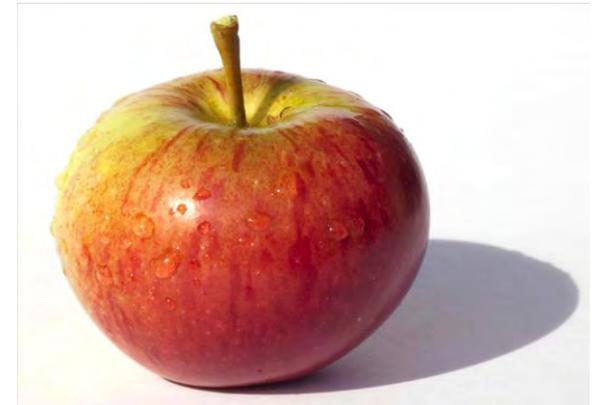


# Nutrition for the Developing Athlete

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CKC Sports Nutritionist

# Content

- The importance of nutrition
- The characteristics of adolescent athletes
- Nutritional requirements
- The daily diet
- Hydration
- Body composition
- Recovery from training
- Travel and eating out
- Planning



# Why is nutrition so important

- To ensure optimal growth and maturation
- Nutrient requirements are at their highest during the adolescent years than for any other life cycle.
- To enable athletes to achieve their sporting potential
- Developing good nutrition strategies in young and developing athletes will help athletes lead healthy lives.
- Without good nutrition the developing athlete can experience problems with growth and development and risk injury and illness.



