



# HOUR OF POWER

Rowing WA

## **Sports Nutrition:** Fuelling for Rowing Performance

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# Overview

## Fuelling for Rowing

- Daily and weekly energy requirements
- Numbers AND Practical Examples
- Training and competition examples

## What happens when you don't get enough fuel?

- Signs/symptoms and consequences
- RED-S

## Weight loss and weight gain

- Training and nutrition strategies for lightweights and heavyweights

## Supplements



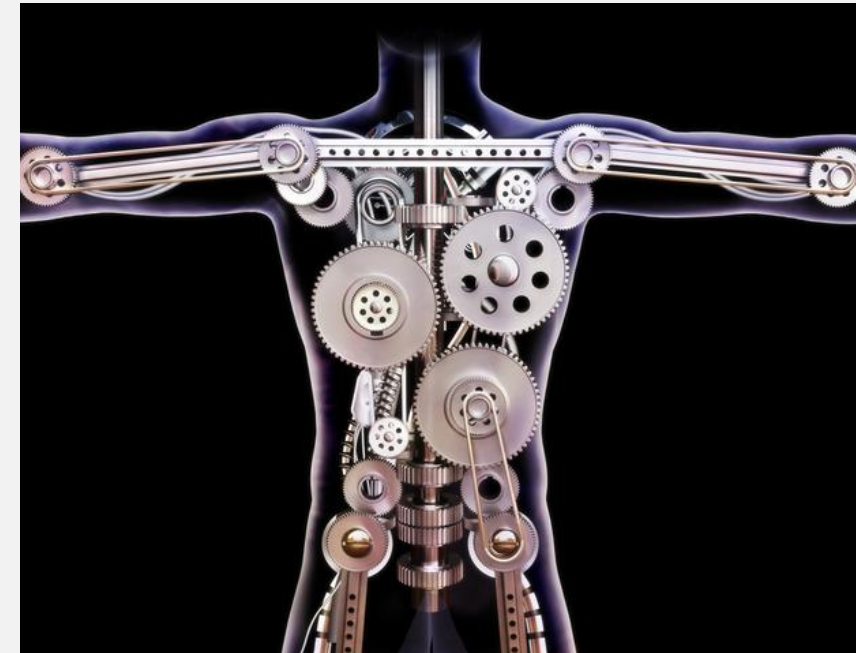
# Metabolic Rate (BMR/RMR)

The energy needed to fuel ventilation, blood circulation and temperature regulation

Energy is also required to digest and absorb consumed food and fuel the activities of daily life and structured exercise training.

Your total daily energy expenditure is made up of three components:

- 1) Metabolic Rate (BMR/RMR)
- 2) Energy required to metabolise your food
- 3) Energy needed for physical activity
  - Includes normal daily movement and structured exercise

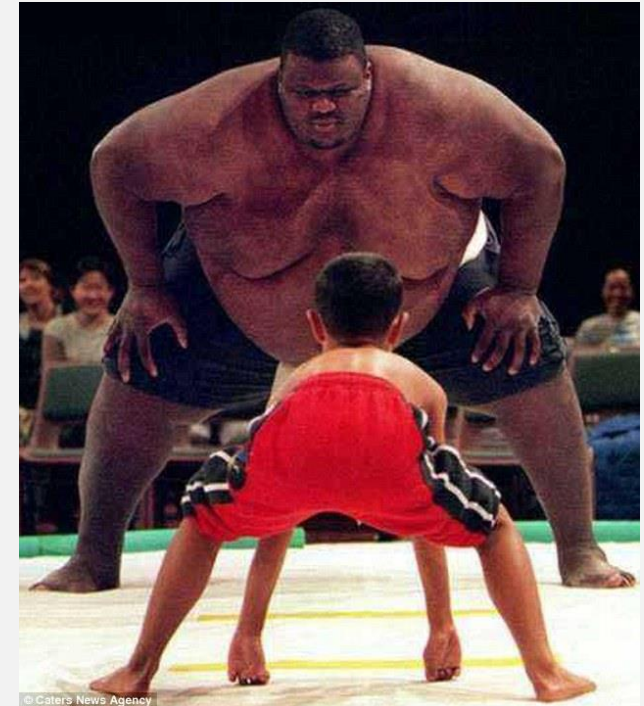


# Metabolic Rate

What factors affect it?

1. **Body composition:** Muscle >> Fat
2. **Age:** Young >> Old
3. **Body size:** Big >> Little (Organ function and temperature regulation)
4. **Gender:** Males>> Females
5. **Genetics:** Lucky >> Unlucky
6. **Physical activity:** Exercise >> Rest
7. **Environmental factors:** Hot & Cold >> Normal
8. **Diet:** Small meals >> Large meals. Caffeine etc.

\*\*Hormonal imbalances caused by certain conditions, including hypo- and hyperthyroidism, can also affect your metabolism.



# Daily Energy Needs

Metabolism + Lifestyle

What you would burn if you didn't train!

