Nutrient Timing

SPORTS &
EXERCISE NUTRITION

NUTRIENT TIMING

NUTRIENT TIMING

NUTRITION FACTORS CAUSING FATIGUE

- Depletion of glycogen stores
- Low blood sugars (hypoglycaemia)
- Dehydration
- Hyponatremia
- Gastrointestinal upset and discomfort

NUTRITION BEFORE EXERCISE

- Maximise glycogen stores
- Ensure liver glycogen stores are filled
- Optimal hydration status
- Avoid starting out hungry, whilst avoiding gastrointestinal discomfort

CARBOHYDRATES:

4-24 hours before (mainly for prior to competitions)

- CHO should compost the majority of each meal & snack (60-70%)
- Always aim to have a full tank when you begin exercising

0-4 hours before

- Aim to consume food & drinks that can be easily digested
- Avoid going into a training session/event hungry
- Aim for 1-4g/kg or 0.45-1.81g/lb of CHO

Ex: 65kg/143lb cyclist aims for 1-4g in the 4 hours prior to event 65-260g of CHO

Meals	CHO (g)
Orange Juice (150ml), wheat biscuit cereal (30g), milk (150ml)	40.5 g
Porridge/oatmeal (60g), milk (100ml), banana (medium)	70.6 g
2 slices wholegrain bread, butter, banana (medium), orange juice (150ml)	67.5 g
Wholegrain pasta (100g), tomato (30g), spinach (30g)	34 g
Quinoa (100g), hummus (1tlbsp)	66.1 g

Snacks	CHO (g)
Banana (medium), peanut butter (½ tblsp)	28.5 g
Carrot sticks (50g), hummus (3 tblsp)	11.3 g
Homemade Hypertonic sports drink (250ml)	20 g
Dried apricots (5 halves)	11 g
Oatcakes (3), peanut butter (1 tblsp)	21.3 g

PROTEINS

- Don't overlook protein with pre-exercise meals and snacks
- Pre-exercise nutrition has several benefits
    - increases muscle synthesis
    - decreases muscle protein breakdown
    - gradual delivery of nutrients
    - delays onset of hunger
- 4-24 hours before – similar to general guidelines (lesson 4)

1-4 hours before:

- 50g – 110g (2-4 oz)
- Need to find balance between pre-exercise PRO & CHO
- Avoid protein sources high in fat – take longer to digest

COMMON SOURCES OF PROTEIN

- Each portion contain approx. 10g of protein

Animal Sources	*Plant Sources*
35g cooked lean beef/pork/lamb	46g of almonds/pistachios/pumpkin seeds
40g skinless cooked chicken	110g lentils
25g skinless turkey breast	53g chickpeas
30g canned tuna	72g quinoa
50g salmon fillet	125g/8.5 tablespoons hummus
2 small eggs	37.5g/2.5 tablespoons peanut butter
300ml of milk	190g wholegrain pasta
136g/9 tablespoons natural yoghurt	4 slices of wholegrain bread
70g cottage cheese	90g porridge/oatmeal

FAT

- Increases satiety
- Avoid fat in the 4 hours prior to exercise
- May cause GI distress
- Experiment during training season to establish personal tolerance levels

NUTRITION DURING EXERCISE:

Carbohydrates:

- Delays fatigue in both long and short duration events
- Reduces reliance on stored glycogen
- Provides alternative sources of energy when glycogen levels are depleted
- Requirements will vary
- Glucose, sucrose, maltodextrins & starches
- Products that contain a mix of sugars may be valuable
- Consume in training lasting > 60 minutes
- Quantity required is determined by 2 main factors:
    - Rate of gastric emptying & intestinal absorption
    - Rate of consumed CHO used by the muscle
- Exercise > 60 mins consume between 30-90g per hour
- Experiment to see what suit you personally
- Sports drinks/CHO gels are convenient sources

PROTEIN

Protein ingestion during exercise thought to improve performance by:

- Energy production
- Reduction in fatigue
    - However currently no conclusive research
    - No established guidelines