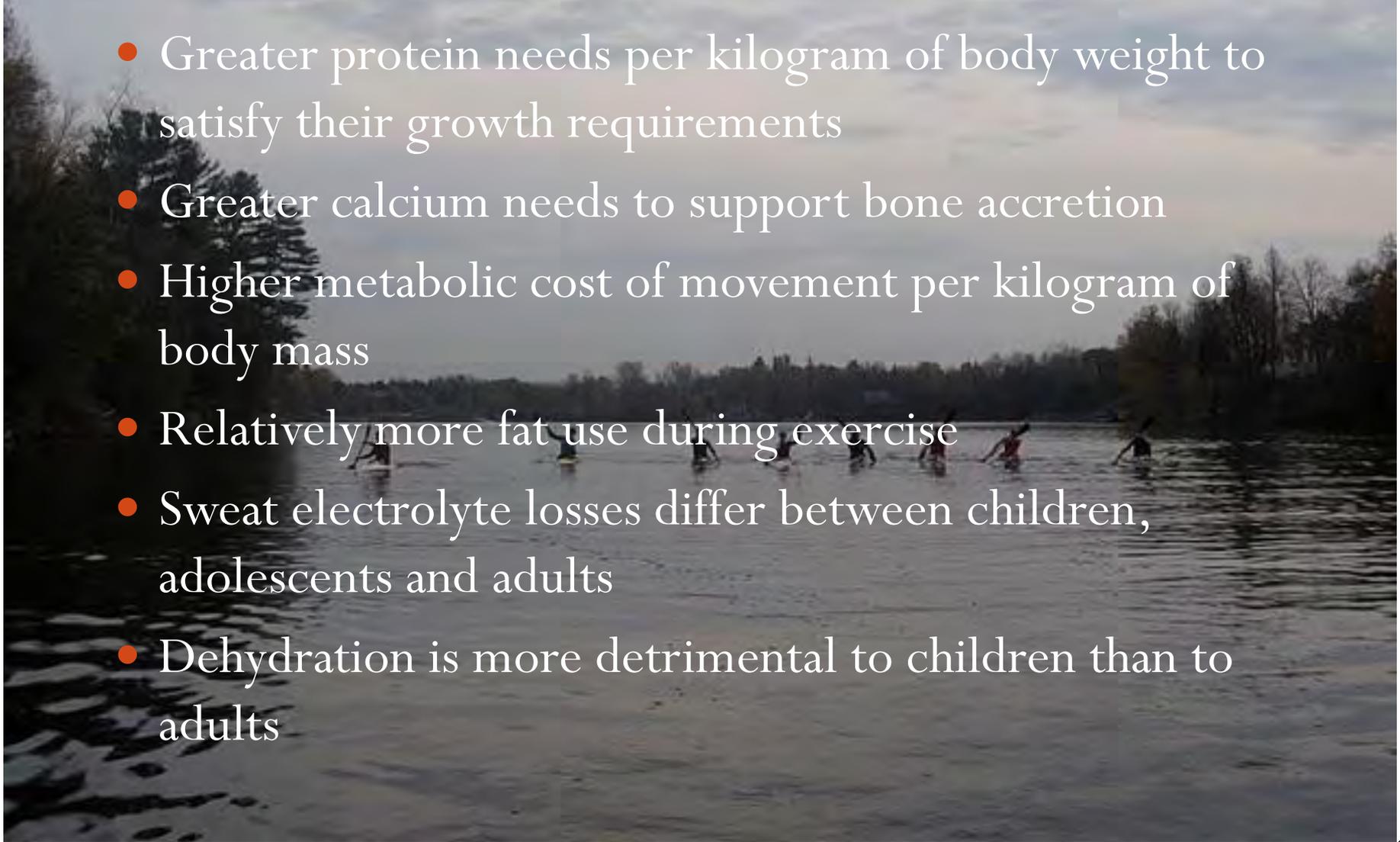
# Growth and Maturation

- Growth – increase in total body size, and/or size attained by specific parts of the body
- Maturation – refers to tempo and timing of progress
- Growth and maturation are complex processes and the effect of intense training and diet must be considered.
- Intense training can attenuate growth and delay maturation
- If growth rate is reduced and the maturation is delayed, catch up can occur but it may be compromised if the delay in maturation is severe.

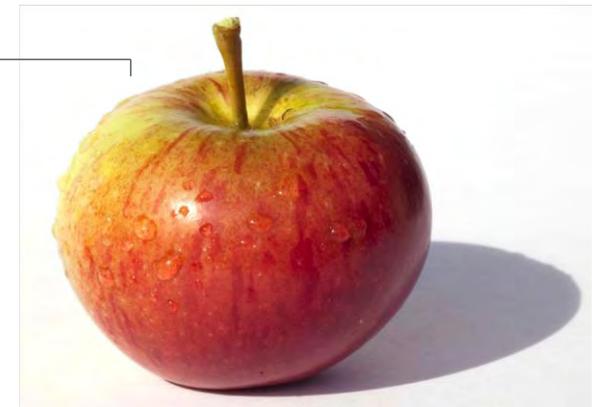
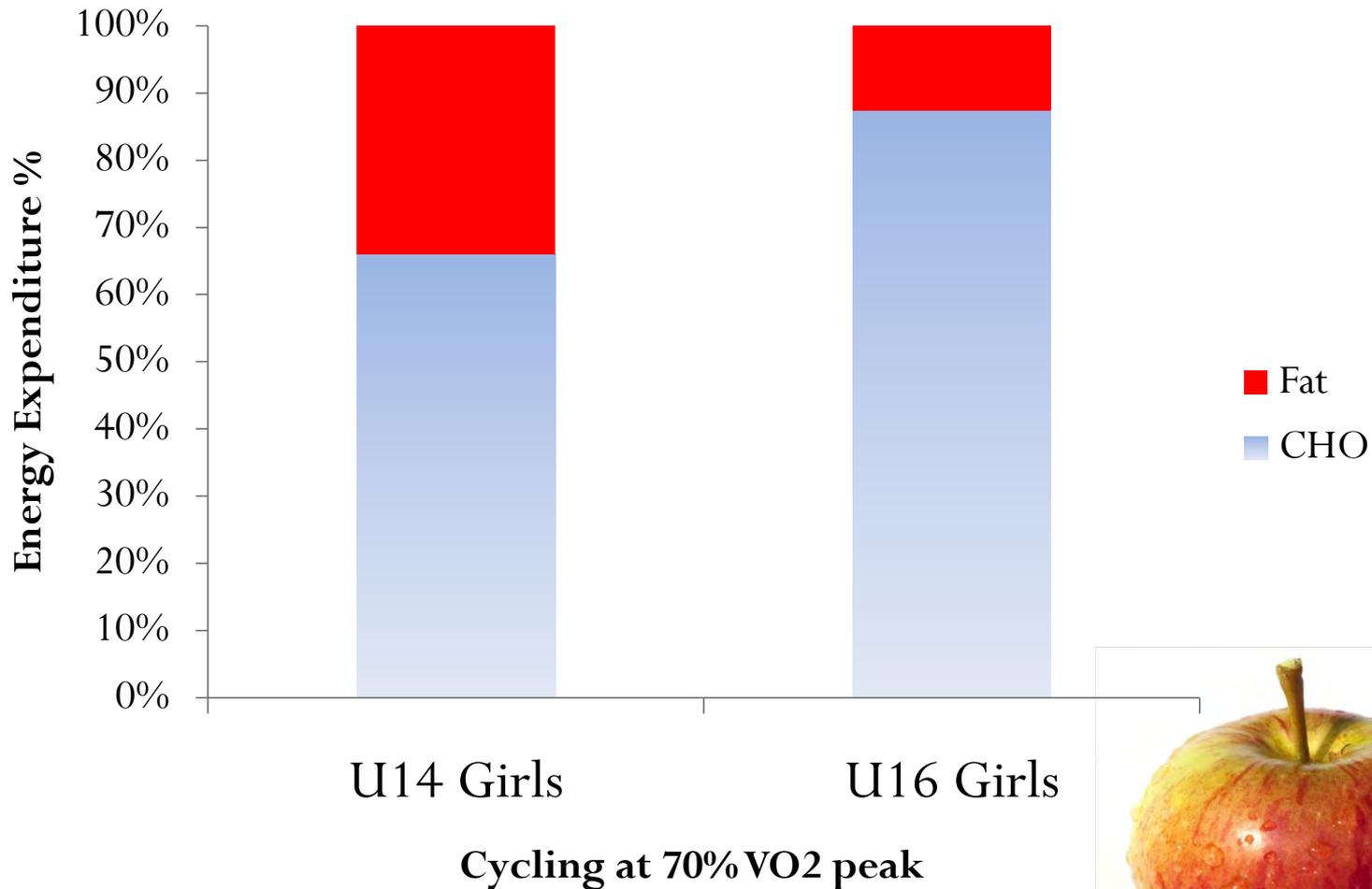