Influence of Age and Body weight

LW female > 60% > HW Male

KJ = ~4 x Kcal

Group	Approx. Age (Yr)	Av. BW LW-HW (kg)	Daily Energy Needs (KJ)
School Rowers (M)	16	65 - 80	9000 - 10500
School Rowers (F)		52 - 70	7000 - 8500
Club Rowers (M)	25	70 - 90	9000 - 11000
Club Rowers (F)		57 - 76	7000 - 8500
Elite Jnr/U21 Rowers (M)	19	70 - 90	9500 - 11500
Elite Jnr/U21 Rowers (F)		57 - 76	7500 - 9000
Elite U23/Snr Rowers (M)	23	70 - 95	9500 - 11500
Elite U23/Snr Rowers (F)		57 - 82	7500 - 9000
Masters Rowers (M)	40	70 - 95	8500 - 10500
Masters Rowers (F)		57 - 82	7000 - 8000

# Energy Cost (EC) of Exercise

Factors Affecting the EC of exercise

## Modality

- Weight bearing and non-weight bearing
- Full body vs. Partial
- Upright vs. Horizontal

## Intensity

- Fuel type?
- CHO vs. Fat

## Duration



# Energy Cost of Exercise

Approx. Energy Cost per Hour of Exercise (KJ/Kg of body weight)		
Activity Type	Low Intensity	High Intensity
Cycling/Swimming	20	40
Rowing	35	65
Running	40	70
Gym	25	45

Running almost 2 x greater than cycling for same intensity  
 Rowing  $\approx$  Running

## Examples

- 1 hour of light rowing for a 70 kg Female is approx.  $35 \times 70 = 2450$  KJ (585 Kcal)
- 45 min of moderate running for a 85 kg Male is approx.  $60 \times 85 \times 0.75 = 3825$  KJ (914 Kcal)



# Total Cost to Fuel the Machine!

Energy Requirements + Exercise Demands = TOTAL Daily (KJ)

Just a guide

Track training demands to get an idea of general requirements

Sport Dietician

Elite HW Female/Male eating close to double what a school level rower does!



Group	Training Hours (/week)	TOTAL Daily Requirements (KJ)		
School Rowers (M)	10	12500	-	15000
School Rowers (F)	10	10000	-	12500
Club Rowers (M)	15	15000	-	19000
Club Rowers (F)	15	12000	-	15000
Elite Jnr/U21 Rowers (M)	20	17500	-	22000
Elite Jnr/U21 Rowers (F)	20	14000	-	18000
Elite U23/Snr Rowers (M)	25	20000	-	25000
Elite U23/Snr Rowers (F)	25	15500	-	21000
Masters Rowers (M)	8	11500	-	15000
Masters Rowers (F)	8	9500	-	12000



# Example Training Week

Example Training week table for EC on different days.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Session 1	2 h Aerobic Row	2 h Aerobic Row	1 h Row (HARD)	-	1.5 h Aerobic Row	1 h Row (HARD)	-
EC (KJ)	5950/4900	5950/4900	5525/4550	-	4463/3675	5525/4550	
Session 2	1 h Gym	1 h Ergo (EASY)	1 h Gym	1 h Ergo (HARD)	30 min RUN (EASY)	3 h Cycle (EASY)	-
EC (KJ)	2125/1750	2975/2450	2125/1750	5525/4550	1700/1400	5100/4200	-
Session 3	-	1 h Cycle (EASY)	-	1 h Cycle (EASY)	1 h Gym	-	-
EC (KJ)	-	1700/1400	-	1700/1400	2125/1750	-	-
Total Exercise (KJ)	8075/6650	10625/8750	7650/6300	7650/6300	8288/6825	10625/8750	-
Total Daily EC (KJ)	18500/15000	21000/17000	18000/14500	18000/14500	19000/15000	21000/17000	10500/8500

85 kg Male/70kg Female

# ***Carbohydrate Quiz***

20 g + carbs / serve : **HIGH** : head

5 – 19 g carbs / serve : **MEDIUM** : shoulders

<5 g carbs / serve : **LOW** : hips



**12 g carbohydrates**

**MEDIUM**



**20 g carbohydrates**

**HIGH**





**25 g carbohydrates**

**HIGH**



**22 g carbohydrates**

**HIGH**



**29 g carbohydrates**

**HIGH**





**1.4 g carbohydrates**

**LOW**



**35 g carbohydrates**

**HIGH**



**0 g carbohydrates**

**LOW**



**1 original (610 mL)**

**Low fat strawberry  
squeeze**

**73 g carbohydrates**

**HIGH**





[dreamstime.com](http://dreamstime.com)

