



# CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

<b>Name(s)</b> <b>Otana A. Jakpor</b>	<b>Project Number</b> <b>J1116</b>
<b>Project Title</b> <b>Do Artificial Nails and Nail Polish Interfere with the Accurate Measurement of Oxygen Saturation by Pulse Oximetry?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> My objective was to determine whether or not artificial nails &amp; nail polish interfere with the accurate measurement of oxygen saturation by pulse oximetry. A pulse oximeter works by shining light through the nail, so I hypothesized that artificial nails &amp; nail polish would interfere. My purpose is to provide data to aid decision-making by medical personnel faced with caring for patients wearing nail polish with acute asthma. Fumes from removing nail polish can cause asthma to worsen.</p> <p><b>Methods/Materials</b> I did three experiments. In Experiment 1, I tested 23 subjects to find the effect of 6 colors of artificial nails. I left one fingernail bare as a control. I measured the O<sub>2</sub> sat on each test finger &amp; subtracted each subject's color reading from their control reading. I calculated the mean change in O<sub>2</sub> sat reading, standard deviation, standard error of the mean, &amp; 95% confidence intervals. I repeated this experiment using two different brands of pulse oximeters-Nonin &amp; Nellcor. In Experiment 2, I tested the effect of the same six colors of nail polish painted directly on the nails of 23 subjects. In Experiment 3, I tested the effect of 27 colors of nail polish on one subject.</p> <p><b>Results</b> I found most colors of artificial nails &amp; nail polish have little or no significant effect on the measurement of O<sub>2</sub> sat. In Experiment 1 (Nonin), only the wine-colored artificial nails caused a statistically significant drop-only 0.44% +/- 0.42%. In Experiment 2 (Nonin), there were also trivial drops in O<sub>2</sub> sat reading when fingers with blue, pink, &amp; white nail polish were tested. These drops were too small to have much clinical significance, especially because the pulse oximeter itself has a range of error of +/- 2 % pts. In both Experiments 1 &amp; 2, the Nellcor pulse oximeter readings did not have any statistically significant change with any color. In Experiment 3, I tested 27 colors of nail polish &amp; found little change.</p> <p><b>Conclusions/Discussion</b> Most artificial nails &amp; nail polish do not interfere with the accurate measurement of O<sub>2</sub> saturation by pulse oximetry. This study contradicts the widely held view of uninformed medical personnel that nail polish interferes with the accurate measurement of O<sub>2</sub> sat. A Medline search shows no previously published studies on colored artificial nails &amp; pulse oximetry. The colored artificial nail study is original research that I hope contributes valuable new information to the medical community.</p>	
<b>Summary Statement</b> I determined in this study that most artificial nails and nail polish have little or no effect on the accurate measurement of oxygen saturation by pulse oximetry.	
<b>Help Received</b> I performed all experiments for my project. My mother helped me understand the technology of pulse oximetry and lent me her pulse oximeters. My parents helped edit my writing. Mr. Falk, a statistics teacher at Woodcrest Christian School, reviewed my statistical calculations.	