



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Alicia Lai	Project Number 34911
Project Title Radioprotection of BNL CL.2 Liver Cells after Exposure to Sedum formosanum	
Objectives/Goals The purpose of this experiment is to test the efficacy of Sedum formosanum (SFEA), or Alfred Stonecrop, as a radioprotector by inhibiting apoptosis from occurring and enhancing DNA repair process in BNL CL.2 nude mice liver cells exposed to ionizing radiation. Radioprotector is a great area of interest for research studies because successfully developing a nontoxic radioprotector offers advancement in many areas of life. It can protect humans from nuclear radiation during wartime, prevent fatigue, hair loss, and other side effects of radiotherapy for cancer patients, and protect flight attendants from harmful cosmic radiation. SFEA, a plant used in traditional Chinese medicine system to treat various ailments, grows along the coastline of Taiwan and in areas of high exposure to radiation. Despite the high exposure to radiation, it is still able to maintain healthy growth, which suggests that it might obtain radioprotective qualities. Abstract The purpose of this experiment is to test the efficacy of Sedum formosanum (SFEA), or Alfred Stonecrop, as a radioprotector by inhibiting apoptosis from occurring and enhancing DNA repair process in BNL CL.2 nude mice liver cells exposed to ionizing radiation. Radioprotector is a great area of interest for research studies because successfully developing a nontoxic radioprotector offers advancement in many areas of life. It can protect humans from nuclear radiation during wartime, prevent fatigue, hair loss, and other side effects of radiotherapy for cancer patients, and protect flight attendants from harmful cosmic radiation. SFEA, a plant used in traditional Chinese medicine system to treat various ailments, grows along the coastline of Taiwan and in areas of high exposure to radiation. Despite the high exposure to radiation, it is still able to maintain healthy growth, which suggests that it might obtain radioprotective qualities. Methods/Materials The experiment procedure began by exposing BNL CL.2 cells with dosage of ionizing radiation and SFEA. Then, the percentage of cells in the apoptosis state, or cell death, was determined by conducting flow cytometry test. The changes in the expression of apoptotic proteins (caspase-9 and caspase-3), anti-apoptotic protein (Bcl-2), and DNA repair protein (RAD50) were determined with western blot test. Results In the flow cytometry test, SFEA was able to decrease the apoptotic cell percentage after the liver cells were irradiated. For the western blot test, SFEA decreased the expression of apoptotic proteins, caspase-9 and caspase-3, and increased the expression of DNA repair protein, RAD50, and anti-apoptotic protein, Bcl-2. Conclusions/Discussion The results of both flow cytometry test and western blot test showed that SFEA, a nontoxic extract, was able to decrease the percentage of apoptotic cells, regulate apoptotic related proteins, and increase DNA repair protein expression. All these qualities suggested that SFEA served as a radioprotective agent on the cellular level.	
Summary Statement The project tests whether Sedum formosanum, a plant native to Taiwan, is able to serve as a radioprotector by inhibiting apoptosis from occurring and enhancing DNA repair process in BNL CL.2 liver cells after being irradiated.	
Help Received Chien-Cheng Chen, a professional laboratory technician, offered assistance and supervised all experimental procedures for my project. The lab equipments were provided by HungKuang University in Taiwan.	