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#FuelYourPassion









HPALS

SSISA



The Science of Protein and Carbohydrate to Optimise Athletic Performance









>>> PROTEIN

- Strength
- Endurance performance
- Recovery





CARBOHYDRATE Before During Recovery













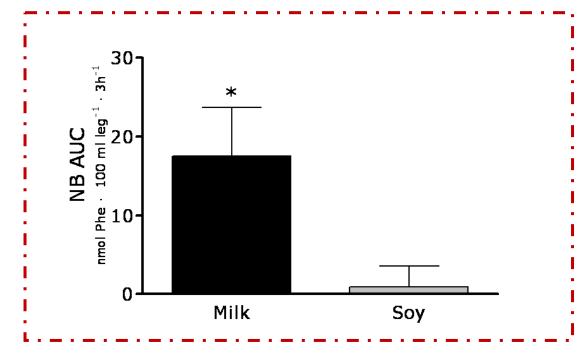






Strength Training: Milk Protein vs Soy Protein

- 18 g of milk protein versus 18 g of soy protein hydrolysate (isocaloric)
- Net protein balance in the leg
- **0** 8 male resistance athletes









Strength training: Milk Protein vs Soy Protein

- **0** 54 untrained weightlifters
- 12 week, 5 day/wk
- 3 groups supplement after each session
- Fat free milk 750kJ, 18g protein, 26g carb
- Soy protein and energy control 750kJ, 18g protein, 26g carb
- Isoenergetic control (CON) 750kJ, 44g carb
- Controlled diet period around exercise



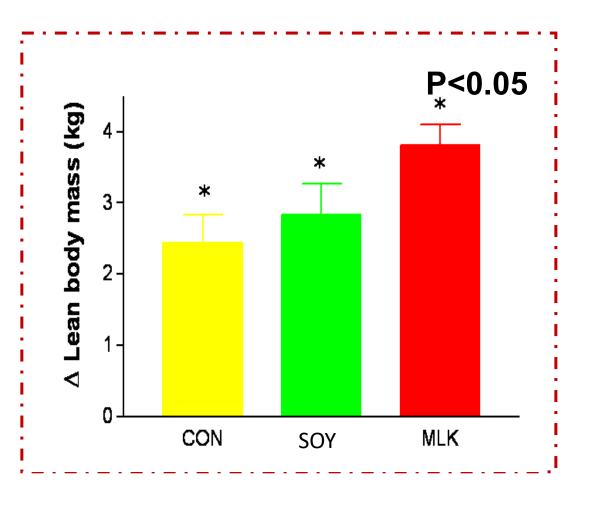
Hartman J, et al. AmJClinNutr, 2006





Strength training: Milk Protein vs Soy Protein



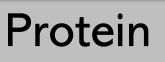






Hartman J, et al. AmJClinNutr, 2006







ENDURANCE PERFORMANCE







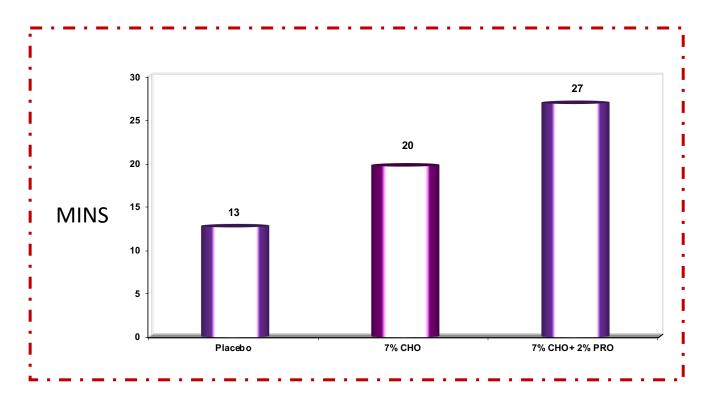




Protein



Effect of whey Protein during exercise on performance at 85% VO₂ max following 3 hr at 75%





lvy J, et al.. Int J Sport Nutr. 13:388-401, 2003



Protein



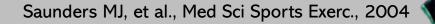
Effect of Protein hydrolysate during exercise on performance at 85% VO2 max following 3 hr at 75%

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- 15 cyclists at 75% VO_2 max until exhaustion
- 12-15 h recovery

- Repeat ride to exhaustion at 85% VO₂-Max
 - Ingested 7% CHO or 7% CHO + 2% Protein drink every 15 min
- Double blind, cross-over (14 days later)









Result

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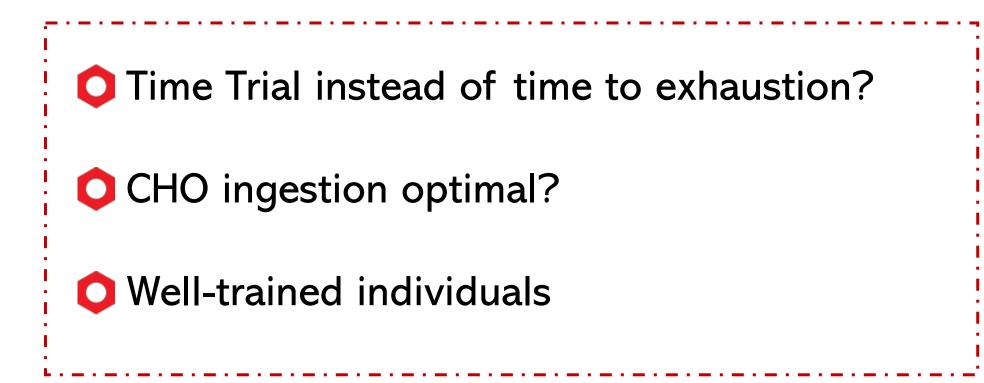
	CHO	CHO + PRO	
	(7%)	(7%+2%)	Diff. %
Time to exhaustion Trial 1 (75% VO ₂ Max)	82 min	106 min	+ 29%
Time to exhaustion Trial 2	31 min	44 min	+ 40%
(12-15 hr; 85% VO₂Max)			
Plasma creatine phospho kinase (CPK) after exercise	1318	216	- 83%













