

Recovery Nutrition For Athletes

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Learning Objectives:

1. Identify important factors for post-exercise recovery among athletes in training/competition.
2. Update current knowledge with evidence-based nutrition for dietetic practice.
3. Apply practical knowledge via food and fluid strategies for post-exercise recovery via case study (training, competition, injury prevention).
4. Update on CDR/SCAN new certification process for Sports Dietitian USA.



Recovery: 4 Rs

1. Replace muscle glycogen
2. Repair muscle fibers
3. Replenish fluids & electrolytes
4. Rest

Factors affecting recovery

- Fatigue
interfering with ability/interest to obtain food or eat food
- Loss of appetite following high intensity exercise
- Limited access to food at exercise venue
- Other post-ex commitments (meetings, drug tests, equipment maintenance, warm-down activities).
- Traditional post-competition activities (ie excessive alcohol intake).

Carbohydrate foods

- Exclusive fuel for the brain
- Fuel the muscles with glycogen

During Training & Competition: In General

- Female athletes 6-8 g/Kg* ~300 g CHO /day
- Male athletes 8-10 g/Kg* ~500-600 g CHO/day

*Manore 2000

Glycogen Depletion Post Exercise

Glycogen depletion can occur:

- after 2-3 hr of continuous exercise at 60-80% VO_2 max (cycling, running, long training)
- Intermittently over a shorter time (15-60 min) at 90-130% VO_2 max (TENNIS, basketball, soccer, swimming, sprints, rowing, beach volleyball, ...)

Glycogen synthesis Post-Exercise

- Goal of post-exercise feeding is to provide CHO for liver and muscle glycogen replacement before next exercise bout/training session

CHO = carbohydrate

Glycogen Synthesis Post Exercise

Normal glycogen levels:

Trained athletes ~130-160 mmol/kg of muscle

Untrained athletes ~80-110 mmol/kg of muscle

Glycogen repletion occurs at

~5-6 mmol/Kg of muscle/hour*

Generally: 6-10 g CHO/Kg BW/day

* males

Case study: Tennis at risk

Rob is a 16 y/o elite Tennis Canada athlete who trains outside the country at a well-known tennis academy. His goal is to be the number one Junior tennis player in the world. He trains 6 hours/day 6 days per week.

He prefers only "organic foods" and shows me the nutrition guidelines given to him by his trainer/"nutritionist". The plan appears to be a high protein, low carb meal approach.

Rob has been trying to gain more lean muscle mass but so far has not been successful. Furthermore he is having more injuries.

Case study

Rob does not follow a strict fluid schedule before, during or after training or competition and occasionally uses a sport drink diluted with water.

At national training camp the head coach comments that for a young player Rob has some serious injuries that would not normally be expected. Two months later, Rob sustained a fracture in his right arm sidelining his chances at the Australian Open.

Is his energy intake adequate for training & muscle gain?

Are recovery strategies based on current sport science?

What other nutrition advice does this adolescent need?

Case study: Energy Needs

Ht: 6' Wt: 163 lbs (73 Kg) BMI: 21 Body fat: 5.1% age:16
Training: 6-7 hrs/day (4 hr on court, 2-3 hrs fitness)

Academy recommendations:	3400 Kcal
Actual intake (3 day food record):	2799 Kcal
Negative Energy Balance:	- 601 Kcal

Recommended by Sports RD: 4225 Kcal
E output > E Input → High risk for injury
Inability to gain lean body mass
Effect on musculoskeletal system?

Academy Recommendations

	Non- Match day	Match day
Grains	9	9
Meat/Alt	21 oz	24 oz
Milk/prod	4	3
Fruit	7	8
Veg	3	3
Fat/oils*	25	14-20

Number of servings: translated to exchanges
 * The fats advocated would increase the Kcal >3400 Kcal as stated
 Note: Rob was not eating all the meat and very few added fats.

