Nutrition and Hydration Strategies for Runners

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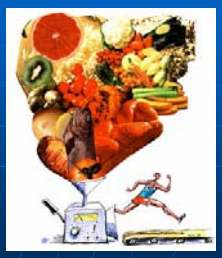
1. The ABC's of nutrition: CHO, PRO, FAT
2. Hydration & Water
3. Examples of pre race, during race and post race nutrition

The role of good nutrition

- Cover demands placed upon the body as a result of training & competition
- Balanced nutrition plan supports peak performance & may prevent injury/illness



Total Daily Energy Needs

- Strenuous physical activity requires sufficient ENERGY supplied through balanced & structured diet.
- Depends on height, weight, gender and physical activity levels

Gender	Height	Age	Weight	Activity	Kcal/day
Female	1.7m	19-30	64kg	Sedentary	2000
				Moderately Active	2580
	1.6m	31-50	56kg	Sedentary	1810
				Moderately Active	2340
Male	1.9m	19-30	80kg	Sedentary	2650
				Moderately Active	3400
	1.8m	31-50	71kg	Sedentary	2370
				Moderately Active	3040

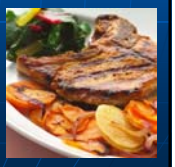
Sedentary: seated work with little or no strenuous leisure activity
Moderate: standing or walking work or sedentary work with regular exercise (>30mins)

Total Daily Energy Needs

	% of Total Daily energy intake	Calories (based on 2000 calories)	Calories/ gm	Weight
Protein to support muscle growth	15%	300 calories	4	75g
Fats an energy source for moderate endurance work	<30% (<10% saturated)	<600 calories (<200)	9	66g (<22g)
Carbohydrates to fuel high intensity work (sprinting, tackling) & also endurance element	~ 55-65%	1100-1300 calories	4	275-325g

Proteins

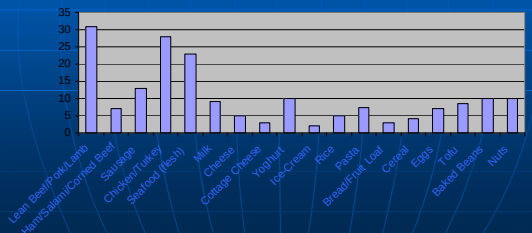
- Structural (muscle/bone) & Functional (hormones /enzymes) role within the body
- Made up of 'building blocks' called amino acids
- Satiating effect
- Late in exercise when glycogen stores become depleted, protein will contribute as a energy source



Sourcing Proteins

In contrast with carbohydrates, foods supplying a good source of protein are typically of animal origin

Protein content (gm/serve)



Fat Intake

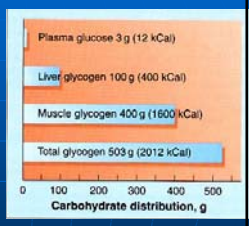
- Some fats considered less desirable due to their implication in some diseases
- Saturated fat: Animal origin (dairy/meat) <10% of energy intake
- Unsaturated fat: Plant origin (oils).
- Generally, hard fats (solid) have higher saturated fat than oils which have higher unsaturated fat

Fat as an Energy Store

- Enough energy stored in fat to supply energy for a 1700 kilometre run
  - 80 kg male 15% body fat
  - ~108,000 Cal
- At rest and during light-to-moderate exercise we get approximately 50% of our energy from CHO and 50% from fat
- As exercise intensity increases we rely more on CHO and less on fat

Carbohydrates ~ premium fuel

- Stored in limited amounts within the body (enough to power a run of around 30 km)
- Preferred fuel for exercise
- Depletion amounts to fatigue
- Vital to restore & maintain these 'glycogen stores' to allow for peak performance



Sourcing Carbohydrates..

The two main sources of carbohydrates in the diet that provide energy are **simple** and **complex**.

Simple: fruit, vegetables, honey, jam, milk & biscuits/cakes

High Glycemic Index

Complex: cereals, grains, pasta, potatoes, breads & rice

Low Glycemic Index

Glycemic Index Range

Low GI	Medium GI	High GI
55 or less	56 - 69	70 or more
Slower and lower rise in blood glucose levels	Blood glucose levels to go up at a moderate rate	Rapid rise in blood glucose levels
Breads Burgen Soy-Lin®, Vogel's honey and oat® **Breakfast Cereals** All Bran®, porridge, Special K®, Rice Bran **Grains** Barley, Pasta (all types), Noodles, Bulgur, semolina **Legumes** All Beans (eg kidney, soy, baked bean), peas, and lentils **Starchy Vegetables** Sweet potato, taro **Fruit** Cherries, grapefruit, peach, dried apricots, apple, pear, plums, orange, grapes, kiwi fruit, banana **Other** Skim milk, Plain Yogurt, Soy beverage, Chick peas	**Breads** Hamburger bun, rye bread, croissant, light rye, crumpet, wholemeal, Whole wheat bread **Breakfast Cereals** Oatbran, untoasted muesli, Just Right®, Nutri Grain®, Sustain®, Weet-Bix® Shredded wheat cereal **Grains** Basmati rice, wild rice, Sunrice Doongara® rice, couscous, cornmeal, tapioca, Brown rice **Legumes** New potato **Starchy Vegetables** Sultanas, raw and canned apricots, mango, paw paw, raisins, rockmelon, pineapple **Fruit**	**Breads** White bread, bagel, gluten-free bread **Breakfast Cereals** Sultana Bran®, Bran Flakes®, Coco Pops®, Puffed Wheat®, Rice Bubbles®, Rice Krispies™, Cornflakes® **Grains** Brown rice, calrose rice, jasmine rice, Instant rice **Legumes** Broad beans **Starchy Vegetables** Other potatoes, parsnip, Instant mashed potatoes, Baked white potato, french fries, **Fruit** Watermelon, Dried dates **Other** Ice cream, Table sugar (sucrose) Soda, crackers, Jellybeans