Saunders MJ, et al., Med Sci Sports Exerc., 2004

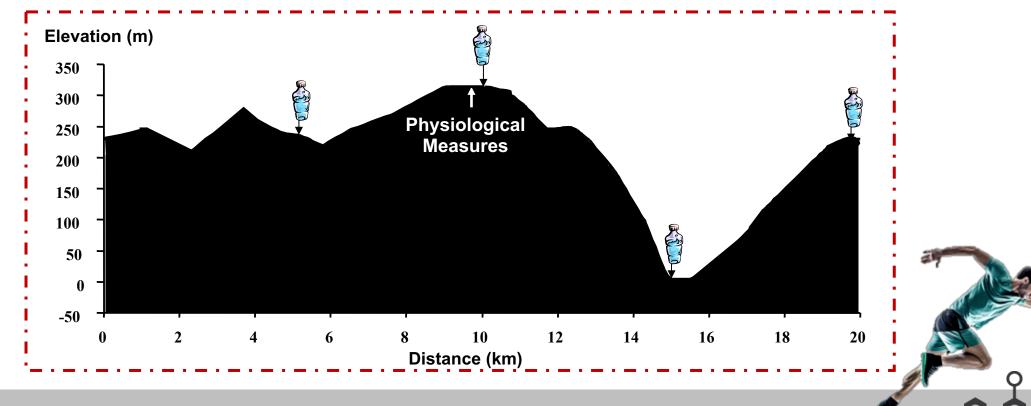




3x 20km lap, 407 m climbing per lap Final 5km climb 5% average grade

O Beverage Administration:

200 ml every 5km of trial CHO: 60g CHO/L (64g CHO/ hr exercise) CHO + Protein (64g CHO + 18g casein hydrolysate)

