

# Nutrition for sport



**Dr Niki Meston**

# Reasons for exercise

- For many children and young adults health improvement does not feature highly



- The desire to play or become a member of the team
- Have fun!

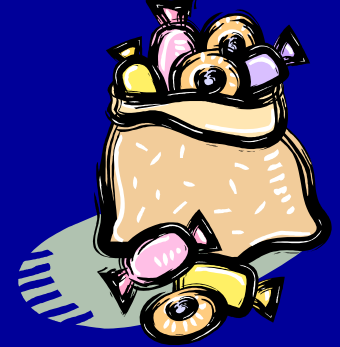


# Advantages of exercise

- Self-confidence
- Self-achievement
- Opportunity for development of 'healthy habits' for adult life
- Activity and energy expenditure



# Energy for activity



- Your body uses a type of sugar known as glucose as its main fuel supply
- Extra glucose can be rapidly released into the blood from glycogen stores in liver and muscles when needed
- Fat also provides a huge energy source, but this takes longer to become available

# Energy needs

- The way energy is used during physical activity and the sources of energy available all affect blood glucose levels
- How fast you move, how much force you produce and how long the activity continues affects the overall needs of the working muscles



# Energy requirements

- Endurance e.g. marathon running
- Strength e.g. gymnastics, weight lifting
- Speed e.g. sprinting
- Body weight changes

## Need to:

- Meet increased energy expenditure
- Meet individual nutritional requirements
- Allow for other alterations occurring e.g. growth spurts or puberty

# Energy sources used during exercise

**Carbohydrate**

**Fat**

**Protein**

# Carbohydrates

- Simple sugars
  - (high GI)
- complex sugars
  - (low GI)

# Carbohydrates

- Simple sugars

## Simple carbohydrates

Simple carbohydrates are found in foods such as fruits, milk, and vegetables

Cake, candy, and other refined sugar products are simple sugars which also provide energy but lack vitamins, minerals, and fiber



ADAM.

# Carbohydrates

- Simple sugars

complex sugars/  
starchy foods

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## Complex carbohydrates

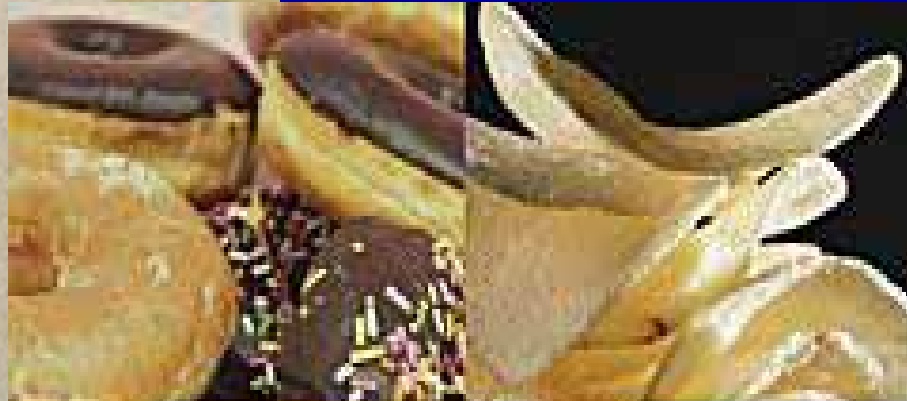
Complex carbohydrates provide vitamins, minerals, and fiber

Foods such as breads, legumes, rice, pasta, and starchy vegetables contain complex carbohydrates



ADAM.

