



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.) Evan W. Chan	Science Fair Use Only <h1 style="margin: 0;">S0305</h1>
Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) Xeroderma Pigmentosum: Increased Ultraviolet Light-Induced Sister Chromatid Exchanges in Cells Derived from XP Patients	Division _ Junior (6-8) <u>X</u> Senior (9-12)
Preferred Category (See page 5 for descriptions.) 3 - Biochemistry / Molecular Biology	
Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.	
<p>Objective To determine if the frequency of ultraviolet light-induced sister chromatid exchanges is elevated in cells derived from patients with the sun sensitive genetic disease Xeroderma Pigmentosum.</p> <p>Methods Cells from normal human, an XP patient, normal Chinese hamster CHO and a UV sensitive CHO mutant line were cultured in the laboratory. After irradiation with UV light of 254 nm wavelength, the cells were cultured in medium containing bromodeoxyuridine for 2 cell generations. The cells were then harvested from the cultured dish, burst by a hypotonic solution and their chromosomes spread on a slide. Under a microscope, the chromosomes were photographed and the SCE#s were counted from the photographs.</p> <p>Results Because I had difficulties finding good chromosome spread from the human cells, the professor I was working with suggested that I use normal Chinese hamster ovary (CHO) cells and a UV-sensitive CHO mutant (UV-135) as a model for the normal human and XP cells. I found that the CHO UV-135 cell line irradiated with 0.5 Joules/meter² had a higher level of SCE#s than normal CHO cells irradiated with 1 or 3 J/m². The limited data I have from normal human and XP cells do confirm that XP cells have higher levels of UV-induced SCE#s than normal human cells.</p> <p>Conclusion My results with both the UV-sensitive CHO UV-135 cell line and XP cells demonstrated that UV sensitivity is associated with increased levels of UV induced sister chromatid exchanges. This is consistent with the hypothesis that cells which cannot excise UV-induced pyrimidine dimers from their DNA have difficulties replicating their DNA and that SCE#s are a mechanism used by cells to get a copy of DNA free of pyrimidine dimers as a template to complete replication of the whole genome.</p>	
Summary Statement (In one sentence, state what your project is about.) Xeroderma Pigmentosum is a hereditary genetic disease where the patients are unable to repair the DNA damage done by ultraviolet radiation. The results of this are often cancerous.	
Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. I used the facility at the Harvard School of Public Health under the supervision of Dr. Hatsumi Nagasawa.	