CHO	442 g	52%	PRO	224 g	26.4%	Fat	83	22.1%	3400 Kcal
	6 g/Kg BW			3 g/Kg			1.1 g/Kg		

Case study: Actual Intake

Ht: 6' Wt: 163 lbs (73 Kg) BMI: 21 Body fat: 5.1%
 Training: 6-7 hrs/day (4 hr on court, 2-3 hrs fitness)

Actual intake (3 day food record): **2799 Kcal**

CHO	430 g	(60%)	5.8 g/Kg
Protein	140 g	(20%)	1.9 g/Kg
Fat	65 g	(20%)	0.9 g/Kg

Calcium: 993 mg/day (76%)	DRI: 1300 mg/day	↑ Milk/prod
Vitamin E: 9.3 mg/day (62%)	DRI: 15 mg/day	↑ Fats& oils
Potassium: 3392 mg/day (72%)	DRI: 4700 mg/day	↑ Fruit/Veg

Sport RD Recommendations

	Training Day	4000-4500 kcal
Grains	17-18	
Meat/Alt	9 oz	
Milk/prod	3-4	
Fruit	8	
Veg	5	
Fat/oils	9-10	

CHO	635 ÷ 73 =	8.6 g/Kg	Tennis: Strength & Endurance
Protein	150 ÷ 73 =	2.0 g/Kg	Intermittent, high intensity
Fat	105 ÷ 73 =	1.4 g/Kg	Adolescent: Muscle gain, injury

Typical Training Diet: 73 kg male (8-10 g CHO/Kg)

- Breakfast** 2 C oatmeal, 1 banana, 250 ml orange juice
250 ml Milk, coffee (if desired), 2 Tbsp walnuts
- Snack** Fruit & yogurt OR 2 toast, 2 T peanut butter
- Lunch** 12" turkey sub (4 oz meat, 4 bread), 2 C garden salad,
2 T. olive oil/vinegar dsng, apple, 250-500 ml milk
- Snack** Energy bar & sport drink OR granola bar &
juice OR milk/shake/smoothie
- Dinner** 5 oz meat, chicken, fish, 2-3 C rice/pasta/potato,
2-4 C veggies, 1-2 fruit, 1-2 tsp soft margarine
- Snack** Milk & cereal OR fruit dessert & yogurt OR Fruit
smoothie OR granola bar, bran muffin, oatmeal
cookies with milk OR 100% fruit juice/fresh fruit

Milk: 3-4 Grains: 16-20+ Meat/Alt: 9 oz Fruit: 6-8+ Veg: 4-5 Fat: 7-9
 CHO: 64% (739 g) Protein 16% (186 g) Fat 20% (101 g) **4000-4500 Kcal**

Training: Poor Recovery

Non-Match Day Academy

Post-training (AM): 51 g CHO ÷ 73 = 0.7 g/Kg
 12-16 oz Gatorade/Banana, yogurt drink, 1 Tbsp olive oil OR 1/4 cup nuts

Post-training (PM): 45 g CHO ÷ 73 = 0.6 g/Kg
 1 Fruit, 1 Grain, 1 yogurt, 1/4 cup nuts
 CHO/day: 439 g ÷ 73 = 6 g/Kg BW

Current Recommendations for recovery:
 1.0-1.5 g CHO/Kg x 73 Kg = 73-110g CHO
 First 15-30 min and every 2 hours (up to 6 hrs)
 CHO/day: 7-10 g CHO/Kg BW (24 hours) ADA/DC/ACSM 2000

Match day: Poor Recovery

Academy:

Post-match (immediate): 51 g CHO ÷ 73 = 0.7 g/Kg
 12-16 oz Gatorade, 1 banana, yogurt drink

Post-match meal (1 hr): 74 g CHO ÷ 73 = 0.6 g/Kg
 1 cup rice, 1 fruit, 1 Grain, 10 oz fish/meat, 1 Tsp olive oil

Dinner (2.5 hr post-match): 57 g CHO ÷ 73 = 0.8 g/Kg
 1 cup veg, 1 cup rice, 8 oz fish/meat, 1 Tbsp olive oil

Pre-bed (6 hr post-match): 22 g CHO ÷ 73 = 0.3g/Kg
 1 cup berries, 1 cup yogurt, 1 Tbsp peanut butter

Current Recommendations for recovery:
 1.0-1.5 g CHO/Kg x 73 Kg = 73-110g CHO
 First 15-30 min and after 2 hours (up to 6 hrs) if playing within
 next 8 hours. Small amount of protein to build/repair muscle.

Recovery Carbs



How much Carb do you need?

Your weight:
 ____Kg x 1.0-1.5 g =
 ____g of Carbs

Choose fluids and foods in amounts that add up to grams carb calculated above.

