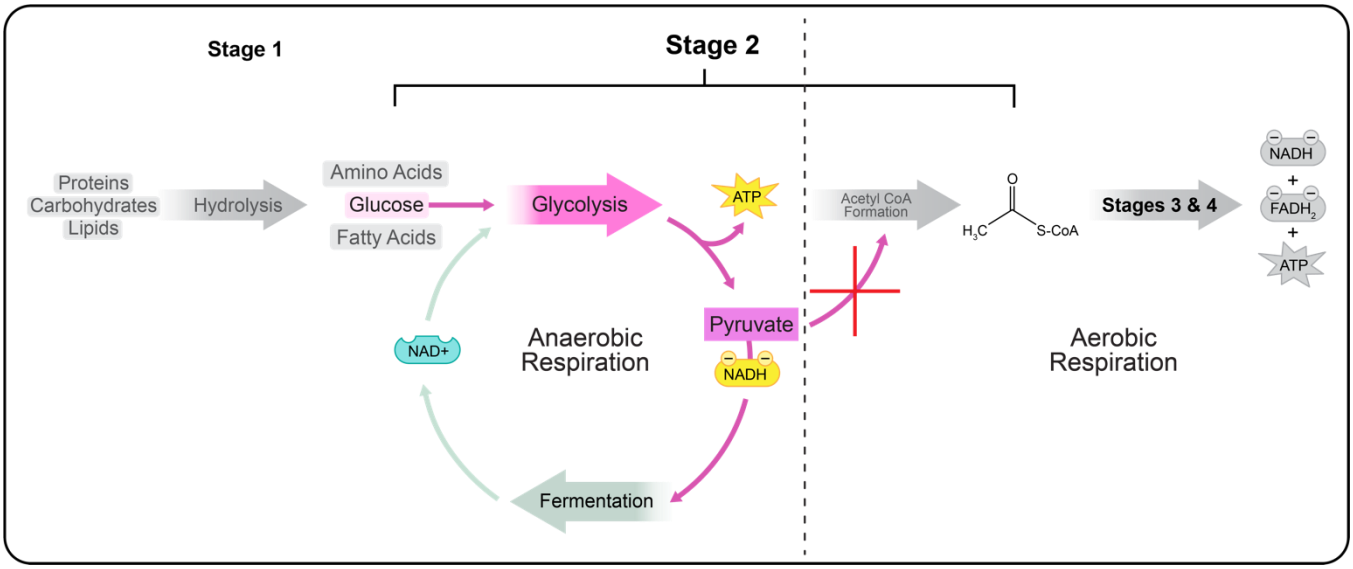
CONCEPT: ANAEROBIC RESPIRATION

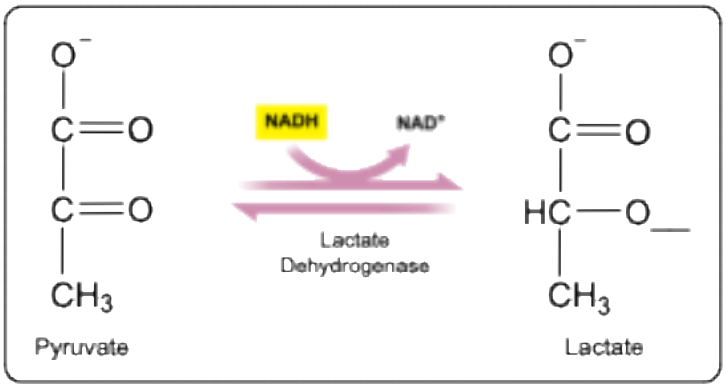
- Without O_2, pyruvate is redirected through fermentation.



- **Fermentation:** generation of energy in the absence of oxygen.
  - □ In the absence of _____, fermentation regenerates _____ allowing glycolysis to continue.

