

Nutrition for Rock Climbing Performance and Health

Presented by:

Lanae Joubert



Abigail Larson



Sarah Weber



RD Observations

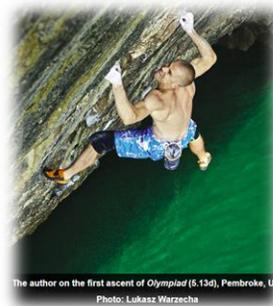


Social Media *data*



Other Media *data*

ROCK THE CLIMBER'S
MAGAZINE
AND ICE



“EAT FAT, CLIMB HARDER...switching to a ketogenic diet...eliminate foods that have been staples our entire lives...”

N. Gresham. Eat Fat, Climb Harder! The Ketogenic Diet.
In Rock and Ice Magazine (Feb 2016)

http://www.rockandice.com/rock-climbing-training/eat-fat-climb-harder-the-ketogenic-diet?utm_source=Email_marketing&utm_campaign=Monday_February_8_2016&cmp=1&utm_medium=HTML>Email

Nutrition Education is Warranted

“...nearly half failed to meet [dietary] recommendations for top level sports activities”

Zapf, J., et al. "Macronutrient intake and eating habits in elite rock climbers." *Med Sci Sports & Exer* 33.5 (2001): S72

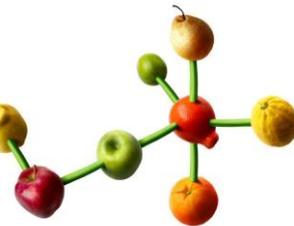
“...high-level climbing should include components for developing ATP-PC and anaerobic glycolysis system power and capacity...”

Watts, P (2004) *Eur J Appl Physiol.* 91(4):361-72

“Climbers should be educated in the importance of an appropriate diet and timing of this intake on health and performance”

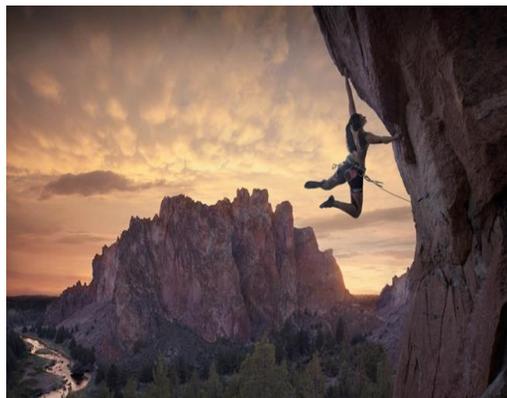
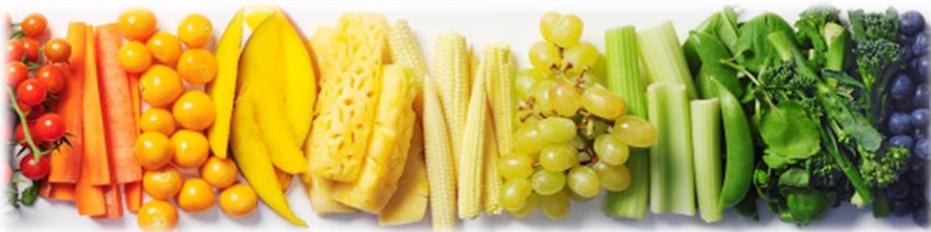
Morrison & Schöffl (2007). Physiological responses to rock climbing in young climbers *Br J Sports Med* 41: 852-861.

The average climber...



Presentation Agenda

1. **Abby:** nutrition-related mechanisms of fatigue; nutrition to prevent fatigue *during* climbing
2. **Lanae:** Nutrition for recovery *after* climbing
3. **Sarah:** Nutrition for multi-pitch climbing



Climb!