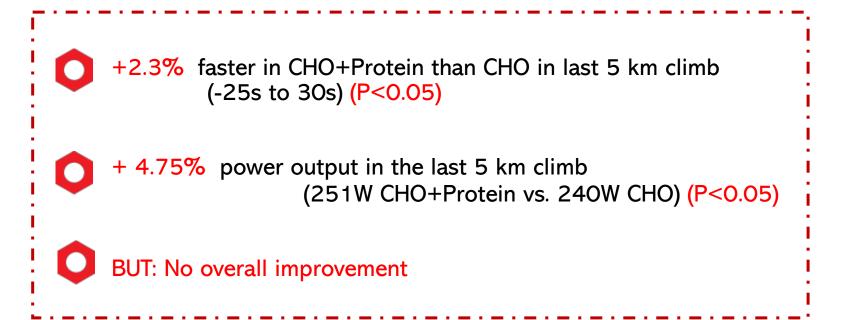




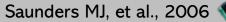


Result







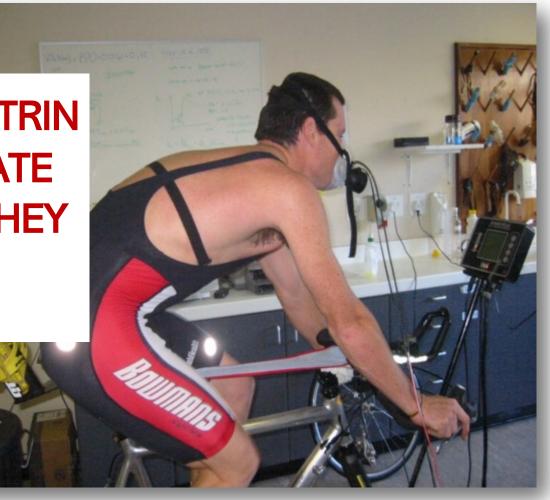




Cycling Time Trial Performance



EFFECT OF A MALTODEXTRIN vs MIXED CARBOHYDRATE vs CARBOHYDRATE & WHEY PROTEIN DRINK

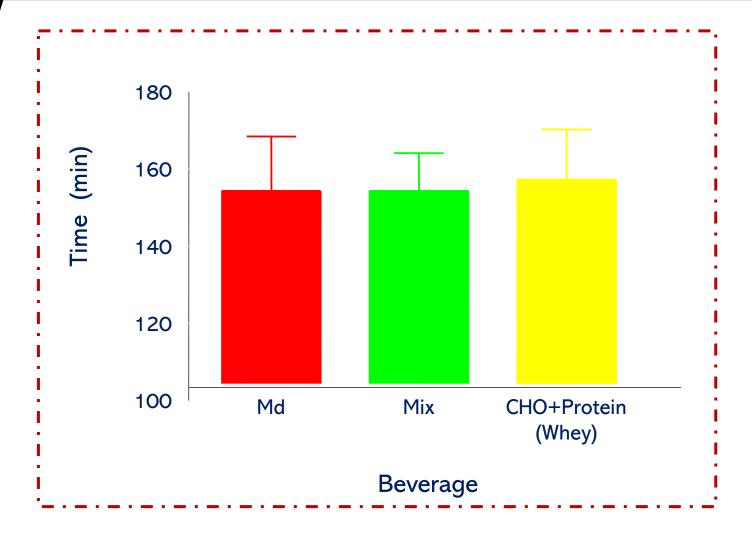








Time to Complete 100 km Cycling Time Trial



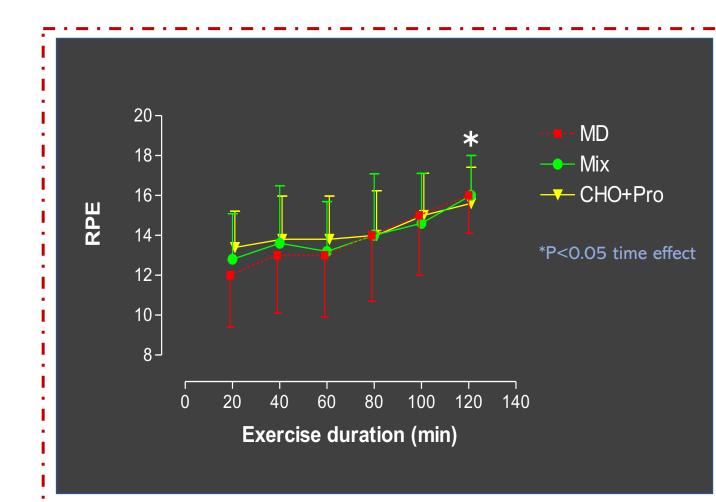






