



Virtual Learning

**Medical Interventions**

**Nanomedicine**

April 29, 2020



## Medical Interventions

### Lesson: April 29, 2020

### **Objective/Learning Target:**

Recognize that nanomedicine shows great promise, particularly for cancer research, in the hope that medical interventions can be developed at the cellular and molecular scale to diagnose and treat disease. (3.4.2)



## Let's Get Started:

1. Watch [this video](#) to learn about the size of the nanoscale.
2. Read about [nanotechnology](#) in relation to nanomedicine. What are some of the ways in which it can be applied?



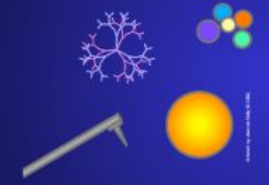
## Let's Get Started: **Answer**

1. Watch [this video](#) to learn about the size of the nanoscale.
2. Read about [nanotechnology](#) in relation to nanomedicine. What are some of the ways in which it can be applied?
  - a. Drug delivery, diagnostic techniques, antibacterial treatments, wound treatments, cell repair, etc.

# Lesson Activity

Read through [this slide](#) presentation on how nanotechnology is being used for cancer detection and treatment. List and describe how each technology can be used for cancer detection or treatment in your notebooks or on paper.


**Understanding Cancer and Related Topics**  
**Understanding Nanodevices**



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Explains nanotechnology and its potential to improve cancer detection, diagnosis, and treatment. Illustrates several nanotechnology tools in development, including nanopores, quantum dots, and dendrimers.

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## Lesson Activity - Answer

Nanotechnologies related to cancer nanomedicine:

1. Cantilever
  - a. Tiny levers that bind with molecules associated with cancer for faster/more efficient detection
2. Nanopore
  - a. Tiny holes that allow single-stranded DNA to be sequenced more efficiently, resulting in faster detection of genes associated with cancer
3. Nanotubes
  - a. Carbon rods that can pinpoint changes in DNA and bind with them for better cancer predictions
4. Quantum dots
  - a. Tiny crystals that glow when stimulated by UV light that can find cancer signatures
5. Nanoshells
  - a. Miniscule beads covered with gold that activate with near-infrared light producing heat; when linked with antibodies can bind to cancer cells and kill with heat
6. Dendrimer
  - a. Branched molecule that can carry molecules for cancer cell detection, treatment, cell death monitoring and reporting.



## Practice

Indicate which nanotechnology matches the description below.

1. Requires UV light in order to work
2. Currently being used to sequence DNA for patients.
3. Crystals that glow indicating the presence of cancer.
4. Can bind with cancerous DNA.
5. Produces heat to kill cancer cells
6. Can detect, treat, and monitor cancer simultaneously



## Practice - **Answers**

Indicate which nanotechnology matches the description below.

1. Quantum dot
2. nanopore
3. Quantum dot
4. nanotube
5. nanoshell
6. dendrimer





## Additional Practice/Resources

1. Check your understanding by viewing [these](#) flashcards over the nanotechnology.
2. See exactly how nanopores are used for DNA sequencing by watching this [video](#).
3. Read more about a hypothetical nanotechnology device for replacing a red blood cell called a [respirocyte](#).
4. Read [this article](#) to understand the connection between precision medicine and the emergence of nanotechnology.