Nutrition and hydration strategies to delay fatigue

Abigail Larson PhD, RD, CSSD, CSCS
2006 US Olympic Athlete

Outline



- Physiological and anthropometrical demands of climbing
- Nutrition needs of climbers
- Nutrition-related *in-situ* fatigue scenarios & mechanisms
- Recommendations to optimize training & delay fatigue
- Future research needs



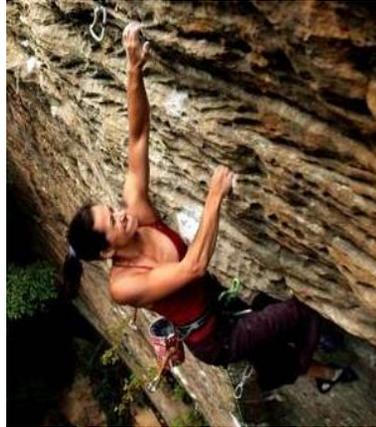
What are the Nutritional Needs of Climbers?

- Not much is known! What do these guys eat??
- Guesstimates based on research from other activities
- **Unique anthropometric requirements for high-level climbing must be considered**



Physical Profile of Elite Climbers

- Excellent strength to body weight ratio
- Small in stature and very lean
 - Body weight: Women <55 kg and Men <70 kg
 - Body fat: Women <10% and Men <7%



Bottom line: Climbers do not want to gain weight but need to meet nutrition demands to support training

Watts, Phillip B., David T. Martin, and Shirley Durtschi. "Anthropometric profiles of elite male and female competitive sport rock climbers." Journal of sports sciences 11.2 (1993): 113-117.

Important Nutritional Goals

- Improve strength to mass ratios
- Prevent injury
- Optimize recovery b/t sessions
- **Optimize daily training sessions**



PALEO



Energy Demands of Climbing

Long duration sport climbing sessions

- 4+ hours off an on intense physical and mental effort
- EE associated with hiking & carrying heavy loads & time on belay??

4 hour session may utilize ~ 1200 kcal (similar to running a ½ marathon)

< 60 min. session at the climbing wall ~ 200 kcal



Nutrition practices often do not meet E demands or support optimal training

Disclaimer!! The following scenarios are NOT based on my friends and are completely fictitious...



Nutrition and Hydration Scenarios

Scenario 1 "Morning Climber"

- Wake up – drink coffee, take vitamins
- 1 mile hike with gear
- Forgot water, must mooch from partner (1 L for two people & 4 hours of climbing)
- No food packed except expired protein bar from 2004

End result: Climber can't complete intended climb

"Bags" it early b/c of thirst, mental & physical fatigue



Nutrition and Hydration Scenarios

Scenario 2 "Evening Climber"



- Climber works until 5 then drives to a nearby crag
- Hasn't eaten anything since a lunchtime protein bar & latte
- Snacks on Paleo-friendly almonds
- Doesn't consume much water because "it will add extra climbing weight"
- **End result:** Climber gets an upset stomach from almond overload

Is there a bathroom around here?

Climber ends the session early



Consequences of Inadequate Fuel & Fluids

Start the climb well but fatigue before the anchors

Decreased anaerobic capacity d/t localized glycogen depletion

Early loss of motivation, focus, mental acuity

Decreasing blood glucose and/or BCAA concentrations, dehydration

Difficulty recovering between attempts

Glycogen depletion, dehydration

GI Upset

Dehydration, food choices, FEAR

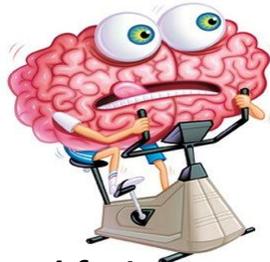
Early cessation of training sessions

All the above?!

Ament W and Verkerke GJ. Exercise and Fatigue. Sports Med. 2009;39(5):389-422.



Its All in Your Head?!



