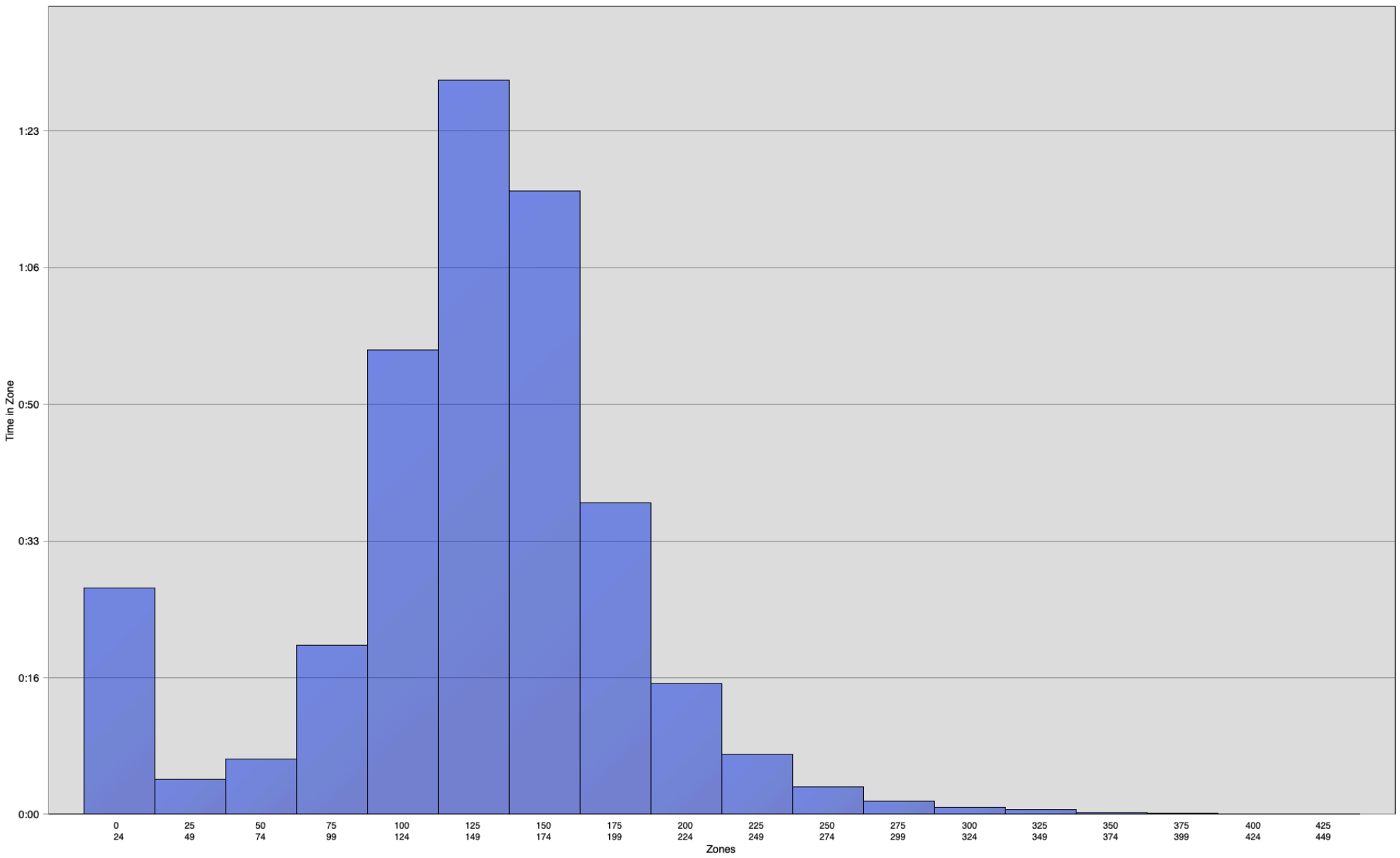
1:23
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Time in Zone
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74
75
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100
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125
149
150
174
175
199
200
224
225
249
250
274
275
299
300
324
325
349
350
374
375
399
400
424
425
449
Zones