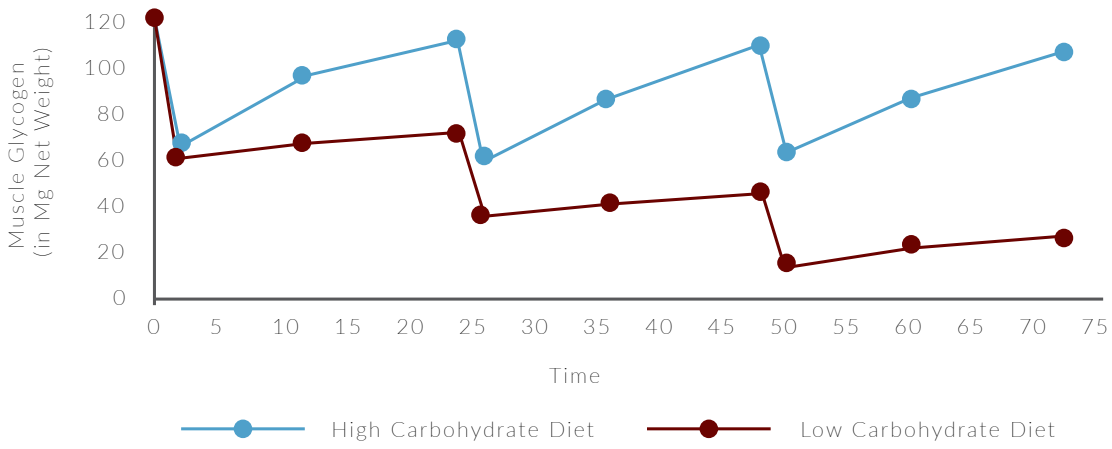
FAT

- Not recommended

NUTRITION POST EXERCISE

- Moderate intensity/duration = partially depleted glycogen stores
- High intensity/long duration = completely depleted glycogen stores
- Vital to replace these stores post exercise
- Muscle absorb blood glucose and restore glycogen at high rates with CHO are ingested within 2 hours
- Aim for high GI CHO
- Aim for 1-1.5g/kg or 0.45-0.8g/ pound
- Best to aim for post workout snack with 15-30 mins of workout completion
- And then again every 2 hours for 6 hours

