



MARY MACKILLOP
INSTITUTE FOR
HEALTH RESEARCH



The role of dairy in Contemporary Sports Nutrition

Professor Louise Burke

Chair of Sports Nutrition
Mary MacKillop Institute for Health Research
Australian Catholic University

Contemporary Performance Nutrition

(Eating your Ps)

Planned

It doesn't happen by accident!

Periodised

Needs and goals change every day

Proven

Evidence-based strategies
trump anecdotes!

Personalised

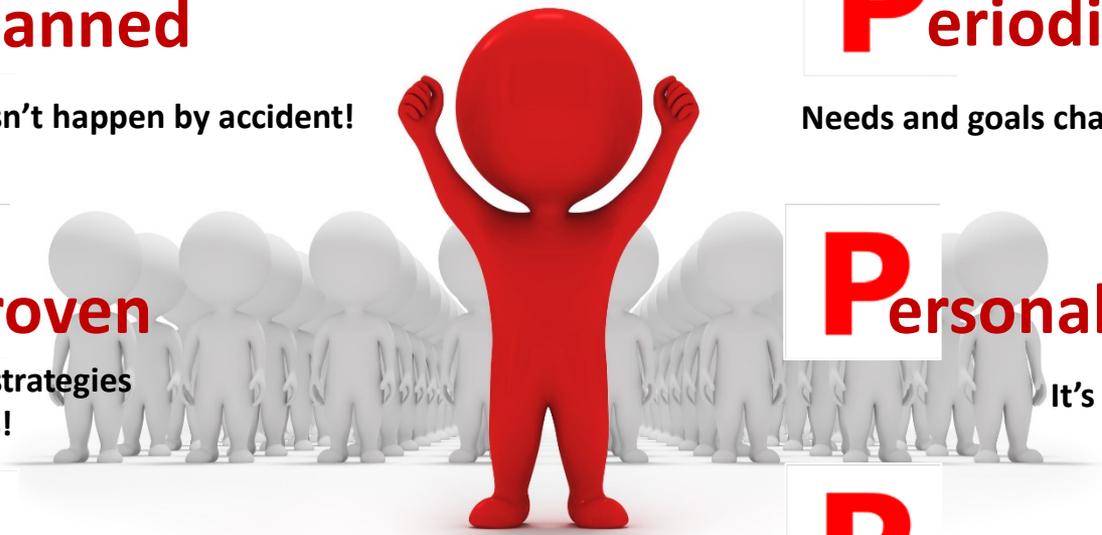
It's all about you!

Practical

Food and drink choices must suit the situation
Pragmatic is possible when perfect isn't

Practiced

Tweak to make the plan better for you
Adapt to make you better at the plan



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Themes in Performance Nutrition

- Making athletes go higher, faster, stronger

1. Pre-event nutrition
2. Competition (during exercise) nutrition
3. Post-exercise rehydration
4. Post-exercise refuelling
5. Post-exercise repair/adaptation
6. Gut health/microbiome
6. Amplified training adaptation
7. Manipulation of physique (gain in muscle, loss of body fat)
8. Immune health
9. Prevention and treatment of injury
10. Supplements and sports food

**AMERICAN COLLEGE
of SPORTS MEDICINE**

ACADEMY OF NUTRITION AND DIETETICS
DIETITIANS OF CANADA

JOINT POSITION STATEMENT

ABSTRACT

It is the position of the Academy of Nutrition and Dietetics, Canada, and the American College of Sports Medicine that the of, and recovery from, sporting activities are enhanced by w nutrition strategies. These organizations provide guidelines for th type, amount, and timing of intake of food, fluids, and st promote optimal health and performance across different training and competitive sport. This position paper was prepri bers of the Academy of Nutrition and Dietetics, Dietitians of

SPECIAL COMMUNICATIONS

Nutrition and Athletic

Consensus statement

UEFA expert group statement on nutrition in elite football. Current evidence to inform practical recommendations and guide future research

James Collins,^{1,2} Ronald John Maughan,³ Michael Gleeson,⁴ Johann Bilsborough,^{5,6} Asker Jeukendrup,^{4,7} James P Morton,⁸ S M Phillips ,⁹ Lawrence Armstrong,⁹ Louise M Burke ,¹¹ Graeme L Close ,⁸ Rob Duffield ,^{5,12} Enette Larson-Meyer,¹³ Julien Louis ,⁸ Daniel Medina,¹⁴ Flavia Meyer ,¹⁵ Ian Rollo,^{4,16} Jorunn Sundgot-Borgen ,¹⁷ Benjamin T Wall,¹⁸ Beatriz Boulosa,¹⁹ ia Lizarraga,²⁰ Peter Res,²¹ Mario Bizzi,²² harlotte M Cowie,^{26,27} Michel D'Hooghe,^{22,28} ^{27,30} Niki Papadimitriou,³¹ Marc Vouillamoz,³¹