Recovery Carbs...after intense training

How much Carb do you need?
 Example:
73 Kg x 1.0 = 73 g Carb

Sport drink 500 ml = 30 g
 Applesauce ¾ cup = 45 g
 75 g

73 Kg x 1.5 = 110 g Carb
 Chocolate milk 500 ml = 62 g
 Bagel 45 g
 107 g

1.0-1.5 g CHO/Kg

Position Paper: Nutrition and Athletic Performance 2000

Fluids: Recovery

Academy Recommendations: Fluids

- Water or green tea with meals
- Fresh squeezed Orange juice with breakfast
- Constantly drink water though the day
- Diluted Gatorade during training

Rob's use of sport drinks:
 591 ml bottle Gatorade diluted with 1/3 water = 788 ml
 2 x 788 ml = 1576 ml (1.6 Liters) for 1.5 hrs training
 Try for: 2 Liters (especially if hot and humid)
 Explain why sport drink should **not** be diluted

Fluids: Recovery

Rob's daily training needs:
 5 x 591 ml bottle Gatorade = 2955 ml (3 L)

3 L = 12 cups
 250 ml (1 cup) Gatorade = 15 g CHO (6%)
 3000 ml Gatorade = 180 g CHO intense training

Endurance sports (tennis training 6 hr/day):
 30-60 g CHO per hour recommended for endurance*
 4 hr daily on court: 120-240 g CHO needed
 Therefore 3-4 L sport drink = 180-240 g CHO
 If diluted by 1/3: then only 120-160 g CHO delivered
 Less sodium and potassium. Monitor electrolytes, cramping.

* Nutrition and Athletic Performance 2000

Fluids ... for hydration & mental alertness

Before
 2 hours 2-3 cups cool water
 15 min. 1-2 cups cool water

During
 Every 15 min ½ - 1 cup cool water or sports drink

After
 For each lb. sweat loss 2 ½ - 3 cups Cool water, sports drink, fruit juice ...
 1 cup = 250 ml 1 gulp = 1 oz. (30 ml)

Dehydration is a major cause of fatigue
 2% sweat loss can decrease performance by 6-7%. Anderson 1985

Fluids & Electrolytes

Drink	Serv	CHO g	%	Cal	Na+	K+
Fruit Juice	250 ml	37	15	115	3	115
Cola	250 ml	27	11	93	9	2
Iced tea	250 ml	22	9	85	-	68
Lemonade	250 ml	32	13	110	14	36
Fruit punch	250 ml	32	13	123	58	66
Gatorade	250 ml	15	6	65	110	30
Powerade	250 ml	18	8	70	55	30
GatorLode	250 ml	50	20	193	62	Vit C, 4 Bs

250 ml = 1 cup CHO = carbohydrate Cal = calories Na+ = sodium K+ = potassium

Sport Drinks for Recovery

- Fluid 150% sweat loss
- CHO 1-0-1.5 g/Kg BW
- Electrolytes 0.5-0.7 g Na+/L (if > 1 hr)

- Sport drink (CHO, Na+, K+ more complete rehydration)
- High Glycemic Index (rapid delivery of simple CHO)
- Cool beverage (gastric emptying, cool body core temp)
- Heavy sweaters may need 1.5 L fluid/hour, more sodium

Nutrition and Athletic Performance 2000 Scan Manual 2005

Don't Forget the Basics !

- E Intake > E Output for muscle gain
- Optimum fluids to prevent dehydration
- Assure key nutrients vs just "organic" (B vitamins, calcium, vitamin E)
- Less protein, more complex carbohydrates
- Adequate rest to allow for muscle growth and development in growing adolescent
- Higher needs for injury recovery (muscle/bone)

Key message

Muscle glycogen can **NOT** be replaced to normal levels *without* adequate dietary Carbohydrate post-exercise

... this flies in the face of all high protein low carbohydrate diet philosophies

CHOs for Recovery

- Nearly 90% of dietary CHO consumed post-exercise is deposited in muscle as glycogen
- Greater muscle glycogen depletion *enhances* glycogen re-synthesis *as do high insulin levels*

Show me the science!

Greater glycogen depletion Higher glycogen resynthesis

First 4 hr post-exercise (exhaustive):

- 43 % increase in glycogen synthesis (producing an 80% decrease in leg muscle glycogen)
- VS
- 13% increase in glycogen synthesis (producing a 35% decrease in leg muscle glycogen)

Bonen et al 1985

Do high glycogen levels lead to improved performance?