Perceived exertion and perceived fatigue have centrally mediated influences

- ***Adequate fluids, CHO, & BCAAs may attenuate these perceptions & have ergogenic potential***

Armstrong LE, J Nutr. 2012 ; Beaven CM, Appl Physiol Nutr Metab 2013; Cermak NM, van Loon LJ. Sports Med. 2013; D'anci K, Percept Mot Skills 2009; Ely BR, Eur J Appl Physiol. 2013

Optimizing Daily Training Sessions via Nutrition and Hydration Practices

Long session performance is supported with:

- Fluid replacement
- Source of CHO
- Source of amino acids
- Foods and fluids that do not cause GI distress
- Long-term, will not lead to increases in weight or body fat
 - ***Current research presents unrealistic recommendations for quantity of CHO and fluids for a climbing population***

Climbers don't need similar quantities of fluids or CHO as endurance athletes



30 g of CHO & 500 ml



VS



90 g of CHO & 1200 ml

American College of Sports Medicine, Sawka MN, Burke LM, Eichner ER, et al. American College of Sports Medicine position stand. Exercise and fluid replacement. Med Sci Sports Exerc. 2007;39(2):377-390.

Recommendations based on general evidence

Avoid hypohydration, decreases in blood glucose, & centrally-mediated perceptions of fatigue

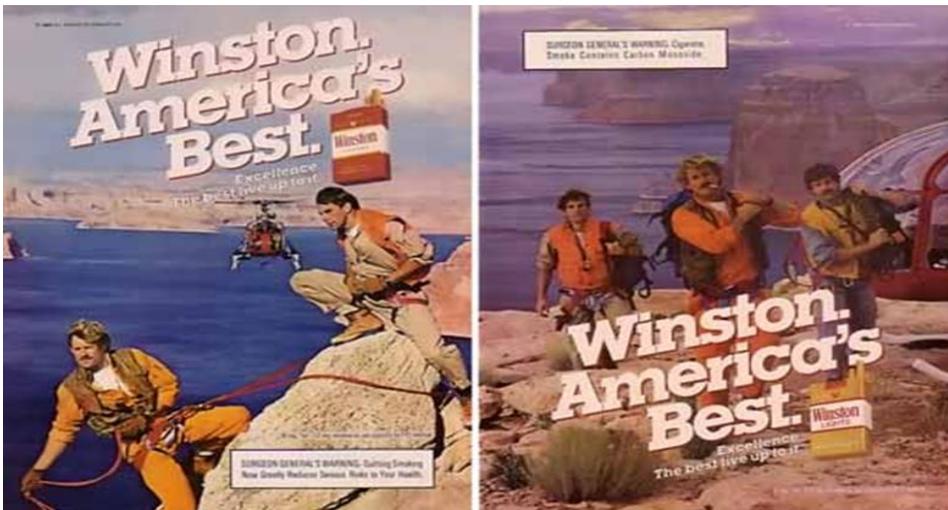
- **~ 250 ml water and ~ 250 ml sports drink each hour of training**
- **10 grams of complete protein <2 hours prior to and every 2 hours of training?**
 - **Some evidence to support decreases in plasma BCAA associated with increased perceptions of fatigue**



American College of Sports Medicine, Sawka MN, Burke LM, Eichner ER, et al. American College of Sports Medicine position stand. Exercise and fluid replacement. Med Sci Sports Exerc. 2007;39(2):377-390.

Recommendations based on general evidence

(January 11, 1964, Luther L. Terry, M.D., Surgeon General of the U.S. Public Health Service)



Probably don't smoke.....

Recovery Nutrition Recommendations for Climbers

Proper *recovery* nutrition aims to:



1. Replace Fluid Loss
2. Replenish Glycogen Stores
3. Protect Muscle Protein Synthesis
4. Minimizing Inflammation
5. Reduce Muscle Soreness
6. Maintain Health

Thomas et al. (2016) Position of the Academy of Nutrition and Dietetics, Dietitians of Canada, and the American College of Sports Medicine: Nutrition and Athletic Performance. *Journal of the Academy of Nutrition and Dietetics*. 116(3): 501– 528.

