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NUTRITION INFORMATION - DDO WATERPOLO

FUELING APPROPRIATELY FOR THE SPORT

The focus of this presentation was to understand the energy needs of water polo athletes and to understand the basics of food digestion?

Eating and drinking provide energy and nutrients to optimize

- Development and growth
- Daily activities (studying)
- Sport performance

Daily energy needs for athletes may be estimated using equations that consider needs for basic functions (basal metabolic rate - BMR), energy used for daily activities, and energy expended for any specific physical activity such as water polo (METs for waterpolo = 10)

Estimated energy needs = BMR + Daily Activities + Water Polo/sports
Male:
(293 - 3,8 x age (yrs) + 456,4 x height (m) + 10,12 x weight (kg)) + (600kcal) + (METs x duration (h) x weight (kg))
Female:
(247 – 2,67 x age (yrs) + 401,5 x height (m) + 8,6 x weight (kg)) + (600kcal) + (METs x duration (h) x weight (kg))

*To convert inches into meters - multiply by 2,54 and divide by 100; lbs into kg - divide by 2,2

On average, a teenage athlete would require 2200-4000kcal (girls) or 3000-6000kcal (boys).

With digestion, nutrients are released from food, such as carbohydrates, proteins and lipids (fats), to be absorbed and used by the body as fuel to produce energy. It's important to plan the delay for digestion before starting a physical activity to benefit from the fuel. Digestion of carbs is fastest, followed by proteins and fats. The process of digestion uses a lot of energy, so it's not optimal to digest and be active at the same time!

Each nutrient provides a specific amount of energy, but the body is less efficient using fats and proteins to produce energy during intense physical activity such as waterpolo.

- 1g carbohydrate produces 4 kcal
- 1g protein produces 4 kcal
- 1g lipid produces 9kcal

Prepared by Mireille Guibord, B.Sc., RD. for DDO Waterpolo. 2101 rte Transcanadienne (Dorval), 514-684-9073

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How much of each nutrient a water polo athlete should get?

It is recommended that an athlete get a balanced diet which means getting food from all four food groups (fruits & vegetables, grains, milk & alternatives, meat & alternatives). Check Canada Food Guide online to see how many servings of each group are recommended for your health and development. (http://www.hc-sc.gc.ca/fn-an/food-guide-aliment/basics-base/quantit-eng.php) A meal should look similar to the model bellow. Throughout the day, the energy should be distributed in order to get 50-60% from the carbohydrates, 15-25% from the protein, and 25-35% from lipids. In the next table, you can see which food provides which nutrient and how much is in a serving (according to Canada Food Guide).

FOOD	CARBS (g)	PROTEINS (g)	LIPIDS (g)
Vegetables	5	2	0
Fruits	15	0	0
Grains	15	3	1
Milk/Soya milk	12	8-12	0-3-5-9
Meat/Poultry/Fish/Cheese	0	20	8-38
Legumes	23	12	0
Nuts/Seeds	0	8	15
Fats	0	0	15

When should you fuel?

With physical activity, the concept of Before-During-After is very common. **BEFORE** means 30 minutes to several hours before. This is the time for you to **hydrate** and to **build up the energy reserve in your muscle**. As muscle uses mostly glucose during exertion, it's time to consume food rich in carbohydrates. More than 3-4 hours before a practice or a game, have complete meals which include all food groups, but with a focus on carbohydrates. As you get closer to the time of the activity, reduce the content of fat and protein which slow down digestion and also the quantity to avoid discomforts.

DURING the activity, it is recommended to focus on **hydration**. If the activity lasts less than 1 hour, **water** is enough, but when the activity is intense and greater than 1 hour, it is recommended to take **1g of carbs / kg of bodyweight**. As you don't get breaks to eat, it could be appropriate to mix fruit juice with your water (1/3 juice for 2/3 water) or get a commercial sport drink. This extra fuel will help you to maintain the energy level throughout the whole practice/game and to avoid muscle pain.