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Human Kinetics
CONSENSUS STATEMENT

International Olympic Committee (IOC) Consensus Statement on Relative Energy Deficiency in Sport (RED-S): 2018 Update

Margo Mountjoy
McMaster University

Jorunn Sundgot-Borgen
The Norwegian School of Sport

Louise Burke
Australian Institute of Sport and Mary

Kathryn E. Ackerman
Boston Children's Hospital and
Massachusetts General Hospital



Constance Lebrun
University of Alberta

Nanna Meyer
University of Colorado

Monica Klungja
University o

IOC consensus statement: dietary supplements and the high-performance athlete

Ronald J Maughan,¹ Louise M Burke,^{2,3} Jiri Dvorak,⁴ D Enette Larson-Meyer,⁵ Peter Peeling,^{6,7} Stuart M Phillips,⁸ Eric S Rawson,⁹ Neil P Walsh,¹⁰ Ina Garthe,¹¹ Hans Geyer,¹² Romain Meeusen,¹³ Lucas J C van Loon,^{3,14} Susan M Shirreffs,¹ Lawrence L Spriet,¹⁵ Mark Stuart,¹⁶ Alan Vernec,¹⁷ Kevin Currell,¹⁸ Vidya M Ali,¹⁹ Richard GM Budgett,²⁰ Arne Ljungqvist,²¹ Margo Mountjoy,^{22,23} Yannis P Pitsiladis,¹⁹ Torbjorn Soligard,²⁰ Uğur Erdener,¹⁹ Lars Engebretsen²⁰

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The practical side of dairy in sports nutrition



1. Provides “Go To” nutrients in sports nutrition goals
 - High quality protein
 - Carbohydrate
 - Calcium
 - Fluid/electrolytes

Milk, flavoured milk

Yoghurt

Buttermilk,

Kefir

Cheese

Fromage, fraise

Custard

Cottage cheese

Evaporated/condensed milk

Milk powder

The practical side of dairy in sports nutrition



Cow's milk as a post-exercise recovery drink: implications for performance and health

Lewis J. James, Emma J. Stevenson, Penny L. S. Rumbold & Carl J. Hulston

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SHORT PRESENTATION 534989

Functional dairy protein supplements for elite athletes

Introduction

Elite athletes have nutritional requirements that differ quantitatively from normally active people (Campbell *et al.* 2007). These requirements extend from the simple need to replace electrolytes lost in sweat through to higher energy requirements to replenish glycogen stores and protein repair and accretion (Burke 2001; Sawka *et al.* 2008). For athletes, nutrition is not only important for physiologic maintenance, but can also impact performance (Burke and Deakin 2006). While the demands associated with elite performance differ from the building or maintenance of skeletal muscle mass, function is critical for success in almost all sports.

The authors

Ross Crittenden,¹ Jonathan Buckley,²
David Cameron-Smith,³ Andrew Brown,³ Ken Thomas,³
Stewart Davey³ and Peter Holman¹

A. Alcántara *et al.* *Journal of the International Society of Sports Nutrition*
(2019) 16:22
<https://doi.org/10.1186/s12970-019-0288-5>

Journal of the International
Society of Sports Nutrition

REVIEW

Open Access

Impact of cow's milk intake on exercise performance and recovery of muscle function: a systematic review

Juan M. A. Alcántara^{1*}, Guillermo Sánchez-Delgado¹, Borja Martínez-Tellez^{1,2}, Idoia Labayen³ and Jonatan R. Ruiz¹



1. Provides “Go To” nutrients in sports nutrition goals
2. Dairy version of nutrients or the dairy matrix offers special benefits for sports nutrition goals
3. “Everyday” food
4. Available and affordable
5. Practical and palatable
6. Versatile

The practical side of dairy in sports nutrition



High kilojoule
Vs
Low kilojoule

High carb
Vs
Low carb



Higher protein
Higher calcium
Higher fluid/salt



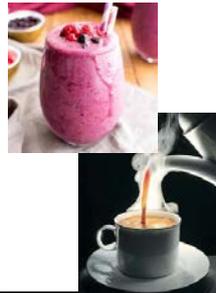
Probiotics
Caffeine
Other phytochemicals