Male & female ROWERS	Mean power output	
High CHO 70% (10 g CHO/Kg)	↑ 10.7%	
Moderate CHO 42% (5 g CHO/Kg)	↑ 1.6%	

Both groups: High protein (2 g/Kg)
Fat intake adjusted to maintain wt

Answer: **YES** High CHO Diet does improve performance

Simonsen et al 1991 More evidence:

How Much carb? 5 g CHO/Kg minimum

Example: Ht 6' Wt 160 lbs Male Age: 16 Goal: 175 lbs (Rob)

Food Group	# Sv	Carbs g	
Milk/prod	2 x 12 =	24 g	2 c. milk
Fruits	3 x 15 =	45 g	banana, apple
Grain/prod	12 x 15 =	180 g	4 bread, 2C cereal, 2 C pasta
Vegetables	2 x 5 =	10 g	3 C salad, 3 C stir fry veg
Sport drink	4 C x 15 =	60 g	6% carb sport drink
Power bar	1 x 45 =	45 g	popular high carb bar
		Total	364 g carbohydrates

160 lbs ÷ 2.2 = 73 Kg

364 g CHO ÷ 73 = ~5 g/Kg Minimum CHO to replace muscle glycogen
Low in major food groups (milk, fruit, veg)

How Much carb? 8 g CHO/Kg diet

Example: Ht 6' Wt 160 lbs Male Age: 16 Goal: 175 lbs

Food Group	# Sv	Carbs g	
Milk/prod	4 x 12 =	48 g	3 c. milk, 175 g yogurt
Fruits	8 x 15 =	120 g	banana, apple, 500 ml juice
Grain/prod	18 x 15 =	270 g	4 bread, 2C cereal, 3 C pasta
Vegetables	5 x 5 =	25 g	3 C salad, 3 C stir fry veg
Sport drink	4 C x 18 =	72 g	8% carb (Powerade)
Energy bar	1 x 45 =	45 g	popular high carb bar
		Total	580 g carbohydrates

160 lbs ÷ 2.2 = 73 Kg
73 Kg x 7-10 g/Kg = 511-730 g carb (ACSM, ADA, DC Position 2000)
580 g CHO ÷ 73 = ~8 g/Kg Adequate in major food groups

Low Carb "diets" ... Poor Recovery

- Female athletes: 2200-2500 Kcal/day
- Difficult to get minimum 300 g CHO/day
- Example:
55 Kg F (121 lbs) needs 6-7 g CHO/Kg/day
55 x 6-7 = 300-385 g CHO
to delay the onset of fatigue
Typical "diets" contain <4.5g/Kg/day too low !

Low carb ...poor recovery

- 55 Kg (121 lbs) Female gymnast
1500 Kcal/day
Even if 60 % CHO diet = 4.0 g CHO/Kg
TOO LOW
Premature fatigue, risk for injury
Inadequate muscle/liver glycogen
Overtraining leads to injury
Injury → stress re weight gain → restriction
Female Athlete Triad & Eating Disorders

Does the type of CHO make a difference?

Type of CHO

- Glucose monosaccharide
 - Sucrose disaccharide
 - Maltodextrins oligosaccharide
- All replace muscle glycogen equally well
- Fructose does not perform as well
can cause GI upset (no longer used alone in sport drinks)

Solid or Liquid Carbs ?

Which are best for replacing glycogen?

1.5 g/Kg fed SOLID or LIQUID carbs
immediately post-exercise
and at 2 hr intervals after exercise

Found: **BOTH** replaced muscle
glycogen **EQUALLY** well.

Reed et al 1989

Key message

- Both liquid and solid carbs are helpful for recovery ... athletes preferences vary

Examples:

- Sport drinks, fruit juice, choc milk, smoothies, soft drink, water
- bananas, bagels, yogurt, energy bars, sandwich, rice pudding, cereal, applesauce, fruit, oatmeal cookies, frozen yogurt....

Sports Bars ... high carb, mod protein for recovery

Brand/Type	Kcal	Carb	Pro	Fat	Vit/Min
■ Power bar	220	40	8	4	yes
■ Luna Bar	190	30	10	4	yes
■ Breakfast Bar	140	27	2	3	yes
■ Granola Bar	92	15	2	3	no
■ High protein Bar	297	39	24	5	yes/no
■ Balance Bar	191	22	14	6	yes

Sellei-Lampert MS, RD

Size of Meal ... Small vs Large

"nibbling" 16 frequent small meals*
vs
"gorging" 4 large meals*

Meal size had no influence on muscle glycogen levels

*Burke et al. Am J Clin Nutr 1996
Siu et al. Med Sci Sports Exerc 2004

Key Message

Appetite is often suppressed following strenuous exercise

Practical solution = small frequent post-exercise high carb snacks can be just as effective for replacing muscle glycogen as a large meal **BOTH** can work!

