

Nutrition for the Developing Athlete

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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.



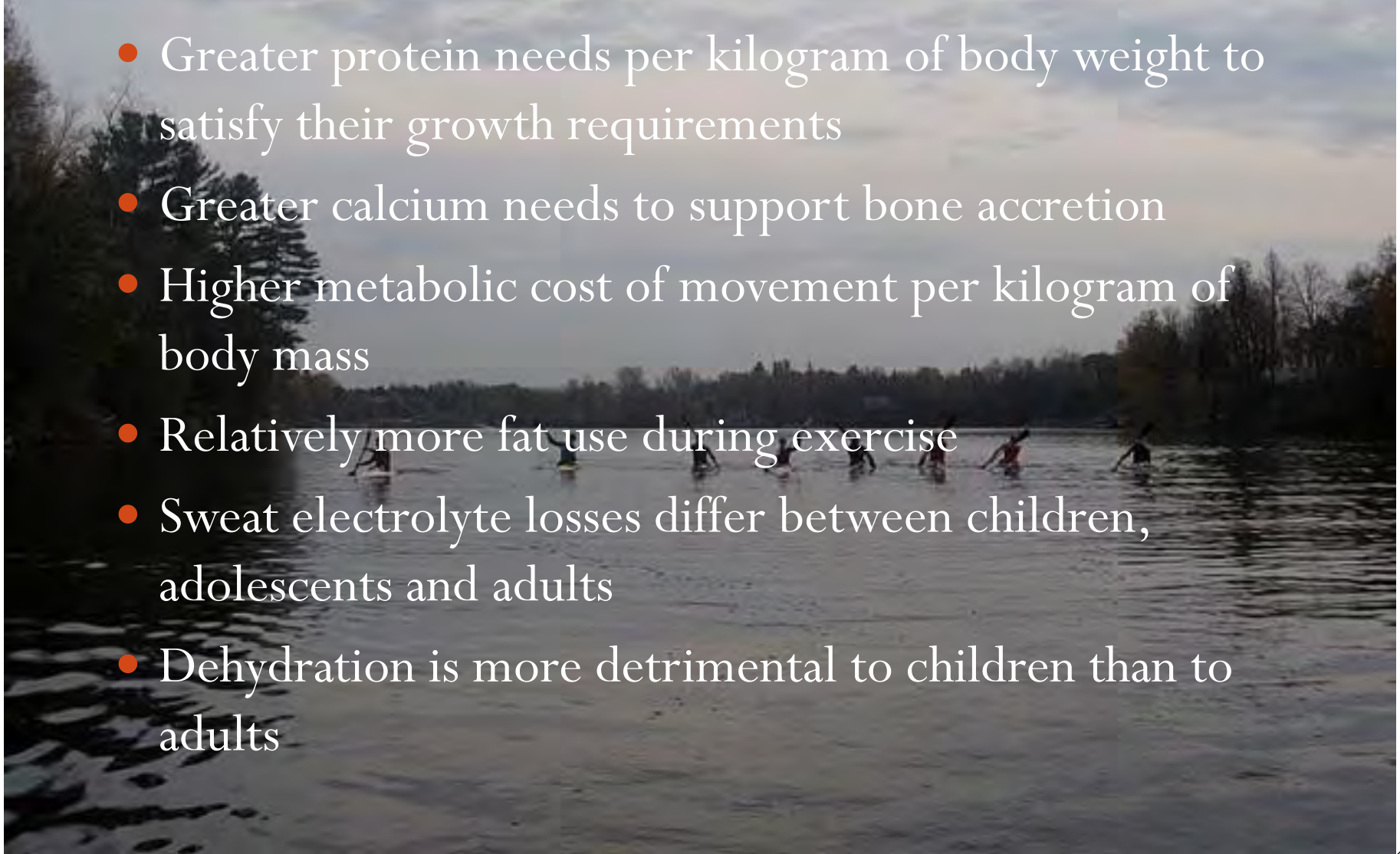
Growth and Maturation

- 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.