**0.6 g carbohydrates**

**LOW**



**Low fat vanilla  
yoghurt**

**(200 g)**

**25 g carbohydrates**

**HIGH**



**1 cup boiled white rice**

**58 g carbohydrates**

**HIGH**



**40 g carbohydrates**

**HIGH**

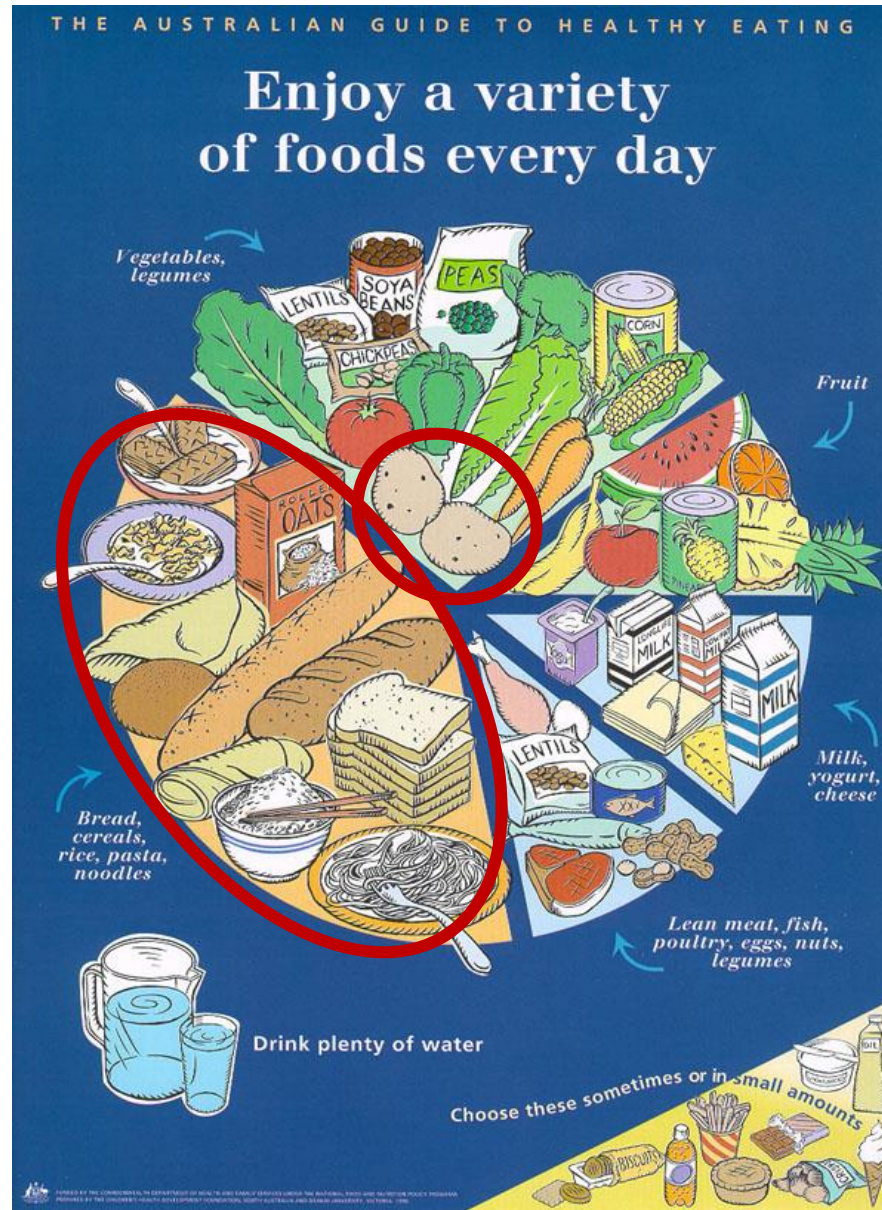




**0.6 g carbohydrates**

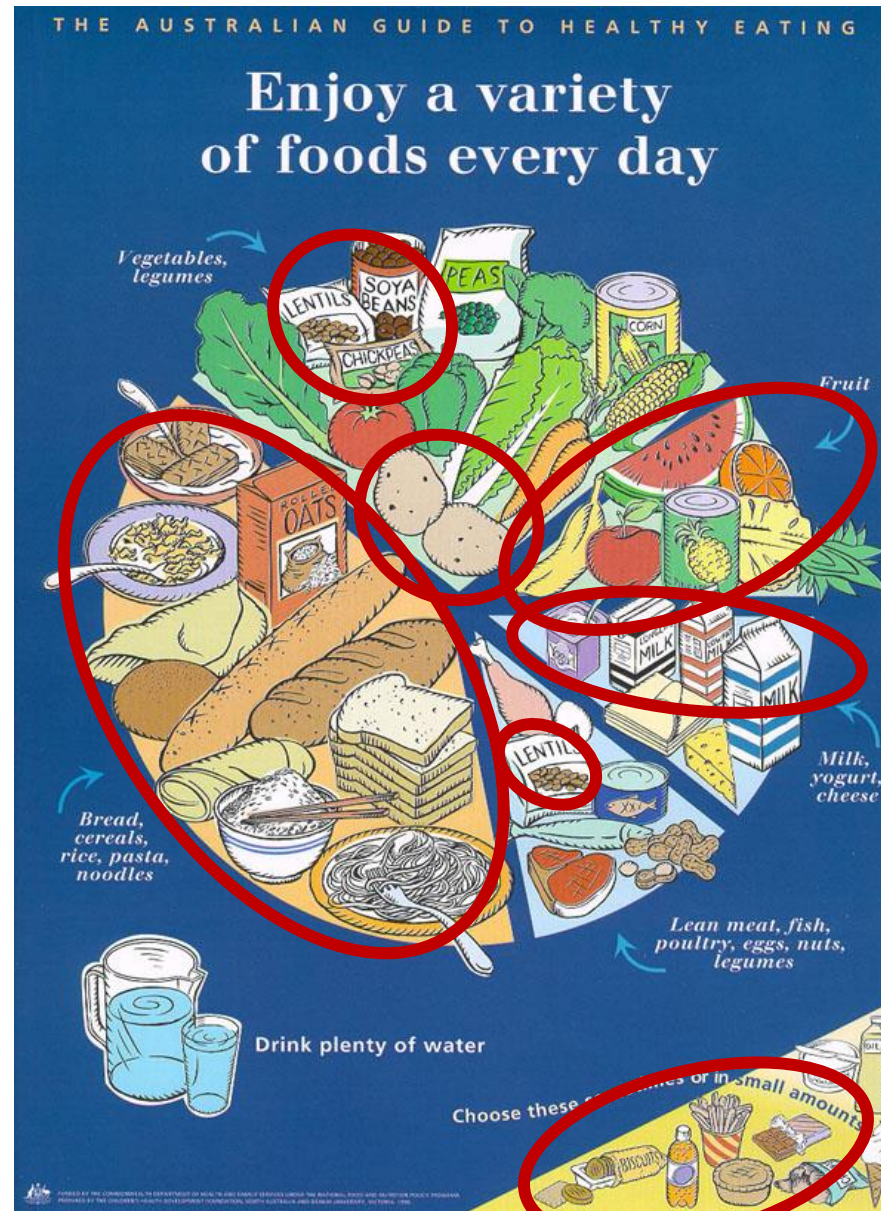
**LOW**

# CARBOHYDRATES





# CARBOHYDRATES





( \_\_\_\_\_ + \_\_\_\_\_ in food)

