Article 1 - Effect of nutritional intervention on body composition and performance in elite athletes (Garthe et al., 2013)

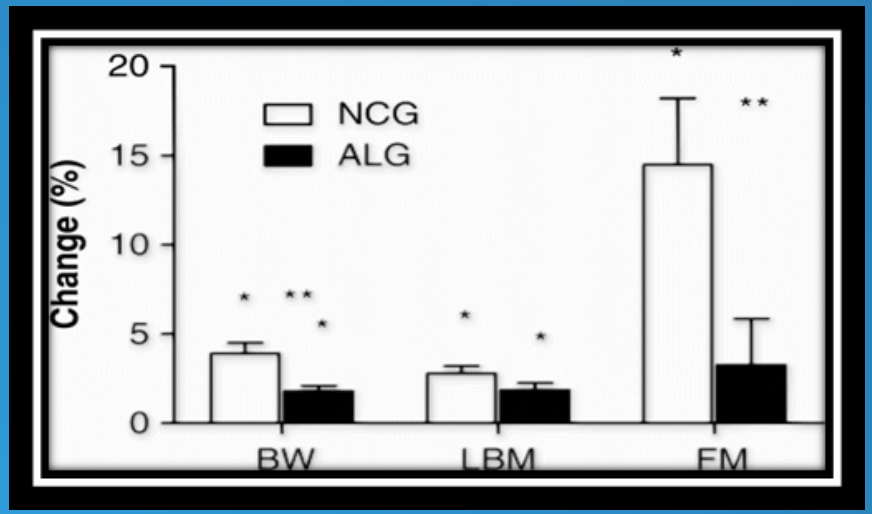
Purpose:

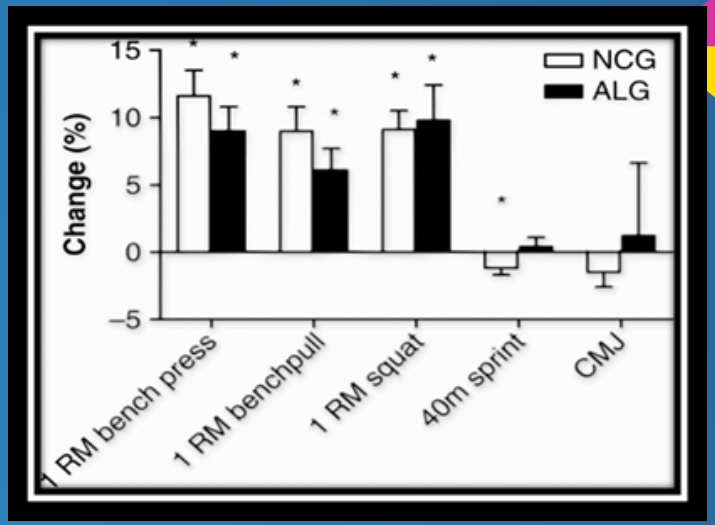
Compare the effects of nutritional interventions on body compositions and athletes performances

Methods:

39 elite athletes were randomly selected in “ nutritional counseling group” (NCG) or “ ad libitum group” (ALG), time duration was 8-12 weeks,Body composition and performance variables were measured

Results


Change (%)
20
15
10
5
0
NCG
ALG
BW
LBM
FM


Change (%)
15
10
5
0
−5
NCG
ALG
1 RM bench press
1 RM benchpull
1 RM squat
40m sprint
CMJ

Discussion and Limitation

Discussion:

The weight gain in NCG was higher than ALG, The weight gain however, it was attributed to increased fat mass rather than muscle mass.

Limitation:

The small sample size, the time procedure was really short, more research should be done

Conclusion

In conclusion, the experienced athletes in strength training may have lower capacity for increasing LMB than inexperienced ones and this is a critical point in designing a diet plan, so each individual need specific amount of energy regarding his/her condition

Article 2 - Effects of combined creatine plus fenugreek extract vs. creatine plus carbohydrate supplementation on resistance training adaptations (Taylor et al., 2011)

- Purpose:
  Investigate the effects of creatine supplemented with fenugreek extract (supplement gaining popularity for other reasons) as an alternate means of increasing cellular uptake of creatine.

- Methods:
  Participants - 47 resistance trained men
  Control - placebo; creatine (5g) and dextrose (70g)
  Experimental - creatine (3.5g) and fenugreek (900mg)
  Treatment - 4 days/week resistance training for 8 weeks
  Analysis - DEXA, 1RM tests, Wingate Anaerobic Capacity test

Table 2.