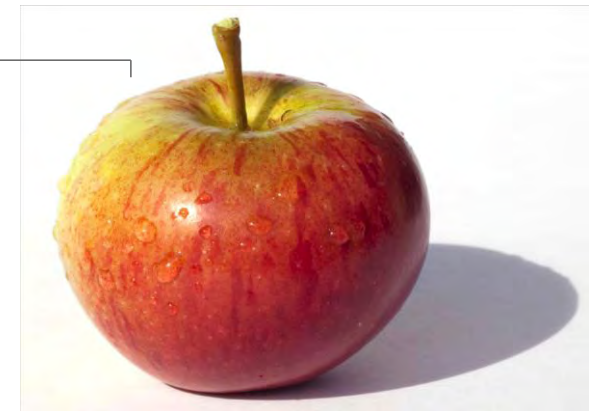
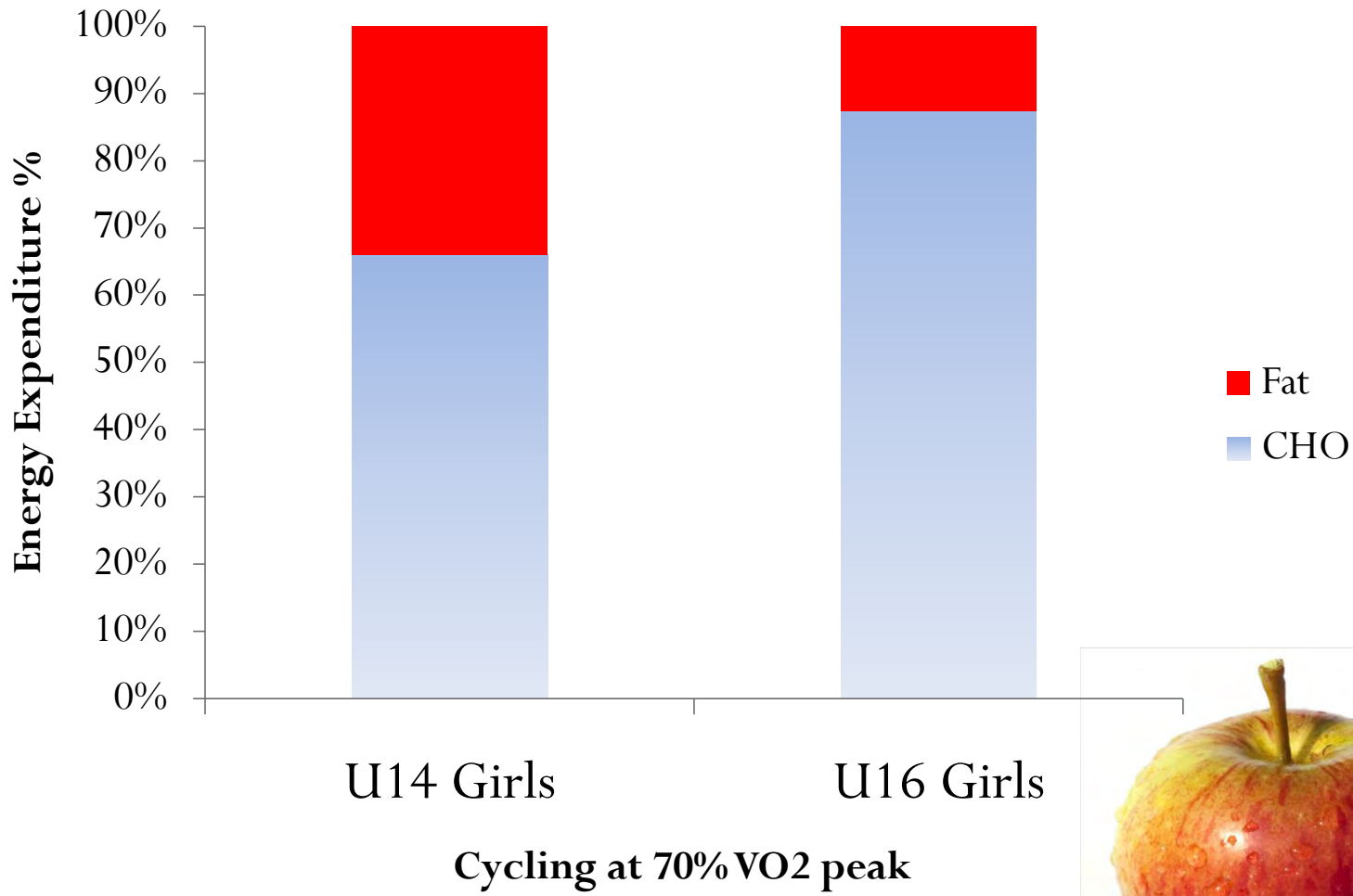