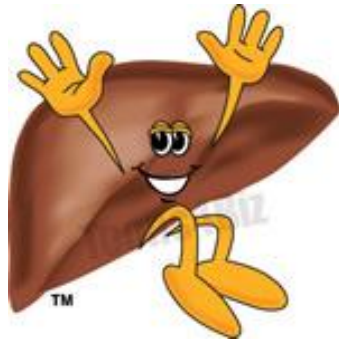


\_\_\_\_\_ in blood



\_\_\_\_\_

in LIVER



\_\_\_\_\_

in MUSCLES





# CARBOHYDRATES

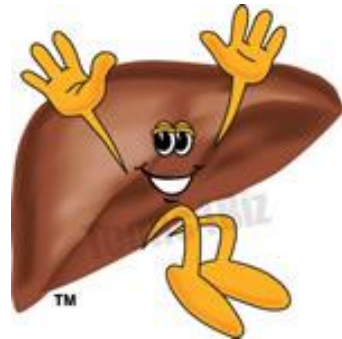
(starches + sugars in food)



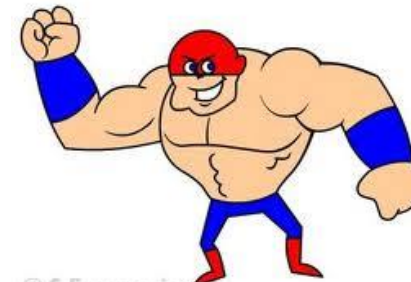
**GLUCOSE** in blood



**GLYCOGEN**  
in LIVER



**GLYCOGEN**  
in MUSCLES



# Training Nutrition

	FOCUS	TIMING	EXAMPLES
<b>BEFORE</b>	• <b>CARBS</b> ~1 g/kg	1 - 2 hrs before  ? less time if ... - tolerated - if liquid - if wt supported	Fruit Raisin toast Cereal Porridge Potato Rice/pasta etc Liquid options.... Next slide
<b>DURING</b>  <b>(and/or half time)</b>	• <b>HYDRATION</b>  ?Electrolytes ?Carbs  Depends on individual sweat rate	Regularly - as comfortable - at opportunities  General guide: 500 – 750 mL / hr	Water  Sports drink (carbs + elect)  Electrolyte only (eg. Shotz) if needed (long session / high sweat rate)



# BEFORE training – liquid options



dilute with water



# DURING LONG SESSIONS

## **Duration OVER 2 hrs**

- Sustained duration

Eg. endurance - cycling, running, triathlon, **rowing**

- **30 – 60 g carbohydrates / hour**

**(Up to 90 g carbohydrates / hour possible)**

# DURING LONG SESSIONS

Options each providing ~30 g CHO

- ~500 mL sports drink
- Banana
- 1-2 x Fruit puree
- 1 sports gel (with water)
- 3 - 4 snakes
- 10 -12 jellybeans
- 1 killer python
- 1 bar (eg. winners/muesli bar)
- Fry's Turkish delight

## Savoury options

- ▣ Vegemite sandwich
- ▣ Gelgimite gel
- ▣ 1 cold baked potato
- ▣ 1 serve DEB mashed potato
- ▣ Savoury mashed potato 'gel' (DIY)

# Recovery Nutrition

	FOCUS		EXAMPLES
AFTER	<u>R</u>		
	<u>R</u>		
	<u>R</u>		

# Recovery Nutrition

	FOCUS		EXAMPLES
<b>AFTER</b>	<b><u>REFUEL</u></b> glycogen stores	<b>CARBS</b>  ~1g / kg	Fruit Potato Rice/pasta etc Grainy bread Yoghurt Milk Smoothie Sandwich/toast – with egg/tuna/meat
	<b><u>REPAIR</u></b> muscle damage	<b>PROTEIN</b>  15 – 25g	
	<b><u>REHYDRATE</u></b> fluid losses	<b>FLUID</b>  Replace fluid losses + 25 – 50 %	Water  Milk  Coconut water / sports drink

# RECOVERY MEALS



# Example Training Week

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Total Exercise (KJ)	8075/6650	10625/8750	7650/6300	7650/6300	8288/6825	10625/8750	-
Total Daily EC (KJ)	18500/15000	21000/17000	18000/14500	18000/14500	19000/15000	21000/17000	10500/8500

85 kg Male/70kg Female

# High energy day (eg. Tuesday 20,000 kJ +)

<b>Pre train</b>	Banana, 3 tbsp Sustagen Sport + 200mL milk	2000 kJ
During / between	600 mL Gatorade, Turkish delight	15000 kJ
<b>Post train</b>	Chobani yoghurt, handful almonds	1400 kJ
Breakfast	3 eggs + 4 slices toast mushroom, spinach, tomato	4000 kJ
MT	Apple, strawberries	400 kJ
Lunch	150g Lamb 1.5 cups quinoa + salad (avo, brocc, tom, spin) 200mL 100% orange Juice	3800 kJ
<b>AT / Pre train</b>	2 slices raisin toast + jam	1000 kJ
<b>Recovery</b>	banana pancake / muesli bar	700 kJ
Dinner	200g Salmon, 2 cups cooked rice asparagus, broccoli, carrot	4500 kJ
Supper	DIY smoothie (blueberries, milk, SMP)	1800 kJ