Sweet
Vs
Savoury



Hot
Vs
Cold
Vs
Ice slurry



Private intake
vs Social Activity



Special variants: A2
Low lactose



Natural/
"real food"
Vs
Ultra-processed



Bespoke Performance Nutrition

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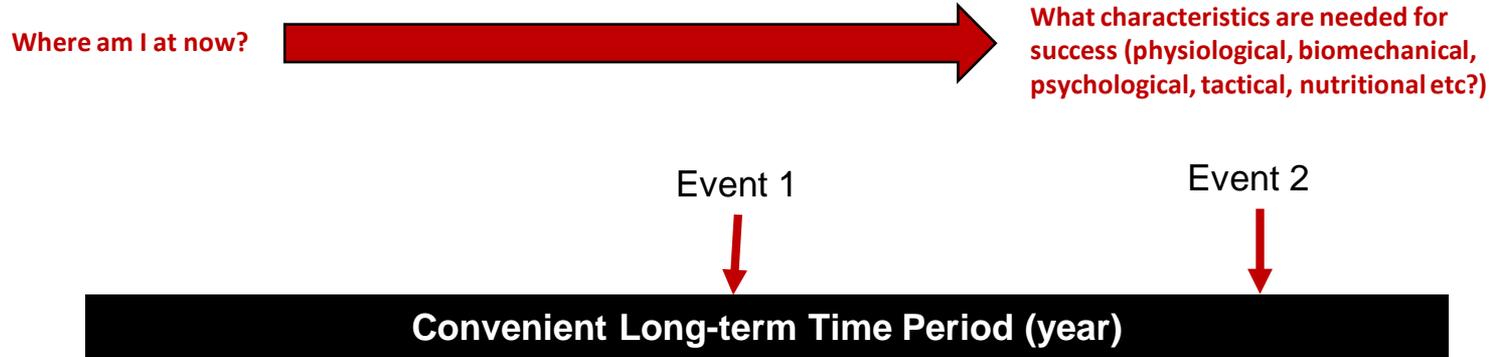
Personalised

