



Human Body Systems

Virtual Learning

9-12th PLTW[®] HBS

**PLTW[®] 4.2.5 Rigor Mortis Modeling
Part 1: What Happens When We Die?**

April 14, 2020



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Lesson: April 14, 2020

Objective/Learning Target:

Students will be able to explain what happens to bodily processes upon death (pallor mortis, algor mortis, rigor mortis and livor mortis). (*Reference: PLTW[®] 4.2.5 Rigor Mortis Modeling*)



Let's Get Started/Warm Up Activities:

Watch these Warm Up Videos:

- [What Happens When You Die?](#)
- [Two Minutes on Pallor Mortis](#)



Lesson/Activity:

Watch Video: [Forensic Science Explains Stages of Death](#)

Watch the video above, and on a piece of paper or in your notebook, complete the following activities:

Activity #1: Stage 1 of Death (Pallor Mortis)

- Why is time of death not the exact time a person died?
- What are the four post-mortem (after-death) physical changes that happen to the body after the first 24-48 hours?
- Why does pallor mortis make a person appear pale?
- When does pallor mortis appear?

Activity #2: Stage 2 of Death (Algor Mortis)

- How is heat produced in the body during normal life processes?
- What is algor mortis?



Lesson/Activity continued:

Watch Video: [Forensic Science Explains Stages of Death](#)

Activity #3: Stages 3 & 4 of Death (Rigor Mortis and Livor Mortis)

- What is the literal meaning of rigor mortis?
- What is primary flaccidity?
- Why does the lack of ATP cause muscles to stiffen?
- When does rigor mortis reach its peak?
- Which stage of death do we use to reliably determine the time of death?
- What is livor mortis (lividity)?

Lesson/Activity Answers:

Activity #1 Answers: Click [HERE](#) or see answers below.

- Why is time of death not the exact time a person died? Normally, a person dies without a witness; therefore, time of death is a time frame in which the person could have died based on the evidence presented.
- What are the four post-mortem (after-death) physical changes that happen to the body after the first 24-48 hours? Pallor mortis, algor mortis, rigor mortis and livor mortis.
- Why does pallor mortis make a person appear pale? Organs farther away from the heart, like the skin, stop receiving blood.
- When does pallor mortis appear? 15 to 20 minutes after death.



Lesson/Activity Answers:

Activity #2 Answers: Click [HERE](#) or see answers below.

- How is heat produced in the body during normal life processes? **Blood is the primary reason your body maintains body temperature.**
- What is algor mortis? **Change in body temperature post-mortem, until the ambient temperature is matched.**

Lesson/Activity Answers:

Activity #3 Answers: Click [HERE](#) or see answers below.

- What is the literal meaning of rigor mortis? “Stiff death.”
- What is primary flaccidity? When all the muscles relax after death. Brain activity gradually decreases after death, so muscles stay in relaxed state. This occurs for 1-2 hours after death, and can cause involuntary urination and defecation.
- Why does the lack of ATP cause muscles to stiffen? Immediately after death, muscles can still produce ATP. This ATP is used up in the act of muscle contraction (tightening). However, there is not enough ATP left over to make the muscles relax (shorten), and so the body remains in a stiff position until the muscles begin to decompose.
- When does rigor mortis reach its peak? 12 hours
- Which stage of death do we use to reliably determine the time of death? Forensic experts use the progression of muscle relaxation and stiffening during rigor mortis to estimate the time of death.
- What is livor mortis (lividity)? Blood pools wherever the forces of gravity are strongest. This occurs 15-20 minutes after death, and is visible about 2 hours after death.



Practice:

Practice Activity: Pretend that you are helping your friend study for his or her forensic science exam on the four stages of death. Your friend is having problems understanding the differences between the stages. On your piece of paper or in your notebook, make four flashcards for your friend that contains the 1) term, 2) the definition, and 3) a way for your friend to always remember what the term means. *Step #3 is the most difficult: Think of word associations such as “pale” = “pallor,” etc.*

- Pallor mortis
- Algor mortis
- Rigor mortis
- Livor mortis



Practice Answer(s):

Practice Answer:

Click [HERE](#) and read about the four post-mortem stages of death.



Additional Practice and/or Resources:

Resource websites:

[Four Stages of Death Flashcards](#)

Test your knowledge by clicking on the link above.

[What Happens When You Die?](#)

Immediately after you die, your body begins to decompose. Trace thought it would be interesting to take a look at everything that happens after your heart stops beating. Watch this video to further your science of death knowledge.

[Time of Death Calculation Involving Bugs](#)

Maggots, blowflies and other bugs not only help investigators determine time of death for a fresh corpse, but they also help catch killers. Read this article to learn more.