**Energy: 21,000 kJ**  
**Carbs: 570g (44%)**  
**Protein: 245g (20%)**  
**Fat: 180g (34%)**

**Fibre: 55g**  
**Iron 27 mg**

# LOW energy day (eg. Sunday 10,000 kJ )

Breakfast	2 eggs + 1 slice toast mushroom, spinach, tomato cappucino	3000 kJ
MT	Apple, strawberries	400 kJ
Lunch	Tuna + salad (avo, 4 bean mix, corn etc)	2000 kJ
AT	Chobani yoghurt, handful almonds	1400 kJ
Dinner	Steak, BBQ veg, 2 potatoes, 1 slice fresh bread	3000 kJ
Supper	ice cream, blueberries	1100 kJ

**Energy: 10,900 kJ**  
**Carbs: 200g (30%)**  
**Protein: 135g (21%)**  
**Fat: 130g (45%)**

**Fibre: 40g**  
**Iron 18 mg**



# - carb confusion -



**LOW CARB**

**vs**

**HIGH CARB**



**VS**



***SMART CARB***



**periodise intake specific to variation in training  
(volume/intensity/duration)**

# Competition Nutrition

*What to eat the night before comp?*

*How soon before racing do I eat?*

*What do I need to eat/drink after racing?*

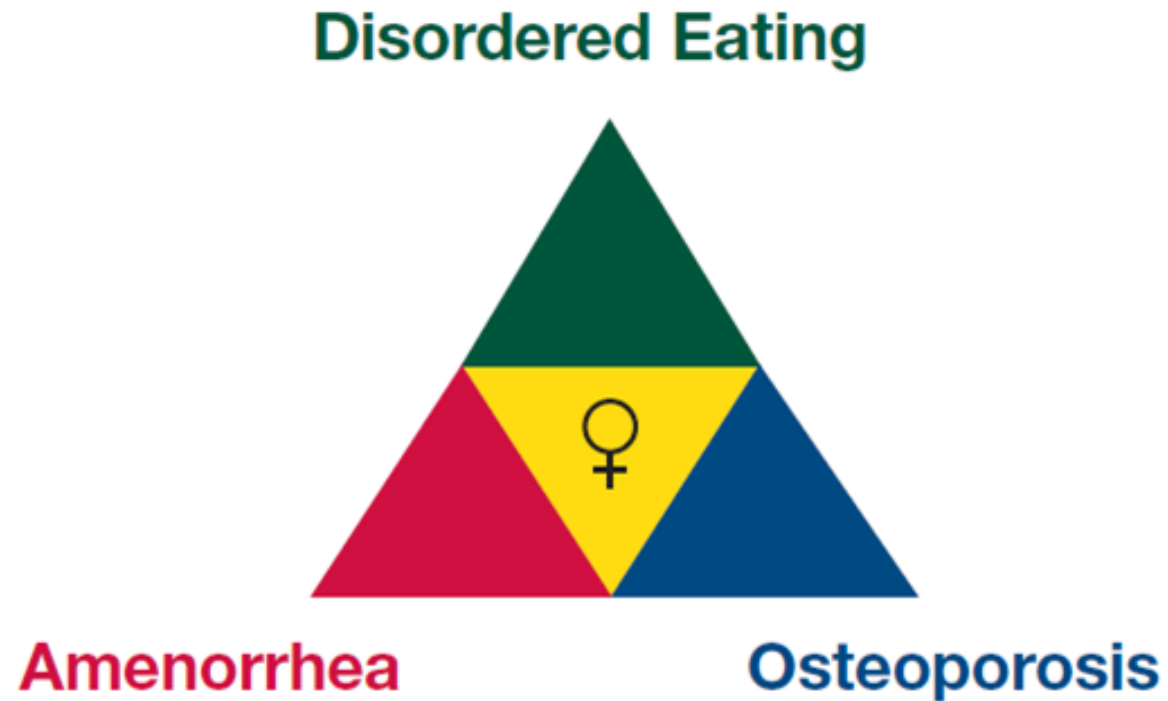
*If I only have a short gap between races (30 min) do I need to eat again?*



