



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

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Project Title Telomerase Processivity in Cervical Carcinoma Cells of Varying Telomere Length	
Abstract Objectives/Goals Telomerase elongates chromosome ends and is required for the indefinite lifespan of cancer cells. We set out to determine whether telomere length correlates with telomerase processivity in cervical carcinoma cells (HeLa). We predicted that telomerase processivity would be similar in individual cell lines, despite differing telomere lengths, because the cells should be genetically identical clones. Methods/Materials We cultured HeLa clones with very short, short, and long telomeres and isolated the nuclear proteins. Then the telomerase activity reaction was performed in vitro by combining protein extract, reaction buffer, a primer that is recognized by telomerase, and the nucleotides thymine, adenine, guanine. After incubating the samples for one hour the elongation products in the three test tubes was purified, amplified by PCR in the presence of radioactive nucleotides and then run on a denaturing polyacrylamide gel. The pattern of bands produced forms a ladder, and since the elongation reaction and the amplification reaction were both performed in a quantitative range, the length of the ladder correlates to the amount of telomeric repeats that were added by telomerase to the primer. Results Our results show that the samples from the long telomere extracts had the longest ladder, while the samples from the short telomere extracts had the shortest ladder, suggesting that telomerase in cells with longer telomeres is more processive than in cells with short telomeres. Conclusions/Discussion This is likely due to differences in the concentrations of end-binding proteins that affect telomerase accessibility or activity. Telomerase processivity may be a key molecular determinant of tumor aggressiveness, and finding a correlation could aid in the development of more precise treatment plans for cancer patients. In conclusion, we demonstrated that there is a link between telomere length and telomerase activity in cancer cells.	
Summary Statement Our experiment sought to determine whether there was a correlation between telomere length and telomerase processivity in HeLa cervical carcinoma cells, as this could eventually be related to cancer aggressiveness and drug development.	
Help Received Used lab equipment at Karlseder Labs at the Salk Institute, under the supervision of Dr. Jan Karlseder and Candy Haggblom. The supervisors performed the procedures involving hazardous materials (Phenol) and radioactivity.	