Carbs + Protein?

Do you need both to replace muscle glycogen?
 After 2 hr of exhaustive exercise
 male cyclists followed 3 protocols:

- 112 g CHO
- 41 g protein
- 112 g CHO + 41 g Protein

Glycogen replacement was 28% higher (CHO + Protein) vs CHO only treatment.
Protein only group did a poor job replacing muscle glycogen

Zawadzki et al 1992

Key Message

Total Energy & CHO more important

The greater amount of glycogen stored with both carb + protein may be due to the higher energy intake and thus is a function of total calories & carbohydrates consumed, not protein

High protein, low carb diets will NOT replace glycogen

Zawadzki et al 1992

more evidence...

Burke et al (1995) studied Triathletes

- High carb (7 g/Kg)
- High carb + added fat (1.2 g/Kg) and protein (1.6 g/Kg)
- Matched energy (Carb diet + additional 4.8 g/Kg carb)

Found **NO difference** among 3 diets
as long as Calories & Carbs are adequate.

Key Message

Bottom line:
 Do not need protein or fat to enhance glycogen recovery
 IF...Calories and carbs are adequate

BUT
 IMPORTANT to feed **BOTH protein and carb** over 24 hour period following strenuous exercise to build/repair muscle and for positive nitrogen balance (anabolism).

Protein & Amino acids

Repair muscle fibers post-exercise

Current research:
 only 6 grams Protein/amino acids needed for repair
 (0.1 g/Kg EAA effective for anabolism)


Note: 250 ml choc milk = 8 g protein good recovery drink

*Rasmussen 2000; Tipton 2003; Borsheim 2003; Gibala 2003
 Scan Manual 2005; Karp et al. Int J Sports Nutr Exerc Metabol 2006

Building Muscle with real food

- 4 cups Milk
- 9 oz Meat, Fish, Chicken
- 4 cups Vegetables
- 18 Grains/starches
- 150 g Protein per day

185-lb. (84 kg.) hockey player
 needs: $84 \times 1.7 = 143$ g
 protein for strength & endurance
 Thus, an extra scoop (30 g) of whey
 protein/amino acids would not be
 needed ...and would be excessive.



Protein supplements not necessary

Calculating dietary protein

Example: Ht 6' Wt 160 lbs Male Age: 16 Goal: 175 lbs (Rob)

Food Group	# Sv	Protein g	
Milk/prod	4 x 8 =	32 g	4 c. milk
Meat/Alt	9 oz x 7 =	63 g	4 oz ham, 5 oz chicken
Grain/prod	18 x 3 =	54 g	4 bread, 2C cereal, 3 C pasta
Vegetables	5 x 2 =	10 g	2 C salad, 2C stir fry veg
Total		159 g	more then enough

160 lbs ÷ 2.2 = 73 Kg
 73 x 1.7g/Kg = 124 g protein needed + adequate daily calories
 Adding 30 g whey protein would be excessive !!

Endurance sports: 1.2-1.4 g/Kg BW Strength sports: 1.6 - 1.7 g/Kg BW
 Position paper: Nutrition and Athletic Performance 2000

Alcohol... effects on performance

Limits skills that require:

- Accuracy
- Balance
- Hand to eye coordination
- Information processing
- Reaction time

Alcohol *decreases*:
 strength, power, speed, muscular endurance,
 and cardio endurance

Alcohol delays recovery

Most affected:

- Psychomotor performance
- Judgment

Alcohol intake post event:

- Dehydration
- Delayed glycogen repletion
- Delayed soft tissue repair
- No alcohol for 24 hr if soft tissue injury

Burke, L et al J Appl Physiol 2003

Glycemic Index (G.I.)

- OFTEN MISUNDERSTOOD by athletes
- Try to follow strict rules for eating
- Limits opportunity for Energy, variety & key nutrients
- Athletes forget we eat mixed meals not single foods
- Protein and fat lower the G.I. of the meal
- G.I. is not universally accepted

Glycemic Index (G.I.)

