

What Effects Do Ultra Violet Rays Have on Yeast Colony Growth

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Abstract

UV light triggers thymine to form thymine dimers inducing cell death. Though the sun provides heat and light, which are essential for life on Earth, ultraviolet (UV) rays in sunlight can cause damage to DNA. In this science fair project, I will experiment with a strain of yeast that is super-sensitive to UV light. The goal for this project is to find out what percent of yeast colony growth has been killed. Baker's yeast, or *Saccharomyces cerevisiae*, is a eukaryotic unicellular organism. *Cerevisiae* is used in many laboratories as a model organism because it has internal organs such as a nucleus and a mitochondria. Since *cerevisiae*'s genes have been well-studied, researchers are able to separate genes of interest from others, called knockout genes. In this project, a knockout strain of yeast will be used. This modified yeast is designed to be DNA-repair deficient which means that this strain of yeast does not have the enzymes needed to repair damaged cells while regular yeast and human cells do. When UV light destroys DNA the light initiates a reaction with thymine creating a thymine dimer. If the thymine dimer does not repair properly there are two paths it can follow, become a cancer cell if the thymine dimers are not widespread, or die, if they are widespread. In this project, there are many thymine dimers that will be formed when the modified yeast is exposed to UV light causing the yeast to die. There will be two dishes next to each other with grown modified yeast. One dish will have aluminum foil on the top and the other one will not have aluminum foil. Then both of them will be exposed to UV light. This is the equation that is used to find out what percent of the yeast colony has died: $100 \times (1 - \frac{\text{colonies on exposed plate}}{\text{colonies on control plate}}) = \% \text{ killed}$ Two more tests will be done on the effects of pure UV light and the effects of regular light with no UV rays on yeast cells. This will show that the light is not effecting the yeast but the UV rays are. This project will demonstrate how DNA in yeast cells are damaged by UV light, causing yeast cells to die. Similarly, UV rays cause human cells to mutate by destroying DNA, which leads to skin cancer. Although modified yeast does not have the enzymes that unmodified baker's yeast and human cells have, it will still show how UV rays affect eukaryotic cells' DNA. A future application for this project would be using skin cells to see how they interact with UV rays and by doing this more research can be done on skin cancer. When I find out what percent of yeast died when exposed to UV lights I will compare it to the effects of skin cancer and see how the enzymes react differently to UV light and look at the difference between the modified yeast and the skin cell.