

Ultraviolet Light: Lethal Effects

Subject Area	Biology/Microbiology/DNA Structure and Mutations
Age or Grade	Junios/Seniors in AP Biology
Estimated Length	2 85-minute class periods
Prerequisite knowledge/skills	Basic Laboratory Safety Skills. DNA Structure. DNA Replication and Transcription.
Description of New Content	Students will learn about what UV light is, and how it is able to damage DNA. The mutation that is caused in DNA is due to the formation of a covalent bond caused by the UV light, which result in the formation of pyrimidine dimers. These mutations can be repaired if there are in small abundance, however when there are many of these the bacterial cell cannot survive, because it is unable to replicate and/or translate its DNA.
Goals	By the end of the lesson the students will understand how UV light damages DNA by causing pyrimidine dimers (a mutation), and how that leads to bacterial cell death.
Materials Needed	UV light source, cultures of <i>Bacillus megatarium</i> , and <i>Staphylococcus epidermis</i> , nutrient agar plates, warm incubator 37°C.
Procedure	<p>Opener (Day 1): Give background and information on UV light, the mutation it causes (pyrimidine dimers), and types of bacteria that will be used (spore formers vs. non-spore formers). Explain how this mutation leads to cell death, but ask them to figure out the mechanism that causes cell death.</p> <p>Development(Day 2): "Jumpstart" activity: Ask the students what the cause of cell death was. Lab activity, where the students will expose two types of bacteria (one a spore former, one a non-spore former) to UV light for different time points. The students should be able to see that UV light causes cell death in the non-spore forming bacteria.</p>

	<p>Closure(Day 3): After discussing the results, the students should be given time to discuss with each other, how this mutation could lead to cell death. Take the answers to their "Jumpstart" question and put some of their ideas down on the over head. Then have a discussion to see if they are able to piece together the cause of cell death. At the end they should understand that the cells die because replication and transcription are unable to take place due to the mutation.</p>
Evaluation	<p>Questions: See handout for questions.</p> <p>Laboratory Report: See lab report guidelines</p>
Extensions	<p>This class can be wrapped up with a discussion tying in how UV light has an effect on humans (sun burn, skin cancer), what we are able to protect ourselves from it. Additionally this could be a good opportunity to talk about skin color, and the pigment molecule melanin.</p>
References	<p>Benson's Laboratory Manual 10th edition. (Handout)</p>