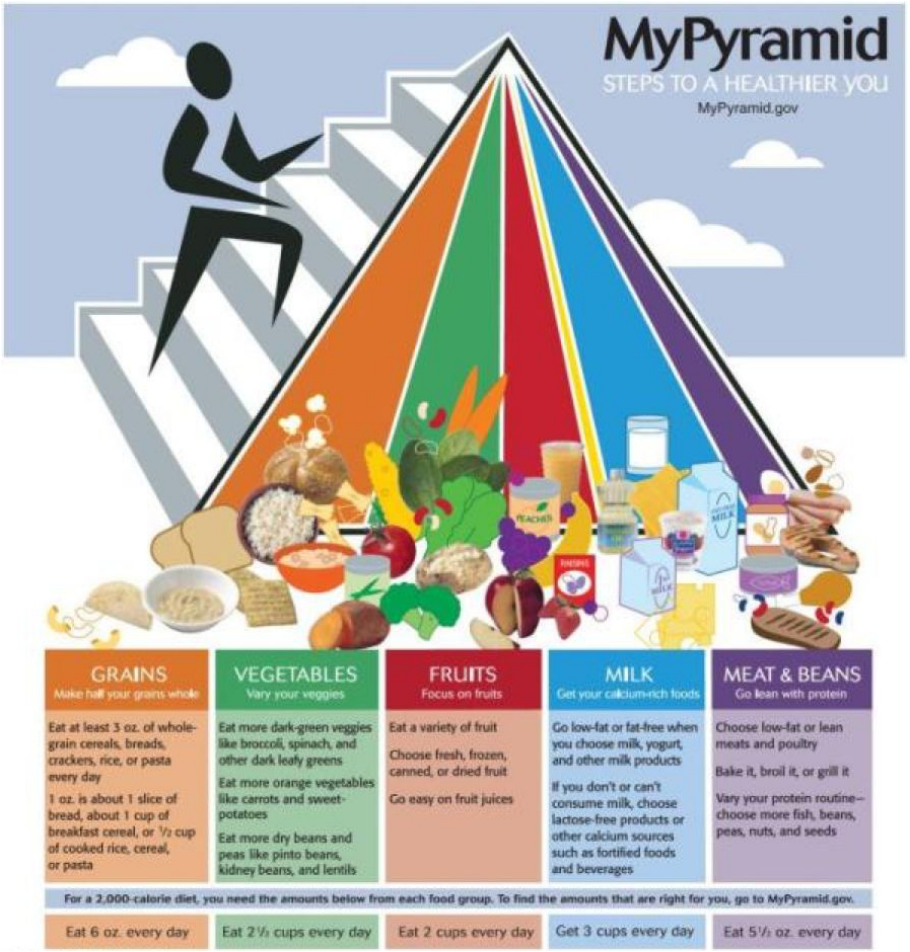
Nutrition

CTYI Introduction to Sports Science
Spring 2020.
Ciarán Boylan

First things first

- Nutrition is personalized
- This means that one size does not fit all
- A balanced approach to health involves healthy nutrition as well as physical activity
- This means consuming a variety of foods in good proportion



Important terms

- Kilocalorie (kcal)
  Amount of energy needed to raise 1kg of water by one degree celsius.
  - One calorie is equal to 0.001 kcal

- Recommended Daily Allowance (RDA)
  The average daily intake that is enough to meet nutrient requirements for up to 98% of healthy individuals

Nutrients

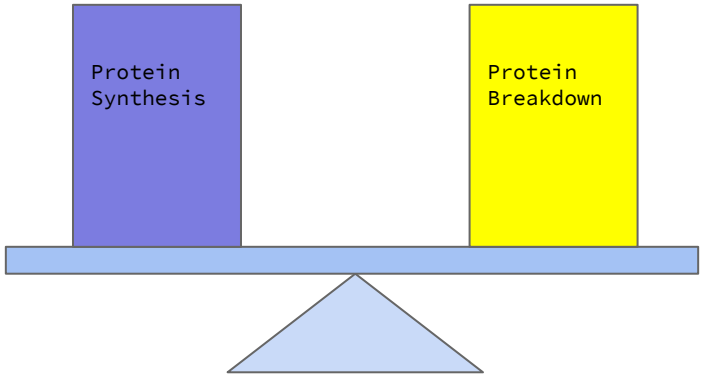
Carbohydrates - CHO

- Stored as glycogen, CHO is then used in high intensity exercise
- The body can only store a limited amount of CHO (usually 60-90 mins)
- RDA for adults is 4.5 g/kg per day
- What foods are examples of carbohydrate sources?