# Differences for Adolescents

- Greater protein needs per kilogram of body weight to satisfy their growth requirements
- Greater calcium needs to support bone accretion
- Higher metabolic cost of movement per kilogram of body mass
- Relatively more fat use during exercise
- Sweat electrolyte losses differ between children, adolescents and adults
- Dehydration is more detrimental to children than to adults



# Energy production for young athletes



# Dietary Requirements

- ENERGY
- Adequate energy is vital to support growth and provide extra energy for training.
- Young paddlers may require 500-1500kcal more than their sedentary peers
- Few studies have measured the energy cost of children and adolescents, it is often extrapolated from adults.
- Children tend to be less metabolically and less mechanically efficient than adults.
- Energy expenditure extrapolated from adults often underestimates their requirements



# Self reported energy intakes of young athletes

Sport	Number of subjects	Age (yrs)	Height (cm)	Weight (kg)	Energy (kcal)	Energy (kcal/kg)
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## Females

<b>Swimming</b>	100	11-14	156.5	47.2	<b>2069</b>	45.1
	22	15-18		58.2	<b>3573</b>	61.4
<b>Volleyball</b>	26	13-17			<b>1799</b>	

## Males

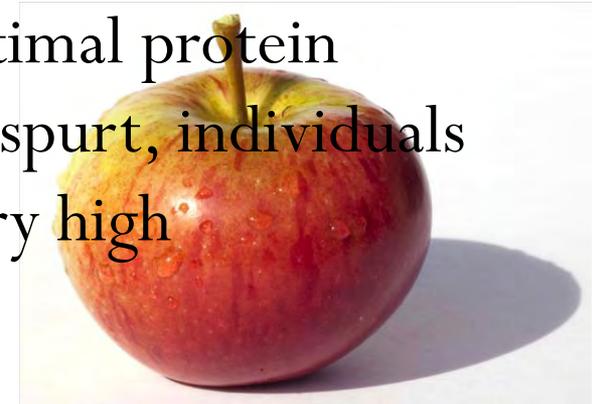
<b>Swimming</b>	9	11-14		56.4	<b>3072</b>	55.0
	42	15-18	182.0	75.1	<b>4537</b>	60.2
<b>Running</b>	14	11-14			<b>2541</b>	66.0
	4	15-18			<b>2736</b>	50.0
<b>Soccer</b>	46	11-14		60.9	<b>2523</b>	41.4
	88	15-18		75.9	<b>3365</b>	44.3

Adapted from Thompson 1998



# Protein

- Children and adolescents require extra protein than sedentary adults due to the extra protein required for growth.
- When energy intake matches energy expenditure protein intakes are usually met.
- Protein intake for children and adolescents is between 1.2-1.7g/kg BM/day.
- Some athletes may be at risk of suboptimal protein intake, especially during their growth spurt, individuals on a vegetarian diet and those on a very high carbohydrate diet.