Practical

Practiced

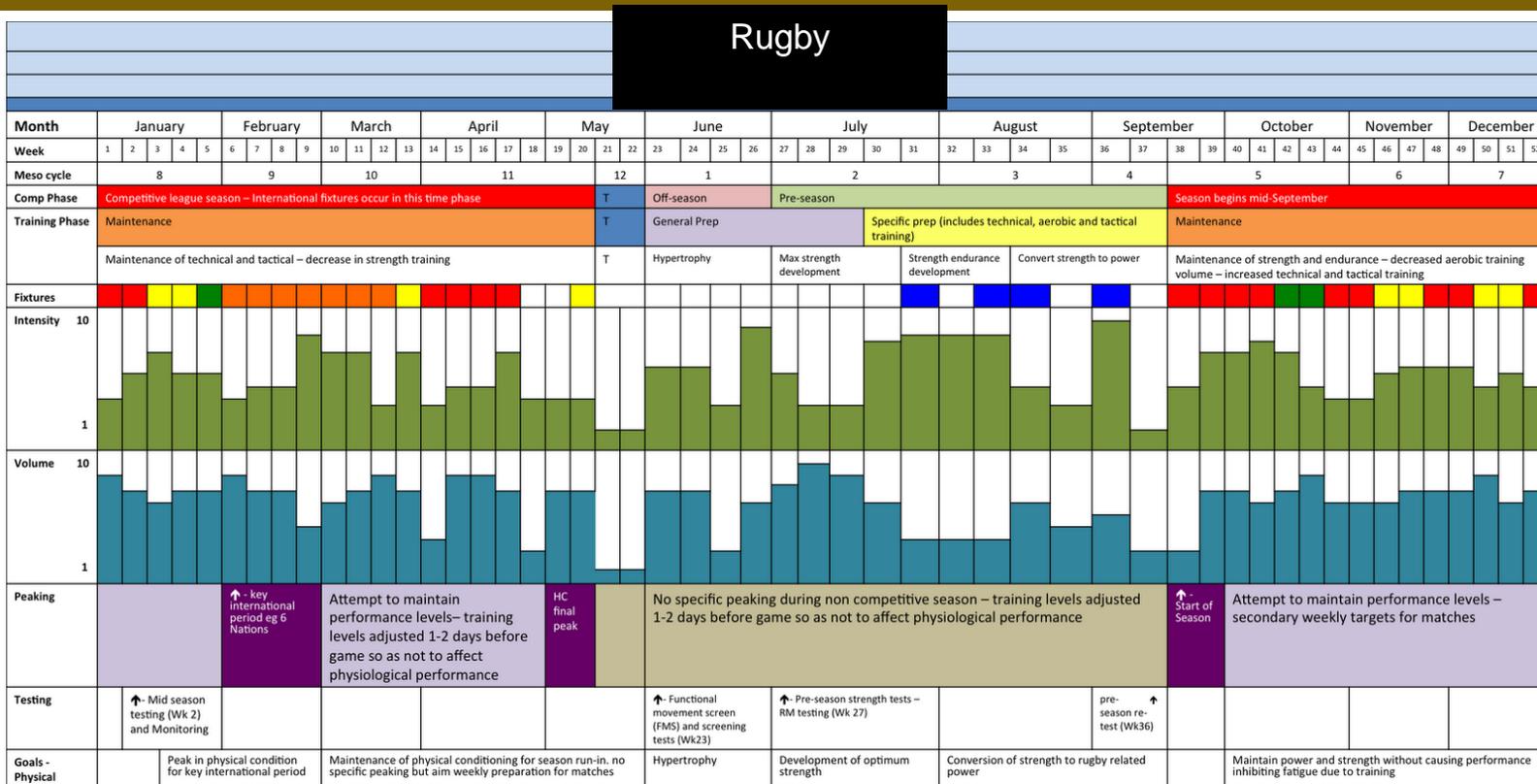


Yearly Training Plan (and Gap Analysis) are key tools to sporting success



Periodised training involves the implementation, integration and sequencing of a range of stimuli/modalities to gradually develop the characteristics required for success at targeted event(s)

Developing the Periodised Training Plan is an art and science



Yearly Training Program

- What are the specific nutritional characteristics that are needed for success? When can they be programmed into the YTP
 - Manipulation of physique
 - Successful supplement protocol
 - Strategic race/event “fluid” plan

PHASE/MESO/MICROCYCLE

- What are the training characteristics of each meso and microcycle? How can nutrition support these?
 - Energy, protein needs
 - Fuel/carbohydrate needs
 - Micronutrient needs – e.g. iron



MICRO/WITHIN DAY

How can nutrition be spread around each training session and over the day to maximise the support for each session and long-term goals?

- Carb/fluid intake around each session
- Protein spread over the day
- Calcium before exercise

SPECIALISED

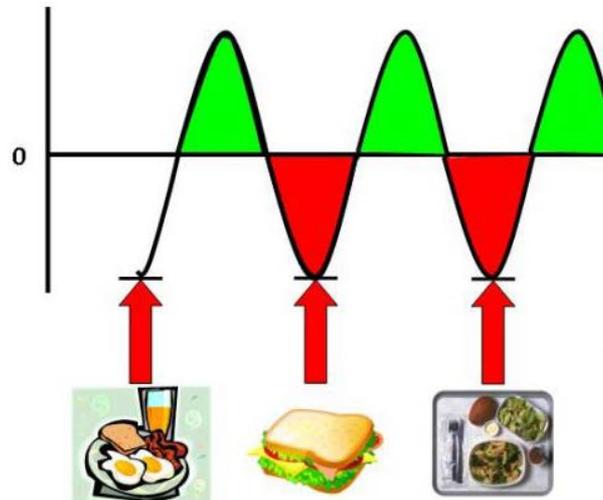
- How can special nutritional strategies, including the deliberate absence of nutrition support for a session, maximise the training stimulus/adaptive response.
 - Periodisation of CHO availability

Muscle protein is a dynamic tissue – it is continually breaking down and being resynthesised

Protein synthesis
> Breakdown

Protein breakdown
> synthesis

Protein balance



Exercise can
increase protein synthesis

And decrease protein
breakdown

Leading to greater muscle
and body protein

Effects last for 24 hours
after each session!

How is exercise important for protein synthesis for to ALL athletes?

