Let's Excel Together

CANADIAN ACADEMY OF SPORTS NUTRITION

Lecture 38:

Dynamics of Fats During Exercise

Copyright Protection:

- **Carbohydrates and fats are the main sources of energy during exercise.**

- **The fuels for the working muscles during an exercise session or a competition:**

1) Carbohydrates in the forms of:

- **blood glucose.**
- **muscle glycogen.**

2) Fats in the forms of:

- **free fatty acids (FFAs).**
- **muscle triglyceride .**

- **Whether the body would consume mainly carbohydrates or fats depends on:**

Major factors:

- **Intensity of exercise.**
- **Duration of exercise.**

Minor factors:

- **Fitness level.**
- **Nutritional status of an individual.**

Intensity of Exercise:

- **Intensity of exercise is a key factor in burning fats during a physical activity.**
- **It is defined as a percentage of the maximal oxygen consumption (VO2max).**
- **Intensity of exercise is measured by MET (metabolic equivalent task).**

- **MET is a physiologic measure that shows how much oxygen is consumed by the body in one minute, which is different in men and women.**
- **One MET equals to 3.5 mL/kg/min.**
- **Age and gender are the two important parameters that affect MET and intensity of exercise.**
- **For example, a low intensity activity for a young man is a moderate intensity activity for an old man and a high intensity activity for a very old person.**

Exercise Intensity Measured by METs (*mL/kg/min*)

Exercise Intensity	Men (METs)	Women (METs)
Low	1.5 - 3.9	1.2 - 2.7
Moderate	4.0 - 5.9	2.8 - 4.4
High	>6	>4.5

- **MET is the most accurate way to measure oxygen consumption during a physical activity. It would determine exercise intensity.**

- **However, it is not practical for most athletes and people to measure the intensity of their exercise in METs.**

- **This is why the "heart rate" and "*talk – sing test*" are good indicators of exercise intensity.**

Heart Rate (HR):

- **Heart rate is a good and practical indicator of exercise intensity, though it is not as reliable as MET.**

- **To determine the intensity of exercise, you need to know the maximum heart rate (MHR).**

- **The MHR is calculated as 220 minus your age. For example, if you are 45 years old, your MHR is 175 (220 – 45).**

Exercise Intensity Based on Heart Rate

Exercise Intensity	MHR% (Maximum Heart Rate)
Low	60 - 70
Moderate	70 - 85
High	>85

Talk – Sing Test (TST):

- **This test gives you an estimation of exercise intensity especially if you are unable to measure your heart rate.**

- **Even though it is not as valuable as MET and Heart Rate, it is a simple way to estimate exercise intensity.**