Differences for Adolescents

- 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

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

Males

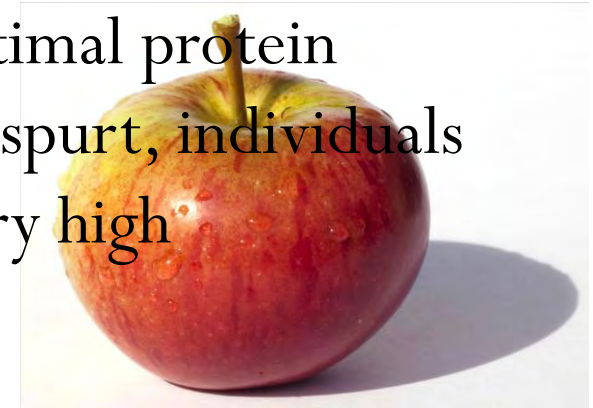
Swimming	9	11-14		56.4	3072	55.0
	42	15-18	182.0	75.1	4537	60.2
Running	14	11-14			2541	66.0
	4	15-18			2736	50.0
Soccer	46	11-14		60.9	2523	41.4
	88	15-18		75.9	3365	44.3

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:**

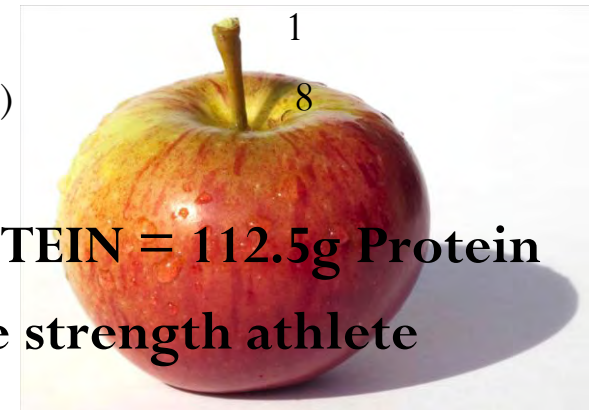
2 slices whole grain bread	6
2 eggs for sandwich filling	12
250 ml lettuce for salad	1
1 tomato	1
175 g fruit yogurt	7
Water to drink	

- **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

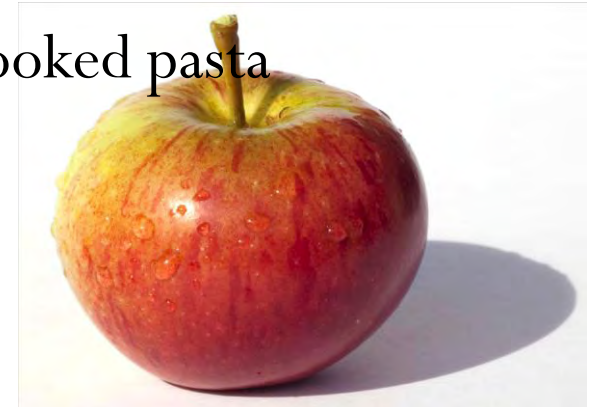
Common food sources containing 10g protein