# Fat



# Protein



# Energy sources used during exercise

**Carbohydrate**

**Fat**

**Protein**

# Energy sources used during exercise

**Carbohydrate**

**Glycogen stores,  
released as  
glucose**

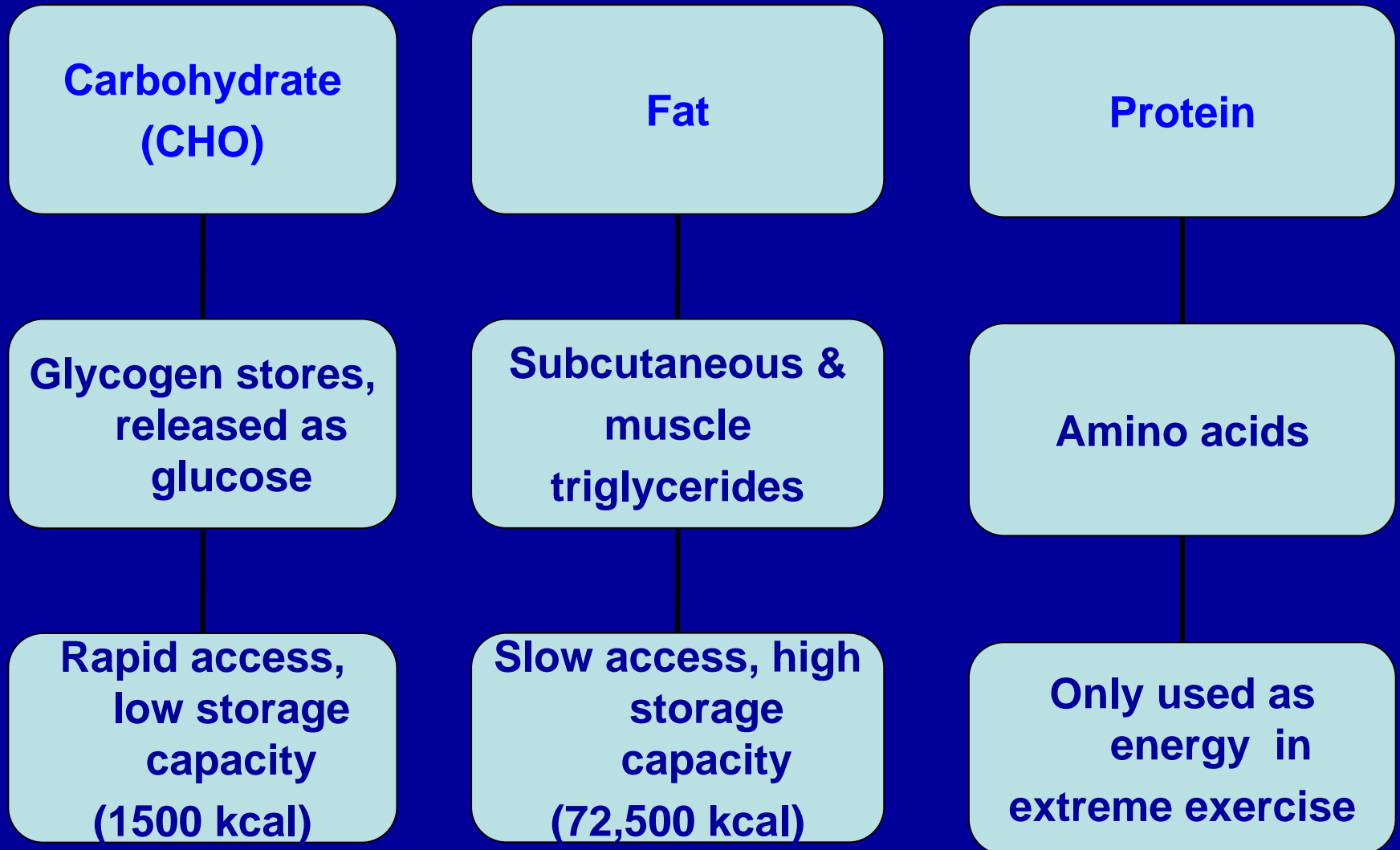
**Fat**

**Subcutaneous &  
muscle  
triglycerides**

**Protein**

**Amino acids**

# Energy sources used during exercise



# Food Intake

- Children 6-18 years need between 1,600 to 2,500 kcals basic intake daily
- Increased need for exercise
- Further increased during puberty or growth-spurts