THE EFFECTS OF DIET ON MUSCLE GLYCOGEN

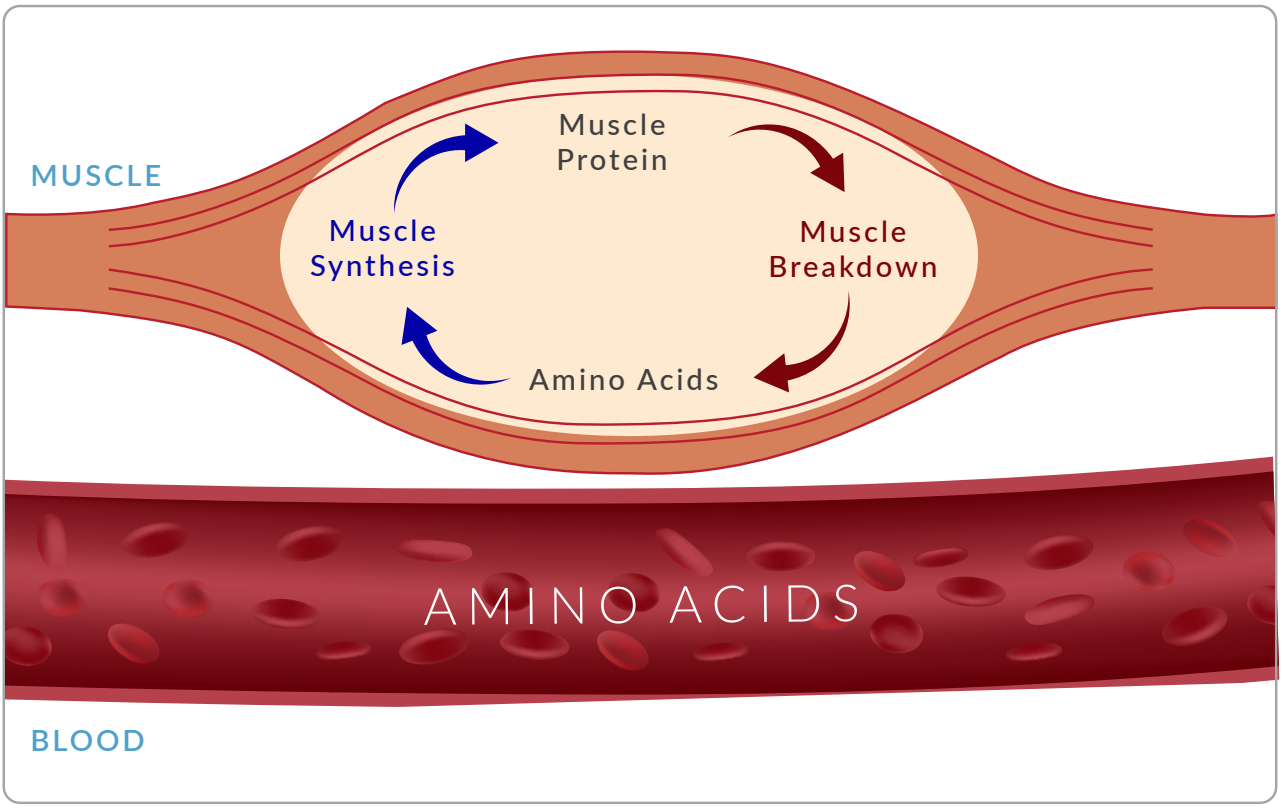


Food/Beverage	Carbohydrates (g)
Bagel (medium) + peanut butter (2 tbsp.)	45g
Tomato juice (12 fl oz/355ml)	16g
Dried apricots (5 halves)	11g
Post workout smoothie (50ml low fat milk, 2 tbsp. honey, 1 banana, 30g blueberries)	74g
Banana (medium)	27g
2 slices whole grain bread + jam (1 tbsp)	42
Pear (medium)	27
Bran Muffin (small)	24

PROTEIN

- Critical for recovery
- After exercise protein synthesis is increases
- Aim for sources that cause hyperaminoacidemia
- Whey & casein protein are high quality protein & contain high amount of BCAA's
- Soy protein also a good source of high quality
- Consumption of essential amino acids soon after exercise is of high importance
- 0.2g/kg BW or 0.09g/lb BW

SCHEMATIC OF PROTEIN BREAKDOWN & SYNTHESIS



HYPERTROPHY OCCURS WHEN

MUSCLE SYNTHESIS > MUSCLE BREAKDOWN

Food/Beverage	Carbohydrates (g)
Almonds 100g	22g
Pumpkin 100g	19g
Eggs (3 medium)	19g
Low fat milk (12 fl oz/355ml)	13g
Greek style natural yoghurt	11g
Chicken breast (100g)	23g
Turkey breast (85g)	34g
Peanut butter (4 tbsp.)	16g
1 slice turkey/ ham/ chicken	7g
Small tin tuna (100g)	19g

COMBINING CHO & PROTEIN AFTER EXERCISE

- Combining CHO and protein enhanced recovery
- Enhances protein and CHO intake into muscle cells
- High uptake of amino acids
- Aim for a 3:1 ratio

	Carbs (grams)	Protein
• 500ml of Chocolate Milk	60	20
• 1 banana and 2 boiled eggs	31	12
• 2 slices wholegrain toast & 1.5 tbsp. peanut butter	32	12
• 120g quinoa and 60g of chicken	55	17
• Smoothie: 500ml milk, 100g mixed berries, 1 tbsp. honey	52	17
• 3 oz/85g tofu, 1.5 cups mixed veg, 1 cup brown rice	20	8
• 1 pear, 50g cashew nuts	42	10

FAT

- Not essential to replace fats post exercise
- Training will not deplete fat stores
- Fats should be kept to a minimum
- Slow gastric emptying which may affect CHO and protein absorption

RECOVERY BETWEEN EVENTS

- Refuel and rehydrate as fast as possible
- Try consume 1g/kg or 0.45g/lb of CHO
- From high GI sources
- Drink 500ml fluid immediately and continue sipping
- Sports drinks will replace both glycogen and fluid
- Choose high GI foods that are easily absorbed

FASTED WORKOUTS

- May burn up to 20 percent more fat
- Workout after overnight fast may use fats for fuel
- However may also use amino acids
- Make sure you have protein post workout
- Fasted cardio may not be the best way to burn fat
- High-intensity training burns more calories and fat a post workout than low-intensitycardio
- If you are >8% BF for a man/16% BF for a woman HIIT and high intensity training may be better for fat loss

EARLY MORNING WORKOUTS

- May be unintentionally fasted
- Exercise after overnight fast may have catabolic affect
- BCAA supplement beforehand may counteract this affect
- Make sure you have protein post workout