


NUTRITION AND ENERGY BALANCE

February 17th 2015 | Sandra Dorman PhD & Ayden Robertson MHK

FOOD AT WORK


- Work, is the #2 place where people spend most of their time (#1 home)
- Workplace factors affect nutrition and food behaviour
- Proper nutrition is essential for safe and effective workers



wiseGEEK
CROSH CRSST



FOOD AT WORK

- Rationale for Workplaces and Workers
 - Increased productivity
 - Fewer infectious disease
 - Fewer chronic and disabling diseases
 - Health promotion = cost saving
 - Improved mental health



FOOD AT WORK

- Fatigue is nebulous...
- Causes of fatigue...
- Include food/nutrition
- Food / Fatigue/ Research
 - FireRangers

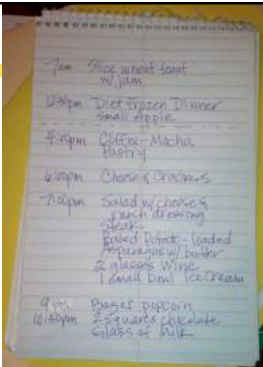
Ayden Robertson

- Food Research Amongst FireRangers





FOOD DIARY

- Self-report and recall methods
- Photography/Audio-video
- Field research example – FireRanger study




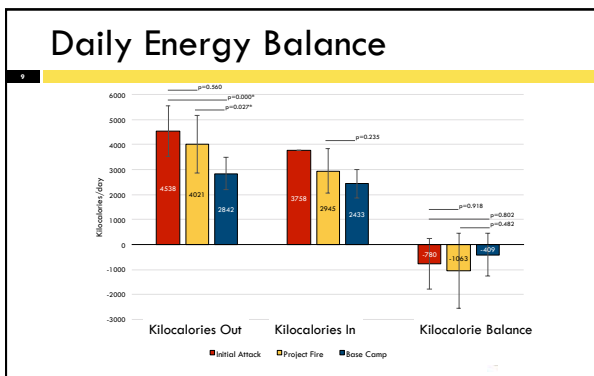
7 Audio-Visual Food Journal

- iPod Touch's: audio-visual food journal
 - Adapted from photographic method (Dorman, 2013; Gauthier 2013)
- Researchers photographed meals
- Data analysis indicates **energy intake (kilocalories) and nutritional quality (micro/macro-nutrients)**



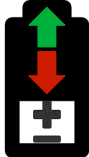

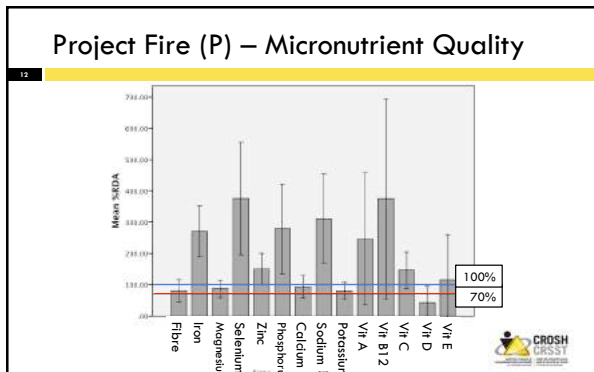
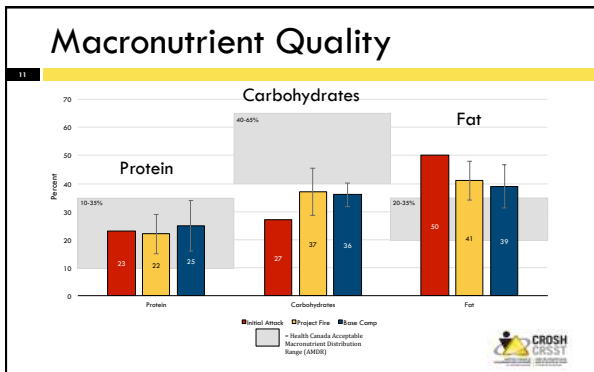
4 Heart Rate Variability (HRV)

- HRV-based estimates of **energy expenditure** (kilocalories) validated against indirect calorimetry (gold standard)
 - FirstBeat Technologies, 2008; Montgomery, et al., 2009; Robertson, et al., 2015
- Compared with energy intake data to indicate daily **energy balance**


10 Fatigue – Energy Balance

- Previously observed in wildland firefighters (Montain, 2008; Ruby, 2002; Hell, 2002)
- Acute effects
 - Decreased energy & alertness
 - Decreased strength & performance
- Chronic effects
 - Weight loss & muscle wasting
 - Impaired endocrine & immune function







Fatigue – Nutritional Practices

- Low carbohydrate consumption
 - Essential metabolic fuel for high intensity activity
Below, 1995; Carter, 2004; Jeukendrup, 2004; van Loon, 2001
 - Recommended that athletes consume 6-10g/kg
ACSM
 - Essential nutrient for recovery
Berardi, 2006; Ivy, 2014; Lane, 2010





vs.