# Example of protein content of a diet

- **Breakfast:** grams

250 mL orange juice	2
(60 g) Cheerios™	7,5
250 mL milk (2 % M.F.)	8
2 slices whole grain toast	6
30 mL peanut butter	8

- **Snack:**

Banana	1
Water to drink	

- **Lunch:**

2 slices whole grain bread	6
2 eggs for sandwich filling	12
250 ml lettuce for salad	1
1 tomato	1
175 g fruit yogurt	7
Water to drink	

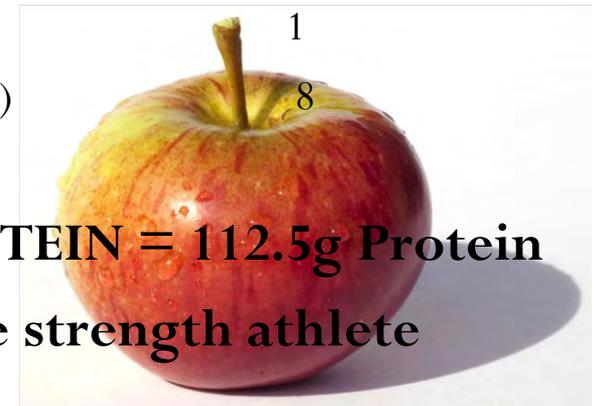
- **Snack:**

Granola bar (28 g)	2
60 mL dried apricots	1
Water to drink	

- **Dinner:**

250 mL cooked pasta	7
125 mL tomato sauce	2
1/2 chicken breast (100 g)	32
1 medium carrot	1
1/2 bell pepper	1
250 mL milk (1%)	8

**TOTAL PROTEIN = 112.5g Protein**  
**65kg athlete strength athlete**



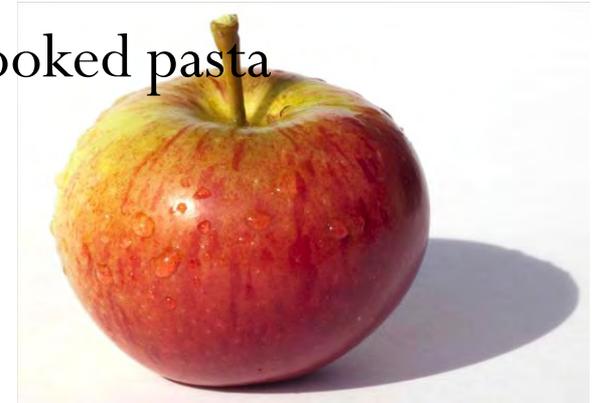
# Common food sources containing 10g protein

## Animal Foods

- 35g cooked lean beef, pork, lamb
- 40g skinless cooked chicken
- 50g cooked fish, tinned tuna
- 1 cup low fat milk
- 200g low fat yogurt
- 30g reduced fat cheese
- 70g cottage cheese
- 2 small eggs
- 30g skimmed milk powder

## Plant Foods

- 4 slices bread
- 3 cups wholegrain cereal
- $\frac{3}{4}$  cup lentils/beans
- 60g nuts or seeds
- 1 cup soy milk
- 120g soy milk
- 2 cups cooked pasta





## Daily Recommendations

Light training day = 3-5g/kg BW

Hard training day = 5-8g/kg BW

About 55% of daily energy intake



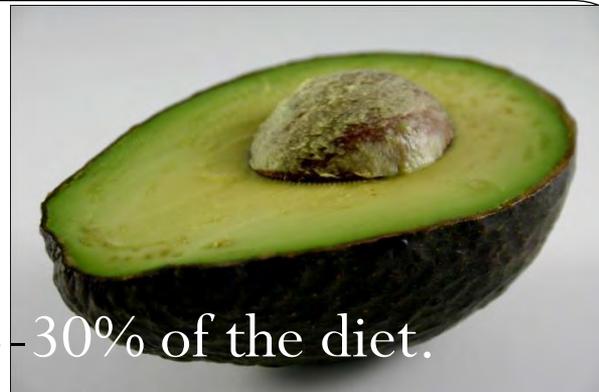
# CARBOHYDRATE





# Fats

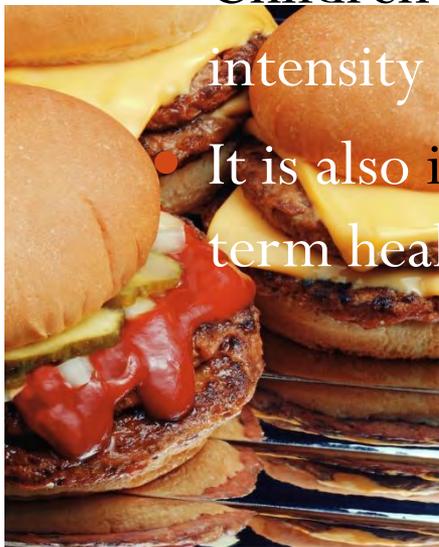
- The recommendation for fat intake is 25-30% of the diet.