Body composition assessments at week 0 (T1) and after week 4 (T2) and week 8 (T3).V means (± SD).

Variable	PL	CRD	CRF
Weight T1 (kg)	88.7 (12.1)	89.7 (12.4)	85.2 (11.2)
Weight T2 (kg)	88.7 (12.1	90.6 (10.9)	86.3 (11.5)*
Weight T3 (kg)	89.2 (11.3	90.6 (11.3)	86.3 (10.6)
Fat Mass T1 (kg)	13.3 (5.6)	15.2 (5.6)	12.4 (7.1)
Fat Mass T2 (kg)	13.5 (6.0)	13.4 (6.0)	14.4 (10.5)
Fat Mass T3 (kg)	13.0 (5.4)	14.5 (5.3)	11.9 (6.1)
Lean Mass T1 (kg)	65.7 (8.8)	64.7 (8.8)	64.4 (6.8)
Lean Mass T2 (kg)	65.9 (8.9)	66.0 (7.9)	66.0 (7.9)*
Lean Mass T3 (kg)	66.2 (8.3)	66.6 (8.2)*	66.1 (6.9)*
Body Fat % T1	16.0 (5.7)	18.2 (5.4)	15.2 (6.4)

Table 3.

Performance assessments at week 0 (T1) and after week 4 (T2) and week 8 (T3). Values (±SD).

Variable	PL	CRD	CRF
BP 1RM T1 (kg)	114.6 (31.4)	108.6 (30.4)	121.8 (18.5)
BP 1RM T2 (kg)	117.0 (30.9)	115.1 (29.6) *	127.0 (20.5) *
BP 1RM T3 (kg)	118.2 (30.5) *	118.0 (30.0) *	128.7 (20.8) *†
BP 80% reps T1	8.4 (2.2)	7.9 (1.9)	8.1 (1.7)
BP 80% reps T2	8.7 (1.9)	8.2 (2.2)	7.5 (1.4)
BP 80% reps T3	8.1 (1.7)	7.2 (1.7)	8.1 (1.5)
LP 1RM T1 (kg)	371.8 (82.9)	382.5 (86.6)	372.7 (67.4)
LP 1RM T2 (kg)	417.9 (98.5) *	423.8 (79.1) *	417.8 (77.3) *
LP 1RM T3 (kg)	446.4 (102.7) *†	454.0 (87.1) *†	434.4 (78.5) *†
LP 80% reps T1	15.1 (5.0)	11.5 (6.4)	13.5 (4.1)

What does the research say?

- Results:
  The treatment showed significant improvement in performance measures (strength and body composition)

- Conclusion/Applications:
  Fenugreek extract can be an acceptable substitute to large quantities, sometimes as high as 70g, of simple CHO (dextrose) for increasing cellular uptake of supplements

- Limitations/Implications/Further Research:
  What other insulin stimulators are available? other subjects? Females?

Middle Distances

Article 3 - Comparison of Energy Expenditure to Walk or Run a Mile in Adult Normal Weight and Overweight Men and Woman (Loftin et al., 2010)

- Purpose:

  Investigated the total energy expenditure of a mile by walking or running in normal or overweight participants

- Methods:

  Participants - 50 volunteers from Oxford, Mississippi community
  19 Normal Weight Walkers (11 men, 8 women)
  11 Overweight Walkers (2 men, 9 women)
  20 Marathon Runners (10 men, 10 women)
  Body Comp - DEXA scan, Metabolic Cart measure RER

Variable	Group	Mean	*SE*
Kilocalories			
	NWW	93.9[a]	3.4
	OW	98.4[a]	9.1
	MR	99.3[a]	2.4
Kcal·mile^{-1}kg·BW^{-1}			
	NWW	1.29[a]	0.02
	OW	1.16[b]	0.05
	MR	1.35[c]	0.04
Kcal·mile^{-1}kg·FFW^{-1}			
	NWW	1.72[a]	0.04
	OW	1.89[a]	0.10
	MR	1.89[a]	0.04
Preferred walking and marathon pace, mph			
	NWW	2.94[a]	0.08
	OW	2.97[a]	0.08
	MR	6.78[b]	1.22

*FFW = fat-free weight; MR = marathon runners; NWW = normal weight walkers; OW = overweight walkers.
†Different letters indicate $p < 0.05$.