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

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NUTRITION

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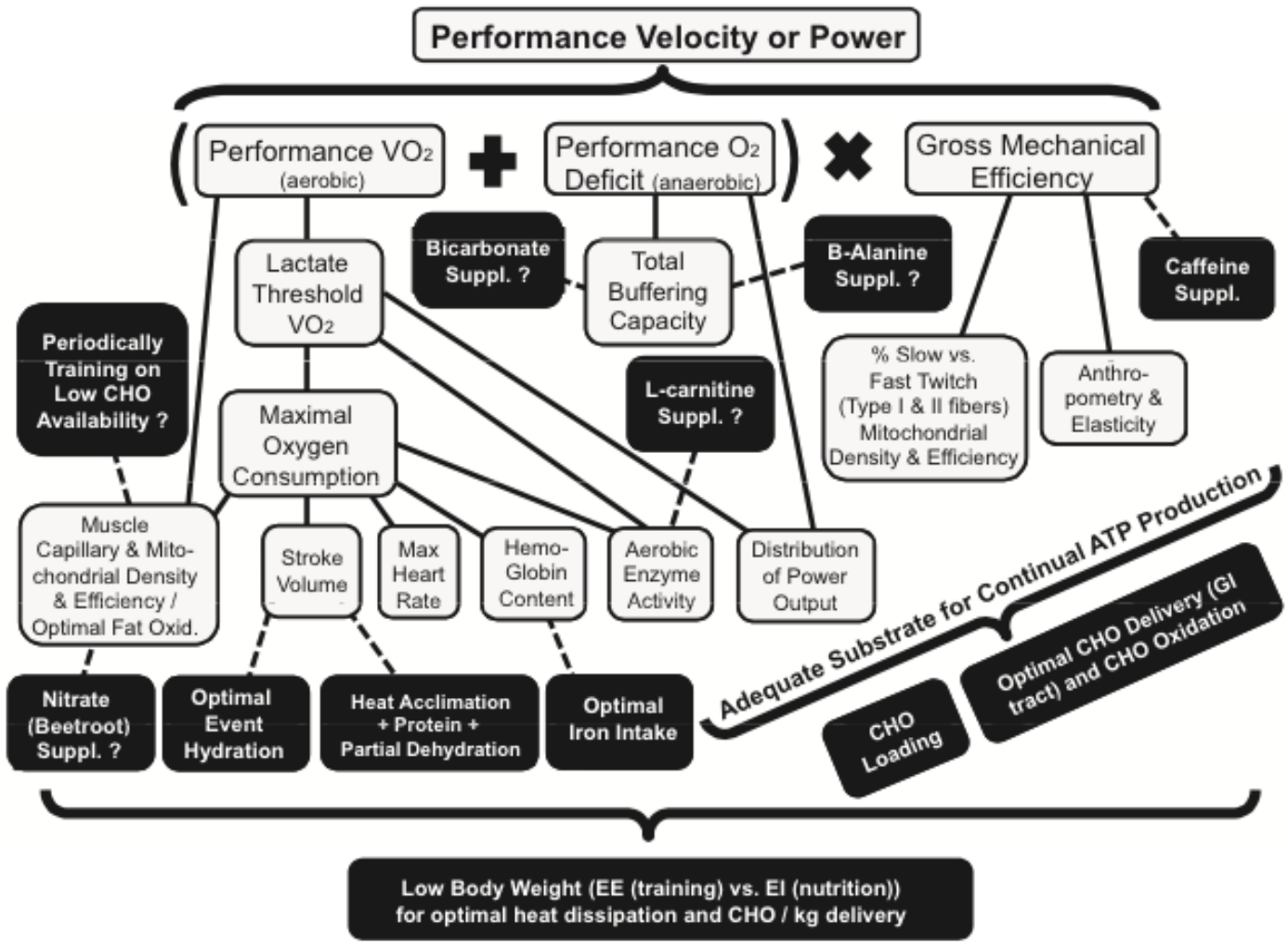
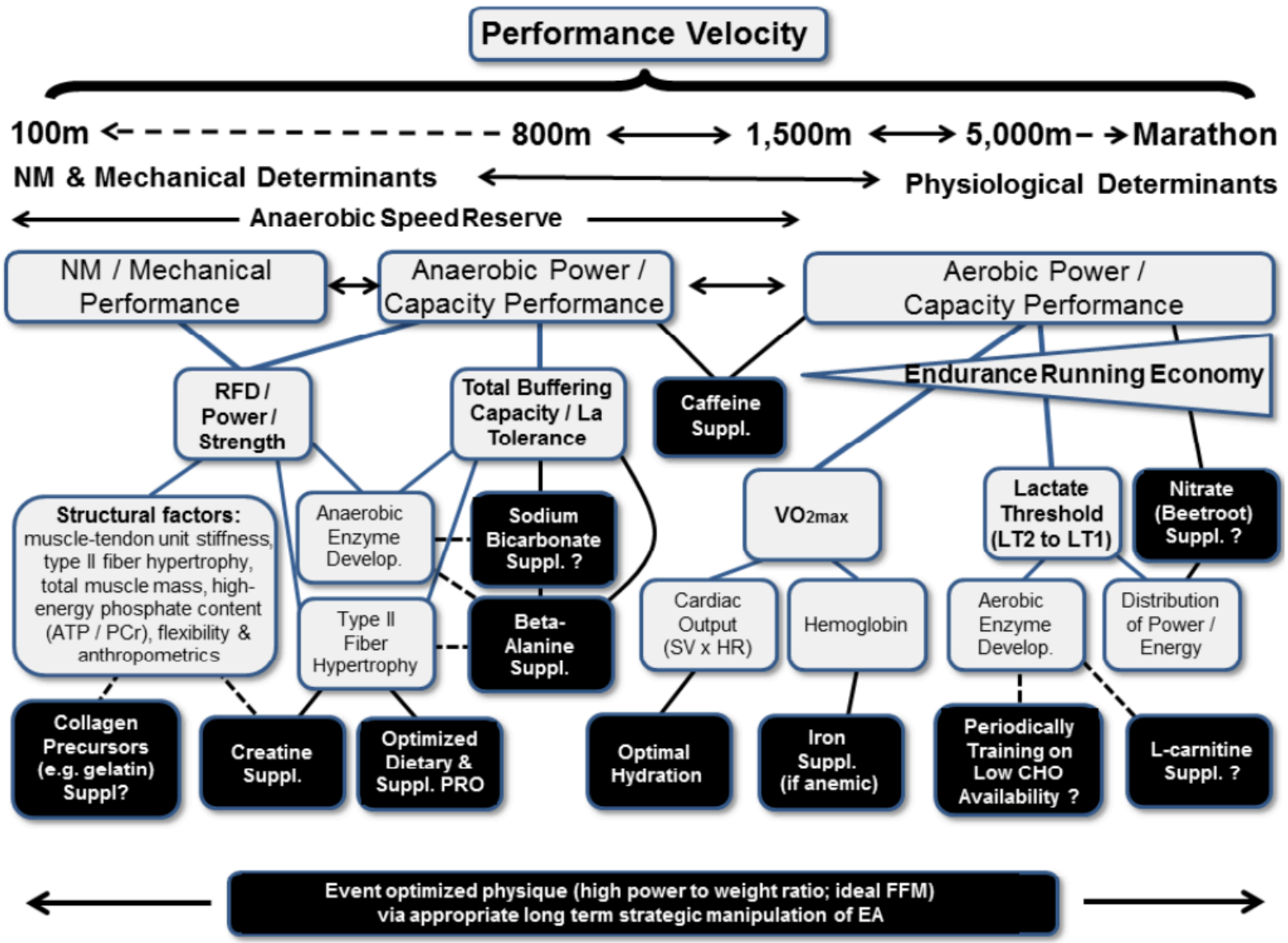
OPTIMISING NUTRITION

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?

Nutrients - YAWYEAD

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)

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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

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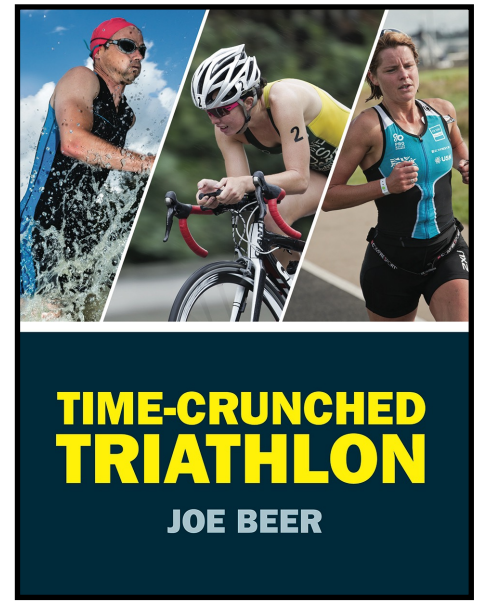

220 TRIATHLON

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IRONMAN
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HUB

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˝

Combining Training & Nutrition for better fitness & Performance