Protein

- Used for the repair and restoration of muscle damage.
- Increased protein requirement when in resistance or endurance training.
- Metabolising protein requires more water than carbohydrate or fat. So if protein intake increases, so should water.
- RDA for 8-13 year olds (USA) is 0.95g/kg per day

Balancing protein breakdown and Protein synthesis



Fat

- Fuel for energy of low intensity and long duration
- Usually readily available in more than enough quantity
- When fat is used as fuel, CHO is spared, which can delay fatigue

Vitamins

- Organic substances of plant/animal origin that our bodies need for normal growth and development, metabolism, and energy transformation.
- For example, one role of vitamin B6 is in the breakdown of glycogen to glucose
- Vitamins are important for the production of energy

Minerals

- Minerals are elements which are not of plant/animal origin which we need to make up all our individual cells and for our bodies to function properly
- For example, iron and zinc are microminerals
- Calcium and potassium are macrominerals
- Where individuals have a deficiency of minerals that has been identified by a professional working in nutrition, an individual can supplement to achieve normal levels

After Exercise

- Following exercise, we are recommended to ingest some carbohydrate and protein as soon as we can
- This allows us to replace our glycogen stores, and also begin to repair damaged muscle

Chocolate Milk

- Chocolate milk can be used as a tasty and nutritious recovery drink.
- Check your food labels!
- Can you find protein, carbohydrate, vitamins, and minerals? If so, how much of each?
- It’s cheap and available
- Lactose free versions are usually available

Energy requirements

- Typical children aged 8-13 years old use about 1600-1800 kilocalories (kcal) of energy on an average day
- Average adult males expend 2500-3000 kcal of energy daily
- Average adult females expend 1500-2000 kcal of energy daily

parent tips

Calories Needed Each Day

It's important to know the number of calories you need to eat to stay healthy. Do you know how many calories you and your family need each day?

How many calories you need each day—ENERGY IN—depends on a few things:

- Your age
- Whether you are male or female
- How active you are

The tables on the next pages show the calories needed each day for boys and men, and for girls and women. They are split by age and three levels of activity.

Not Active—Not much ENERGY OUT. Does only light activity needed for daily life. For instance, cooking or walking to the mailbox.

Somewhat Active—Some ENERGY OUT. Does physical activity equal to walking quickly for 1 ½ to 3 miles (about 30–40 minutes) each day. Plus, does light activity needed for daily life.

Very Active—A lot of ENERGY OUT. Does physical activity equal to walking quickly for more than 3 miles each day (more than 40 minutes). Plus, does light activity needed for daily life.

These tables give you an idea of how much ENERGY IN your family members need.

The amount of calories needed differs by age based on the level of regular physical activity. That's why the tables give a range of calories for some age groups.

- For children, more calories are needed at older ages.
- For adults, fewer calories are needed at older ages.

Calories Needed Each Day for Boys and Men

Age	Not Active	Somewhat Active	Very Active
2–3 years	1,000–1,200 calories	1,000–1,400 calories	1,000–1,400 calories
4–8 years	1,200–1,400 calories	1,400–1,600 calories	1,600–2,000 calories
9–13 years	1,600–2,000 calories	1,800–2,200 calories	2,000–2,600 calories
14–18 years	2,000–2,400 calories	2,400–2,800 calories	2,800–3,200 calories
19–30 years	2,400–2,600 calories	2,600–2,800 calories	3,000 calories
31–50 years	2,200–2,400 calories	2,400–2,600 calories	2,800–3,000 calories
51 years and older	2,000–2,200 calories	2,200–2,400 calories	2,400–2,800 calories

Calories Needed Each Day for Girls and Women

Age	Not Active	Somewhat Active	Very Active
2–3 years	1,000 calories	1,000–1,200 calories	1,000–1,400 calories
4–8 years	1,200–1,400 calories	1,400–1,600 calories	1,400–1,800 calories
9–13 years	1,400–1,600 calories	1,600–2,000 calories	1,800–2,200 calories
14–18 years	1,800 calories	2,000 calories	2,400 calories
19–30 years	1,800–2,000 calories	2,000–2,200 calories	2,400 calories
31–50 years	1,800 calories	2,000 calories	2,200 calories
51 years and older	1,600 calories	1,800 calories	2,000–2,200 calories

Source: HHS/USDA Dietary Guidelines for Americans, 2010

We Can! is a program from the National Institutes of Health that offers resources for parents, caregivers and communities to help children 8-13 years old stay at a healthy weight through eating right, increasing physical activity, and reducing screen time.