food	glycemic index
sugars	
glucose	100
honey	87
fructose	20
fruits	
apples	36
oranges	40
bananas	65

food	glycemic index
vegtables	
soybeans	15
kidney beans	30
lentils	25
yams	46
white potatoes	70
carrots	90

grains	glycemic index
whole wheat spaghetti	40
buckwheat pancakes	45
oats	48
white flour spaghetti	56
brown rice	60
whole wheat bread	64
white flour pancakes	66
white rice	70
white bread	76

Nutrient Information Inquiry
Calculation of Nutrient Quantity of Food
(Marco Nutrients)

Food Item	Serving Size (g or mL)	Energy (kcal)	Protein (g)	Carbohydrate (g)	Total Fat (g)	Saturated Fat (g)	Trans Fat (g)	Cholesterol (mg)	Dietary Fibre (g)	Sugars (g)	Calcium (mg)	Sodium (mg)
Breakfast												
HK style milk tea (sweetened)	240.00	108.00	5.52	8.64	5.76	3.12	NA	16.56	NA	NA	177.60	84.00
Ham and egg sandwich	306.00	734.40	33.66	64.26	36.72	10.10	NA	459.00	4.59	7.65	113.22	1346.40
Breakfast Sub-total	**546.00**	**842.40**	**39.18**	**72.90**	**42.48**	**13.22**	**0.00**	**475.56**	**4.59**	**7.65**	**290.82**	**1430.40**
Morning Snack												Mo
Morning Snack Sub-total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Lunch												
Fried rice in Fujian-style	500.00	700.00	30.00	95.00	23.50	4.50	NA	205.00	9.00	2.45	60.00	1600.00
HK style milk tea (sweetened)	240.00	108.00	5.52	8.64	5.76	3.12	NA	16.56	NA	NA	177.60	84.00
Lunch Sub-total	**740.00**	**808.00**	**35.52**	**103.64**	**29.26**	**7.62**	**0.00**	**221.56**	**9.00**	**2.45**	**237.60**	**1684.00**
Afternoon Snack												Afte
Afternoon Snack Sub-total	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Dinner												
Soft Drink, Lemonade	200.00	82.00	0.00	20.80	0.00	0.00	NA	0.00	0.00	20.80	2.00	32.00
Steamed rice with stewed eggplant and shredded salty fish	500.00	700.00	17.50	95.00	29.50	7.00	NA	18.00	Trace	5.00	38.50	1250.00
Dinner Sub-total	**700.00**	**782.00**	**17.50**	**115.80**	**29.50**	**7.00**	**0.00**	**18.00**	**0.00**	**25.80**	**40.50**	**1282.00**
Other Occasions												Oth
Instant noodles in soup with luncheon meat and egg	160.00	224.00	7.84	19.20	13.44	4.32	NA	65.60	Trace	0.83	22.40	640.00
Other Occasions Sub-total	**160.00**	**224.00**	**7.84**	**19.20**	**13.44**	**4.32**	**0.00**	**65.60**	**0.00**	**0.83**	**22.40**	**640.00**
Serving Total	**2146.00**	**2658.40**	**100.04**	**311.54**	**114.68**	**32.16**	**0.00**	**780.72**	**13.59**	**36.73**	**591.32**	**5036.40**

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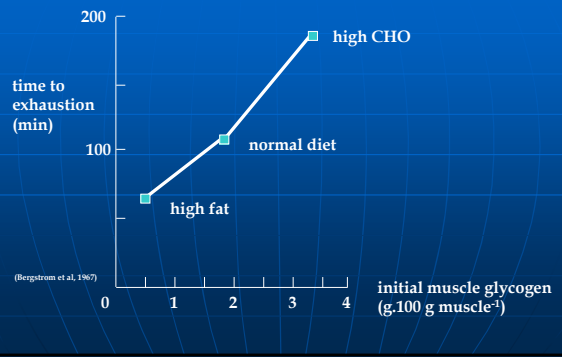
	Sizes (g/mL)	Energy (kcal)	Protein (g)	Carbohydrate (g)	Total Fat (g)
HK style milk tea (sweetened)	240	108	5.52	8.64	5.76
Ham and egg sandwich	306	734.4	33.66	64.26	36.72
Breakfast Sub total			**18.33%**	**35.00%**	**45.00%**
HK style milk tea (sweetened)	240	108	5.52	8.64	5.76
Fried rice in Fujian-style	500	700	30	95	23.5
Lunch Sub total			**20.44%**	**32.00%**	**48.00%**
Soft drink (lemonade)	200	84	0	21.6	0
Steamed rice with stewed eggplant and shredded salty fish	500	700	17.5	95	29.5
Dinner Sub Total			**10.00%**	**54.29%**	**37.93%**
Instant noodles in soup with luncheon meat and egg	160	224	7.84	19.2	13.44
Supper Sub total			**14.00%**	**34.29%**	**54.00%**
Daily Total	**2146**	**2658.4**	**100.04**	**312.34**	**114.68**
TOTAL			15%	47%	39%
IDEAL			*15%*	*55-65%*	*30%*