# Food Intake

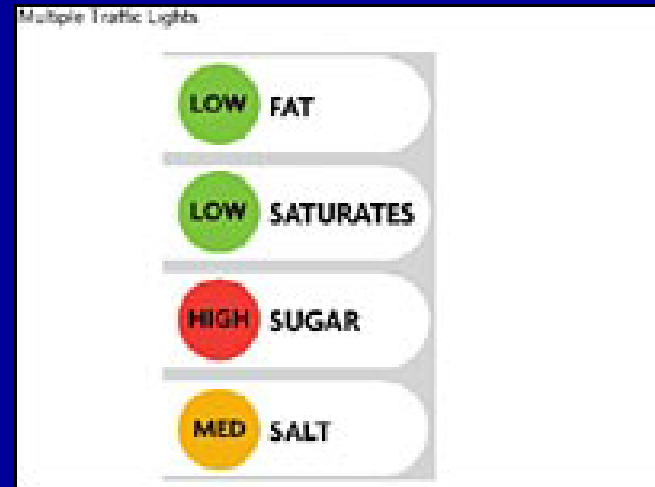
- Protein: 10%-30% of daily calories
- Carbohydrates: 45%-65% of daily calories
- Total fat: 25%-35% of daily calories

# Food labelling

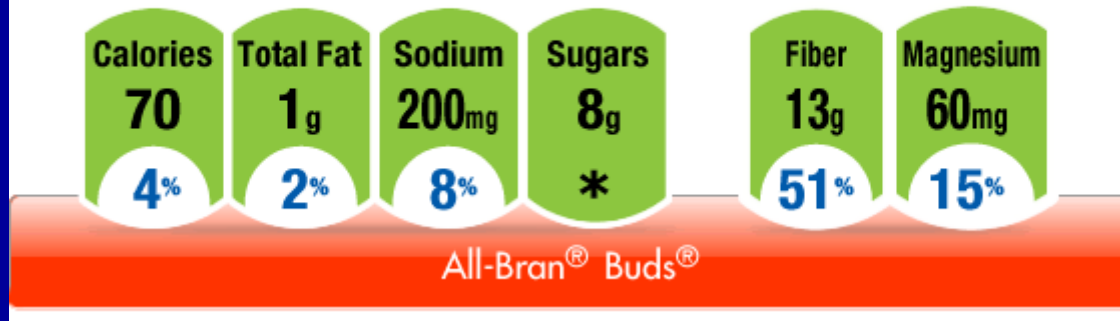
Nutrition		Per 1/2 cup	Per 100g
<i>Typical values (rounded as per instructions)</i>			
<b>Energy</b>		1615 kJ 380 kcal	3215 kJ 770 kcal
<b>Protein</b>		9.5g	19.0g
<b>Carbohydrate</b>		84.0g	168.0g
of which sugars		1.0g	2.0g
of which starch		83.0g	166.0g
<b>Fat</b>		0.7g	1.4g
of which saturates		0.1g	less than 0.3g
<b>Fibre</b>		3.5g	7.0g
<b>Salt</b>		2.5g	5.0g
of which sodium		1.0g	2.0g

	Guideline daily amounts for average adults	
	Women	Men
Calories	2000	2500
Fat g	70	95
Salt g	5	7



Each 1/3 cup (30g) serving provides these percentages of the GDA based on a 2,000 calorie diet.



**What type of energy is used  
in swimming?**



# Short duration <10 minutes

- Energy source:
  - Blood glucose
  - Breakdown of muscle glycogen



# Duration > 10 minutes

- Energy source:
  - Muscle and liver glycogen breakdown
  - Blood glucose and some fatty acids



# Endurance exercise > 90 minutes

- Energy source:
  - Increasing contribution of energy from fat
  - Coincides with lowered glycogen stores
  - Running out of glycogen stores is strongly associated with exhaustion