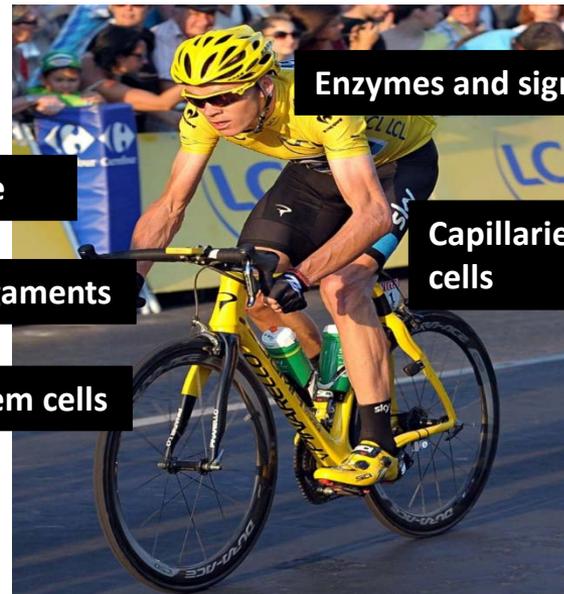


Contracting muscle fibres

Bone

Tendons and ligaments

Immune system cells



Enzymes and signalling proteins

Capillaries and red blood cells

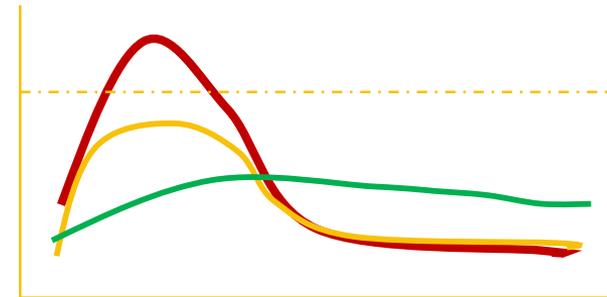
Exercise activates specific signalling chemicals which send messages around the muscle and to other parts of the body about adapting
- many of these messages involve building new body proteins

Dietary protein enhances muscle protein synthesis for several hours



Blood leucine concentrations

Leucine “trigger”



Time

- Turns on the machinery in the muscle that synthesises protein
- Turns on this machinery by a different mechanism to exercise, so the effects are additive

Dietary protein enhances muscle protein synthesis for several hours



- Turns on the machinery in the muscle that synthesises protein
- Turns on this machinery by a different mechanism to exercise, so the effects are additive
- Provides the building blocks to make new protein

Dietary protein enhances muscle protein synthesis for several hours



What's the best dietary protein?

How much do I need?

When should I eat it?

How often should I eat it?

Do I need supplements?

How much protein do I need to eat after training to promote post-exercise recovery

Simple answer:
~ 20 g, soon after a key workout

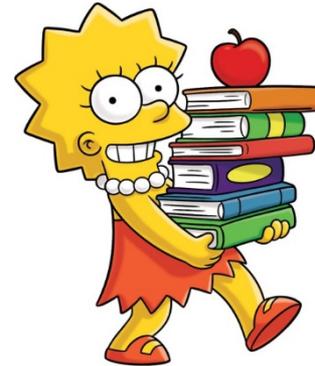


How much protein do I need to eat after training to promote post-exercise recovery

Real answer

0.3 g/kg BM, soon after exercise is a good starting point

- More if you are big (30-35 g)
- Less if you are small (15 g)
- More if you do full body exercise (30-40 g)
- More if you are energy restricting (0.4 g/kg BM)
- Less if you are happy with a good effect rather than maximum effect (10-15 g)
- Ok if it is a quickly digested protein source (dairy/protein-based drink)
- More if it is a slowly absorbed meal containing some protein
- More if it is a lesser quality protein (lower leucine)
- More if you are old



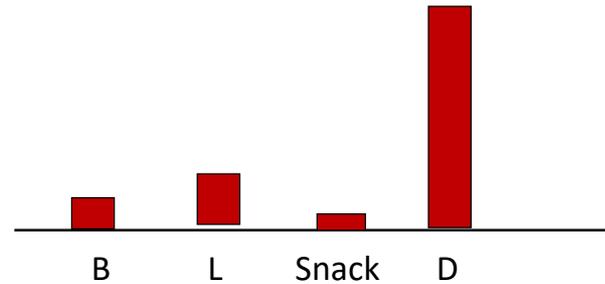
How should I spread my protein intake over the day (to take advantage of my 24 hours of recovery)

3 square meals
(6 hours apart)

~~Back ended eating
(most at dinner)~~

Grazing (hourly)

Body Builder (3-4 hours)



J Physiol 591.9 (2013) pp 2319–2331

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Timing and distribution of protein ingestion during prolonged recovery from resistance exercise alters myofibrillar protein synthesis

José L. Areta¹, Louise M. Burke², Megan L. Ross², Donny M. Camera¹, Daniel W. D. West³, Elizabeth M. Broad², Nikki A. Jeacocke², Daniel R. Moore⁴, Trent Stellingwerff⁴, Stuart M. Phillips³, John A. Hawley¹ and Vernon G. Coffey¹

