

FUELS AND METABOLISM



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LEARNING OBJECTIVES

- Learn major classes of dietary fuels
- Know different forms of body fuel stores
- Define metabolism
- Distinguish between anabolism and catabolism

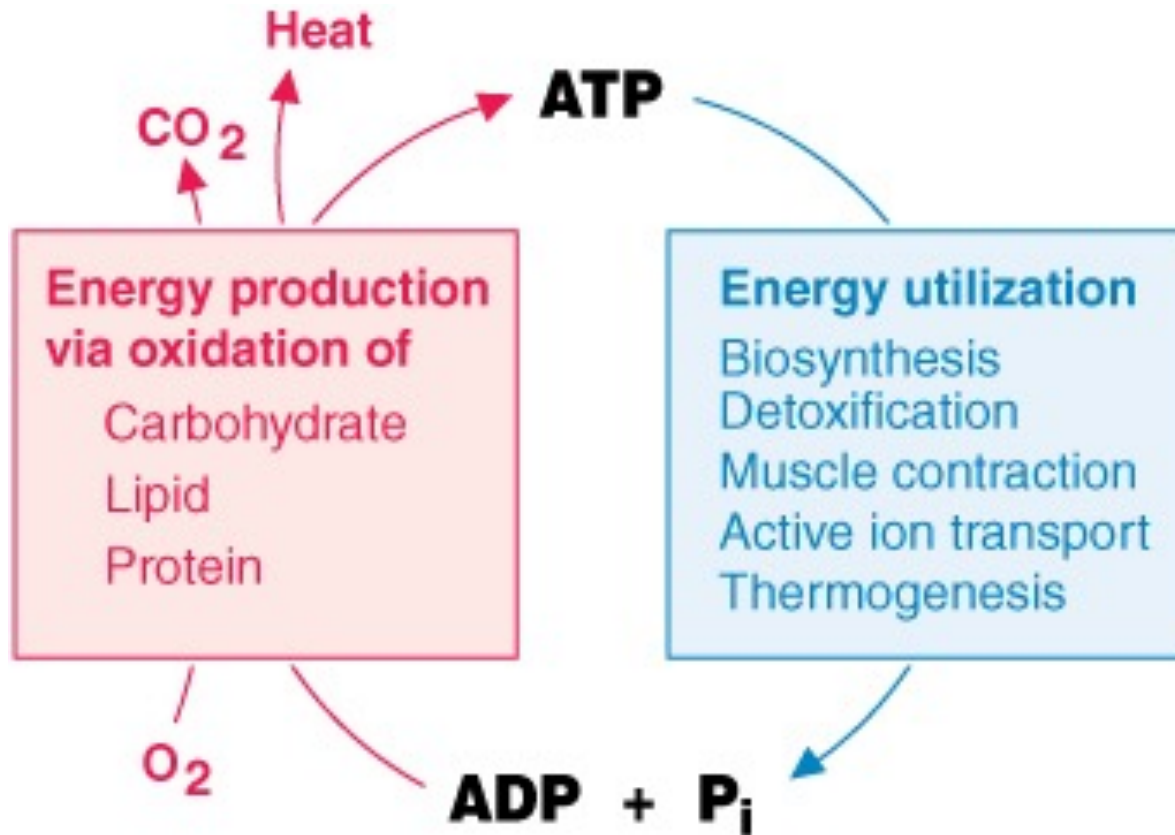
DIETARY FUELS

- Major fuels from food are
 - Carbohydrates
 - Proteins
 - Fats
- Energy is released by oxidation of these fuels to CO_2 and H_2O
- Such released energy generate
 - Heat
 - ATP (adenosine triphosphate)

CELLULAR FUEL IS ATP



- What does ATP do?
 - Provide energy that is needed to drive such as
 - Biosynthetic reactions
 - Muscle contractions
 - Active transport across membranes
- Where does ATP end up?
 - Converts to ADP (adenosine diphosphate) and P_i (inorganic phosphate)
 - ADP regenerates ATP