1. Recovery Fluid Replacement



- Individual Sweat Rate
- ~ 600 mL within 2-4 hrs prior to next session
 - Achieve pale yellow urine
 - Void before next session
 - Water or sports beverage
- If severe dehydration then 1200 mL/kg BW lost
 - Sodium chloride
 - Aids in fluid retention
- Alcohol is discouraged

Sawka et al. (2009); Shireffs & Sawka (2011)

2. Replenish Carbohydrate Stores

- Mix of quality macronutrients
- Glycogen resynthesis ~5%/hr
- ~30-60g of carbs??
 - Start early
 - Personal preferences
 - Trifecta with liquid foods
 - Absorption efficiency
 - Hydration needs
 - GI tolerance



Burke et al. (2011); Haff et al. (1999)

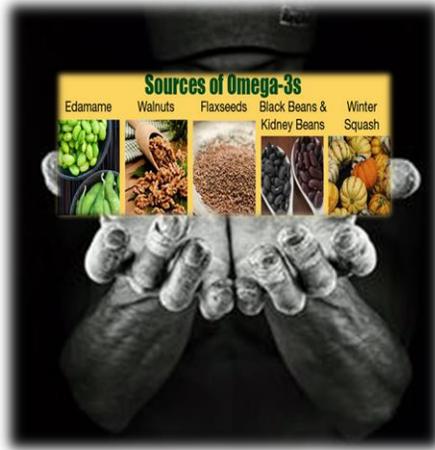
3. Protect Muscle Protein Synthesis



- Adequate energy + protein
 - Preserves muscle tissue
 - Protects soft tissues
- ~20 grams of protein
 - ~10 g EAAs promotes MPS
 - Leucine is key (mTOR)
- Pros/Cons of protein food vs. supplement

Beelen et al. (2008); Hoffman et al. (2010); Breen & Phillips (2012)

4. Minimize Inflammation & 5. Reduce Muscle Soreness



- Eating fat is important
 - Adequate EFAs
 - ~3 g/d Ω_3 may be adequate
- Micronutrients maintain metabolic efficiency & support immune system
 - Iron, Zinc
 - Vitamins A, B, C, E, D

Mickleborough (2013); Juris et al. (2001); Gleeson (2006)

Recovery Nutrition Recommendations for Climbers

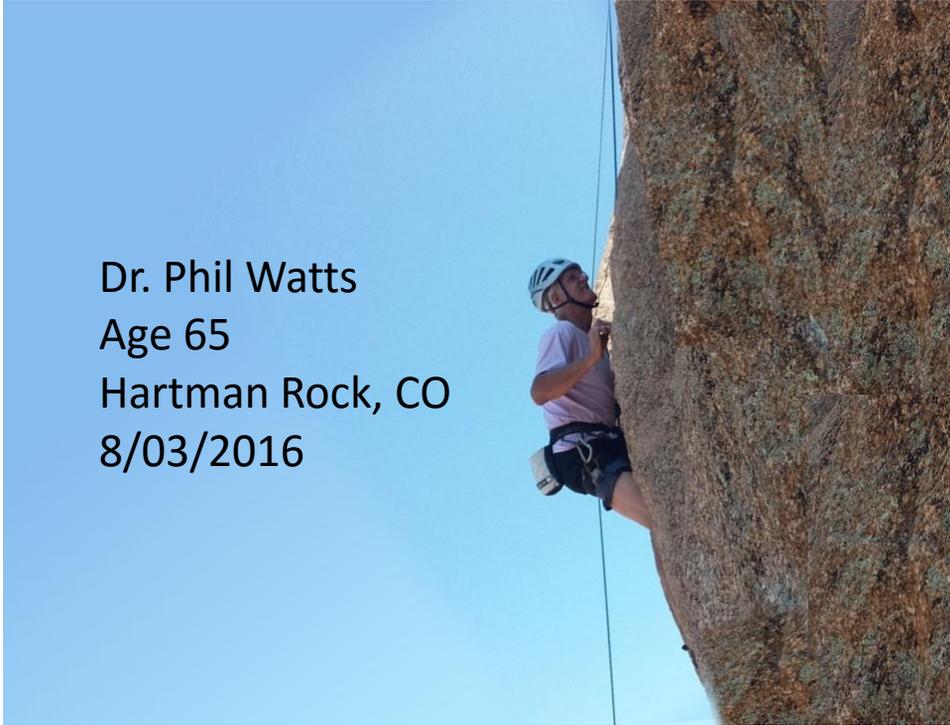
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Photo by: Cindy Noble

Dr. Phil Watts
Age 65
Hartman Rock, CO
8/03/2016



Anything
missing
from
this *recovery*
table?