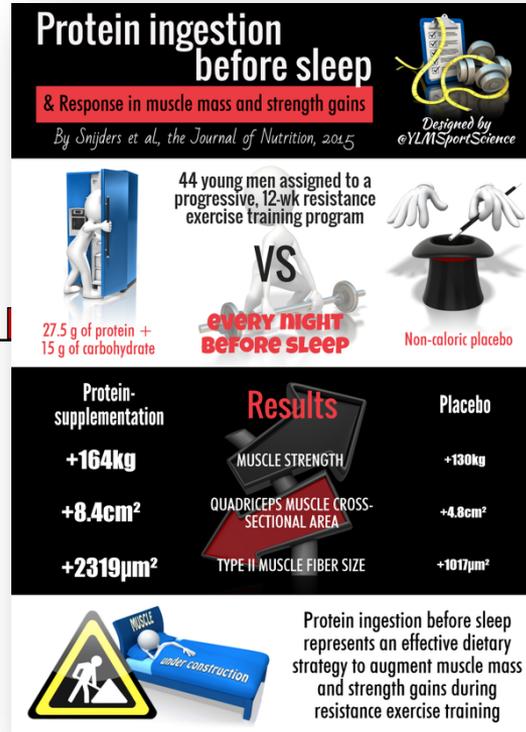
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Larger (20-40 g) serve of protein before bed

(Res et al. Med Sci Sports Exerc. 2012;44(8):1560-9.)

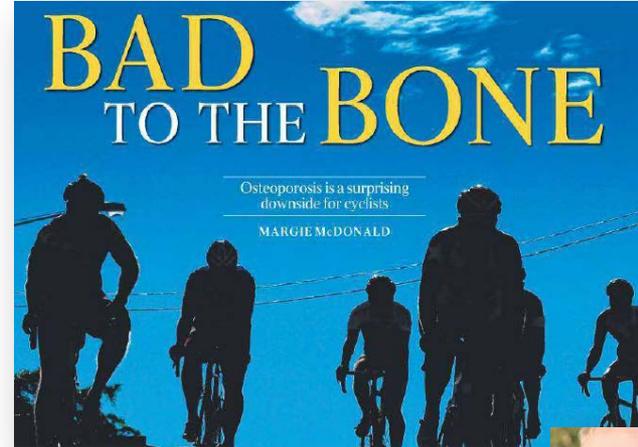
Pre-exercise calcium and non-weight bearing exercise

- Not all athletes have good bone mass despite the generally positive effect of bone loading exercise on bone health
- **Non-weight bearing exercise** may lack the bone building stimulus
- The onset of exercise may cause an increase in bone breakdown
 - Blood calcium levels drop
 - The body needs to defend calcium levels and releases hormones (PTH) which dissolve bone to support calcium stability
- What if eating calcium before training could provide an alternative source of “emergency calcium”?

