

BIOMEDICAL NANOTECHNOLOGY

Study Questions

Study questions are designed to reinforce your understanding of the lesson material. Please create a Microsoft Word document and submit your completed study questions to the instructor via email.

Module 1

1. Define nanotechnology in your own words
 2. List and discuss 3 unique properties of nano-scale materials
 3. Describe the cellular structure
 4. Discuss the promise of biomedical nanotechnology
 5. Briefly discuss the recent work conducted by the Project on Emerging Nanotechnologies
 6. Why is nano important for electronic circuits?
 7. Briefly discuss 2 commercialized applications using nano technology?
 8. What was the estimated spend on nano technology in 2002?
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Module 2

1. Briefly discuss the current (or conventional) methods for treating cancer cells
 2. Describe how nanotechnology can be used for drug delivery.
 3. Drug targeting by nanoparticles or nanocapsules offers what enormous advantages?
 4. Define and discuss the following:
Passive targeting
Active targeting
 5. Describe 3 of the conventional imaging and diagnostic methods. What are their key limitations?
 6. Describe how nanotechnology can be an improvement over conventional imaging and detection techniques.
 7. What is 'tissue engineering'?
 8. What are some of the limitations of autografts?
 9. Describe how nanotechnology can be used in an orthopedic implant?
 10. What are 3 keys to success for constructing a tissue scaffold?
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Module 3

1. What is a protein? What is their role in biomedical nanotechnology?
 2. Describe a dendrimer, and how this material can be used for drug delivery.
 3. Describe a micelle, and how this material can be used for drug delivery.
 4. Provide an example of a bioconjugated product.
 5. What is meant by biomimetic characteristics?
 6. Briefly discuss 'top down' fabrication approach.
 7. Briefly discuss 'bottoms up' fabrication approach.
 8. Define tubular peptide nanostructures
 9. Define charge-complementary peptide nanostructures
 10. Define aromatic nanostructures
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Module 4

1. Conduct a brief Internet search. Briefly describe a bioconjugated quantum dot, its synthesis, and its application.
 2. What are some of the issues faced with quantum dots and metal nanoparticles?
 3. We discuss gold nanoparticles. Discuss one other metal nanoparticle.
 4. Discuss 2 applications for magnetic nanoparticles.
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Module 5

1. Briefly discuss a typical electrospinning process
2. Briefly discuss the application of electrospun nanofibers
3. Briefly discuss the uniqueness carbon nanotubes
4. Briefly discuss the application of carbon nanotubes
5. Briefly discuss the issues faced with carbon nanotubes