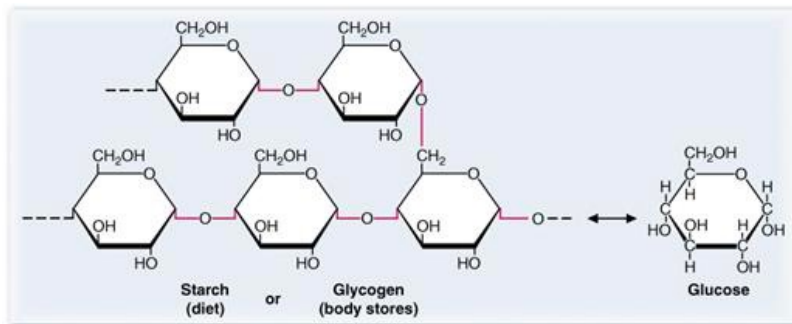
THE ATP-ADP CYCLE.

The energy-generating pathways are shown in *red*; the energy-utilizing pathways in *blue*.

TWO PROCESSES OF METABOLISM:

- Catabolism
 - To break down molecules
- Anabolism
 - To build up molecules from building blocks

FOR EXAMPLE



- Structure of starch and glycogen.
- Starch, our major dietary carbohydrate, and glycogen, the body's storage form of glucose, have similar structures. They are polysaccharides (many sugar units) composed of glucose, which is a monosaccharide (one sugar unit).

Excess dietary fuel

Fed



Fuel stores:

Fat

Glycogen

Protein

Fasting



Oxidation



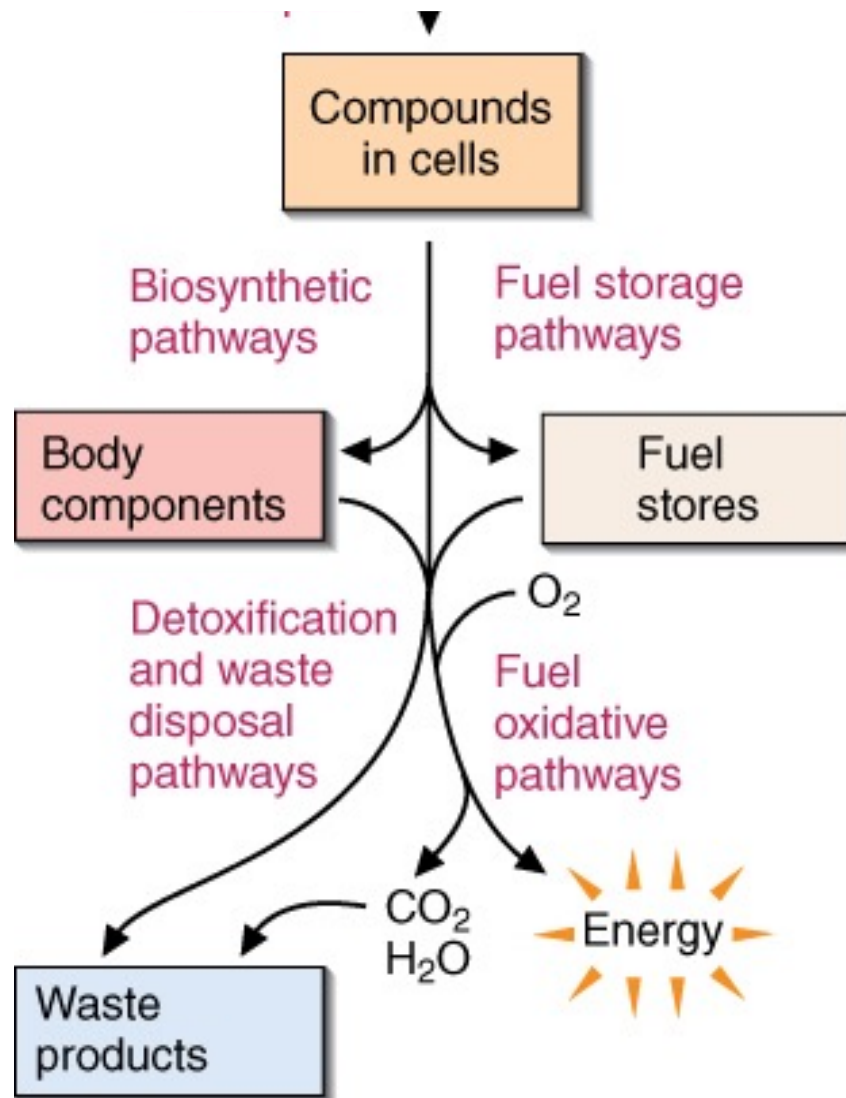
FATE OF
EXCESS
DIETARY FUEL
IN FED AND
FASTING
STATES.