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

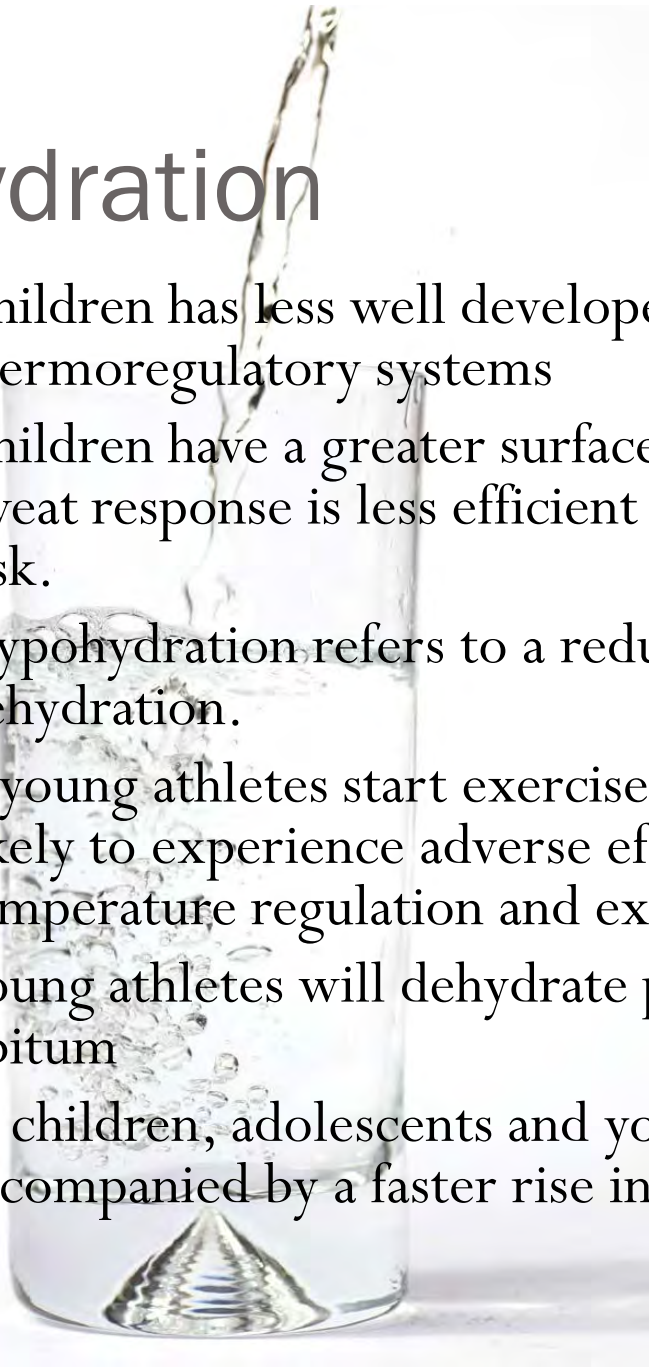
Meal time checklist

- Carbohydrate
- Protein
- Vegetables/Fruit
- Fluid



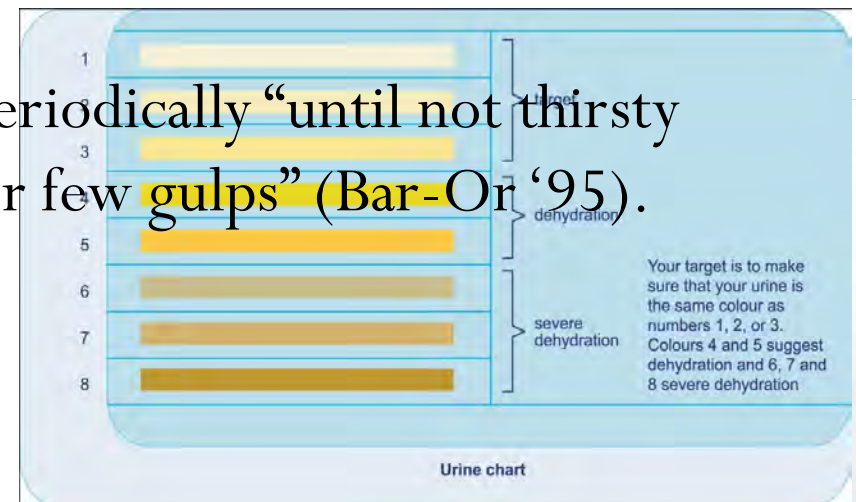
Hydration

- 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

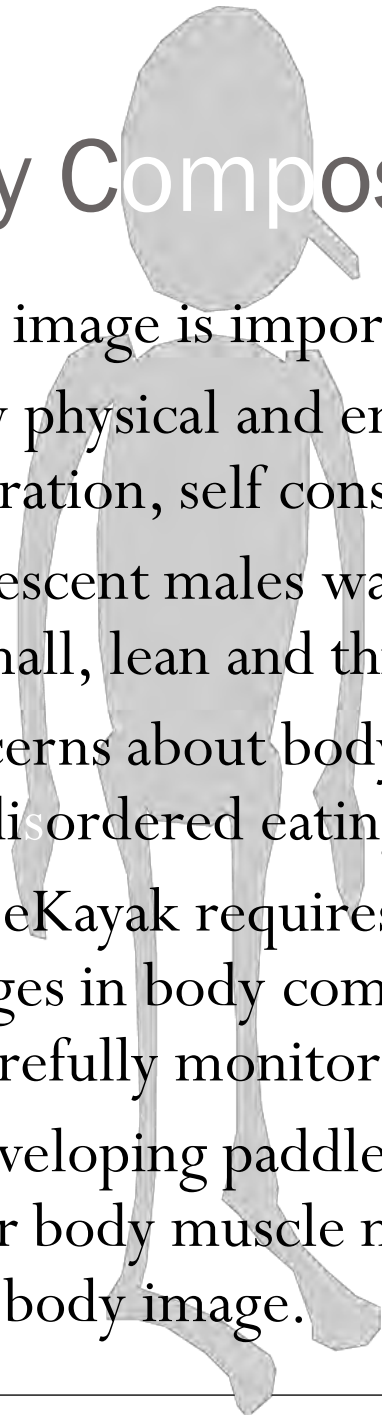
In hot environments fluid intake will need to be more frequent.