# What happens when you don't get enough?

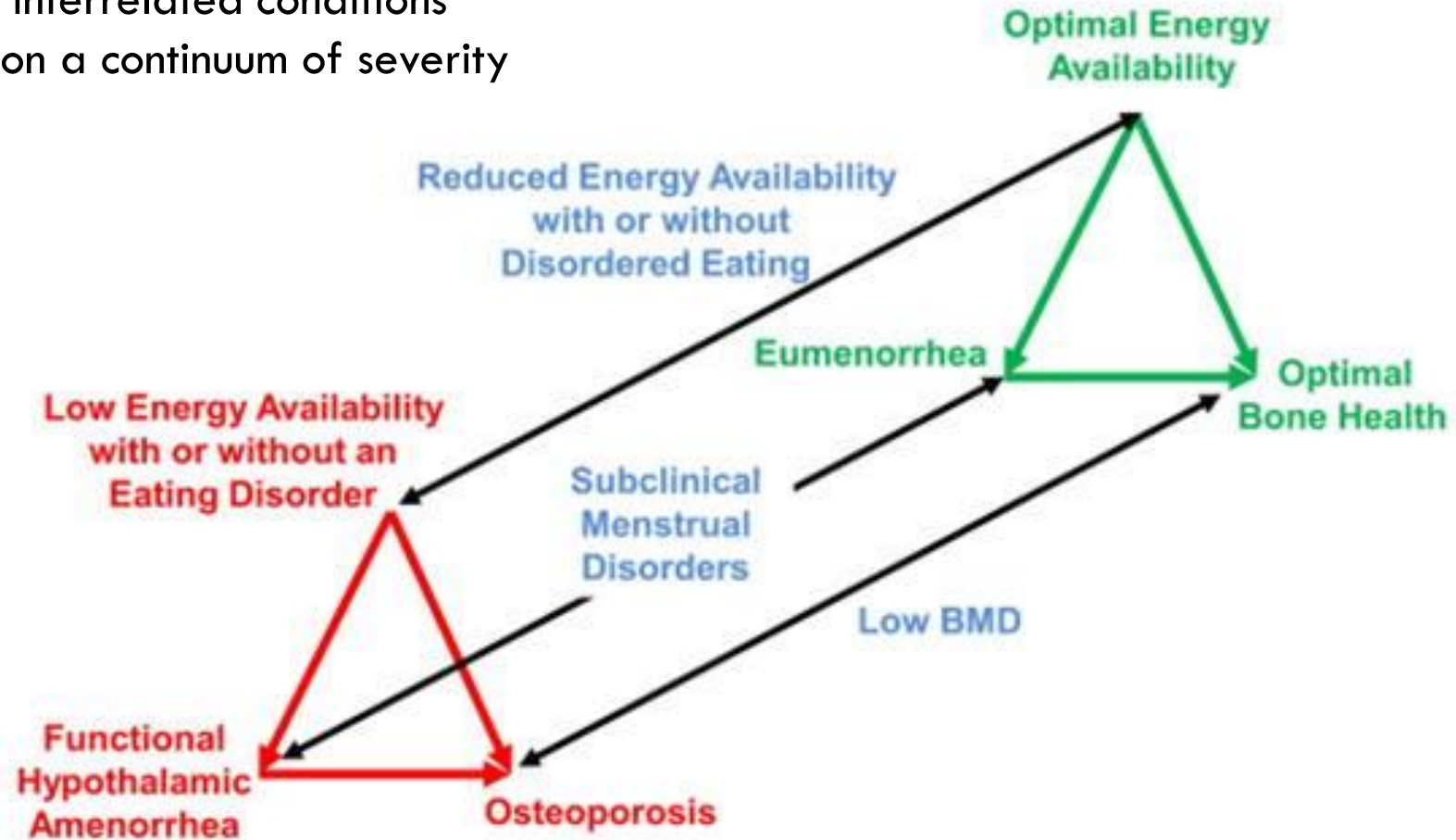


# **(Original) Female Athlete Triad**



# Current Female Athlete Triad

- three interrelated conditions
- exist on a continuum of severity



*Image source: 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad*

# Energy availability

**Energy availability** = Energy intake – Exercise energy

(expressed per kg Fat Free mass or Lean Mass)

- Growth
- Movement  
(exercise and activity)
- Thermoregulation
- Cellular maintenance
- Reproduction etc

**Energy needed to support  
various body systems**

# Energy availability

**LOW Energy availability** = Energy intake – Exercise energy

(expressed per kg Fat Free mass or Lean Mass)

- Growth
- Movement (exercise and activity)
- Thermoregulation
- Cellular maintenance
- Reproduction etc

Energy **insufficient** to support various body systems

```
graph TD; A[Energy insufficient to support various body systems] --> B[Sacrifice body energy stores]; A --> C[Sacrifice energy requiring functions];
```