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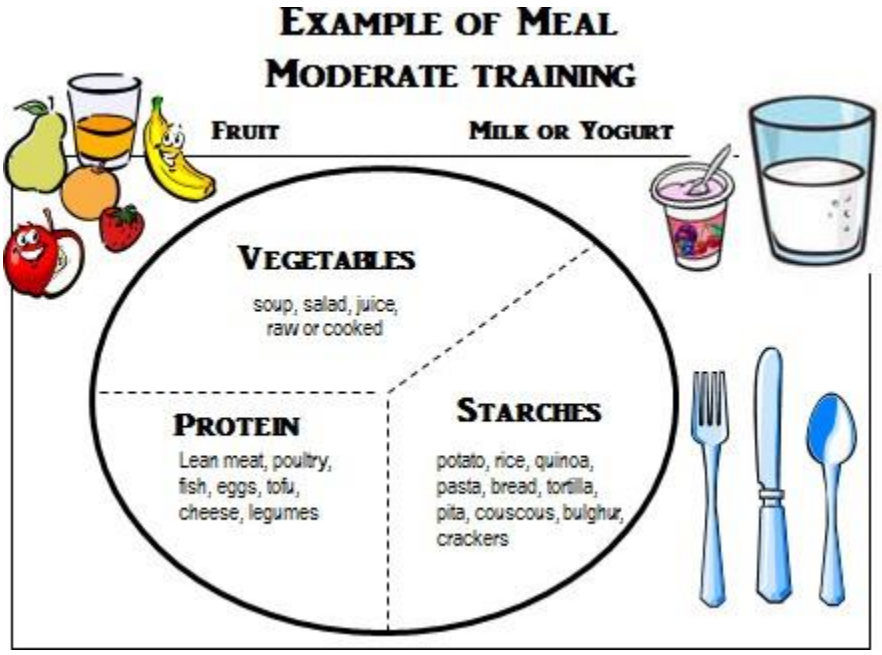
AFTER the activity, it's time to optimize the recovery using the **3 R's.** Within 30 minutes after the activity, think of **refuelling** to replenish your energy stores by eating food with carbs. If you have another practice or game within the next 8 hours, you should consume **1-1.5g of carbs/kg of bodyweight** for each of the next 3 hours. Also **rehydrate** yourself by drinking to replace the lost fluids. And **rebuilt** by eating food with protein to enhance muscle repair and intake of carbs in storage. A **minimum of 7g of protein** is recommended.



Do the calculation to find out how much energy you need in your day and also do the one to find out how many grams of each nutrient would be required to get the recommended distribution of energy. (see equations bellow) If you have a smart phone, a tablet or an i-pod, use an application which can help you count the amount of carbs, protein, fat and calories to analyse your intake.

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PRESENTATION 1 – Fueling Appropriately for the Sport

October 2014

My estimated energy needs as a water polo athlete

age:_____years height:_____m weight:_____kg

height in inches converted to meters by multiplying by 2,54 and dividing by 100

weight in lbs converted to kg by dividing by 2,2

BMR

Female: **247 - 2,67 x age (yrs) + 401,5 x height (m) + 8,6 x weight (kg)** OR

Male: **293 – 3,8 x age (yrs) + 456,4 x height (m) + 10,12 x weight (kg)**

Sport specific energy expenditure

Using a METs = 10 for water polo duration:_____hours

METs x duration (h) x weight (kg)

TOTAL ENERGY NEEDS = BMR + Daily Activities + WP

=_____kcal + 600kcal +_____kcal =_____**kcal / day**

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My estimated protein needs as a water polo athlete

1,2-1,6g / kg of body weight

= 1.2g x_____kg to 1.6g x_____kg =_____to_____g / day

Distribution of energy

50-60% carbohydrates = 50-60% x_____kcal =_____-_____kcal /4 =_____-_____g

15-25% protein = 15-25% x_____kcal =_____-_____kcal /4 =_____-_____g

25-35% lipids = 25-35% x_____kcal =_____-_____kcal /9 =_____-_____g

What could be appropriate foods to take at this time, relative to water polo training or game?

