



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Priyanka J. Koliwad</b>	<b>Project Number</b> <b>J1607</b>
<b>Project Title</b> <b>Soccer Players Beware! Identifying and Preventing Bacterial Growth on Sports Equipment</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> To identify bacteria growing on soccer shin guards in order to figure out how to prevent this growth.</p> <p><b>Methods/Materials</b> Materials: Cotton swabs, Blood agar plates, sweaty shin guards sampled right after use, Crystal violet, Gram's iodine, acetone/ethanol, 0.1% basic fuchsin soln., glass slides, bunsen burner, light microscope , oxidase reagent, 3% hydrogen peroxide, MacConkey agar Methods: Isolating Bacteria: Swab shin guards. Streak on blood agar. Culture upside down in a cool place for 2 w. Gram Stain: Streak samples on new slides. Dry samples over flame. Spray samples with crystal violet, allow to sit for 10-20 s, then rinse. Add Gram's iodine solution. Let stand for 1 min then rinse. Add decolorizer then rinse for 10 s. Counter stain with basic fuchsin. Hemolysis Test: Re-streak cultures onto blood agar. Wait 3 d. Look at the clearing of the agar (hemolysis). Catalase Test: Place a small amount of culture onto slide. Add H<sub>2</sub>O<sub>2</sub>. A positive reaction is seen as bubbling. No bubbles mean a negative reaction. Oxidase Test: Re-streak a culture onto paper. Place a drop of oxidase reagent onto the paper. A positive reaction turns blue within 10-30 s. MacConkey Test: Streak a MacConkey plate with the selected bacteria. Culture for 2 d. Yellow cultures ferment lactose. No color change indicates non-fermenters. Identifying the Bacteria: Use an algorithm to identify bacteria based on test results.</p> <p><b>Results</b> Sample A: Grew Gram+ cocci (round) in clusters. They were catalase+ and hemolytic. This makes it <i>S. aureus</i> or <i>S. epidermis</i>. We tested whether it was a methicillin resistant. It was not. Sample B: Gram-, catalase+ and non-hemolytic. Therefore, it was most likely <i>S. hycius</i>, a normal skin flora. Sample C: Gram, oxidase+, and did not grow on MacConkey agar. Given that it was a non-motile bacillus (rod), it was most likely a Gram- normal skin flora. Sample D: Gram-, oxidase+, and grew on MacConkey agar (lactose fermenter). It was non-motile. Therefore, it was either <i>Acinetobacter</i> or a non-motile <i>Aeromonas</i>.</p> <p><b>Conclusions/Discussion</b> Bacteria grew from the shin guards we studied. Though ours were normal flora, some bacteria do cause disease. Because skin infections are reported from sports equipment, it makes sense to prevent all bacterial growth on shin guards. Some ways include chemicals (70% alcohol, chlorhexidine), antibiotics, or barriers. My next goal is to compare these approaches.</p>	
<b>Summary Statement</b> This project is designed to identify bacterial species growing on soccer shin guards in order to better understand what sorts of approaches might be used to prevent odors and skin infections.	
<b>Help Received</b> Worked in UCSF Microbiology Lab to perform specific tests under the supervision of Dr. Miller. See letter from Dr. Miller for details. My parents helped me join two display boards together to make a larger board.	