#FuelYourPassion RPE During 100 km Cycling Time Trial





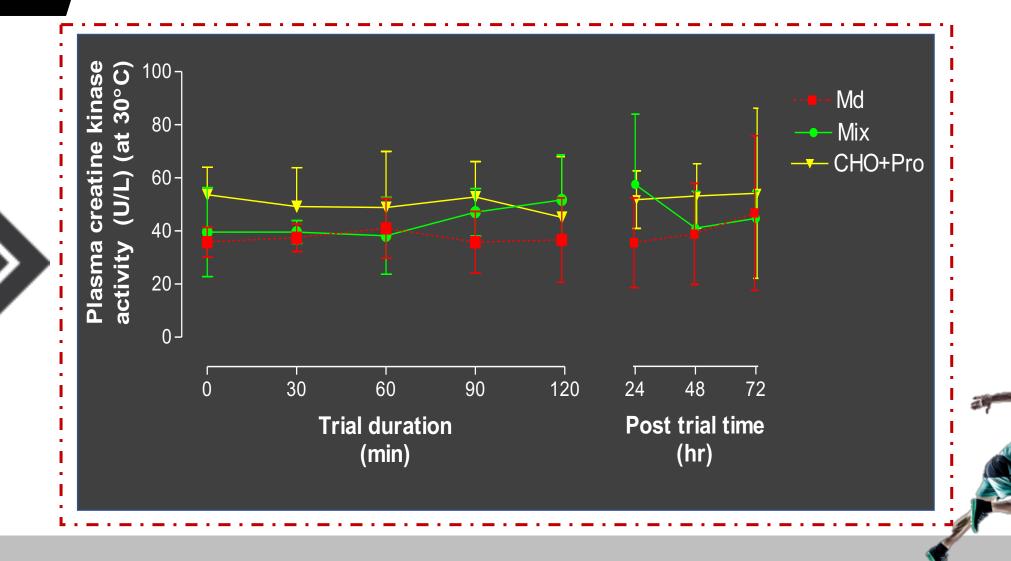






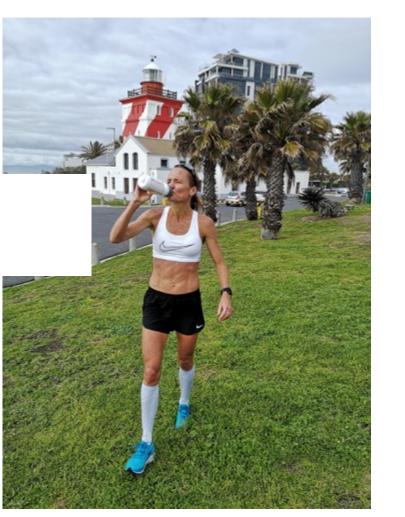


Creatine Kinase Concentrations During & Post 100 km Cycling Time Trial





Protein





RECOVERY

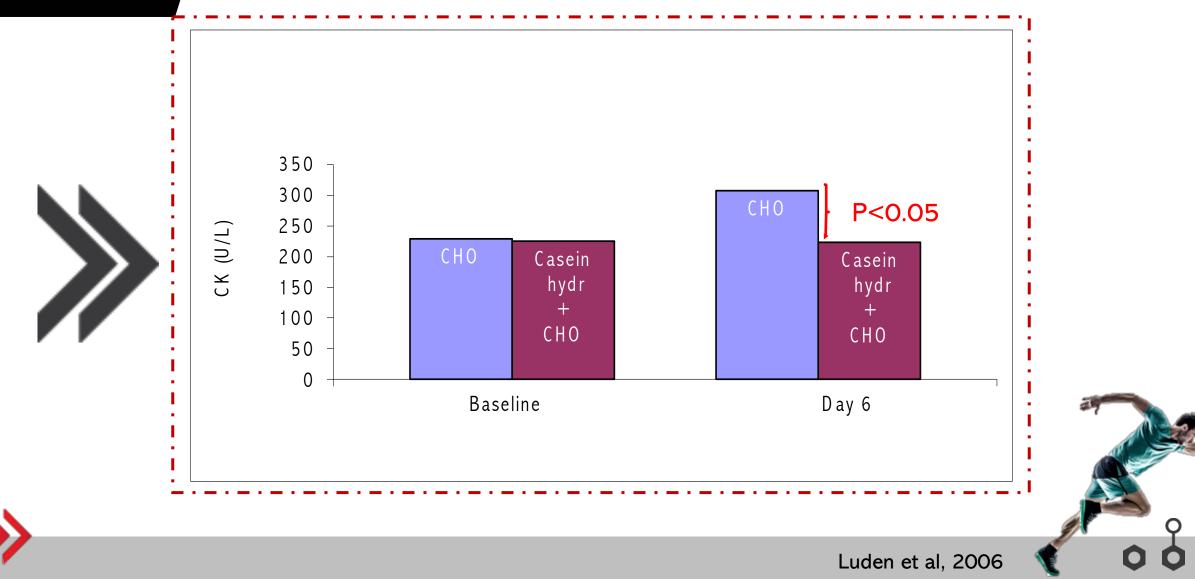


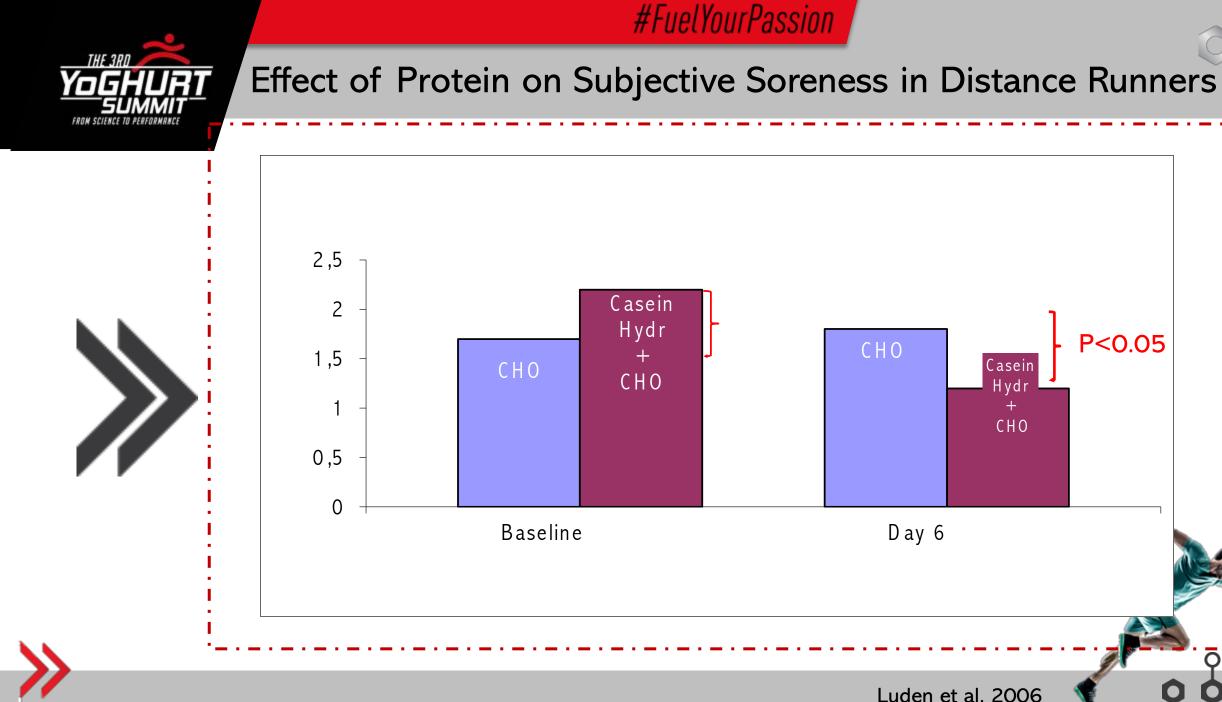
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Protein & Muscle Damage in Distance Runners