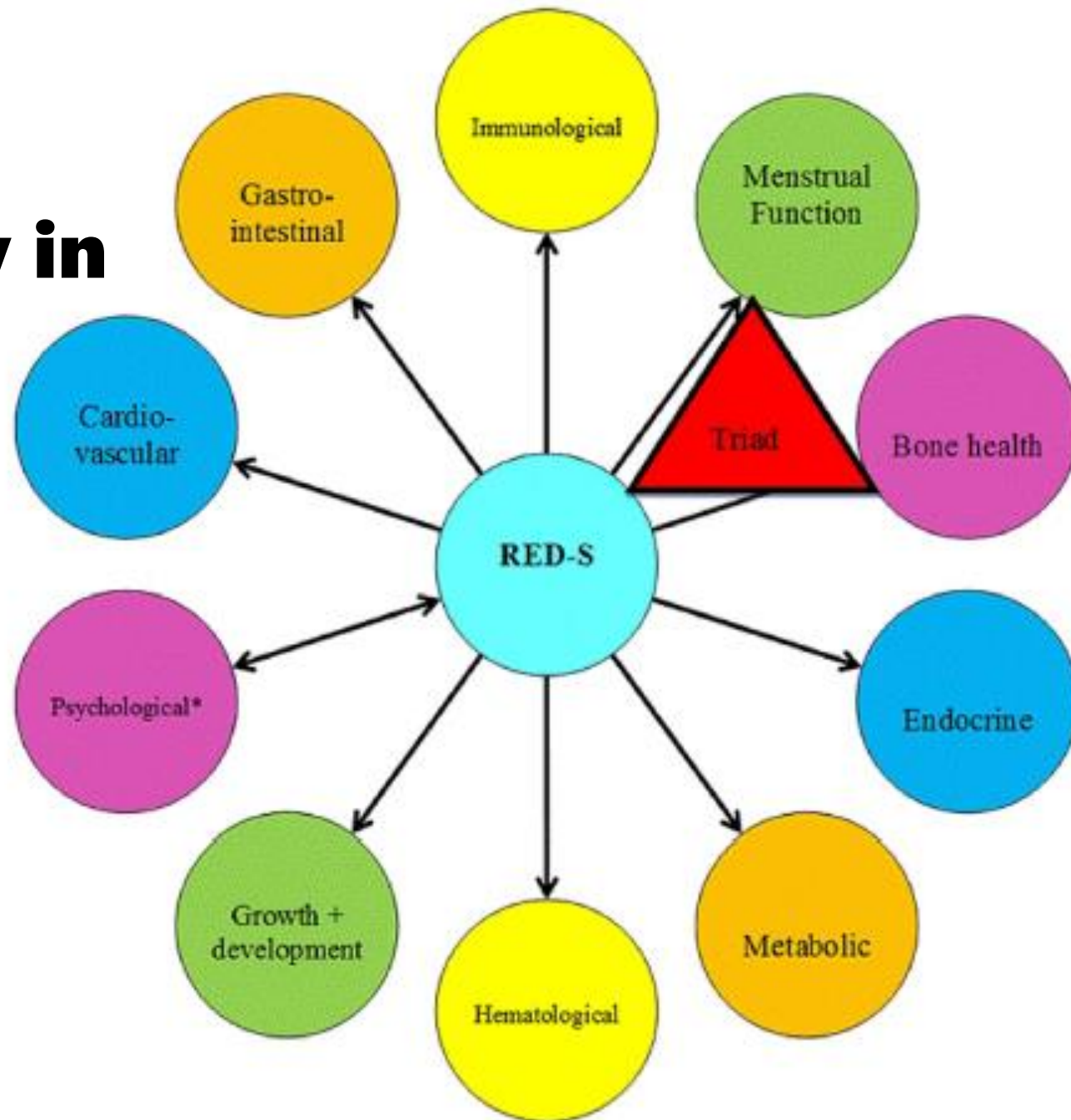
Sacrifice body energy stores

Sacrifice energy requiring functions



# Relative Energy Deficiency in Sport (RED-S)

- recent concept
- expands on the female athlete triad
- low energy availability is not just a female problem
- males affected also





# Low EA in practice

## New strategies to monitor and diagnose @ WAIS

- RMR testing in lab (can be done in training week, overnight fast)
- Relative to lean tissue demands of body

## Suppressed RMR when energy in $\neq$ energy out

- $\downarrow$  energy available for basic metabolic functions.
- $\downarrow$  hormone production (i.e. oestrogen and testosterone)
- $\downarrow$  bone density
- $\downarrow$  immune function
- $\downarrow$  ability to lose body fat amongst other things.

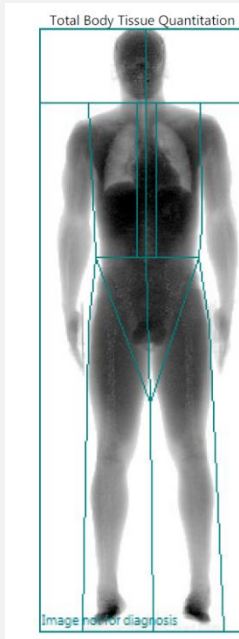
## How?

Basic understanding of Demands (Exercise Diary) vs. Intake (Food Diary)

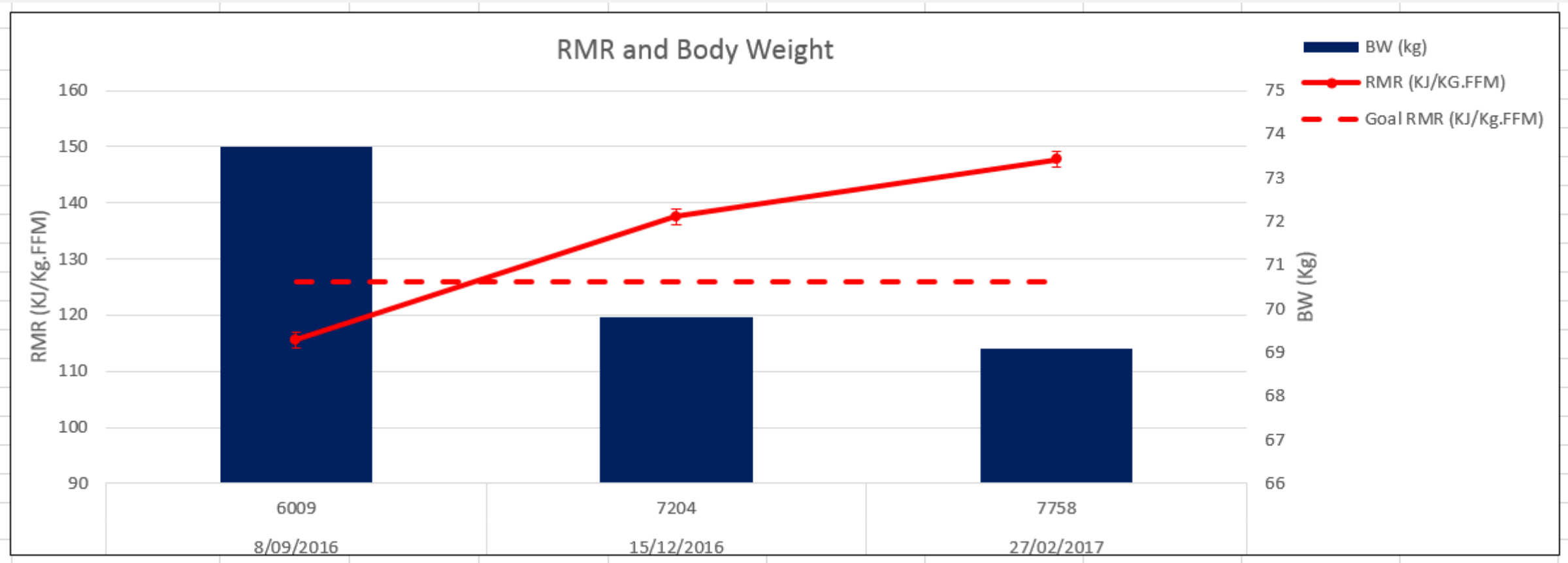
If Concerned see an Accredited Sports Dietician

UWA Exercise Performance Centre (EPC)

<http://www.sseh.uwa.edu.au/community/epc>



# Low EA – Case Study



- What do you really need and what is your balance?
- Increase intake 1000-1500 KJ/day towards target (week by week) (\*\*Muesli bar or Sustagen)
- ~1-3 months reset

