



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Jason R. Castillo	Project Number S0203
Project Title Infrared Thermometers: How Accurate Are Infrared Ear Thermometers Relative to the Gold Standard Mercury Thermometers?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of my project is to determine if the infrared ear thermometers are as accurate when compared to the gold standard oral temperature reading from a mercury thermometer as well as to determine the consistency between the two infrared temperature readings.</p> <p>Methods/Materials Informed consent was obtained from 53 randomly selected individuals. Each test subject was acclimated to room temperature for 10 minutes prior to any testing. Each person had their oral temperature taken for three minutes using the mercury oral thermometer (gold standard). During this three minute period, infrared aural temperatures were taken in both ears of the test subject. All temperatures were recorded as well as gender, age, ethnicity, and any ear surgeries/problems.</p> <p>Results The infrared readings matched the mercury oral reading only 3.8% of the time in the left ear and only 7.5% in the right ear. The two infrared aural readings matched each other only 3.8% of all readings. The range difference in the left ear was negative 2.1 to +1.5 degrees Fahrenheit variation from mercury reading. The range in the right ear was negative 1.6 to +2.1 degrees Fahrenheit. The difference between the two aural infrared readings was up to 0.1 to 1.8 degrees Fahrenheit difference. The infrared aural readings differing more than +/- 0.5 degrees Fahrenheit from the mercury readings were 55.0% in the left ear, 49.2% in the right ear, and 30.3% between the two aural infrared readings.</p> <p>Conclusions/Discussion Temperature readings are important in health and medical settings as it is one part in determining illness, infection, and an indicator to determine if ordering tests are appropriate. The project showed that infrared aural thermometers are inaccurate more than 90% of all tests (compared to the mercury reading) and have more than 0.5 degrees Fahrenheit variation 49% - 55% of all testing results. The data suggests that aural infrared thermometers, although convenient, are usually inaccurate and should be strongly reconsidered for use by health care professionals.</p>	
Summary Statement My project is to determine the accuracy of Infrared Aural (ear) Thermometers as compared to the Mercury Thermometer temperature in determining human body temperature.	
Help Received My sister assisted me in attaining test subjects.	