Luden et al, 2006

Casein

Hydr

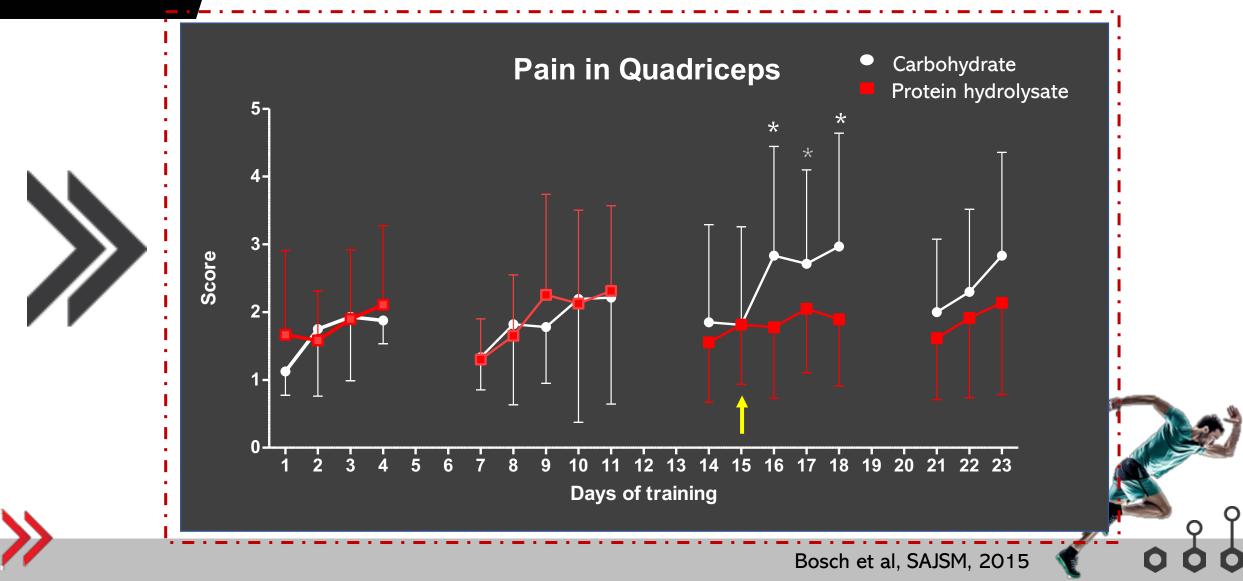
CHO

P<0.05





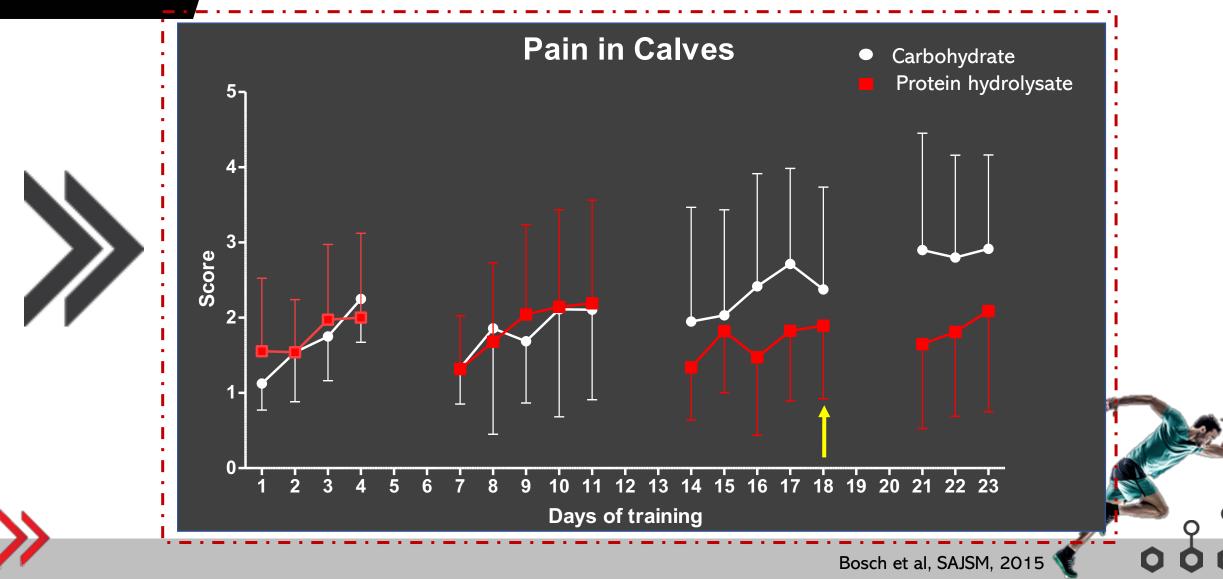
Subjective Soreness In Sevens Rugby players