- Important that saturated fat only contributes 10%
- Advise a low to moderate fat intake to ensure that the carbohydrate and protein demands are met to improve training and recovery.
- Children can oxidise more fat than adults at a given exercise intensity but they do not need to consume fat to use it.

V's

- It is also important that we educate the athletes on the long term health implications of a high fat diet



# Vitamins and Minerals

- If energy intake requirements are met then vitamin needs should be met
- Encourage athletes to eat a range of colourful fruits and vegetables to ensure a good intake of vitamins and minerals.
- Calcium intakes are high during childhood and adolescence.
- Athletes who restrict energy intake and/or dairy intake maybe at risk from low calcium
- Adolescent females are at risk of iron deficiency, 40-50% of young female athletes demonstrate low iron stores (Burke '06).

# The daily diet



**TRAINING**

**TRAINING**

Breakfast

Lunch

Dinner

Post  
Training  
Snack

Pre-  
Training  
snack

Post  
Training  
Snack

Evening  
snack



# The daily diet

- Athletes should aim for 5-6 smaller meals/snacks a day.
- Fluid intake should be encouraged throughout the day
- Variety, balance and moderation is key.
- Adjustments need to be made to energy intake depending on the training volume/intensity.
- Energy requirements will change during the racing season

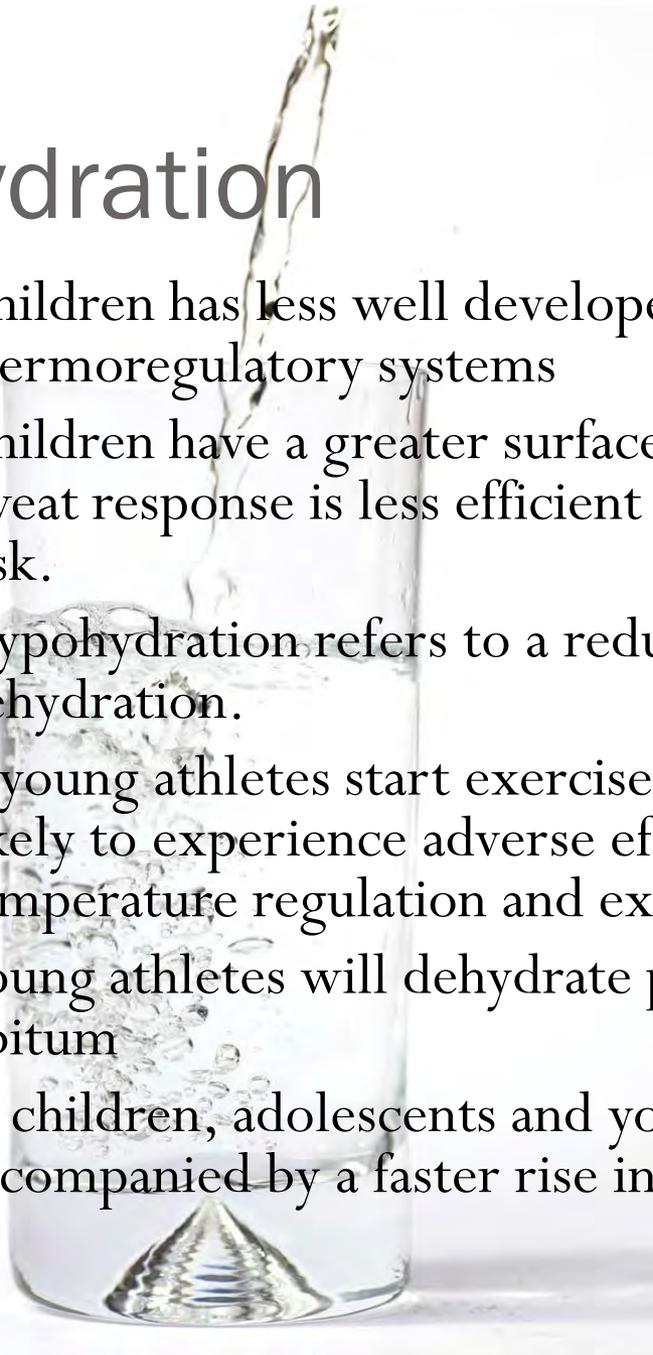
## Meal time checklist

- Carbohydrate
- Protein
- Vegetables/Fruit
- Fluid



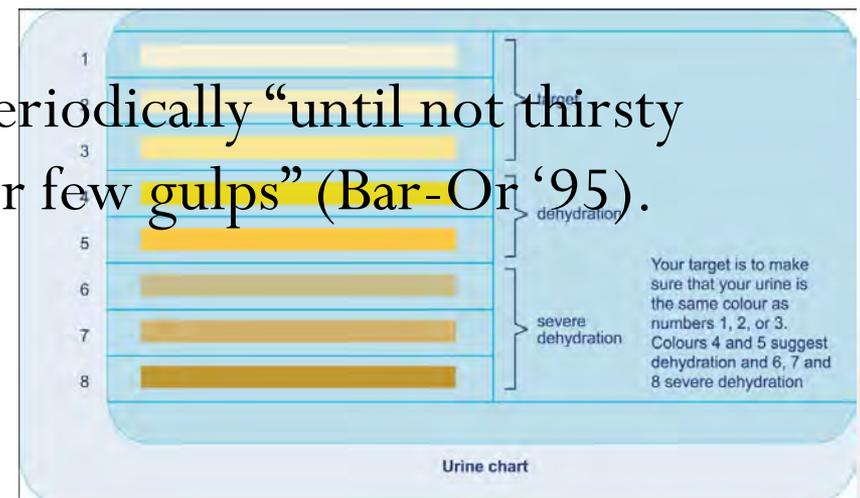
