



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> Catherine Wu	<b>Project Number</b>  33385
<b>Project Title</b> <b>Reverse Suppressor Screen for a Dominant Mutant Form of SUMO Protein in Yeast</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> SUMO, or Small Ubiquitin-like MOdifiers, is a group of proteins essential to life in many eukaryotes, implicated in such processes as the cell cycle and transcription. Although many proteins have been found to be SUMO substrates, very few of these are known to require SUMOylation. Rather than continue along this search, it would be more beneficial to look directly for proteins that need SUMO to function. This process will hopefully confirm a regulatory target of SUMO, based on its ability to be rescued by mutant SMT3.</p> <p><b>Methods/Materials</b> An efficient way to do this would be to use a genetic approach known as a yeast reverse suppressor screen. In this screen, lethal mutations suppressed by the presence of a mutated yeast SUMO homologue SMT3 gene (smt3-Q56K) would likely be observed in genes coding for critical substrates. I mutagenized a new, tailored strain transformed with a plasmid containing smt3-Q56K, which would be essential to the screen. Genes containing these mutations would be determined through transformation of a yeast genomic plasmid library.</p> <p><b>Results</b> In the end, of 80,000 mutagenized cells and around 100 tested colonies, two successful strains were revealed to have mutations in BRF1 and TFC1, both subunits of RNA polymerase III transcription factors.</p> <p><b>Conclusions/Discussion</b> This matched up with a previous identification of RNA polymerase III, which transcribes rRNA and tRNA, as a SUMO substrate. These findings strongly suggest that SUMO plays a critical role in regulating the function of RNA polymerase III, an idea with potential for future testing.</p>	
<b>Summary Statement</b> Discover novel critical substrates of SUMO in <i>S. cerevisiae</i> , through a genomic approach	
<b>Help Received</b> Used lab equipment at Salk Institute under the supervision of Dr. Zheng Wang	