Talk - Sing Test

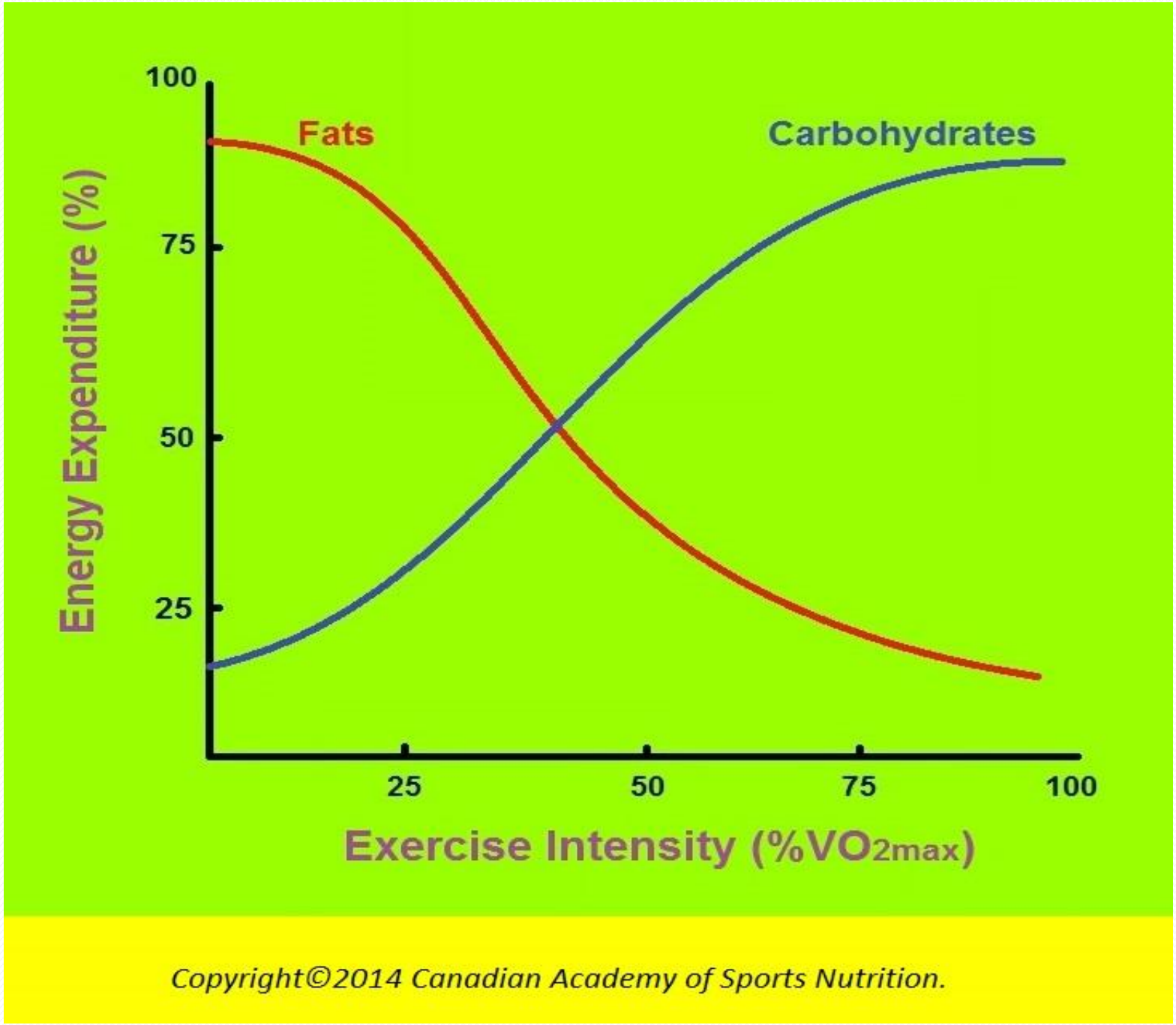
Exercise Intensity	Talk	Sing
Low	Easy	Easy
Moderate	Easy	Difficult
High	Difficult	Difficult

- **There is an inverse relationship between exercise intensity and fat consumption. The major source of energy for :**

- **low intensity exercise: fats, providing approximately 90% of energy.**

- **Moderate intensity exercise: about 50% of energy supply comes from carbohydrates and the other 50% from fats.**

- **High intensity exercise: requires an easily accessible source of energy, which are carbohydrates.**



