Resisting the Nucleotide in Oligonucleotide-Directed Mutagenesis

Schieman, Maximus (School: Satellite High School)

Ionizing radiation causes numerous adverse health effects. Concerns include an increase in nuclear energy consumption because it causes alarm for ionizing leaks, and human's extraterrestrial exploration because of cosmic radiation. Ultraviolet radiation is detrimental to human health, which is responsible for nearly 90% of non-melanoma skin cancers and 65% of melanoma cases (Kim 2014). Ionizing radiation will be induced into a Saccharomyces cerevisiae cell culture throughout subsequent generations. Through repeated ionization, the Saccharomyces cerevisiae cells could microevolve to resist cellular damages caused by further radiation. Saccharomyces cerevisiae possesses the 8-OxoGuanine Glycosylase gene, a key component in base excision repair, which repairs damaged DNA during cell division. Irradiating Saccharomyces cerevisiae cell culture generations before and during the exponential phase suggests that the cells could genetically adapt to develop radioresistance. Ionization was accomplished through the creation of an apparatus with soldered UV-B light emitting diodes. Cells were irradiated at 19 Gy/min, which was calculated through multiple manipulated equations. Radioresistance was determined by the percentage of area occupied and observational mutations. Radiation resistance was indicated by X2 cells. No mutations were apparent and the area percentage covered by cells increased throughout generations 3-5. Radiation resistance was slightly suggested by X1 cells. The area percentage covered by cells increased – not as much as X2 cells – throughout generations 4-5. However, during generation 3, the X1 cells changed to a greenish color, indicating a mutation. C1 cells decreased throughout all generations. ANOVA and t-Tests suggested no statistical significance.