Race day Nutrition

- Race day emotions can suppress appetite & factors such as travel can disrupt familiar eating patterns.
- Leaves valuable glycogen stores in a sub-optimal state
- Experimenting with food intake prior to training sessions affords a safe route to ensuring beneficial pre-race nutrition.

Can we reduce fatigue?

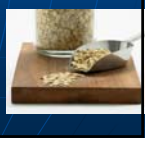


Muscle Glycogen & Exercise Duration

Muscle Glycogen Stores (approximate mmol/kg)							
		Day 1		Day 2		Day 3	
		2 hour run		2 hour run		2 hour run	
	Initial	Before	After	Before	After	Before	After
High CHO Diet	120	120	60	115	60	110	60
Low CHO Diet	120	120	60	60	30	40	15
High CHO Diet -- End of Day 3						105	
Low CHO Diet -- End of Day 3						20	

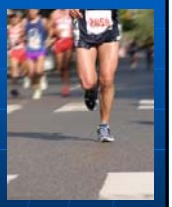
Carbohydrate Loading

- Technique used to enhance endurance in aerobic exercise events
- High CHO diet 24-48 hours days prior to event with decrease in training
- Boosts muscle glycogen 20-40% above normal
- 8-10 grams/kg BW (~ 600g)



Pre Exercise Nutrition

- Meal high in carbohydrates: 2g CHO/kg BW (~160g) that is low GI (e.g. porridge, whole grain toast)
- 2-3 hours prior to start
- Serves to load muscle's glycogen stores ensuring adequate energy for >90mins
- Good time to take on extra fluid to ensure optimal hydration (300-600ml)
- Low in fibre & fat with low-mod protein: minimise risk of stomach upsets



During Race Nutrition?

- During your race it is time to eat high GI foods that quickly release energy and give you a fast energy boost.
- Convenient foods on the run are energy bars, energy gels and sports drinks.
- Exercise > 1 hour ingesting CHO with fluid (4-8%) improves performance

Post-exercise nutrition goals

- Depletion of glycogen stores during exercise stimulates regeneration immediately following exercise
- Crucial if subsequent training/races will occur within 24 hours
- Aim: 1g CHO/kg BM immediately & at 2 hours post exercise or until normal meal pattern resumes
  - Electrolyte drink = easily consumed & good immediate source of energy
  - Snacks (banana, cereal bars & sandwiches) to ensure immediate food supply.

Hydration

- Body made up of about 70% water
- Ensures body can effectively maintain temperature without compromising performance.
- Thirst is NOT a good indicator of hydration
  - 1% of BW lost before you become thirsty
  - 2% = 10-15% drop in performance

Effects of Increasing Dehydration on Physical Performance

BODY WATER LOSS	EFFECTS
0.5%	Increased strain on the heart
1%	Reduced aerobic endurance
3%	Reduced muscular endurance
4%	Reduced muscle strength; reduced fine motor skills; heat cramps
5%	Heat exhaustion; cramping; fatigue; reduced mental capacity
6%	Physical exhaustion; heatstroke; coma

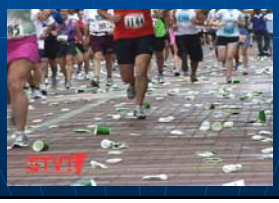
Excerpt from The Performance Zone by Dr. John Ivy

Fluid intake and exercise

- No advantage in being hyperhydrated (excess body water)
- A good hydration plan should include:
  - 300-600ml with pre-race meal
  - 150-300ml/20minutes until 45mins prior to exercise
  - 200ml of electrolyte every 15-20min during exercise
- Total rehydration post-exercise.
  - Weight lost during exercise represents water therefore 1kg loss is approximately 1l water.

Fluid intake and exercise

- Exercising at moderate intensity < 1 hour: no need to drink fluid or take in energy
- Exercise > 1 hour ingesting CHO with fluid (4-8%) improves performance
- Exercise > 2 hours, drinks should contain sodium



"There are no magic foods!"

- CHO and water are the most important nutrients for athletes
- Never try anything new on race day
- Choose foods low in fibre & fat with low-moderate protein in order to minimise risk of stomach upsets
- Liquid options for a pre-event meal are an alternative option for those who prone to stomach problems during race day.

Good Luck!