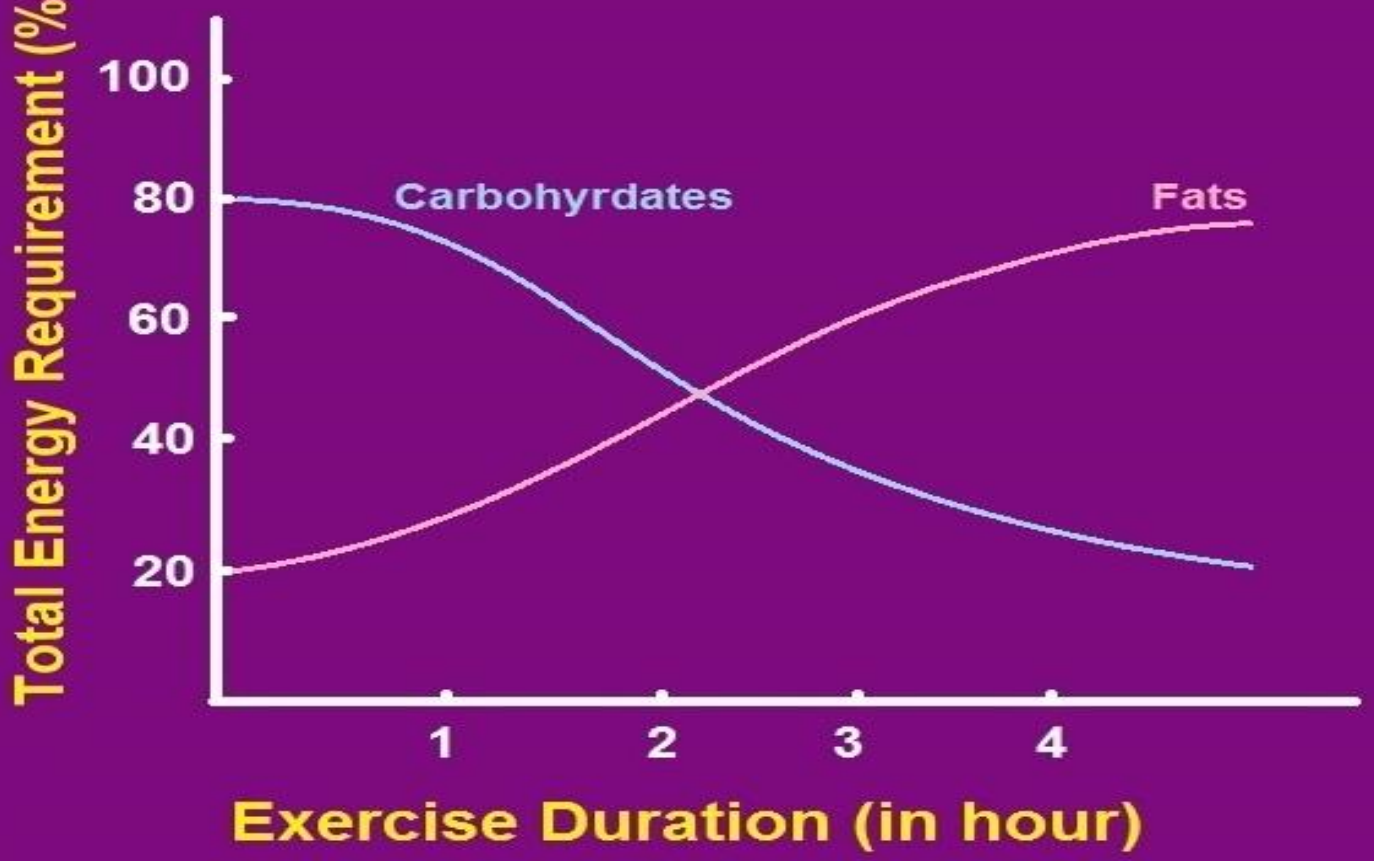
Relationship between Exercise Intensity and Energy Expenditure

Exercise Intensity	Carbodydrates		Fats	
	Blood Glucose	Muscle Glycogen	Blood FFAs	Muscle Triglyceride
Low	10%	0%	75%	15%
Moderate	10%	40%	30%	20%
High	15%	60%	13%	12%

Exercise Duration:

- **Exercise duration is another major factor that determines the source of energy supply during exercise.**
- **There is a direct relationship between exercise duration and fat consumption.**
- **In a prolonged exercise, as glycogen reserves get depleted, fats in the form of free fatty acids (FFAs) provide up to 80% of the total energy requirement.**

Relationship between Exercise Duration and Total Energy Requirement



Homework:

- 1) Describe the relationship between intensity of exercise and fat metabolism.

- 2) Describe the relationship between duration of exercise and fat metabolism.