Table 2. Energy Expenditure walking or running a mile in NWW, OW, and MR and physical activity recall.

Variable	Group	Gender	Mean	*SE*
Kcal				
	NWW	M	103.1	3.8
		F	81.1	1.9
	MR	M	106.9	2.4
		F	91.7	2.4*
Kcal·mile^{-1}kg·BW^{-1}				
	NWW	M	1.28	0.02
		F	1.31	0.04
	MR	M	1.48	0.03
		F	1.51	0.03
Kcal·mile^{-1}kg·FFW^{-1}				
	NWW	M	1.64	0.03
		F	1.82	0.06
	MR	M	1.91	0.11
		F	1.75	0.04

†F = female; FFW = fat-free weight; M = male; MR = marathon runners; NWW = normal weight walkers; OW = overweight walkers.
*$p < 0.05$ for gender difference.

Table 3. Energy Expenditure walking or running a mile by gender in the NWW and MR

Article 4 - Energy availability of female varsity volleyball players. (Woodruff et al., 2013)

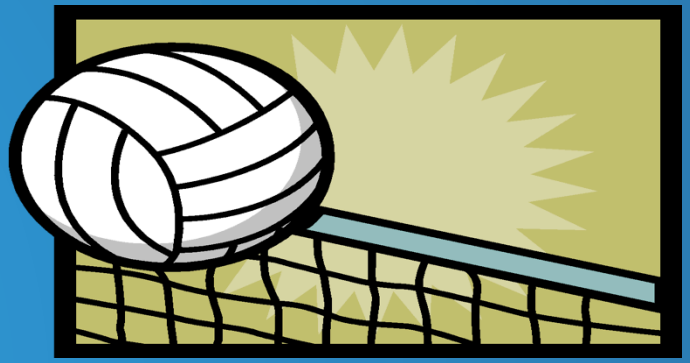
- Purpose:
  - Use current advancement of technologies for measuring total energy expenditures and exercise energy expenditures to determine the energy availability of female volleyball athletes for the first time .
    - Energy Availability is the amount of energy available for the body to perform all other functions after subtracting exercise training energy expenditures

- Study Subjects:

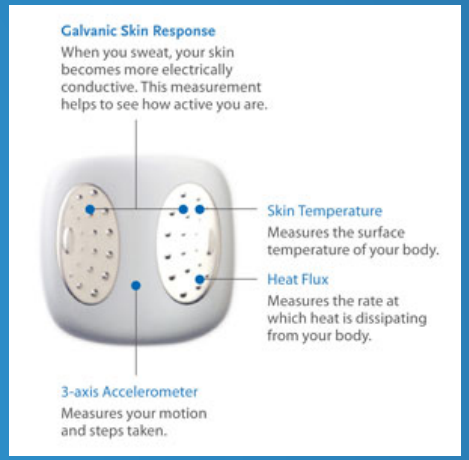
  10 medium sized participants from Canadian Interuniversity female volleyball team.

- Method:

  For seven days all the participants' energy intakes, total energy expenditures, body compositions, energy availabilities, and exercise energy expenditures were measured every day.



- Equipments used:
  - Energy Intake : Food Processor Nutrient analysis software
  - Body compositions : Bod Pod
  - Total energy expenditure and METs: Bodymedia Sensewear Mini armband
- Energy availability = (EIkcal – ExEEkcal)/kg fat-free mass (FFM)



- Result:
  - All ten participants have proper energy balance throughout the week of the study
  - Energy expenditure
    - During a game: 848 kcal
    - During practice: 511 kcal
    - Warm ups before a game: 402 kcal
  - Mean energy availability 42.5 kcal· kg FFM^–1 · day^ –1

- Limitations:
  - Errors in measuring energy intakes
  - Small sample sizes

- Conclusion:
  - Energy availability is critical to determine athletes' energy balance
  - It is important to identify any imbalanced energy status that can lead to serious health consequences
  - Energy availability above 30 kcal· kg FFM^–1 · day^ –1 may achieve optimal athletic performances when needed

~~Article 5~~ - PASSCLAIM: Process for the Assessment of Scientific Support for Claims on Foods (Saris et al., 2003)