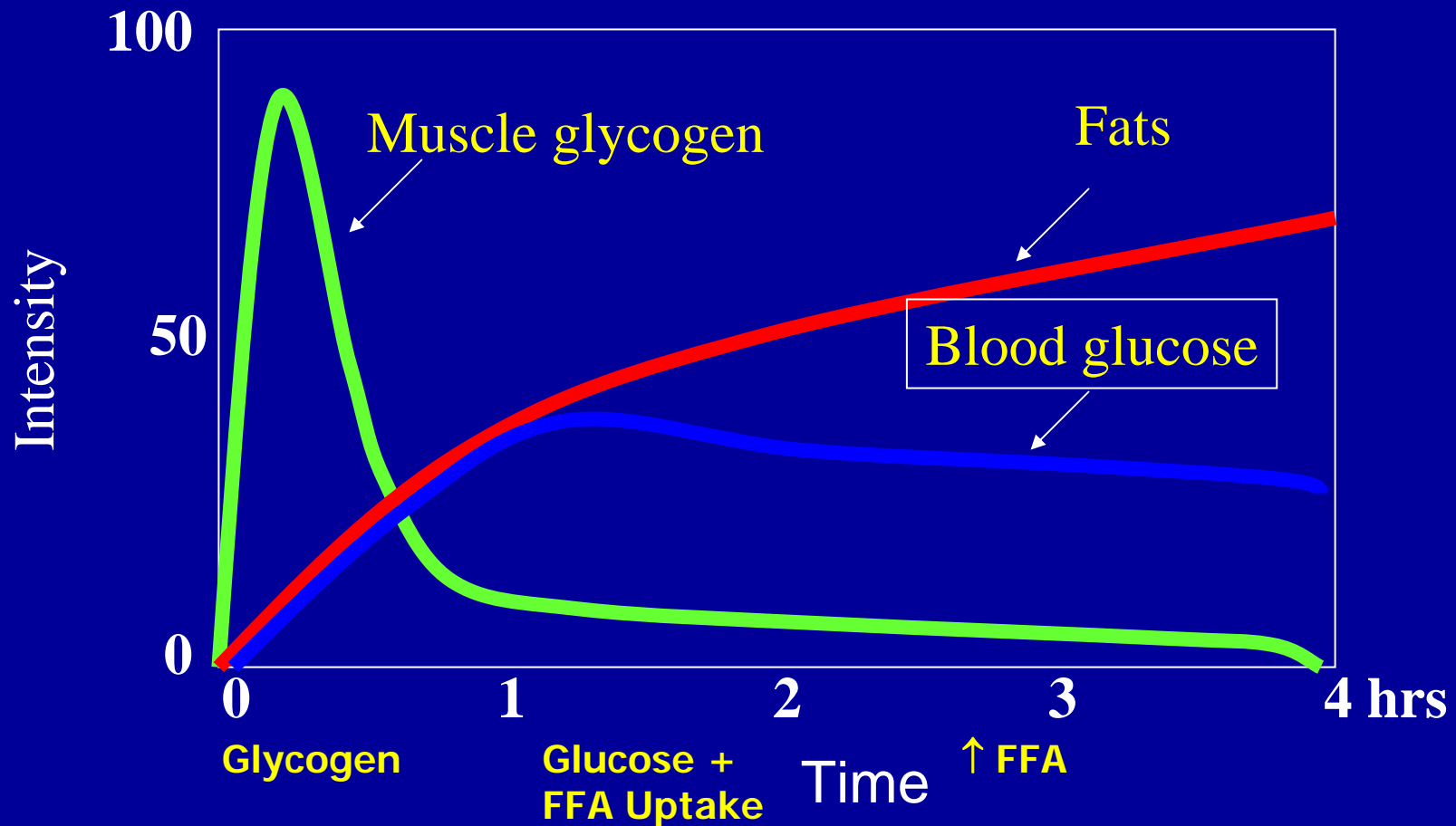




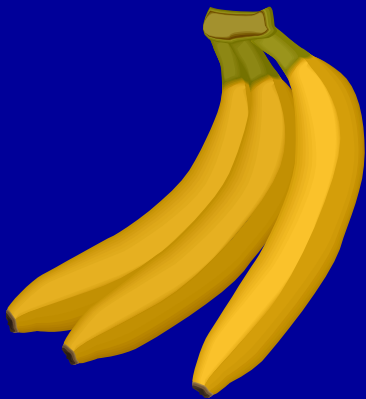
# Fuels used during different exercise intensities