3h Before: _____ _____

_____ _____

_____ _____

1h Before: _____ _____

_____ _____

_____ _____

During: _____ _____

_____ _____

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After:

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HYDRATION

The goal of this presentation was to inform on the role of water in the body, the requirements with sport activities and specifically with water polo, and the signs, symptoms and side effects of dehydration.

Facts on water in the body

- About 60% of your body is water
- Your blood is 83% water
- Muscles are 75% water
- Body fat is 50% water
- Bones are 25% water
- **Your body contains between 30-50 liters!**

WHAT DOES WATER DO IN THE BODY?

- Carries oxygen and nutrients to working muscles and removes waste through breathing, urine and feces
- Regulates body temperature
- Helps maintain normal blood pressure levels and heart rate
- Lubricates joints and cushions organs
- Helps store energy in muscles
- Helps with transport of food through digestive tract
- Keeps skin moist

On average a sedentary person will lose 2-2.5L of water per day with urine, stools, sweating, and breathing. Losses are influenced by genetics, body size (larger athletes tend to sweat more), fitness, environment, and sport (duration, intensity). A very active person like you will lose a lot more because of sweating and breathing during the sport.

If losses get greater than intakes, you get **dehydrated.**

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What are the adverse effects of dehydration?

A dehydration of 3% is enough to reduce your overall performance by 10% because mostly of reduced blood volume, so blood gets thicker and circulation is more difficult. Dehydration hinders performance by affecting **strength, power, coordination and aerobic endurance.** Severe dehydration can cause **heat stroke** and can be **fatal**!!!

Signs and symptoms of dehydration

- Increased body temperature
- Rapid heart beat
- Thirst, dry mouth
- Decreased concentration and coordination
- Cramps, nausea, headaches, poor vision
- Fatigue, weakness
- Dizziness, irritability

Dehydration is rarely a problem in aquatic sports, but still can happen with water polo because

- Training and competition involve prolonged high-intensity exercise
- Although cool water of the pool contributes to reduce body temperature, sweat losses are increased with humidity

Studies have shown that on average a water polo male athlete loses 550mL per hour. In comparison, a soccer player would lose on average 1.2 liter per hour because of the environment (temperature, humidity, wind).

In general, athletes are drinking less than half of the volume of fluid they lose!

Sources of water

- 20% comes from food
- 80% comes from beverages

Recommendations

Average woman: 2.2 liters / day of fluids (= 7 cups + food)

Average man: 3 liters / day of fluids (= 10 cups + food)

+ 1 liter when water polo training or game

Prepared by Mireille Guibord, B.Sc., RD. for DDO Water polo. 2101 rte Transcanadienne (Dorval), 514-684-9073

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YOUR STRATEGY

Before: Arrive well hydrated at the practice!

- **Drink regularly several hours before**
- **In the 2-3 hours before the practice/game, drink 400-600mL**

During: Drinking is a priority!

- **Start early and take small quantities to avoid cramps and bloating. Don't wait to be thirsty!**
- **No specific volume is recommended, but drink to satisfy your thirst and to avoid a water loss > 2%**
- **If you are fasting or your training is vigorous and longer than 1 hour, take a sport drink or make your own by mixing water, fruit juice and a pinch of salt. You'll get fluid with carbs and electrolytes.**

After: It's time to replenish the lost fluids!