To learn more, go to http://wecan.nhlbi.nih.gov or call 1-866-35-WECAN.

production note: second side Calories Needed Each Day

Metabolic rate

- Energy expenditure, the energy we use as humans, is called our metabolic rate.
- Basal Metabolic Rate (BMR) is the amount of energy expended by our bodies to sustain our vital functions when awake, fasted, free of psychological or physical stress.
- Resting Metabolic Rate (RMR) is the amount of energy we expend when resting quietly while lying down

Resting metabolic rate

At rest, different body systems use different amounts of energy

Liver: 29-32%
Brain: 19-21%
Muscles: 18%
Heart: 10%
Lungs: 9%
Kidneys: 7%

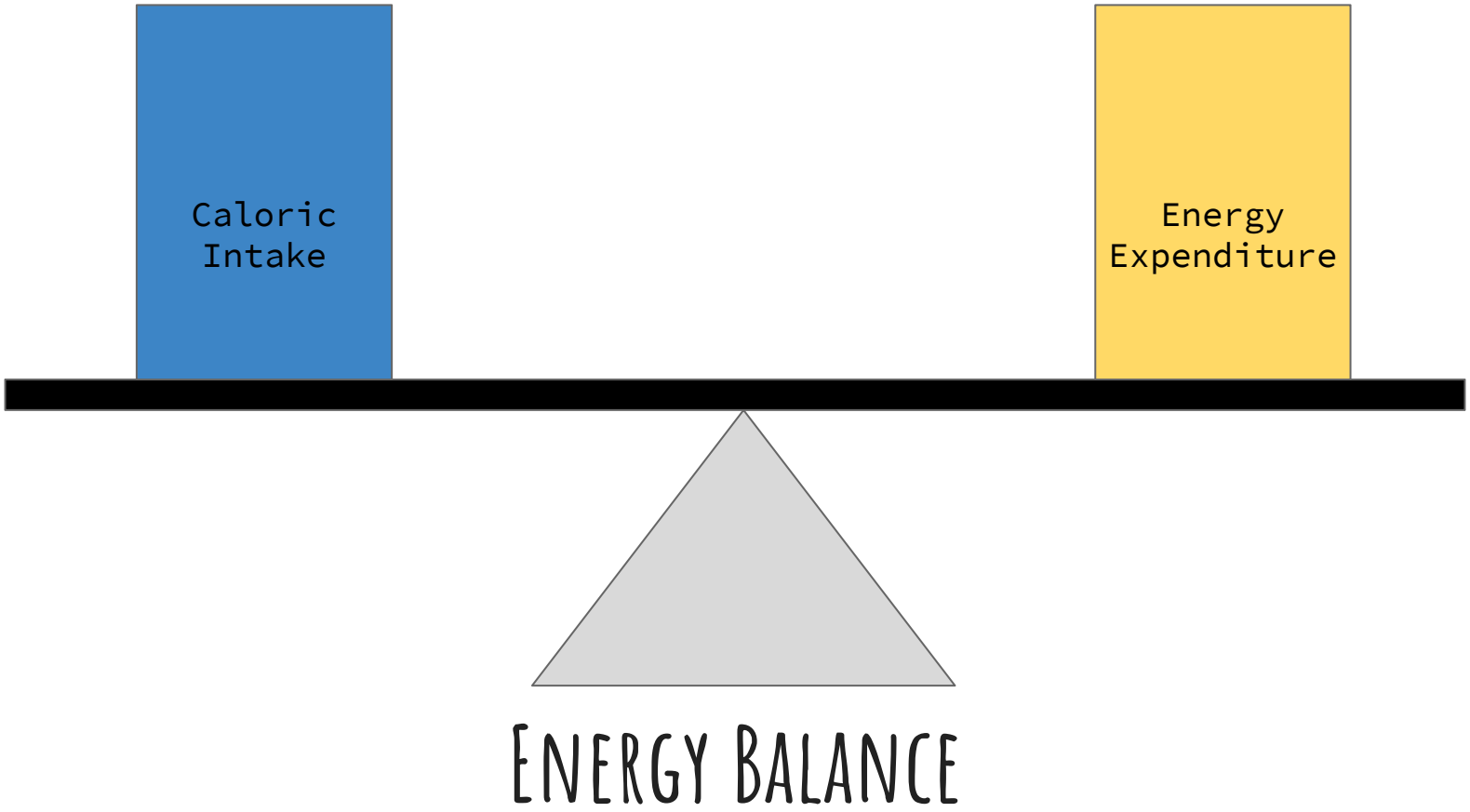
Energy Expenditure

- Why might it be useful to know how much energy we use at different times?
- For example, BMR, RMR, or during and after exercise.
- Our Physical Activity Level (PAL) is the ratio of our total energy expenditure to our RMR of a day

Energy Balance

- Knowing our energy expenditure at different times allows us apply energy balance
- There are three states of energy balance:

★ Positive
★ Negative
★ Balanced


Caloric Intake
Energy Expenditure
Energy Balance

Task

What would happen if we were to:

1. Increase caloric intake, and keep our energy expenditure constant ?
2. Increase energy expenditure, and keep our caloric intake constant ?
3. Increase our energy expenditure, and increase our caloric intake also ?

Positive energy balance

- This is required consistently over time in order for people to gain weight
- Calorie intake exceeds energy expenditure, meaning we have a surplus of intake

Negative energy balance

- This is required consistently over a defined time period in order for people to lose body weight
- Energy expenditure exceeds caloric intake, meaning we have an deficit

Balanced state

- Energy expenditure and caloric intake are matched for a continued period of time

Task

- Our three energy states are clear, however the optimal strategy to achieve each of these states over time is challenging.
- Which do you think is a better approach to weight gain or weight loss; increasing/decreasing caloric intake, or increasing/decreasing energy expenditure? Explain your answer

Energy expenditure in Team sports athletes

Average energy expenditure in team sports athletes

- Male: 3000-6000 kcal per day
- Female: 2000-4000 kcal per day