ILSI Europe
International Life Sciences Institute

passclaim

"we will define endurance as resistance to fatigue during a mode of exercise where the primary cause of fatigue is induced by substrate depletion… typically endurance exercise is therefore 30 min or longer..."
(Saris et al., 2003)

Most important substrates for the contracting muscle:

1. Muscle glycogen
2. Blood glucose

(Jensen & Richter, 2012)

Muscle glycogen utilized as a function of:

1. Exercise intensity and duration (training)
2. Activity of the enzyme glycogen phosphorylase (genes, training)
3. Concentration of substrates: glycogen & inorganic phosphate (diet)

(Jensen & Richter, 2012)

Muscle glucose uptake is a function of:

- Permeability of the muscle membrane to glucose *(genes, training)*
  - Cell signaling mechanisms including insulin and stress hormones
  - GLUT4 mediated glucose transport and saturation point
- Delivery of glucose *(diet)*
  - Capillary diffusion
  - [Plasma glucose]

(Jensen & Richter, 2012)

What does the research say?

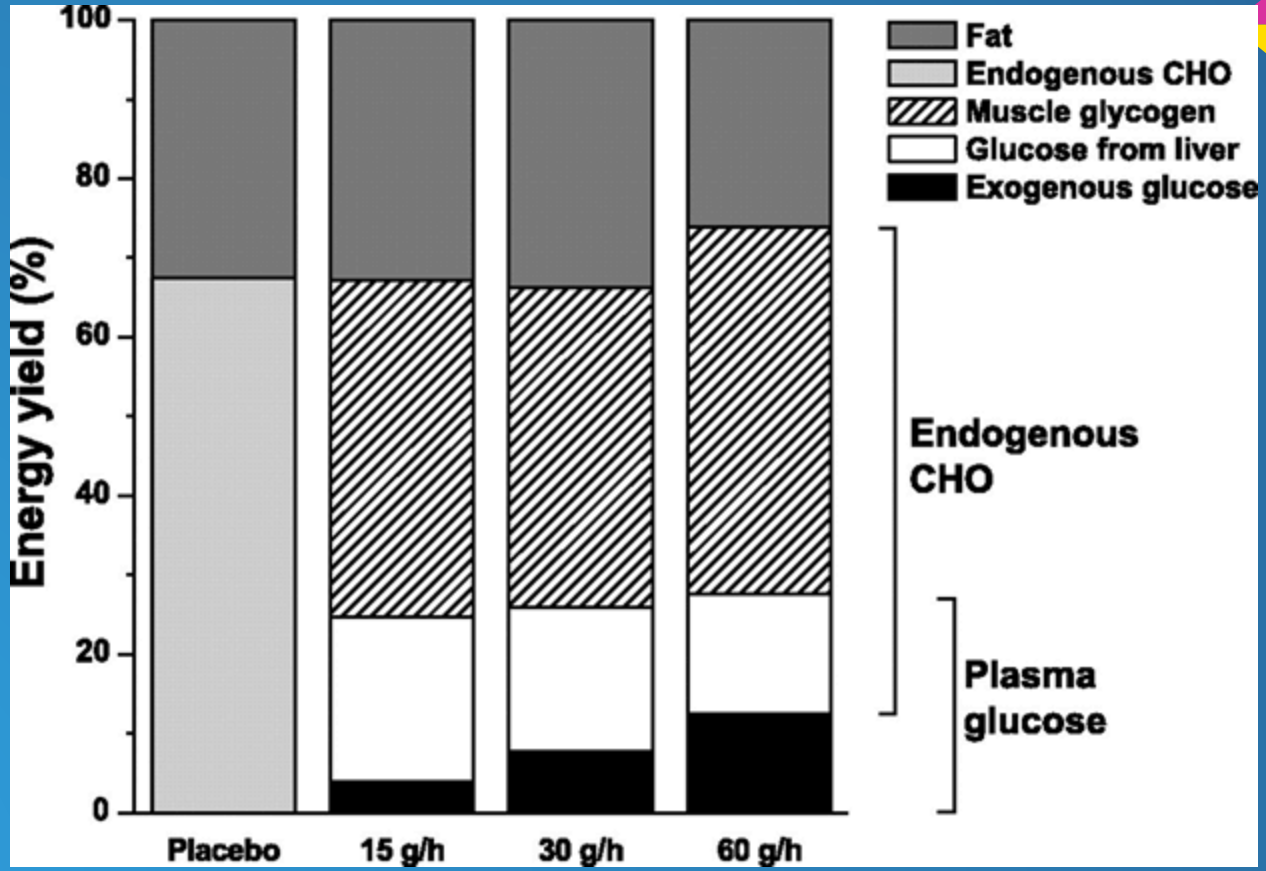
Fuel selection and cycling endurance performance with ingestion of [^{13}C]glucose: evidence for a carbohydrate dose response:

Purpose: to investigate the relationship among glucose ingestion, fuel selection, and performance in an endurance exercise

(Smith et al. 2010)

Methods

- Twelve trained, recreational male cyclists or triathletes
- Placebo vs. 15, 30, and 60 g/h glucose
- 2 hour constant load ride followed by 20-km time trial
- Used [^{13}C]glucose and tracer techniques to determine sources of glucose utilized:
    - muscle
    - liver
    - exogenous (i.e., the Gatorade)


Energy yield (%)
100
80
60
40
20
0
Placebo
15 g/h
30 g/h
60 g/h
Fat
Endogenous CHO
Muscle glycogen
Glucose from liver
Exogenous glucose
Endogenous CHO
Plasma glucose

Results

Sample size too small for enough statistical confidence (n=12)

Mean time and power to complete 20 km trial after 2 hours of cycling:

Placebo:	36.4 minutes at 210 Watts
15 g/h	35.2 minutes at 225 Watts
30 g/h	35.0 minutes at 227 Watts
60 g/h	34.7 minutes at 232 Watts

Controversies…

- Female Athletic Triad
- Supplementation
  - Creatine
  - Protein
  - John Ivy's Exercise Drink (Nutrient Timing)
- Diets
  - Ketogenic Diet
  - Paleo
  - Atkins
- Timing Goals
  - Pre Exercise - sparing, glycemic impact/index
  - Concurrent - sparing, hormone balance
  - Post Exercise - nutrient sensitivity, anabolic state

References

- Ackerman, K., Pierce, L., Guereca, G., Slattery, M., Lee, H., Goldstein, M., & Misra, M. (2013). Hip structural analysis in adolescent and young adult oligoamenorrheic and eumenorrheic athletes and nonathletes. *The Journal of Clinical Endocrinology and Metabolism, 98*(4), 1742-1749. Retrieved from http://press.endocrine.org/doi/full/10.1210/jc.2013-1006
- Ackerman, K., Skrinar, G., Medvedova, E., Madhusmita, M. & Miller, K. (2012). Estradiol levels predict bone mineral density in male collegiate athletes: a pilot study. *Clinical Endocrinology, 76*(3), 339-345. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3274603
- Baker, L., Heaton, L., Nuccio, R., & Stein, K. (2014). Dietitian-observed macronutrient intakes of young skill and team-sport athletes: Adequacy of pre, during, and postexercise nutrition. *International Journal of Sport Nutrition and Exercise Metabolism*, *24*(2), 166-176
- Barber, J. , McDermott, A. , McGaughey, K. , Olmstead, J. , & Hagobian, T. (2013). Effects of combined creatine and sodium bicarbonate supplementation on repeated sprint performance in trained men. *Journal of Strength and Conditioning Research*, *27*(1), 252-258
- Brooks, G. A., Fahey, T. D., & White, T. P. (2005). Exercise physiology: Human bioenergetics and its applications. *Mayfield publishing company*. 4th Edition.
- Cooper, R. , Naclerio, F. , Allgrove, J. , & Jimenez, A. (2012). Creatine supplementation with specific view to exercise/sports performance: An update. *Journal of the International Society of Sports Nutrition*, *9*(1), 33
- Garthe, I., Rasstad, T.,Refsnes, P., Sundgot-Borgen, J.,(3013) Effect of nutritional intervention on body composition and performance in elite athletes, *European Journal of Sport Science,* Vol. 13,No 3,295-303,http://dx.doi.org/ 10.1080/17461391.2011.643923