- **Replace fluids and refuel muscles with carbohydrate-containing foods and beverages such as fruit juice, fruit yogurt, milk or soup.**
- **Foods and drinks rich in sodium help to rehydrate, so good choices are: milk, vegetable/tomato juice, cheese, cereals, bread, crackers, salted nuts/peanuts**

During a training session, if you sweat a lot, you may lose a lot of water. One way of calculating how much you're losing is to measure your weight before and after (dressed exactly the same way, for example with dry clothing). The difference will indicate how much to take to replenish. For each 0,5kg loss, you have to drink 750mL. For example, your weight before is 61kg and after is 60,2kg.

61kg - 60,2kg = 0,8kg → 0,8kg x 750mL / 0,5kg = 1200mL

So following this training you should drink 1200mL of fluids. And maybe next time, try to drink more during the session (such as 800mL in this example) to prevent any dehydration and reduction of performance!

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VITAMINS AND MINERALS & APPLICATION OF NUTRITIONAL CONCEPTS

The first objective of this presentation was to inform waterpolo athletes of which minerals and vitamins are essential to include in their diet. The second objective was to provide examples and tools to better apply the nutritional concepts that were presented in October and November.

VITAMINS AND MINERALS

- do not provide energy as can do carbohydrates, proteins and fats
- are involved in different chemical reactions in the body
- several of them are important for performance

Do you need to take supplements?

- athletes consume great quantities of food to meet their energy needs, if foods from all food groups are consumed and recommended servings from Canada's Food Guide are met, there is no need to take multivitamins
- "Nature's multivitamins" are fruits and vegetables
- vitamins and minerals are also present in other food groups

Three important ones for you

- **Vitamin D**
  - is very important during growth; required for the absorption of calcium and phosphorus to build strong bone and teeth
  - protects against infections by keeping your immune system healthy
  - is involved in muscle function for strength, power and cardiovascular endurance
  - **Health Canada recommends a daily intake of 600 IU (15µg)**
  - deficiency may cause fractures or stress fractures, chronic inflamed injuries, muscular weakness, frequent infectious diseases, and for girls, non-regular menstrual cycle
  - several studies show that most athletes have suboptimal blood levels
  - **Where to find it?**
    - biological synthesis with exposure to the sun UV rays, only from May to October
    - food sources: some fatty fishes, egg yolks and some foods are fortified (milk, yogurt, margarine, some beverages such as soy, almond, rice, coconut, orange juice)
    - as seen with the next table, it's not very easy to meet the 600 IU each day

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FOOD	AMOUNT	VITAMIN D
Milk	250ml	100 IU
Yogurt	2 x 100g	60 IU
Egg yolks	2	64 IU
Tuna	75g	220 IU
Salmon	75g	245 IU

Recommendation:

take a supplement of 2000 IU of vitamin D each day of your waterpolo season

- **Calcium**
  - is an important component of bone and teeth, and has also several other functions such as in muscle contraction, blood clotting, and nervous system functioning
  - from 9 to 18 years, it's time for investments!
  - **Health Canada recommends intakes of 1300mg per day**
  - **Where to find it?**
    - food sources: dairy products, fortified beverages (soy, rice, almond, coconut, orange juice), green leafy vegetables, nuts, seeds, canned salmon with bones, sardines, and firm tofu with calcium sulfate
    - calcium absorption varies from 5-75% because of the presence of other element such as phytates and oxalates
    - one serving of milk (250ml), fortified soy beverage (250ml) or cheese (50g) 300mg of calcium are absorbed; large quantities of other calcium rich foods are necessary to get 300mg absorbed:

FOOD	AMOUNT
unfortified soy beverage	8.5L
broccoli	2 ¾ cups
spinach	7 cups
red kidney beans	8 cups
almonds	1 ¼ cup

Recommendation:

get 4 servings of milk or alternatives each day

- **Iron**
  - Iron is essential in the body for the transport of oxygen and production of energy in muscle cells
  - Deficiency is called "anemia" and is observed when pale skin, muscular weakness, fatigue that can't be fixed with rest, irritability, difficulty to follow usual trainings