Lactate Fermentation

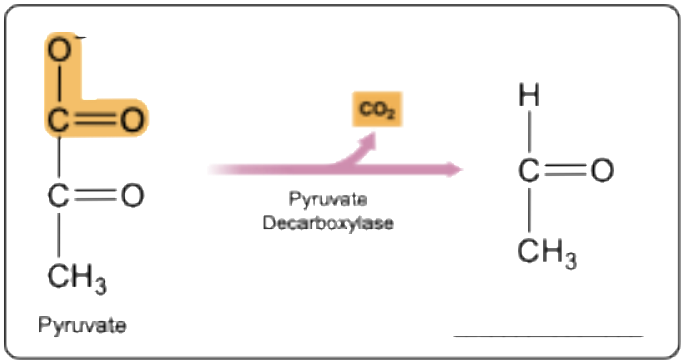
- Process occurs in animal _____ cells during strenuous activity.
- Pyruvate is _____ by lactate dehydrogenase to _____.
  - □ 1 NADH is oxidized to 1 _____.

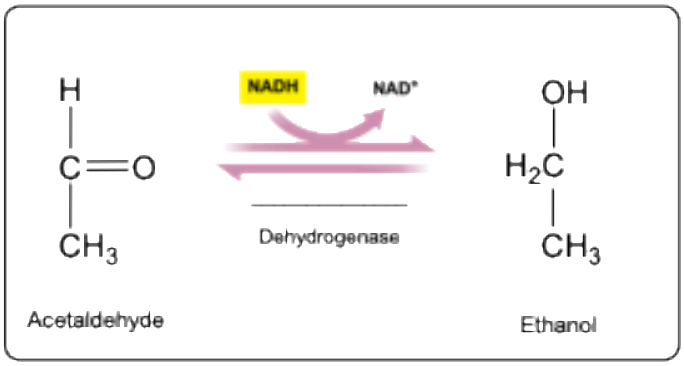


CONCEPT: ANAEROBIC RESPIRATION

Alcohol Fermentation

- Process by which certain _____ and yeast convert pyruvate to _____ and CO_2.
- Pyruvate is reduced to ethanol by a ____ step process.
  - □ 1 C atom is lost as _____.
  - □ 1 NADH is oxidized to 1 _____.





EXAMPLE: Pyruvate is converted into ethanol and CO_2 by which of the following enzymatic reactions?

a) Pyruvate is directly converted to ethanol by alcohol dehydrogenase.

b) Pyruvate is converted to acetaldehyde by pyruvate decarboxylase, then reduced to ethanol by alcohol dehydrogenase.

c) Pyruvate is converted to lactate by lactate dehydrogenase, followed by conversion to ethanol by lactate reductase.

d) Pyruvate is converted to ethanol by oxidative decarboxylation.

PRACTICE: Select the best statement about fate of pyruvate.

a) Conversion of pyruvate to lactate is irreversible because it is an oxidation reaction.

b) Conversion of pyruvate to lactate involves reduction of aldehyde group of pyruvate.

c) Conversion of pyruvate to acetaldehyde is irreversible because it is a reduction reaction.

d) Pyruvate oxidation involves transfer of acetyl group to CoA.

e) Both fermentation and pyruvate oxidation produce NAD^+.

CONCEPT: ANAEROBIC RESPIRATION

PRACTICE: Select statement that explains importance of conversion of NADH to NAD^+ during anaerobic respiration.

a) Cells rely on glycolysis to produce ATP and NAD^+ in the absence of oxygen.

b) Conversion of glucose to pyruvate in glycolysis requires NAD^+ as an electron acceptor.

c) Allows for conversion of glucose to Acetyl CoA in the absence of oxygen.

d) Regeneration of NAD^+ through fermentation ensures that glycolysis will come to a halt.

PRACTICE: Circle the correct type of respiration under which:

a) Pyruvate converted to lactate (aerobic or anaerobic)

b) Glucose converted to pyruvate (aerobic or anaerobic)

c) Pyruvate converted to Acetyl CoA (aerobic or anaerobic)

d) Pyruvate converted to ethanol (aerobic or anaerobic)