Type of Exercise	Substrates used at different exercise intensities
High Intensity	75% CHO 25% Fat
Moderate Intensity	50% CHO 50% Fat
Low Intensity	25% CHO 75% Fat
Rest	5-20% CHO 80-90% Fat

# The contribution of fuels used depending on the duration of exercise



# Food for exercise



# Carbohydrate

- The most important fuel for working muscles
- This should provide 45-65% of total daily energy
- Limited storage as glycogen in liver and muscle
- Muscle stores rapidly run out during high intensity exercise e.g. sprints
- Liver stores gradually depleted in endurance exercise over several hours



# When may carbohydrate be needed?

- Meal 2-3 hours before exercise
- 20 - 30 minutes snack before exercise
- During exercise for sessions longer than 30 minutes or in between repeated races
- After exercise for refuelling of muscle and liver stores



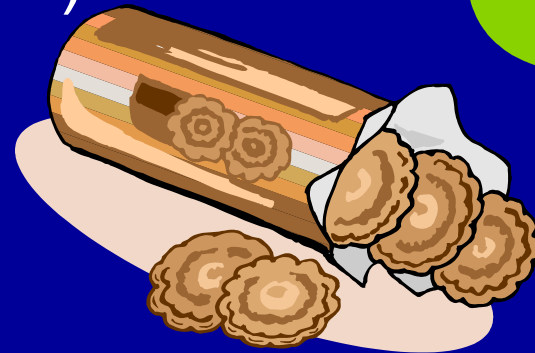
# Pre exercise carbohydrate meal

- Long-acting/complex (low GI) carbohydrates 2 - 3 hours before training or competing e.g.
  - pasta
  - porridge
  - granary/wholegrain bread
  - fruit e.g. apple, under ripe banana
  - milk/yoghurt
  - basmati rice



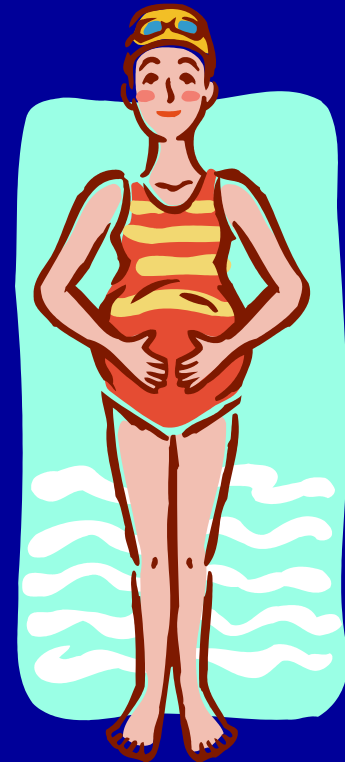
# Pre exercise carbohydrate snack

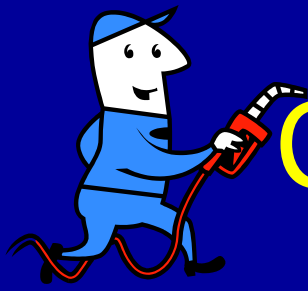
- Rapid acting (high GI) carbohydrates immediately before exercise e.g.
  - isotonic carbohydrate drink
  - plain biscuits/ jaffa cakes
  - fruit juice, ripe banana, strawberries
  - sweet scone, scotch pancakes
  - (sweets – beware teeth!)