# Hydration

- Children has less well developed and less efficient thermoregulatory systems
- Children have a greater surface area to body volume ratio and the sweat response is less efficient so hyperthermia is an increased risk.
- Hypohydration refers to a reduction in body water, leading to dehydration.
- If young athletes start exercise in a hypohydrated state they are likely to experience adverse effects on cardiovascular function, temperature regulation and exercise performance (Bar-Or '89).
- Young athletes will dehydrate progressively when left to drink ad libitum
- In children, adolescents and young adults dehydration is accompanied by a faster rise in core temperature.



# Fluid replacement

- Maintaining adequate hydration is crucial
- Thirst is not a good indicator
- Water is good but there are time when drinks containing carbohydrate are more appropriate
- In children and adolescents greater consumption occurred when drinks were flavoured, in Canada grape was the preferred flavour (Bar Or & Wills '96)
- Young athletes should drink periodically “until not thirsty anymore and then take another few gulps” (Bar-Or '95).

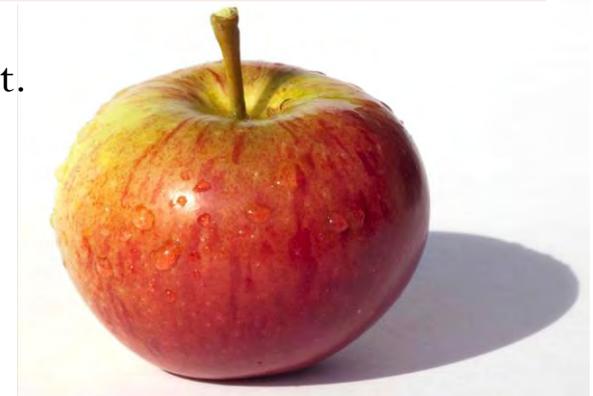


# Guidelines for fluid replacement (water)

Age (years)	Time (minutes)	Volume (ml)
Approx 15	45 (before exercise)	300-400
	20 (during exercise)	150-200
	As soon as possible after exercise	Liberal until urination
Approx 10	45 (before exercise)	15-200
	20 (during exercise)	75-100
	As soon as possible after exercise	Liberal until urination

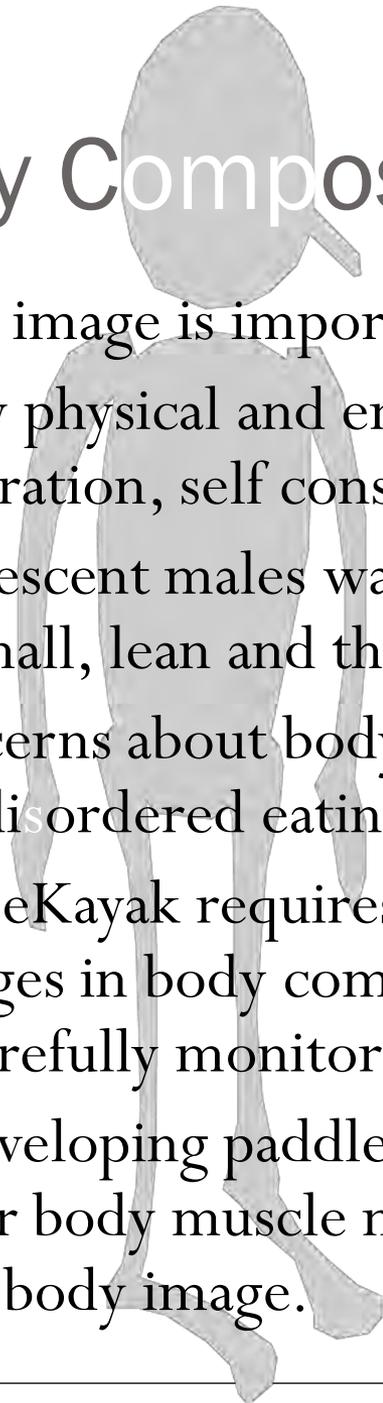
In hot environments fluid intake will need to be more frequent.

