

A Qualitative and Quantitative Approach to Investigating Cellular DNA Repair Mechanisms

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Light and dark repair are two common cellular-DNA-repair mechanisms available in most cells. Wild type and mutant (dark-repair deficient) *E. coli* cells are exposed to UV light resulting in pyrimidine dimer formation. After the cells are irradiated, samples are either kept in the dark or exposed to blacklight which induces the light repair system. Through the various combinations of *E. coli* strains and repair mechanisms, students create inactivation curves for irradiated *E. coli* with no repair, light repair only, dark repair only, and both light and dark repair. In graphical form students have a qualitative measurement of the contribution by each of the DNA-repair mechanisms. Quantitative results are obtained by calculating inactivation rates from each of the four inactivation curves. From the inactivation rates, photoreactivable and host-cell reactivable sectors are determined. The sector values provide a measurement of the fraction of lethal damage repaired by light and dark repair, respectively. Comparable yeast strains exist for this procedure and the experimental design also allows for an inquiry based approach.