Burke & Deakin 2000

High GI >85	Medium GI 60-85	Low GI <60
white bread	pasta/noodles	apples/pears
wholemeal bread	popcorn	cherries
Cornflakes	oatmeal porridge	peaches
Wheetabix	potato chips	apple juice
Potato	Special K	All-bran
Raisins	white rice	baked beans
Bananas	sweet corn	lentils
corn chips	sponge cake	ice cream
Sugar	oranges	yogurt
Honey	orange juice	fructose
sport drinks	chocolate	brown rice
glucose		milk (all types)
		green peas
		peanuts

When to choose High or Low G.I. ?

In General:

- Low G.I.
Before training or competition
- High G.I.
During and post-training & competition

Evidence: As long as total CHO is adequate the G.I. may not be as important. Jury still out.

Parkin et al. Med Sci Sports Exerc 1997 Stevenson et al. Int J Sport Nutr Exerc Metab 2005

Timing & Rate of CHO Feedings for Recovery

- 1.0-1.5 g CHO/Kg BW
- 15-30 minutes post-exercise
- And every 2 hours up to 6 hours
- rate of glycogen synthesis is linear during first 6 hrs post-ex
- a 2 hour delay in feeding CHO reduced rate of glycogen synthesis by 47% (Ivy & Katz 1988)

Practical Guidelines Training & Competition

Feeding CHO post-exercise:

- General:
100-150 g CHO within first hour combined with small protein
- Over 24 hr period: F 6-8 g/Kg (-300+ g/day)
M 8-10g/Kg (500-600 g/day)
- Specific Individuals:
1.0-1.5 g CHO/Kg BW within 15-30 min and after 2 hrs
0.1 g Protein/Kg for building & repair, fluids, salty foods
- High G.I. foods can help to increase insulin levels more quickly, stimulate glucose transport into cells, promote glycogen re-synthesis

Recovery Foods

~50 grams CHO =

- 1 cup applesauce
- 1/2 cup raisins
- 3 1/2 cups Gatorade (975 ml)
- 2 cups 100% fruit juice (500 ml)
- 2 cups chocolate milk (500 ml)
- 1 slice bread, 4 tsp jelly, 1 1/2 cups skim milk
- 1 cup spaghetti, 1/4 cup spaghetti sauce
- Powerbar (~45 g CHO)
- breakfast/cereal bar, 250 ml choc milk
- large banana, 250 ml choc milk
- smoothie (banana, 125 g yogurt, 125 ml milk, 125 ml orange juice)
- 2 granola bars
- yogurt and banana

Recovery Foods


~100 grams CHO =

- 1 1/2 cups GatorLode (carbo-loading drink) 375 ml
- 6 1/2 cups Gatorade/Powerade (1.5 Litres)
- 2 cups applesauce (500 ml)
- large apple, 1/3 cup raisins, 14 saltines
- large bagel, 2 Tbsp jam, 1 cup skim milk
- peanut butter & jelly sandwich, 250 ml choc milk, banana
- chicken sandwich, 1 cup fruit cocktail, 250 ml pineapple juice
- frozen fruit smoothie (750 ml), Power/energy bar
- 4 oatmeal cookies, 1 pint choc milk (500 ml)
- 12 oz can soda pop, 4-6 fig newton cookies

Recovery

1.0-1.5 g CHO/Kg post event

Fast Foods


<u>Instead of</u>	<u>Choose ...</u>
Deluxe pizza/double cheese	Spaghetti/meat sauce 3 cups
	Garden salad, large
	Italian bread, 2-4 slices
	Olive oil, 2 tsp
	Fruit juice 12 oz (750 ml)
	Choc/vanilla ice cream 2 scoops
Kcal: 1837	Kcal: 1888
Carb: 151 g 33%	Carb: 292 g 61%
Pro: 56 g 12 %	Pro: 52 g 11%
Fat: 52 g 26%	Fat: 55 g 28%
Fibre: 10 g	Fibre: 20 g

Fast Foods

Instead of

- Big Mac
- Large fries
- Choc shake
- Ketchup 2 Tbsp

Kcal: 1338
 Carb: 173 g 51 %
 Pro: 44 g 13 %
 Fat: 53 g 35 %
 Fibre: 10 g



Choose ...