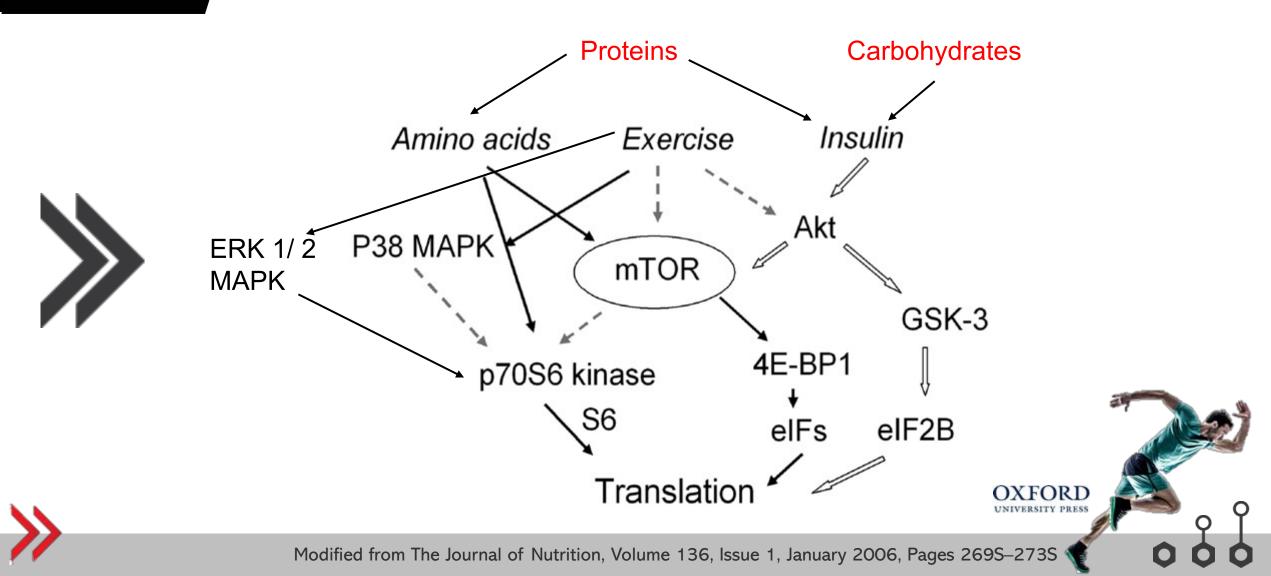
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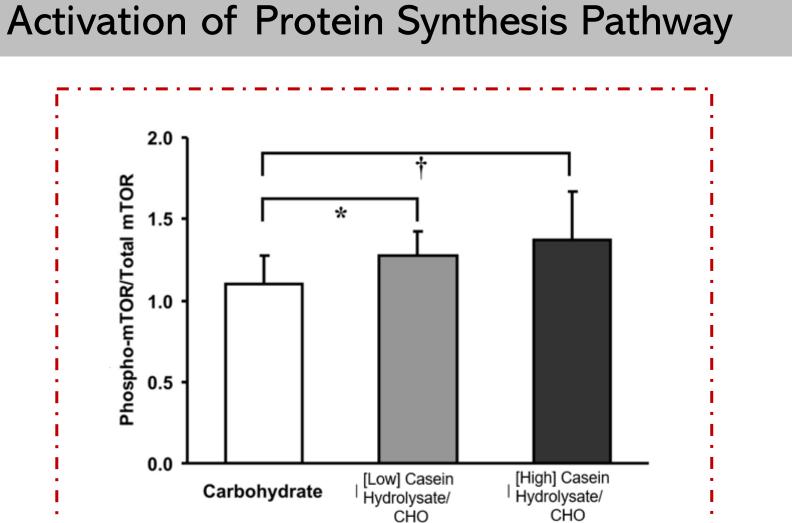














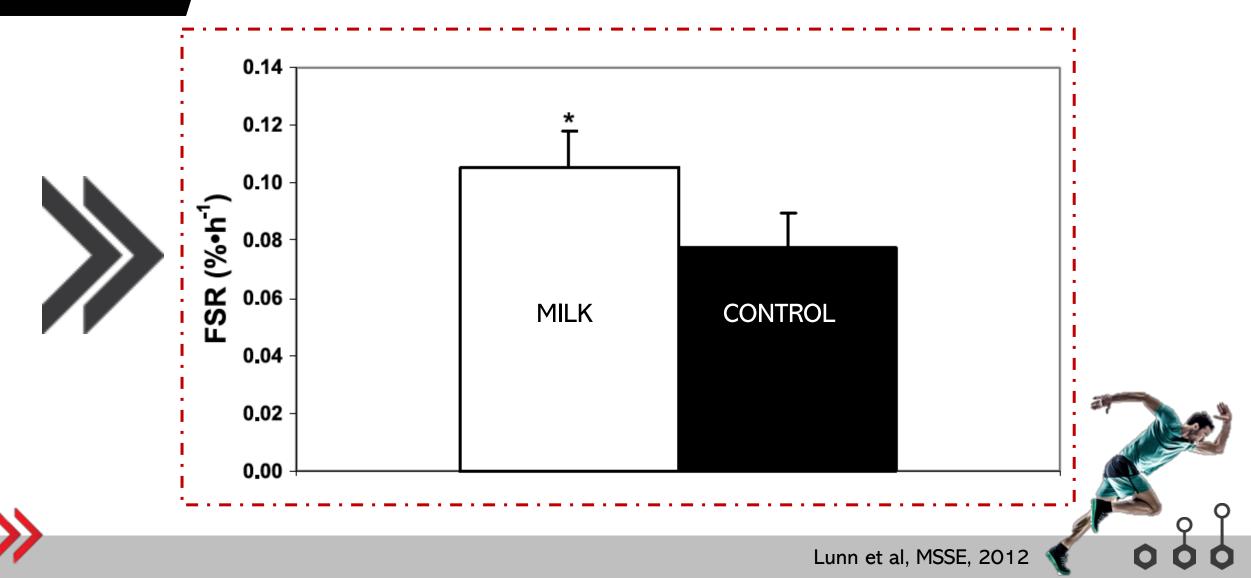
Phospho-mTOR/Total mTOR

*p < 0.05





Milk Improves Muscle Protein Synthesis 3hr After 45 min of Running at 65% VO2 max







Conclusion



Consumption of ~20g milk-based protein after training results in increased muscle protein synthesis and improved strength gains and recovery













CARBOHYDRATE: Before (Loading)