- Statistics: 30% of athletes training intensively in various sports have anemia because they don't rest enough (more than 7 trainings/week without a day off) or they have a diet low in iron; other reasons are growth spurt or for girls, monthly blood loss through menstruations
- **Recommendations are to take 8mg between 9-13 years and between 14-18 years, boys to increase to 11mg and girls to 15mg**
- **Where to find it?**
    - plant sources: legumes, peanuts, nuts, some dried fruits and vegetables (spinach, asparagus), fortified grain products such as flour, pasta and breakfast cereals, and whole grains
    - animal sources: meat, poultry and fish
    - low absorption of 2-5% for plant sources and 20-30% for animal sources
    - caution: tea and coffee contains tannins known to affect iron's absorption
    - to improve absorption of iron from plant sources, combine with an iron animal source such as eating beans with meat as in a chili or combine with a source of vitamin C as having an orange juice with your peanut butter toast at breakfast or adding strawberries or tomatoes to a spinach salad

You think you might be suffering from a nutrient deficiency. Don't hesitate to address the situation with your doctor or with the dietitian. They can help you to fix the situation.

APPLICATION OF THE NUTRITION CONCEPTS

With the 1st presentation you learned how to calculate your energy needs. Using this information you can get very precise in the supply of energy to your body by calculating what you consume, using an accessible application with an electronic device. Making the effort to count your calorie and protein intakes for a few days is not too difficult and will give you a good idea of the situation which you'll be able to adjust after. Eating well and meeting your needs can also be done with simplicity and rapidity. First, you can use the Canada's Food Guide and meet and even go above all the food groups recommended servings. You can use the Plate Method which includes distribution of all food groups at each meal. Remember that with this method you allow 1/3 of the plate for starches; days with heavy training, allow up to $^1/_2$ - $^3/_4$ for starches; if you are trying to reduce your body weight, rather focus on $^1/_4$ for starches and $^1/_2$ for vegetables.

Another easy way of planning your caloric intake in a day is to divide the calories between meals and snacks. The distribution can depend on the timing of your different training periods. Here is an example for a 3000kcal plan with training at supper time.

Breakfast	600	Light supper	350
am Snack	300	Training	120
Lunch	700	Recovery snack	200
pm Snack	250	Evening snack	500

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SIMPLICITY AND RAPIDITY
Sandwich
Leftovers
Microwave meals
Eggs (boiled, microwave, scrambled)
Cereals
Salad such as pasta, beans, couscous, rice
Canned fish with crackers
Fruits and veggies with hummus

EXAMPLES OF EARLY BREAKFASTS
Smoothie (fruits + dairy)
Fruit + milk + granola bar
Muesli pita bread with margarine + juice + yogurt
Yogurt parfait with berries and granola cereals
Oatmeal + dried fruits
Cereals + milk

EXAMPLES OF SNACKS
Pita + hummus + veggies
Crackers + cheese
Smoothie with soy/milk + fruits
Medium fruit + nuts
Roasted chickpeas or soy nuts + juice
Applesauce + homemade bran muffin
English muffin + peanut butter + apple
Mix of nuts and dried fruits
Yogurt + fruits + granolas cereals

EXAMPLES OF RECOVERY SNACKS AT 200kcal
250ml vanilla soy beverage + 2 rice cakes
1/4c cottage cheese + 1c fresh fruit + 1/4c cranberries
1 slice bread with peanut butter + 200ml fruit juice
1.5c Cheerios + 250ml milk + ½ banana
2 slices banana bread + 1 drinkable yogurt
1 granolas bar + 250ml milk
3/4c greek yogurt + 1.5c fruits

When you plan your intakes think of those points:

1. **Taste**: select food and beverages which you like the taste and that you'll enjoy.
2. **Time:** remember that the time you have available to prepare and to digest is also very important.
3. **Energy content:** always focus on getting about 60% of your energy from carbs.
4. **Quality of food**: select foods that are nutrient rich, low fat, low in added sugar and high in fiber.