- This may rise for larger/smaller individuals, and depends of the intensity, duration, and frequency of exercise. E.g. Long distance swimming versus darts.

Task

We know that if we use 1 litre of oxygen, we will use 5kcal of energy.

1. If we know this, can we work how how much exercise it will take us to burn the amount of calories that is in our favourite food item?
2. How might we measure how much energy we use when exercising or in a resting metabolic state?

Diets and dieting

- Extreme caution is required when engaging in dieting.
- This should only be done under the supervision of a nutritionist/ sports scientist/ doctor.
- Nearly every diet works...in the short term.
- Healthy weight regulation is consistent, and appropriate to our individual energy demands

- Rapid changes in weight can damage our bodies in the short, and long-term
- Sports such as boxing, horse racing, once engaged in dangerous strategies to reduce and maintain low weight. Nowadays, these (and other)sports achieve similar results using healthier techniques for athletic health short and long term.

Goals of nutrition in training

1. Give us caloric and nutrients required
2. Practice good nutrition and good overall health
3. Achieve and maintain body weight appropriate to the sport/ goal of the individual
4. Facilitate recovery from exercise bouts and fuel physiological adaptations to exercise
5. Try out new foods and fuelling strategies to avoid tedium, and determine our bodies response to different fuelling techniques

For you!

- Children aged 5-18 are recommended to undertake 60 minutes of moderate physical activity every day.
- Create a menu of ways you can be at least moderately active for 60 minutes over the course of a day
- Make one menu for outside, or fair weather days, and another for wet, or bad weather days.
- Use as much variety as possible, and include activities of different intensities, and which as as fun as possible!

Key Messages

- Proper nutrition and exercise work together to optimise health and athletic performance
- Nutrition fuels our bodies for exercise, and helps to recover and positively adapt after exercise
- Nutrition is individualised - but we all need carbohydrates, proteins, fats, vitamins, and minerals.

Go Raibh Maith Agat!

- Thank you for listening and taking part in the class.
- You do not have to submit or send me all, or any of the tasks; but, if you would like to choose one thing, I would be delighted to see it!