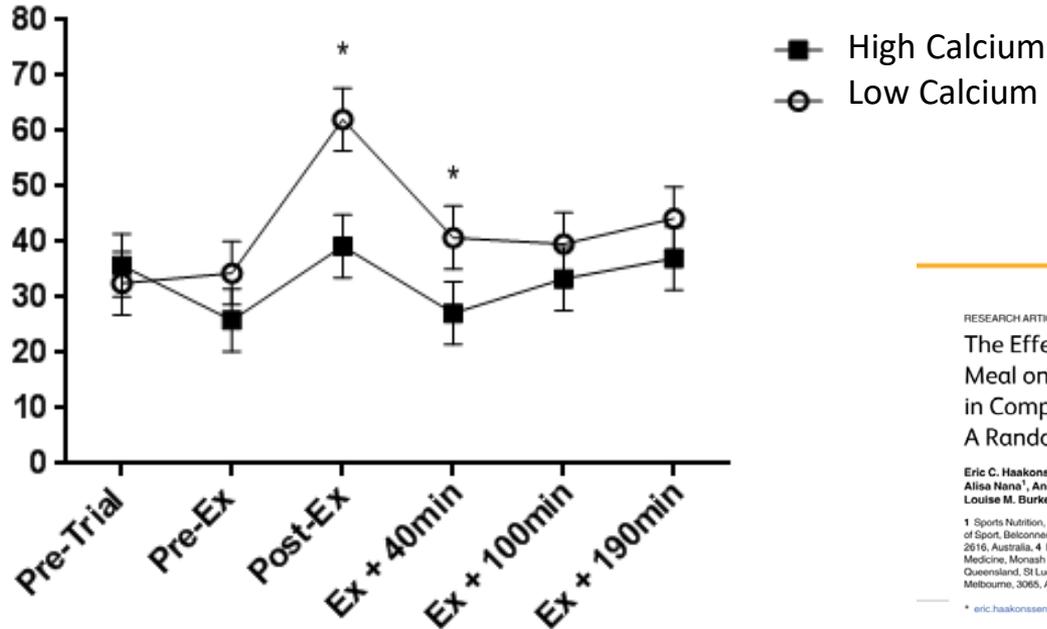


Dairy intake around exercise, calcium losses and calcium homeostasis

- Female cyclists (n = 32) participating in National Road series
- BMD, body composition, Vitamin D status
- Standardisation
 - Pre-trial diet and training
 - Menstrual phase
 - Time of day of trial
- 2 trials of 90 min cycling
 - 80 min steady state + 10 min TT
- Meal 2 hours pre-ride (matched for energy and carbohydrate (2 g/kg))
 - High calcium: 1350 \pm 53 mg
Oats + Milk + serve of yoghurt
 - Low calcium: 46 \pm 7 mg
Oats + water + serve of fruit



Effect of high dairy pre-event meal on parathyroid hormone



RESEARCH ARTICLE

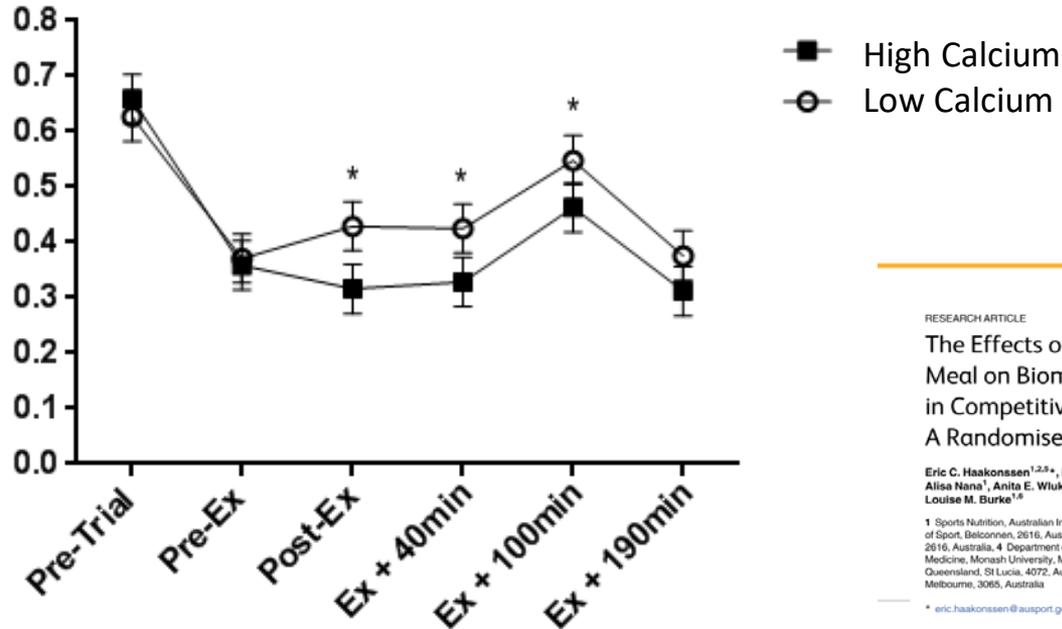
The Effects of a Calcium-Rich Pre-Exercise Meal on Biomarkers of Calcium Homeostasis in Competitive Female Cyclists: A Randomised Crossover Trial

Eric C. Haakonssen^{1,2,3*}, Megan L. Ross^{1,2}, Emma J. Knight¹, Louise E. Cato¹, Alise Nana¹, Anita E. Wluka⁴, Flavia M. Cicuttini⁴, Bing H. Wang⁴, David G. Jenkins⁵, Louise M. Burke^{1,6}

¹ Sports Nutrition, Australian Institute of Sport, Belconnen, 2616, Australia, ² Physiology, Australian Institute of Sport, Belconnen, 2616, Australia, ³ Performance Research, Australian Institute of Sport, Belconnen, 2616, Australia, ⁴ Department of Epidemiology & Preventive Medicine, School of Public Health & Preventive Medicine, Monash University, Melbourne, 3004, Australia, ⁵ Human Movement Studies, University of Queensland, St Lucia, 4072, Australia, ⁶ School of Exercise Science, Australian Catholic University, Melbourne, 3065, Australia

