



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

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| <b>Name(s)</b><br><b>Mariah R. Erlick</b>   | <b>Project Number</b><br><b>S1399</b> |
| <b>Project Title</b><br><b>Dark and Light Repair Effectiveness in Liquid Holding Recovery</b>   |                                       |
| <p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b><br/>To determine whether Liquid Holding Recovery (LHR), a phenomena which increases cell growth after UV damage by holding E. coli cells in nutrient-free buffer, increases effectiveness of light or dark DNA repair more.</p> <p><b>Methods/Materials</b><br/>Equivalent amounts of RecA- (a necessary deletion to observe LHR) E. coli were placed in either a nutrient-free buffer or a nutrient broth. All E. coli were exposed to 30 minutes of ultraviolet light. One half of plates in each group were exposed to an additional 60 minutes of florescent light. Plates were then incubated for six hours and cultured to a nutrient agar. They were incubated for another 29 hours and data was obtained using a digital camera and a histogram computer program to determine plate coverage. Procedure was repeated several times, for a total of 15 plates in each group: LHR light exposure, LHR no light exposure, No LHR light exposure, and No LHR no light exposure.</p> <p><b>Results</b><br/>My hypothesis was proven correct. Light DNA repair increased by an average of 3.3% plate coverage, while dark DNA repair increased by 26.2% plate coverage. My data was consistent, with only two outliers. Both outliers were in the first trial, and all percentages excluded them.</p> <p><b>Conclusions/Discussion</b><br/>Liquid Holding Recovery, discovered in 1949, was the first evidence of DNA's ability to repair itself after ultraviolet light damage. Little is yet known about this phenomena. My data shows that it increases dark DNA repair's ability to excise dimers caused by UV light nearly eight times the amount it increases light repair's effectiveness. It can be hypothesized that this is because LHR needs RecA negative bacteria to work, and RecA is a system within light repair. It isn't logical for a phenomena to function through the handicapped system of light repair, so therefore it must increase the other system: dark DNA repair.</p> |                                       |
| <b>Summary Statement</b><br>Dark DNA repair is more enhanced by the Liquid Holding Recovery phenomena than light DNA repair.  |                                       |
| <b>Help Received</b><br>My science teachers, Colin Matheson and Sunny LeMoine, helped edit and advised me on my project design. Microbiologists at Howard Memorial Hospital instructed me on culturing techniques and donated the use of an incubator. Professor Kendric C. Smith also gave me feedback on project design.  |                                       |