Source: Sports Medicine Australia 1997



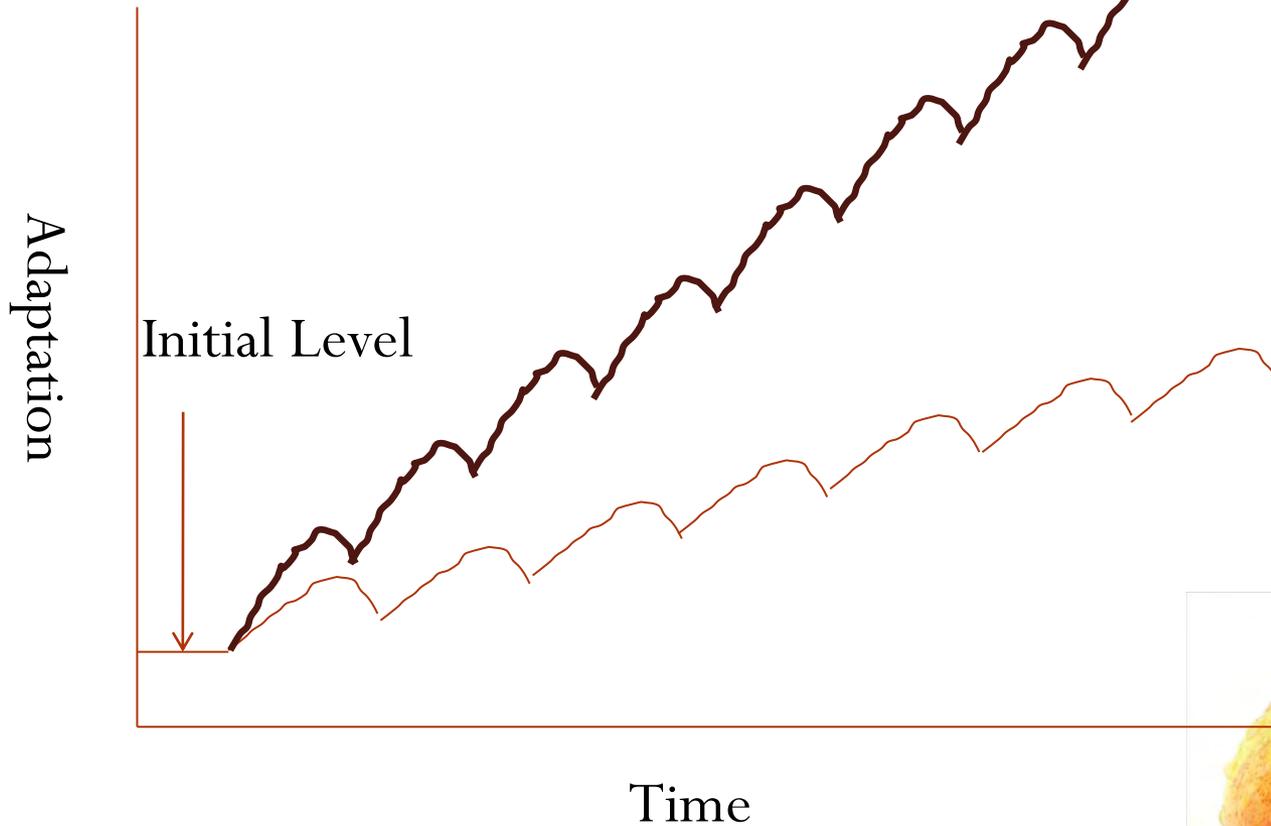
# Body Composition/Body Image

- Body image is important for adolescents
- Many physical and emotional changes occur with pubertal maturation, self consciousness about the body is accentuated
- Adolescent males want to be muscular and females want to be small, lean and thin
- Concerns about body image can lead to poor eating practices and disordered eating.
- Canoe/Kayak requires a good power to weight ratio but changes in body composition in the developing athlete must be carefully monitored.
- In developing paddlers we are also looking for increases in upper body muscle mass which may conflict with athletes ideal body image.