* eric.haakonssen@ausport.gov.au

Effect of high dairy pre-event meal on CTX (bone breakdown)



RESEARCH ARTICLE

The Effects of a Calcium-Rich Pre-Exercise Meal on Biomarkers of Calcium Homeostasis in Competitive Female Cyclists: A Randomised Crossover Trial

Eric C. Haakonssen^{1,2,5*}, Megan L. Ross^{1,2}, Emma J. Knight¹, Louise E. Cato¹, Alise Nana¹, Anita E. Wiuka¹, Flavia M. Cicuttini⁴, Bing H. Wang⁴, David G. Jenkins⁵, Louise M. Burke^{1,6}

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* eric.haakonssen@ausport.gov.au

Practical recommendations from study of pre-exercise dairy intake

- Pre-ride calcium intake guidelines set for elite Australian cyclists and cycling teams
 - 1000 mg calcium from dairy and/or supplement
- Sub-elite and recreational cyclists could eat pre-ride meal featuring dairy foods and choose dairy drinks during Café rides

The **EDGE** on eating 

Calcium, cycling, dairy and bones 

What's it all about? 

- → Generally, exercise is promoted as being good for bone health since loading the bone provides a stimulus for bone formation 
- → Cyclists, however, are considered at risk for low bone density. A number of studies have shown that cyclists lose bone mineral density (BMD) faster than the average 

(Preventable) Risk factors for low bone density in cycling 

- → **Low energy availability** (consuming a diet that is too low in calories/kilojoules to meet the energy cost of cycling as well as healthy body 



Calcium and repeated non weight bearing exercise.....watch this space!

- Study in progress (Lundy et al. in preparation)
- Repeated bouts of rowing training (4 h apart)
- Dairy intake providing 1000 mg of calcium 2 hours prior to each session
- Effects on serum iron, markers of bone breakdown



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Peak **P**erformance!

Podium **P**lacings!

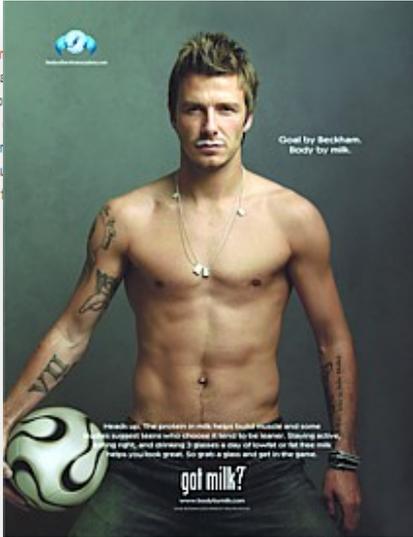
Personal **P**ride!

Chocolate Milk the Best Post Workout Recovery Drink?

NUTRITION/RECIPES | 8:27 AM BY MIKE | 11 COMMENTS

Surprising, right?

Usually, when we think of **chocolate milk** we think of it as a lunch line at school much to the dismay of those who don't like sweet moo-juice tossed into the gym bag as a post-workout drink. Research, however, tells us that chocolate milk is the best post-workout drink. Director of the Human Performance Laboratory at the University of North Carolina, Dr. Robert Steiger's latest study, published in January in the journal *Metabolism*, names chocolate milk as the best post-workout recovery drink.



Milk the moment.

"Milk gives me the protein I need for muscle repair and helps me maintain a lean body mass. It's my natural choice."
Jessica Rothwell, Elite athlete. Milk Drinker.



HOME SCIENCE BECOME ONE TEAM REFUEL

share:



WHEN YOUR WORKOUT'S DONE. YOUR BODY ISN'T. REFUEL, REPLENISH AND RECHARGE WITH CHOCOLATE MILK!

Pros like Chris Bosh and Apolo Ohno will tell you that the first two hours after a workout is when your body's real work begins, building and repairing muscles.

That's why they choose lowfat chocolate milk. Its protein and carbs refuel exhausted muscles, while fluids and electrolytes rehydrate and help replenish what's lost. Plus, it has the added bonus of other nutrients, like calcium and vitamin D to keep bones strong.

So make lowfat chocolate milk your sports recovery beverage of choice.

BACKED BY SCIENCE, TRUSTED BY ATHLETES.

Discover the science behind refueling with lowfat chocolate milk.