



**CALIFORNIA STATE SCIENCE FAIR  
2009 PROJECT SUMMARY**

<b>Name(s)</b> <b>Jacqueline J. Wang</b>	<b>Project Number</b> <b>J0423</b>
<b>Project Title</b> <b>Molecular Analysis of Blood Typing Compared with Traditional Serological Typing</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goal of this project is to perform molecular analysis on human cheek cells for ABO blood typing. The objective is to determine if molecular analysis will offer a less invasive method to identify blood type than serological testing while discovering if any differences in blood type data occur as a result of the experiment. It is hypothesized that extracting human cheek cells for molecular analysis of blood type will be less traumatic to patients as compared with using a syringe in serological testing and will reveal the same or more detailed data about a subject's blood type.</p> <p><b>Methods/Materials</b> The results of blood type tests were gathered from 19 subjects. Each subject swished 0.9% saline solution around in the mouth to loosen cheek cells. A molecular analysis was performed on the subject's cheek cells for ABO Blood Typing. DNA was extracted, purified, and isolated from the cells. Many copies of the DNA sequence were created through Polymerase Chain Reaction (PCR). A Gel Electrophoresis was run to verify that the PCR was working. Restriction enzymes were added to cut sequence to the target fragment. Another gel electrophoresis was run to read fragment length of DNA base pairs to find the alleles (version of ABO gene) present. The results of the molecular analysis were then compared with the traditional blood test data obtained.</p> <p><b>Results</b> Of the 19 samples tested, at least 12 gave clear results as two bands (2 blood type alleles) for each subject showed in gels. Molecular analysis detected the same allele that showed up in the blood test, but also revealed an additional blood type allele that was not identified by the serological test. The molecular analysis revealed the second ABO blood type allele which confirms prior studies by other researchers concluding that blood type is an inherited trait as humans receive one allele from one parent and another allele from the other parent.</p> <p><b>Conclusions/Discussion</b> My data supported my hypothesis as molecular analysis proved to be less invasive, more accurate, and detected the presence of an additional ABO blood type allele that was not revealed in the serological blood test data. This new procedure can easily be applied to a standard high-school lab course to detect each student's blood type. The eventual goal is to obtain FDA approval for hospital usage in blood transfusions to reduce immune reactions.</p>	
<b>Summary Statement</b> The goal of this project is to extract human cheek cells to perform a molecular analysis of ABO blood typing and compare the results to serological typing (blood test) data.	
<b>Help Received</b> Used lab equipment at the Schmahl Science Workshop under the supervision of Sarah Perry. Sarah Thaler advised on science experiment procedures. Lorna Claerbout of the Harker Science Research Club provided instruction on science project tasks.	