Source: Sports Medicine Australia 1997



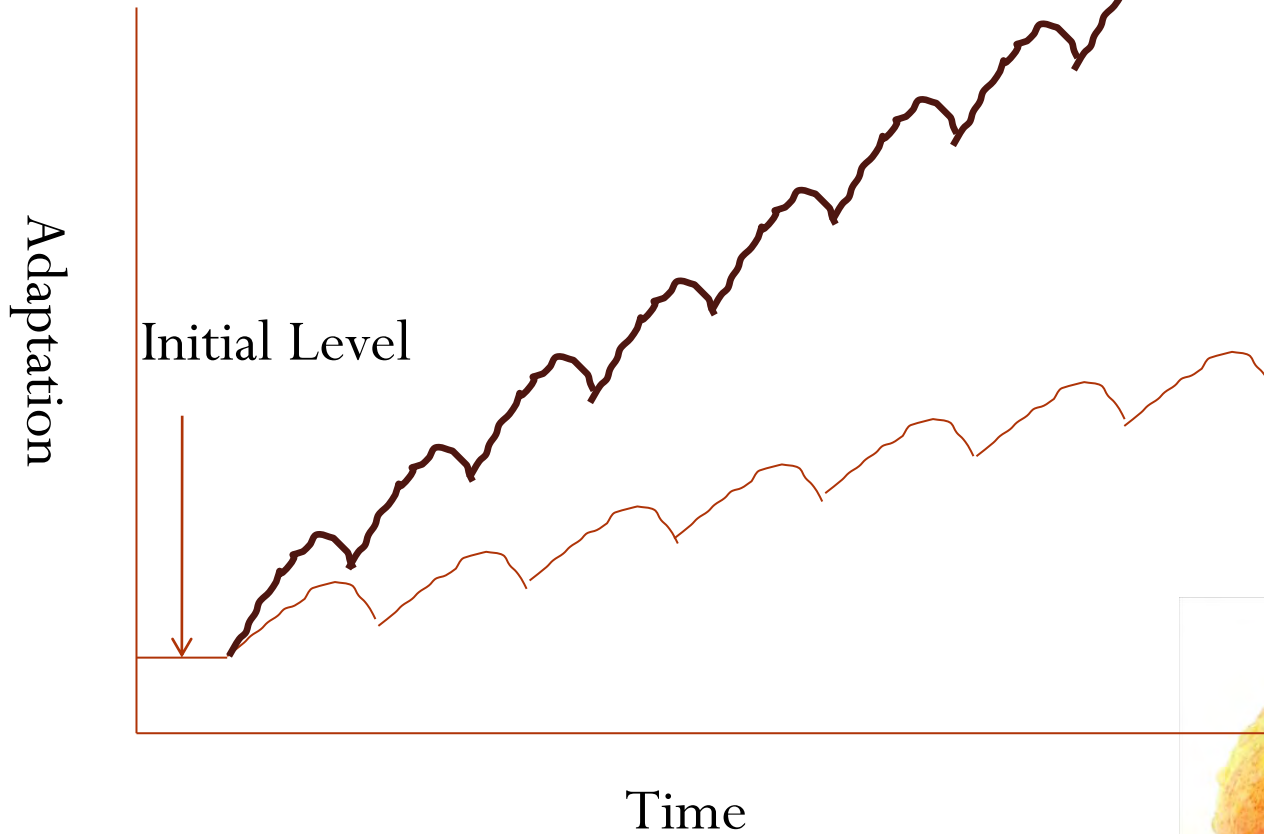
Body Composition/Body Image

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