- Plain quarter pounder
- Chocolate milk 1%, 500ml
- Garden salad/Low cal dsng
- 2 cookies


Kcal: 1370
 Carb: 197 g 57 %
 Pro: 52 g 15 %
 Fat: 43 g 28 %
 Fibre: 11 g

Fast Foods

Instead of

- Full pork back ribs
- 3 regular beers
- Large french fries

Kcal: 1710
 Carb: 108 g 25 %
 Pro: 83 g 19 %
 Fat: 74 g 39 %



Choose ...

- Roast beef sub
- Milk 1%
- Apple or banana
- Garden salad/dressing
- Oatmeal cookies, 2

Kcal: 1120
 Carb: 150 g 52 %
 Pro: 55 g 20 %
 Fat: 38 g 29 %

Ergogenic Aids

ASK:
 Is it effective?
 Is it safe?
 Is it ethical?
 Is it legal?

Before you act make sure:

- Food and fluids are adequate to meet training needs
- Ask a Registered Dietitian (Certified Sports RD) to assess your diet to make sure you are getting the "right stuff".

Glutamine & Recovery

Claim: improved recovery, muscle gain
 4 studies show no evidence
 No changes in immune function, muscle performance, body composition, protein degradation, leg/bench press, any weight-lifting performance

Claim: beneficial for decreasing exercise stress
 1 study for, 3 studies no evidence

Safe: NO adverse effects reported. No DRI

SCAN Manual 4th ed 2005

Glutamine... is in protein-rich foods

Pork chop 3 oz	4.14 g	Dry roast peanuts 1 oz	1.59 g
Round steak 9 oz	12.15	Lentils ½ cup	1.39
Chicken breast 3 oz	3.74	Sunflower seeds 1 oz	1.35
Salmon 3 oz	3.47	Soy drink 1cup	2.70
Chicken thigh 3 oz	3.31	Tofu 3 oz	1.19
Ground beef 3 oz	3.19	Pinto/kidney beans ½ cup	1.01
Ham 3 oz	2.68	Boiled egg 1 lge	0.82
Sole 3 oz	2.39		
Skim milk 1 cup	1.67		
Mozzarella cheese 1 oz	1.65	Ultra Myogen Rx (2 scoops) 4.13	
LF yogurt 6 oz	1.64	Endurox R4 (2 scoops) 0.42	
2% Milk 4 cups	5.48		

g = grams of glutamine

No proof supplements work
 Low protein, low glutamine?

Creatine: Is there any risk?

Creatine binds water

Loading dose 3-5 g/day
 OR 20 g/day for 5-7 days

What happens if:

- Low fluid intake
- Low carb intake
- High protein diet
- Intense activity
- High sweat loss
- Other supplements



Is there any link to groin injuries?

Creatine & Injury?

"There may be negative consequences with the more is better attitude ... users tend to gain weight from water retention which may inhibit performance. This causes cells to swell and can lead to an increase in blood pressure. The inability of connective tissue to adapt to this swelling may lie behind the slight increase in muscle tears among world class sprinters."

Mark Tarnopolsky MD *McMaster University*
The Nutrition Post Fall 1997

Creatine & Recovery

Claim: increases body mass & LBM, strength gains, enhanced recovery ...

Effective for recovery? "Seems to enhance muscle glycogen thus enhancing glycogen storage." SCAN Manual 2005

Safety: hotly debated. Generally considered safe
Not recommended for youth in sport

Side effects: GI upset nausea, diarrhea, cramps
Long term effects: unknown (studies on adults only)

Food sources: Lean red meat, fish
Stored in body: liver, muscles, brain, testes
Responders may have lower creatine pools (vegetarians)
Not a "banned" substance by IOC

Caffeine Risky Combo

Risk:Benefit Ratio HIGH

- High total caffeine
- Very high stimulant effect
- High sugar, if pre-game
- If gas tank on "empty" you will run on adrenalin
- Risky to health
anxious, jittery, insomnia, rapid irregular heartbeat
- Might cause death ?



