



PRE-ACTIVITY

ASSIGNMENT

2.

- liver:* metabolic management for the organism
- heart:* constant muscle contraction
- brain:* functions by releasing neurotransmitters and taking them back up against concentration gradients. Therefore major energy consumer.
- muscle:* needs to be prepared for short bursts of high levels of muscle contraction
- adipose:* store and mobilize fat

IN-CLASS

ACTIVITY

Critical Thinking Questions

1.
 - Low blood glucose: Brain is obtaining glucose from liver performing gluconeogenesis
 - Early starvation: Brain is transitioning to metabolism of ketone bodies
2.
 - Glycogen, fat, muscle (protein)
 - Glycogen depleted first
3.
 - Glycogen: Liver glycogen broken down after 40 hours
 - Gluconeogenesis: Starts when glycogen begins to be depleted. By 40 hours, gluconeogenesis supplies nearly all glucose and continues operate somewhat throughout the two weeks.
 - Ketogenesis: After 3 days, brain has started to use ketone bodies (30%), but still relies on gluconeogenesis for much of its glucose (After 40 days, brain gets 70% of energy from ketone bodies)
 - Protein catabolism: Protein breakdown a lot in first few days, decreases thereafter, but remains above zero
 - Fat catabolism: Starts early in starvation and continues throughout the two weeks.
4. These amino acids can still enter the TCA cycle as acetyl-CoA and by way of OAA, appear in glucose. However, the body cannot synthesize glucose from these starting materials without depleting the intermediates of TCA.
5. All but leu and lys could be gluconeogenic. Leu and lys are converted only into acetyl-CoA or acetoacetate, which can not be used as substrates for net synthesis of glucose. All others can be converted to glucose without depletion of TCA intermediates.
6. If α -ketoglutarate were depleted, the ability of TCA to operate would become impaired.

In addition to supplying α -ketoglutarate for TCA, this reaction also functions to eliminate ammonia groups from amino acids that undergo transamination reactions with α -ketoglutarate.