# Weight Gain

## Why?

- Junior to Senior Transition
- Size and Strength = Powerful and Robust Athlete (Train Heavy)

## How?

- +ve energy balance 2000-4000 KJ/day
- 1.2-2g protein/ kg body weight (100 g + for 80kg Male)
- Timing (CHO rich and 10-20g Protein within 30 min of training) – recovery and growth of muscle

## Training?

- What type of gym? 4-5 sets of 8-15 reps (limited rest)
- What if I just want strength (i.e. lightweight) 3-5 sets < 8 reps more rest (HEAVY)
- Neural vs. Metabolic

## What to expect?

- 1-3 kg/month possible but be patient





# PROTEIN



# protein requirements

<b>Group</b>	<b>Protein requirements (g / kg body wt / day)</b>	<b>85 kg male (g protein/day)</b>
<b>Adults, non-athletes</b>	<b>0.80</b>	<b>68</b>
<b>Recreational athletes</b>	<b>1.0</b>	<b>85</b>
<b>Strength athletes (steady state)</b>	<b>1.0 – 1.2</b>	<b>85 - 102</b>
<b>Strength athletes (early training)</b>	<b>1.5 – 1.7</b>	<b>127 - 145</b>
<b>Power sports, football</b>	<b>1.4 – 1.7</b>	<b>119 - 145</b>
<b>Endurance athletes</b>	<b>1.2 – 1.4</b>	<b>102 - 119</b>
<b>Elite endurance athletes</b>	<b>1.6</b>	<b>136</b>
<b>Adolescent athletes</b>	<b>1.4 – 1.8</b>	<b>119 - 153</b>

## Actual daily intake of protein (g/kg/day):

Average Australian adult eats 1.0 – 1.5 +

Female athlete, average 1.0 – 2.8

Male athlete, average 1.5 – 4.0

# Protein

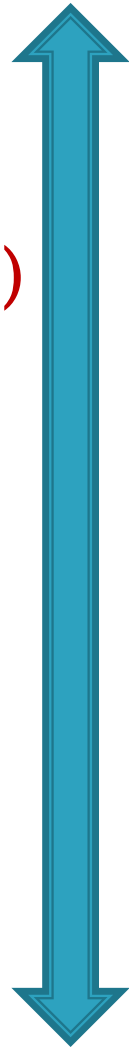
## Am I getting enough?

### Higher requirements

(larger, male, early strength training)  
eg. 95 kg male @ 1.7g/kg

### Lower requirements

(smaller body, recreational exercise)  
eg. 60 kg female @ 1g/kg



~160 g  
protein/day

~60 g  
protein/day

# Protein intake – omnivore

Porridge 1 cup	15 g ptn	<b>75g protein</b>
2 eggs	10 g ptn	
160 g chicken/meat/fish	50 g ptn	

Tin tuna	15 g ptn	<b>160g protein</b>
1 cup baked beans	15 g ptn	
4 sl grainy bread	18 g ptn	
1 cup milk + 2 tbsp SMP	20 g ptn	
1 /3 cup almonds	8 g ptn	
1 cup cooked quinoa	8 g ptn	
200g yoghurt	15 g ptn	



# Protein intake – vegetarian

Porridge 1 cup (cow/soy)	15g ptn	<b>75g protein</b>
1 /3 cup almonds	8 g ptn	
4 sl grainy bread	18 g ptn	
40g roasted chickpeas	8 g ptn	
100g tofu (eg. in veg curry)	18 g ptn	
1 cup cooked quinoa	8 g ptn	
3 eggs	16 g ptn	<b>160g protein</b>
2 tblsp chia seeds	6 g ptn	
1 cup baked beans	15 g ptn	
200g yoghurt	15 g ptn	
Pea protein powder	22 g ptn	
2.5 cups mixed vegetables	10 g ptn	

# Weight Loss

## Why?

- Improve Power/Weight
- Weight restrictions
- Getting into shape after off-season!

## How?

- Planned energy deficit – what is safe/reasonable?
- ~2000-4000 KJ/Day (Moderate) *(Relative to you!)*
- Too much can drop RMR (15-30%) and have –ve impact
- Must keep CHO around training and recovery

## Training?

- Add in light activity where possible (best bang for your buck)

## What to expect?

- ~0.5 kg/week dependant on start point (1-4 kg/month)



# Short Term Lightweight Strategies

## Aim to be within 5 % of target

- Male (70 kg) - 73.5 kg
- Female (57 kg) - 60 kg

## Acute weight Loss Strategies

### *Hydration*

- 2-3% in the 2-3 days before weigh-in
- Mod energy restriction (2000-4000KJ/day), mild restriction of fluid and sodium

### *Low Residue*

- Moderate/high fibre to low fibre (residue) can result in acute loss of about 0.5-1 kg.
- Multigrain to white bread, high to low fibre cereal (rice bubbles), and reduce fruit and veg intake.

\*\*Normal fluctuation in evening vs. wake time: assess and manage.



# Supplements

## Food First Approach

### Protein from Diet (1.2-2.0 g/kg)

- Examples of protein rich sources to have after training

### Sport Supplements

- Very elite only
- Caffeine/Bicarb etc. (2-3 % very marginal vs. training)
- >95% of training improvements come from consistency & quality of training completed

### Nitrates (Dietary sources)

- Improve oxygen economy (5%) and maximal aerobic performance
- Leafy green and root vegetables (Beetroot, Spinach, Celery etc.)
- 3-5 days out (310-560 mg a day)
- ~200 g of beetroot/spinach/rocket/celery (1 beetroot = 100 g)



# QUESTIONS?