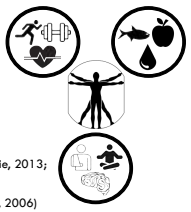

Fatigue – Nutritional Practices

- High fat consumption
 - Acute performance reduction
Jakulj, 2007; Vogel, 1997; Hozumi, 2002
 - Chronic cardiovascular issues
Institute of Medicine
- High sodium & low potassium
 - High blood pressure
Aaron, 2013
 - Dehydration
- Low fiber, High iron, High phosphorus

Fatigue - Recommendations

- Meal composition & snacking strategies
 - Structuring of meals before, & after shifts
 - Structuring of shift “snacks”
 - Sufficient energy content
 - Optimum nutritional profile
- Supplemental nutrition
 - Caffeine
(McClung, 2011)
 - Beet Juice – dietary nitrates
(Lansley, 2011; Wylie, 2013; Vanhatalo, 2010)
 - BCAA's
(Blomstrand, 2006; Monirujjaman, 2014 Shimomura, 2006)

Snacking & Performance

Cuddy JS, Gaskill SE, Sharkey BJ, Harger SG, & Ruby BC. Supplemental feedings increase self-selected work output during wildfire suppression. *Medicine & Science in Sports & Exercise.* 2007;39(6):1004-1012.

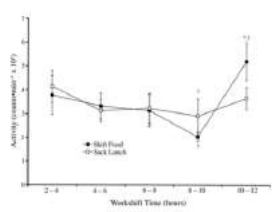



FIGURE 6—Mean counts per minute for the shift food and sack lunch trials using the Actical monitors. * $P < 0.05$ between shift food and sack lunch; † $P < 0.05$ vs hours 2-4.



Snacking & Performance

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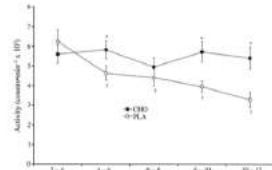



FIGURE 4—Mean counts per minute for the liquid CHO = solid CHO vs PLA trials using the Actical monitors. * $P < 0.05$ between CHO and PLA; † $P < 0.05$ vs hours 2-4 for PLA.



Snacking & Performance

Moritan SI, Baker-Fulco CJ, Niro PJ, Reinert AR, Cuddy JS, Ruby BC. Efficacy of eat-on-move ration for sustaining physical activity, reaction time, and mood. *Medicine & Science in Sports & Exercise.* 2008 Nov;40(11):1970-6.

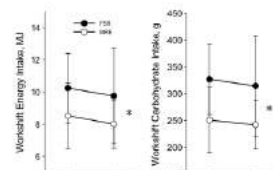



FIGURE 3—Work shift energy (left) and carbohydrate (right) intake when consuming FSR or NRE. Data are mean ± SD for 28 subjects. * Main effect of diet, $P < 0.05$.



Snacking & Performance

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Montain SJ, Baker-Fulco CJ, Niro PJ, Reibert AR, Cuddy JS, Ruby BC. Efficacy of eat-on-move ration for sustaining physical activity, reaction time, and mood. *Medicine & Science in Sports & Exercise*. 2008 Nov;40(11):1970-6.

FIGURE 4—Work shift activity counts when consuming ESR and MRE. Work shift has been subdivided into eight periods to illustrate the interactive of diet and time on activity level. Data are mean \pm SD for 21 subjects. *Main effect of diet, $P < 0.05$.

E.g. Ideal FireRanger Daily Food Intake

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Meal	Calories (kcal)
Breakfast	959
AM Snack	717
Lunch	502
PM Snack	717
Dinner	799
Bed Snack	211
TOTAL	3905

E.g. Ideal FireRanger Daily Food Intake

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Sandra Dorman

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Fatigue Mitigation at Work through Diet

FOOD AT WORK

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- Acute Fatigue
 - Energy Imbalance
- Chronic Fatigue
 - Linked to Obesity and Inflammation

Acute Fatigue – Under-eating

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- Negative Energy Balance
- Can cause over-eating at home (linked to Obesity/ Inflammation)
- Eating snacks can reduce the number of Calories you consume in your next meal (& in total)

Akhavan AJCN 2010

Whey protein preload*	Energy intake (kcal)	
	Test meal	Cumulative
Control (water)	1142 ^a	1142
10 g	1064 ^b	1115
20 g	989 ^b	1091
30 g	983 ^b	1136
40 g	837 ^c	1041

Practical Tip #1

- Snack on Yogurt
 - High protein
 - Satiety
 - High Calcium
 - Satiety
 - Fat burning
 - Vitamin D
 - Mood

Acute Fatigue – Sugar

Adapted from: biohackme.net/blood-sugar-insulin-ketosis/



Acute Fatigue – Over-eating

- Positive Energy Balance – post-meal sleepiness
- Linked with Obesity and Inflammation
- Both - related to key foods
- Food Culture at Work






Practical Tip #2

- Don't add sugar to your coffee
- Don't drink high sugar beverages (pop, juice, energy drinks, sports drinks etc.)
- Avoid sweets (donuts, cakes etc.)
- Discuss food culture in the office



Acute Fatigue - Water

- Water consumption
- Mild dehydration is common
- Dehydration can slow brain function
- Thirst drive declines with age (>55y)

Practical Tip #3



- Sip water throughout the day
- Keep a water bottle in your work space

Nutrient Rich Foods



Plants!

- Complex carbohydrates
- Phytochemicals
- Disease prevention!
- Workplace exposure protection!

Practical Tip #5

- Minimum Goal of FIVE plants a day
- Ask yourself 'what 2 vegetables will you eat with dinner?'

Prevention - DOs

- Eat Plants with every meal
- Eat nuts and oils with each meal
- Include dairy every day
- Take a Vitamin D supplement
- Sip water throughout the day
- Eat Fish twice a week




Prevention - DON'Ts

- Deep fried foods
- Cakes/cookies/donuts
- Pop, energy drinks
- Sugar in coffee
- Smoking






Acknowledgements

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Questions?

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