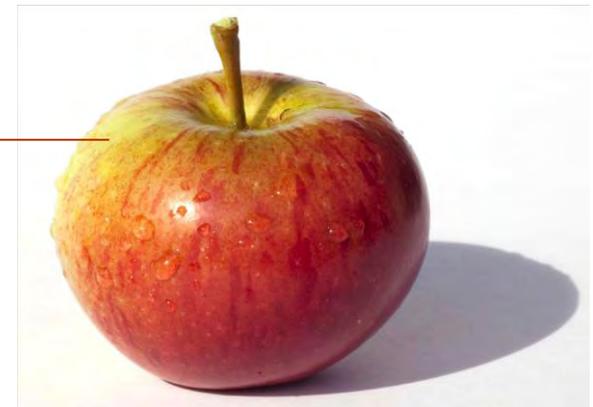


# Recovery Graph

Athlete optimizing  
training and recovery



Athlete not  
optimising  
training and  
recovery



# Recovery

- Recovery should start within the first 30min after exercise, the first two hours are crucial.
- The shorter the recovery time the more aggressive the recovery strategies need to be.
- Fresh foods are as good as sports foods.
- Endurance session: carbohydrate is the priority with some protein – athletes require 1.0-1.5g CHO/kg BW
- Resistance session: protein and carbohydrate are important – 0.5 – 1.0g CHO/kg BW and 15-20g protein
- Recent research suggests that smaller more frequent snacks can improve recovery.
- Low intensity or recovery workouts require less carbohydrate for recovery.



# Recovery strategies

**55 kg female athlete**

**On water workout**

1 medium banana,

200g fruit yogurt

**65g CHO, 10g Protein**

**Resistance workout**

500ml chocolate milk

**52g CHO and 19g Protein**

**70 kg male athlete**

**On water workout**

2 slices wholegrain toast

1 hard boiled egg

1 banana

**73g CHO, 16g Protein**

**Resistance workout**

Fruit smoothie (250ml milk,  
100g yogurt, 2 tbsp skimmed  
milk powder, ½ cup berries

**60g CHO, 22g Protein**



# Fast food choices

## Healthier Choices

- Bagel/low fat muffin
- Grilled chicken sandwich
- Milk/Juice
- Salad with minimal dressing
- Pasta with tomato sauce
- Turkey, chicken and vegetable sub
- Frozen yogurt and fruit

## Unhealthy choices

- Donut/croissant
- Burger
- Pop
- Fries/onion rings
- Pasta with cream sauce
- Meatball or salami sub
- Pies and cakes



# Nutrition on the move – helping your athletes make good choices

GOOD CHOICE	POOR CHOICE
<p>2 English muffins, poached egg, 15ml jam 250ml 2% milk, 250ml apple juice <b>70 % CHO 16% FAT</b></p>	<p>English muffin, egg, cheese, ham. Hash browns. 250ml 2% milk, 250ml apple juice <b>49 % CHO 35 % FAT</b></p>
<p>Baked Potato, plain, Chilli, 250 mL Chocolate Shake, 250mL Fresh Orange <b>63% CHO 17% FAT</b></p>	<p>Fish burger, French Fries Homo Milk, Cherry Pie <b>38% CHO 51% FAT</b></p>
<p>Regular Hamburger with lettuce and tomato Strawberry Shake Orange Juice, 375 mL Apple, Banana <b>62% CHO 25% FAT</b></p>	<p>Deluxe Double Burger, French Fries Strawberry Shake <b>43% CHO 43% FAT</b></p>

# Planning is key

- Paddlers lead busy lives with training, school and work.
- Long days mean a large volume of food required for the day
- Preparing lunch and snacks the night before
- Available food options may not be optimal
- Educating the parents is an important process
- On training camps encourage athletes to write meal plans
- Nutrition needs to be an integral part of training and recovery.



# Conclusions

- Variety, balance and moderation are key principles
- For children the priority is developing healthy eating strategies
- Adolescence it is important to ensure they have sufficient energy, carbohydrate, protein and calcium.
- Hydration is important for children and adolescents
- Encourage athletes to consume fresh and wholegrain foods.
- Developing good eating habits in young athletes is essential.
- Nutrition and recovery is an important component of an athletes training.