# Carbohydrate during/between exercise

- Isotonic drinks
- energy bars
- raisins/bananas
- jaffa cakes
- carbohydrate gel
- Teeth health





# Carbohydrate post exercise

- Rate of glycogen re-storing is greatest in the first 2 hours after exercise, first 30 minutes for muscle stores
- Essential to replenish depleted glycogen stores- common cause of tiredness next day/training session
- High GI (simple sugars) carbohydrate in the early part of recovery

# Recovery



- Meal within 2 hours of end of exercise if possible
- Protein – for muscle development and repair
  - Beans, lentils, or other legumes
  - Eggs
  - Lean meats
  - Low fat yogurt or cheese
  - Peanut butter or other nut butters
  - Tofu
- Carbohydrate – for energy replacement

# Hydration

*“Increased fluid intake is necessary to avoid dehydration and may improve performance during prolonged exercise, especially when sweat loss is high.”*

Lausanne consensus statement 1991

# Hydration

- Dehydration can affect blood glucose levels and heart function adversely
- Exercise can be impaired if you are dehydrated by as little as 2%
- Fluid loss in excess of 5% can decrease ability to train and compete



# Fluid requirements

- Sedentary/resting individuals require 2-3 litres/day
- Sweat rates during exercise are 0.5-1.5 litres/hour (adult)
- Trained adult athletes can lose up to 3 litres/hour in hot and humid conditions



# Fluid requirements

- 1 kg weight loss = 1000ml sweat
- Fluid should be taken in all sporting events lasting more than 30 mins



# Hydration choices

- Water, milk, fruit juice, yogurt drinks, fruit smoothies, soups, and even juicy fruits such as watermelon, oranges, and peaches
- Sports drinks – claim to enhance physical performance and speed recovery



# Classification of sports drinks

- Hypotonic
- Isotonic
- Hypertonic



# Hypotonic

- 2-3g carbohydrate per 100ml
- Low level electrolytes (sodium, potassium etc)
- Fluid replacement
- Can be taken before, during and after exercise
- Light on stomach
- E.g. Lucozade hydro, Replay





# Isotonic



- 5-7g Carbohydrate per 100ml
- Electrolyte concentration similar to body fluids – rapid absorption
- Source of **fluid** and **fuel**
- Can be taken before, during and after exercise
- More concentrated – try out in training first
- E.g. Lucozade Sport, Isostar, Gatorade

# Hypertonic

- Contain  $> 10\text{g}$  carbohydrate per 100ml
- High concentration
- Should only be used after exercise
- Rapid fuel replacement – useful if next meal will be delayed for  $> 30$  minutes
- E.g. Lucozade energy, Ultra fuel



# Guidelines for fluid intake before exercise

- Hypotonic or water on the way to training/racing
- Little and often but not to fill stomach capacity
- Urine colour and frequency



# Guidelines for fluid intake during exercise

- Drink sufficient fluid to limit losses as sweat (parents as well)
- If exercise > 1 hour, drink 150-200ml every 30 mins (adult data)
- Isotonic sports drinks may be useful in providing both fluid and carbohydrate during exercise



# After **exercise**

- Isotonic or hypertonic sports drinks may be useful for maintaining post exercise blood glucose levels and refuelling glycogen stores



# Teeth



- Increased risk of plaques, cavities and sensitivity from:
  - frequent and extended use of sugary drinks
  - frequent snacking between meals



# Teeth



- What to do:
  - rinse mouth out with water after sugary drinks
  - sugar-free drinks/snacks contain little useful carbohydrate
  - sugar free gum – short duration
  - clean teeth afterwards



# Increasing experience

- Try out different snacks/drinks before training sessions
- Try different isotonic or hypotonic drinks
- Increase variety and as many natural products as possible – fruit etc
- Use food diaries to see what worked well in training and racing
- Don't try anything new in competitions!

Thank you very much for  
listening

# Carbohydrate recommendations for training

Level of training	Carbohydrate g/kg bw/day
Regular (3-5 hrs/week)	4-5
Moderate duration/low intensity	5-7
Moderate to heavy endurance training	7-12
Extreme exercise (4-6 hrs + per day)	10-12

# Calculating your carbohydrate requirement

Body weight (kg)	X	carbohydrate for level of training	=	Total carbohydrate per day
60 (weight)	X	5-7g (moderate duration)	=	300 – 420 g