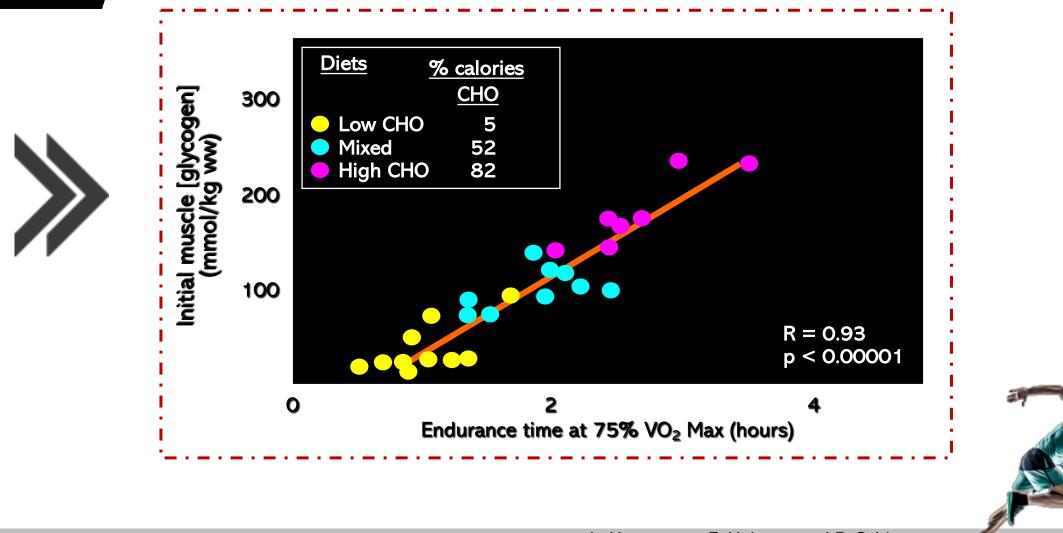






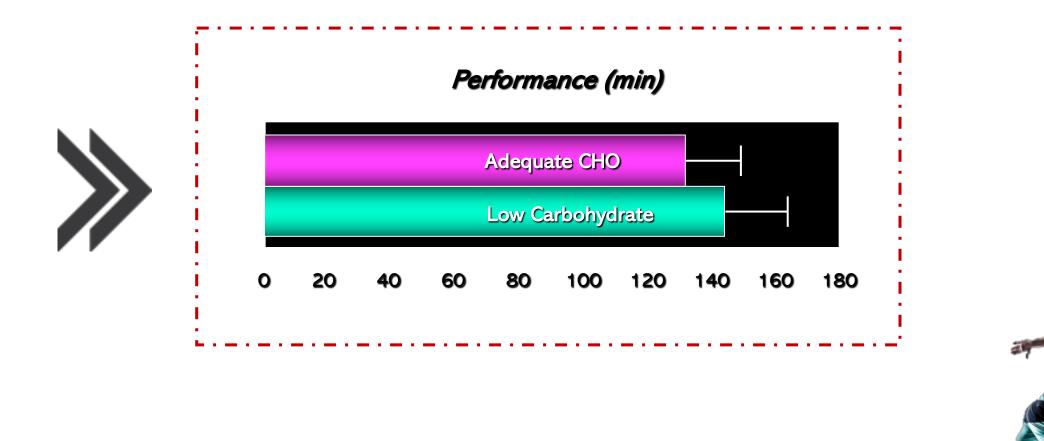


Linear Relationship Between Pre-Exercise Muscle Glycogen Content & Exercise Duration at 75% VO2 Max