BODY FUEL STORES

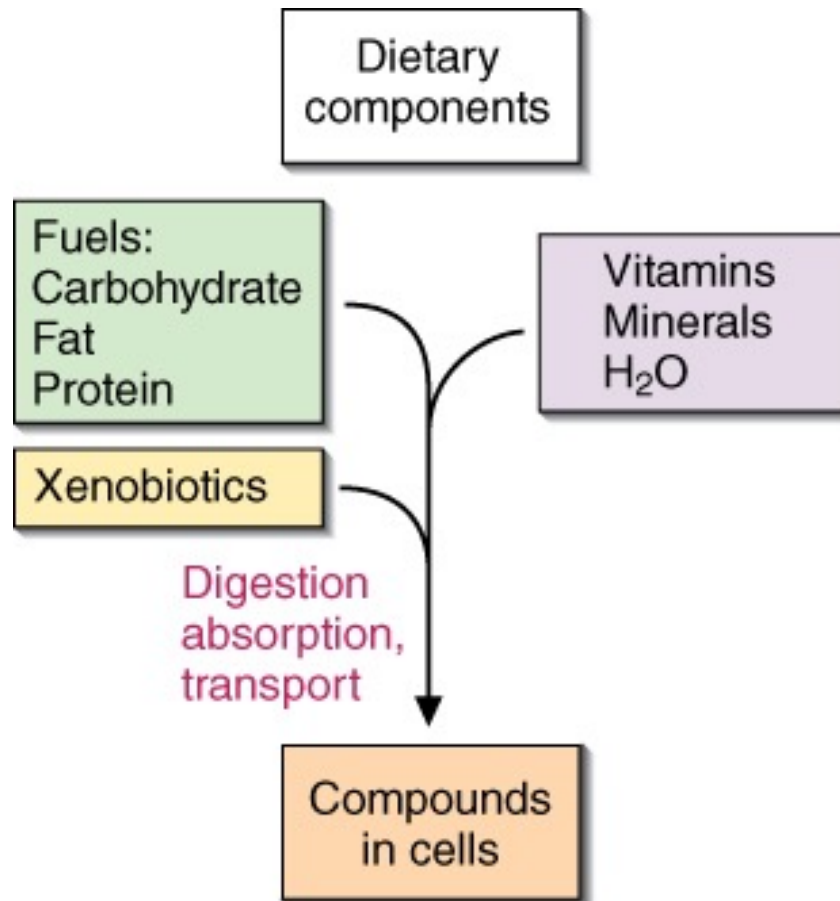
- Fats
 - Major fuel store!
 - In adipose tissues, which is found throughout our bodies
 - May accumulate more in hips, thighs and abdomens
- Carbohydrates
 - Smaller fuel stores
 - As glycogen
 - Mainly in liver and muscles
- Proteins
 - From large muscle masses in particular
 - Used when we fast

Fuel	Amount (kg)	% of total stored calories
Glycogen		
- Muscle	0.15	0.4
- Liver	0.08	0.2
Protein	8.0	14.4
Fats	15.0	85.0

Fuel composition of the Average 70-kg Man after an Overnight Fast



AN OVERVIEW
OF THE
GENERAL
METABOLIC
ROUTES FOR
DIETARY
COMPONENTS
IN THE BODY.



AN OVERVIEW OF THE GENERAL METABOLIC ROUTES FOR DIETARY COMPONENTS IN THE BODY.