80 mg
caffeine

"1000 mg caffeine"
Label recommends
2-4 caps/day

3 Red Bulls + Hot Rox will **NOT** enhance recovery

SUMMARY

Factors that enhance recovery

- The lower the glycogen stores, the faster the rate of recovery
- Immediate intake of CHO post-exercise
- Adequate amount of CHO:
1.0-1.5 g/Kg immediately after
7-10 g/Kg per 24 hours
- Focus on high CHO-rich foods
- Small amount protein to build repair
- Very low fat diets have no benefit

Burke & Deakin 2000

SUMMARY

Factors that reduce rate of recovery

- Muscle damage (contact injury or delayed muscle soreness)
- Delay in CHO intake after exercise
- Inadequate amounts of CHO
- Reliance on low G.I. Foods
- Prolonged & high intensity exercise during recovery
- High energy drinks (caffeine, guarana, mate, kola, ma haung)
- Alcohol
- Lack of rest/sleep

Burke & Deakin 2000

SUMMARY

CHO intake: chronic/everyday training

- 5-7 g /Kg BW per day**
Daily recovery fuel needs for athlete with moderate exercise program (<1 hr of low intensity exercise)
- 7-10 g/Kg BW per day**
Daily recovery fuel needs for endurance athletes (1-3 hr mod-high intensity exercise)
- 10-12+g CHO/Kg BW per day**
Daily recovery fuel for extreme exercise program (>4-5 hr of mod-high intensity exercise
ie. Tour de France, Hawaii Ironman

Burke & Deakins 2000

Timing and Recovery

- Multiple day event
- Multiple weekend event

Multiple events... same day

- Build breakfast strong
- Eat 2-3 hr before event
high carb, mod protein, low fat
low fibre, not too spicy, calm atmosphere
- Bring food and fluid for snacks & mini meals if only 45 min to 2 hours between events
- Sport drinks, choc milk, yogurt, fruit & fruit juice, easy to digest carbs (pasta, rice, bread, cereal, oatmeal, rice pudding, chunky soup, meal replacement drinks (Boost, Ensure, Enercal, Instant Breakfast...))
- Lunch/Dinner - high CHO, mod pro, low fat, easy to digest
chicken/rice, ham sandwich, turkey/pita, pasta, chunky soups, fruit, milk/juice, mash potato/meat/veg
water or sport drink ... *individuals needs will vary*

Multiple events..weekend

- Start hydrating with fluids Thurs & Fri
- High carb, mod protein, mod-low fat meals
pasta/meat sauce, salad, veg, milk/juice
- After first event, recover immediately, get adequate rest
- Strong breakfast and healthy snacking routine
- Sport drinks during and after events routine
- Recovery tactics for food and fluids continue
- Keep muscle glycogen stores filled and blood sugar stable
- To assure a podium finish at the final competition

Recommended resources:

- Sports Nutrition: A Practice Manual for Professionals 4th edition 2005 (Marie Dunford editor)
- Clinical Sport Nutrition ed. Burke & Deakin 2006 (new)
- Sport Nutrition for Health & Performance Manore & Thompson 2000
- Position paper: Nutrition for Athletic Performance Dec. 2000 (in revision 2006)

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Sports Dietetics Certification

First Exam: June 2006

- Board Certification
- Why Certification?
- Application Process
- Cost: \$250.00
- Eligibility
- Specialty Exam:
June 12-30, 2006 Deadline April 24, 2006
Jan 8-26, 2007 Deadline Nov.22, 2006
- www.scandpg.org
www.cdrnet.org/whatsnew/Sports.htm

Certification Process

- Formation of SPAW to assist CDR
- SPAW members
- Meetings Sept 05 & Jan 06

SPAW = Specialty Practice Analysis Workgroup
CDR = Commission on Dietetic Registration, ADA

SPAW Tasks

- Identify knowledge, skills, abilities for competency in sports dietetics practice
- Develop a sports dietetics practitioner definition
- Develop eligibility requirements for sports dietetics specialty certification
- Identify sports nutrition resources applicable to sports dietetics practice
- Develop a specialty certification examination and a content outline for the exam

Definition of Practice

Sports Dietitians are experienced Registered Dietitians who apply evidence-based nutrition knowledge in exercise and sports. They assess, educate, and counsel athletes and active individuals. They design, implement, and manage safe and effective nutrition strategies that enhance lifelong health, fitness and optimal performance.

Need more information?

- www.scandpg.org
 - Read articles listed on website
 - Sign-up for SD-USA
- NDIMarco@mail.twu.edu if any questions

Eligibility Requirements

- Current RD status
- 3 years RD
- 1500 hrs experience

www.cdrnet.org/whatsnew/Sports.htm

Sports Nutrition Resources

- Sports Nutrition References
- Exercise Physiology References
- References for professionals who work with athletes
- References for specific sports-related topics

AODA Conference Dublin 2006

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