Mastery Series: Bacterial Metabolism

1. Which of the following processes can ALL organisms perform?
    a. glycolysis
    b. fermentation
    c. electron transport chain
    d. krebs cycle

2. How are carbohydrates used to make ATP?
3. How are proteins used to make ATP?
4. How are fats used to make ATP?
5. Proteus can use urea to make ATP. Klebsiella can't. What must be different about these two organisms at the DNA level?
6. Which part of bacterial cellular respiration might result in gas production in the colon?
7. What are 4 products of fermentation?
8. Which organism did I mention that can ONLY ferment?
9. In lab, if an organism produces a byproduct called indole, which amino acid is it probably capable of metabolizing?
10. Why do electrons move down the electron transport chain?
11. What must happen to keep ATP synthase working?
12. Besides oxygen, what highly electronegative atoms do bacteria use to keep the transport chain working?
13. Why is ammonia a byproduct of amino acid metabolism?
14. Which two yeast species make ethanol?
15. Which eukaryotes are particularly good at fermenting pyruvate to lactic acid?
16. In lab, one bacteria ferments mannitol. Another doesn't. Is the mannitol metabolizer most-likely *S. aureus* or *E.coli*?
17. In lab, one bacteria has a variety of fermentation products. Is it more likely to be *Enterobacter* or *Escherichia*?

Mastery Series ANSWERS: Bacterial Metabolism

1. Which of the following processes can ALL organisms perform? **A: GLYCOLYSIS**
    a. **glycolysis**
    b. fermentation
    c. electron transport chain
    d. krebs cycle

2. How are carbohydrates used to make ATP? **They can be broken down into simple sugars, then into pyruvate, (yield: 2 ATP). The pyruvate may then be fermented or passed through the Krebs cycle and the ETC to make lots more ATP.**
3. How are proteins used to make ATP? **Proteins are broken down into amino acids. Amino acids are deaminated, and then either are converted to pyruvate, or modified into molecules used in the Krebs cycle. ATP is produced when the electrons from broken down amino acids pass down the ETC.**
4. How are fats used to make ATP? **The glycerol head of triglycerides can be converted into pyruvate (yield: 2 ATP) and the three lipid tails can be modified to enter the Krebs Cycle and then their electrons passed down the ETC (yield: lots of ATP).**
5. Proteus can use urea to make ATP. Klebsiella can't. What must be different about these two organisms at the DNA level? **Proteus contains a gene that allows it to make an enzyme that is able to modify urea into a substance that can enter the Krebs cycle.**
6. Which part of bacterial cellular respiration might result in gas production in the colon? **The Krebs cycle.**
7. What are 4 products of fermentation? **Lactic acid; alcohol; mixed acids; 2, 3-butanediol (also various gases such as carbon dioxide or methane)**
8. Which organism did I mention that can ONLY ferment? **Lactobacillus**
9. In lab, if an organism produces a byproduct called indole, which amino acid is it probably capable of metabolizing? **tryptophan**
10. Why do electrons move down the electron transport chain? **They are pulled by progressively stronger electronegative proteins.**
11. What must happen to keep ATP synthase working? **There must be a final electron acceptor present: oxygen, sulfur, or nitrogen.**
12. Besides oxygen, what highly electronegative atoms do bacteria use to keep the transport chain working? **Sulfur or nitrogen**
13. Why is ammonia a byproduct of amino acid metabolism? **NH3 is formed when amino acids are deaminated**.
14. Which two yeast species make ethanol? ***Candida albicans and Saccharomyces cerevisiae***
15. The prokaryote Lactobacillus ferments pyruvate to lactic acid; can you give an example of a eukaryote that can do this? **Animal cells, especially muscle cells.**
16. In lab, one bacteria ferments mannitol. Another doesn't. Is the mannitol metabolizer most-likely *S. aureus* or *E.coli*? **S.aureus**
17. In lab, one bacteria has a variety of fermentation products. Is it more likely to be *Enterobacter* or *Escherichia*? **Escherichia**