**Calculating Time of Death Using Rigor Mortis**

**Objective:** Be able to estimate the time of death using rigor mortis evidence.

**Background:**In old detective movies, a dead body was often referred to as a “stiff”. The term refers to the onset of rigor mortis that follows soon after death. In this activity, you will estimate the approximate time of death by analyzing the degree of rigor of the deceased body.

**Procedure:**In PAIRS, answer the following questions dealing with approximating the time of death based on rigor mortis evidence. Use the following two data tables.  
  
***Progression of rigor mortis***

|  |  |  |  |
| --- | --- | --- | --- |
| **Time After Death:** | **Event:** | **Appearance:** | **Circumstances:** |
| 2 – 6 hours | Rigor begins | Body becomes stiff and stiffness | Stiffness begins with the eyelids and jaw muscles after about two hours, and then the center of the body stiffens, then the arms and legs. |
| 12 hours | Rigor Complete | Loss of rigor in small muscles first followed by larger muscles. | Entire body is rigid. |
| 15 to 36 hours | Slow loss of rigor | Loss of rigor in small muscles first followed by larger muscles. | Rigor lost first in head and neck and last in bigger leg muscles. |
| 36 to 48 hours | Rigor totally disappears | Muscles become relaxed. | Many variables may extend rigor beyond the normal 36 hours. |

***Factors Affecting Rigor Mortis***

|  |  |  |  |
| --- | --- | --- | --- |
| **Factors Affecting Rigor:** | **Event:** | **Effects:** | **Circumstances:** |
| Temperature | Cold temperature | Inhibits rigor | Slower onset and slower progression of rigor. |
|  | Warm temperature | Accelerates rigor | Factor onset and faster progression of rigor |
| Activity before  Death | Aerobic exercise | Accelerates rigor | Lack of oxygen to muscles, the build-up of lactic acid and higher body temperature accelerates rigor. |
|  | Sleep | Slows rigor | Muscles fully oxygenated will exhibit rigor more slowly |
| Body weight | Obese | Slows rigor | Fat stores oxygen |
|  | Thin | Accelerates rigor | Body loses oxygen quickly and body heats faster. |

**Questions:**

1. What is rigor mortis?

**Part A:**Estimate the approximate time of death for the following situations. Explain each of your answers.

1. A body was found with no evidence of rigor.

2. A body was found exhibiting rigor throughout the entire body.

3. A body was found exhibiting rigor in the chest, arms, face and neck.

4. A body was discovered with rigor present in the legs, but no rigor in the upper torso.

5. A body was discovered with most muscles relaxed, except for the face.

6. A body was discovered in the weight room of a gym. A man had been doing “arm curls” with heavy weights. The only place rigor was present was in his arms.

**Part B:**Estimate the approximate time of death based on the following information.

7. A frail, elderly woman’s body was found in her apartment on a hot summer’s evening. Her body   
 exhibited advanced rigor in all places except her face and neck.

8. A body was discovered in the woods. The man had been missing for two days. The average   
 temperature the past 48 hours was 50o Fahrenheit (10OC.). When the body was discovered, it was at   
 peak rigor.

9. An obese man was discovered in his air-conditioned hotel room sitting in a chair in front of the   
 television. The air conditioner was set for 65o Fahrenheit. When the coroner arrived, the man’s body   
 exhibited rigor in his upper body only.

10. After a run, a young woman was attacked and killed. The perpetrator hid the body in the trunk of a   
 car and fled. When the woman’s body was discovered, rigor was noticed in her thighs only.

11. The victim’s body is not rigid. How long has she been dead? Explain your answer.

12. The body is completely stiff. How long has he been dead? Explain your answer.

13. The victim was found in a snow bank alongside a road. His body is rigid. How long has he been   
 dead? Explain your answer, remembering the cold temperature.

14. The body of the runner was found in the park one early, hot summer morning. Her body shows rigor   
 in her face, neck, arms and torso. How long has she been dead? Explain your answer.