Effect of Muscle Glycogen on 30km Running Performance





Karlsson and Saltin. Journal of Applied Physiology 31; 203 - 206, 1971



CARBOHYDRATE



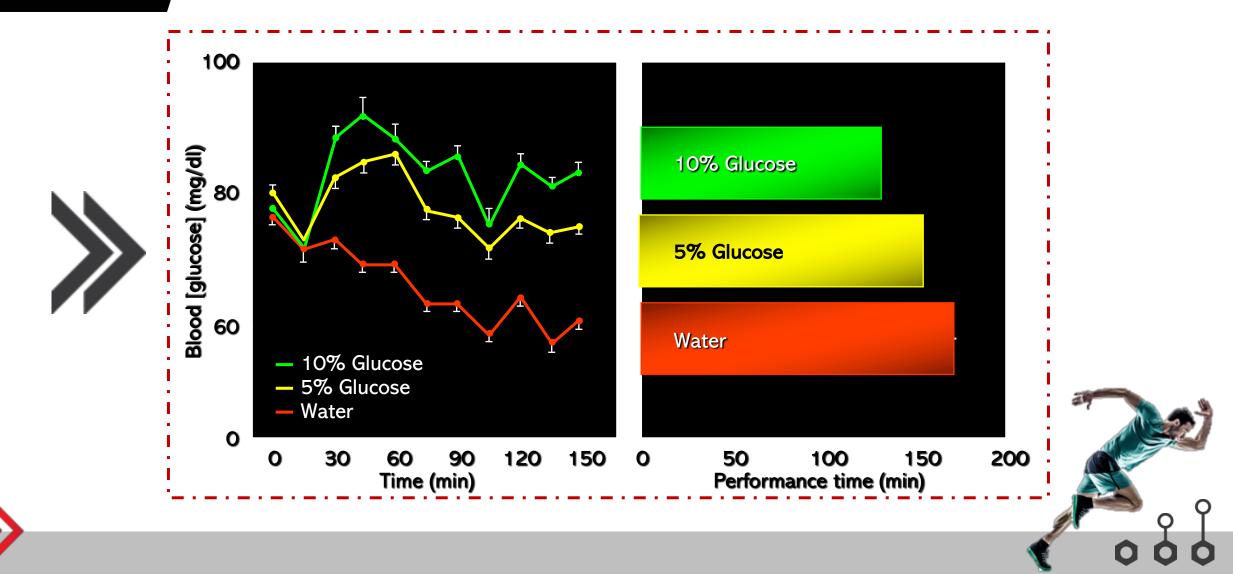
#FuelYourPassion







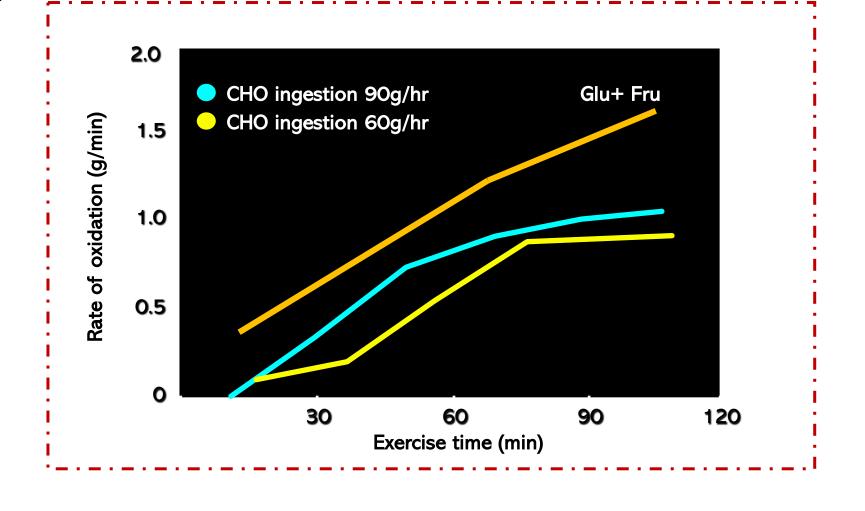
Carbohydrate Ingestion Improves Performance







Muscles Use Carbohydrate Ingested During Exercise







CARBOHYDRATE





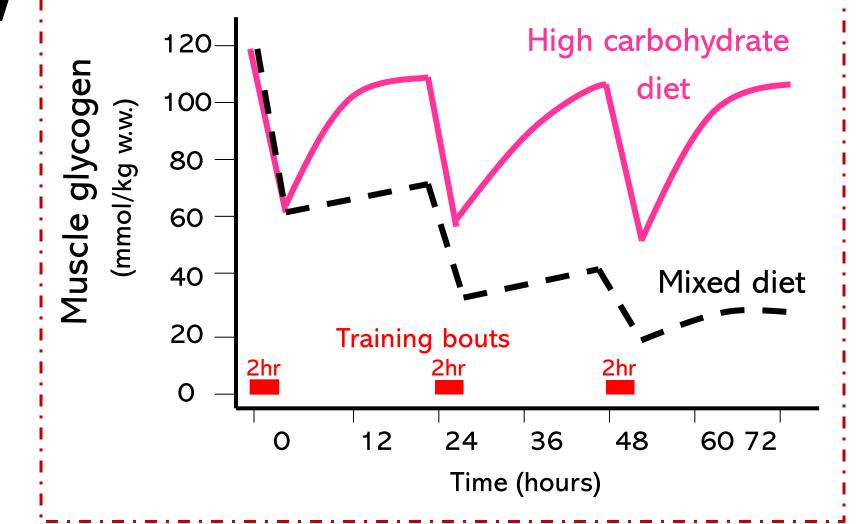
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Replacing Carbohydrate Stores



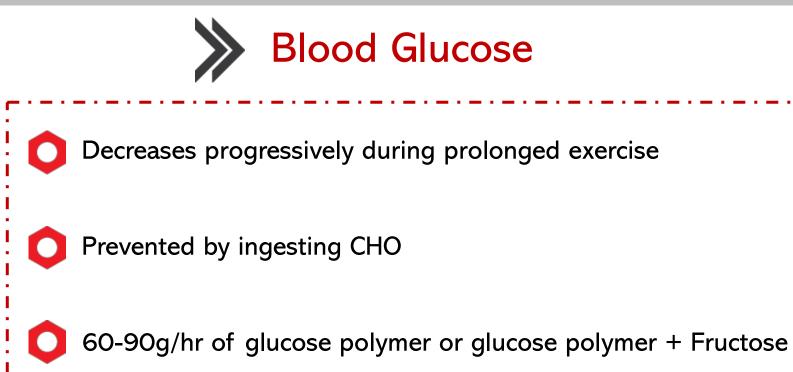


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Conclusion





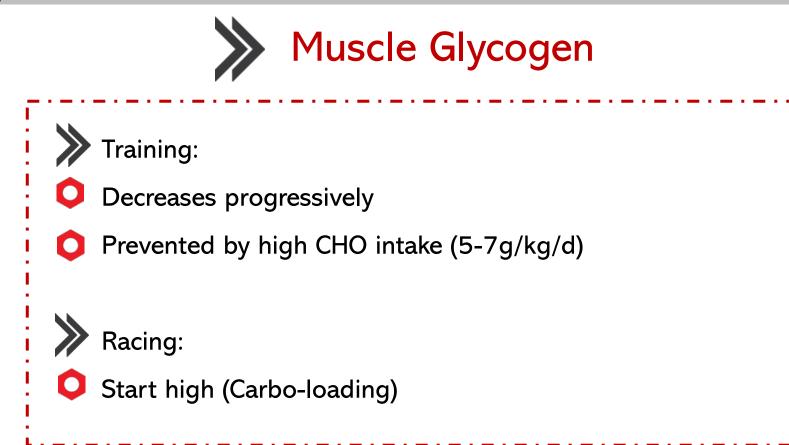






Conclusion











Conclusion - Overall



> Inclusion of Protein and CHO in a Post-Exercise Recovery Beverage

- Enhances muscle protein synthesis
- May improve recovery
 - Enhances post-exercise glycogen synthesis







END THANK YOU