References

- Hall, C., Figueroa, A., Fernhall, B., Kanaley, J.A. (2004). Energy expenditure of running: Comparison with prediction equations. *Medicine and Science in Sports and Exercise, 36(12),* 2128-2134
- Jensen, T., & Richter, E. (2012). Regulation of glucose and glycogen metabolism during and after exercise. *Journal of Physiology*, 1069-1076. Retrieved from http://jp.physoc.org/content/590/5/1069.full
- Jeukendrup, A. (2011). Nutrition for endurance sports: Marathon, triathlon, and road cycling. *Journal of Sports Sciences, 29*(S1), S91-S99. Retrieved from http://www.tandfonline.com/doi/full/10.1080/02640414.2011.610348
- Kim, H., Lee, S., Choue, R.,(2011) Metabolic responses to high protein diet in Korean elite bodybuilders with high-intensity resistance exercise, *Journal of the International Society of Sports Nutrition;*8:10.
- Kreider, R. , Ferreira, M. , Wilson, M. , Grindstaff, P. , Plisk, S. , et al. (1998). Effects of creatine supplementation on body composition, strength, and sprint performance. *Medicine and Science in Sports and Exercise*, *30*(1), 73-82
- Lagowska, K., Kapczuk, K., Friebe, Z., & Bajerska, J. (2014). Effects of dietary intervention in young female athletes with menstrual disorders. *Journal of the International Society of Sports Nutrition, 11*(21). Retrieved from http://www.jissn.com/content/11/1/21
- Loftin, M. , Waddell, D. , Robinson, J. , & Owens, S. (2010). Comparison of energyexpenditure to walk or run a mile in adult normal weight and overweight men and women. *Journal of Strength and Conditioning Research*, *24*(10), 2794-2798
- Magill, F., & Moose, C. (2003). *Dictionary of world biography: The Ancient World*. London, UK: Taylor & Francis. Retrieved from http://books.google.co.uk/books?id=wyKaVFZqbdUC&pg=PA820&dq=Marathon+runner+Philippides+Pheidippides&hl=en&sa=X&ei=-_OBT670MqOt0QXhg93iBg&ved=0CDUQ6AEwAA#v=onepage&q=Marathon%20runner%20Philippides%20Pheidippides&f=false

References

- Mahan, L., Escott-Stump, S., & Raymond, J. (2012). Krause's food and nutrition care process.Missouri: Elsevier Saunders
- Maughan, R. J., & Gleeson, M. (2010). The biochemical basis of sports performance. *Oxford University Press*
- Nutrition for low-endurance, precision skill sports. (2006). In M. Dunford (Eds.), *Sports Nutrition: A practice manual for professionals* (4th ed., pp.486-487). American Dietetic Association.
- Rawson, E. S. and Volek, J.S. (2003). Effects of creatine supplementation and resistance training on muscle strength and weightlifting performance. *Journal of Strength and Conditioning Research 17 (4),* 822-831
- Rosenbloom, Coleman, E. (2012). *Sports Nutrition: A practice manual for professionals* (5th ed., pp. 465-486). American Dietetic Association.
- Saris, W. Antoine, J., Brouns, F., Fogelholm, M., Gleeson, M., Hespel, P., & Stitch, V. (2003). PASSCLAIM – physical performance and fitness. *European Journal of Nutrition, 42*, I50-I95. Retrieved from http://link.springer.com/article/10.1007%2Fs00394-003-1104-0
- Slater, G., Philips, M., (2011) Nutrition guidelines for strength sport: Sprinting, Weight lifting, Throwing events, and body building, *Journal of sports sciences:* 29:sub1, S67-S77
- Smith, J.W., Zachwija, J., Peronnet, F., Passe, D., Massicotte, D., Lavoie, C., & Pascoe, D. (2010). Fuel selection and cycling endurance performance with ingestion of [^{13}C]glucose: evidence for a carbohydrate dose response. *Journal of Applied Physiology, 108*, 1520-1529. Retrieved from http://jap.physiology.org/content/jap/108/6/1520.full.pdf

References

- Taylor, L. , Poole, C. , Pena, E. , Lewing, M. , Kreider, R. , et al. (2011). Effects of combined creatine plus fenugreek extract vs. creatine plus carbohydrate supplementation on resistance training adaptations. *Journal of Sports Science & Medicine*, *10*(2), 254-260
- Volek, J.S., Kraemer, W.J., Bush, J.A., Boetes, M., Incledon, T., Clark, K.L., Lynch, J.M. (1997). Creatine Supplementation enhances muscular performance during high intensity resistance exercise. *Journal of the American Dietetic Association 97 (7)*, 765-770
- Woodruff, S. J., & Meloche, R. D. (2013). Energy availability of female varsity volleyball players. *International Journal of Sport Nutrition & Exercise Metabolism*, *23*(1), 24-30.