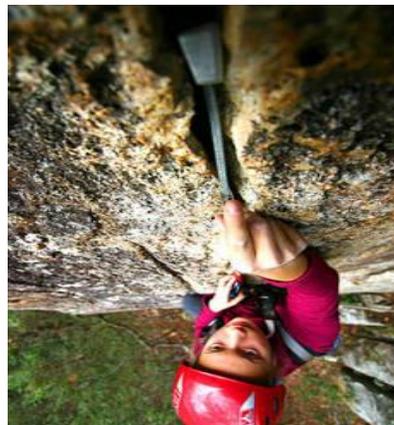


Multi Pitch Climbing: Practical Nutrition Applications



Considerations for Multi-pitch

- Length of the climb?
- Length of approach + descent
- Weather/temperature
- Weight of backpack
- Weight of food
- No refrigeration and minimal cookware if any



Where's the kitchen???



Total Weight of the Climber

Weight of Food & Fluids vs. Performance

What point does too little packed food & fluid DECREASE ability to climb?

- Hypohydration
- GI Upset
- Reduced alertness and motor skill responsiveness
- Mental & Physical Fatigue
- HANGRY

¹Compton 2001 Analytic Cycling model for analysis
(http://analyticcycling.com/ForcesSpeed_Page.html)

A Typical Pack Contains: Gear

Large rack and rope



Clothes and bivvy sack



Total Weight of Gear = 4.5-9kg (10-20 pounds)
Large rack alone can weigh ~ 5.5kg (11 pounds)

Ideal Nutrition to Meet Needs



**Total Weight =
4.5+ kg
(10+ pounds)
+ 4 L H₂)**

Not Possible!

*The dilemma
stands...
Food vs. weight*

Hydration



Fluid loss per hour: ~0.5-2.0 L

Sawka 2007 ACSM Position Stand: Exercise and Fluid Replacement

Recommended fluid intake during an all day climb:

~ 250 mL water/hour

~ 250 mL sports drink/hour

**Average Weight: ~ 1.4-1.8kg (3-4 pounds)
over a 6-7 hour climb**



Practicality:

~1 liter for 7-10 multi-pitch climb over 3 hours

Weight = 0.9kg (2 pounds)

= ~300 mL/hour



Water Containing Foods?

Multi Pitch Nutritional Recommendations

<i>Needs per Day</i>	Males	Females	60kg Climber
Total Energy Kcals/kg FFM	~ 40-45	~ 40-45	2,400 Kcals- 2,700 Kcals
Carbohydrate Multipitch Climb g/kg	5-10	5-9	300g – 600g
Protein g/kg	1.2-1.6	1.2-1.6	72g – 96g
Fat % total Kcals	~20-35%	~20-35%	~60g

Example Menu to Meet Needs

Breakfast



Dinner



Lunch



Snacks

- Hard candy
- Beef or turkey jerky
- Energy bars & granola bars

Total Weight: ~0.5kg (18 oz or 1.1 pounds)

Presentation/Discussion Summary

- Nutrition-related mechanisms of fatigue
- Optimal nutrition to prevent fatigue *during* climbing
- Nutrition for optimizing recovery *after* climbing
- Nutrition for endurance climbing



Open Invite for Audience Discussion

1. Which nutrition concerns or problems exist in the rock climbing community?
2. What future research will explore these concerns/ problems?
3. How might we best collaborate to help solve these concerns/ problems?



Bright Ideas for Future Research?

