



**CALIFORNIA STATE SCIENCE FAIR
2002 PROJECT SUMMARY**

Name(s) Nicholas J. Hennrikus	Project Number 22422
Project Title What Type of Shin Guard Is the Best at Preventing Soccer Related Tibia Fractures?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project was to determine what property of the shin guard best prevents tibia fractures.</p> <p>Methods/Materials I chose four commercial shin guards of varied padding and hard coverings plus a self made shin guard. I constructed model legs using boards 1 inch thick by 2.5 inches wide, stuffing and a stocking. I covered the leg with the different shin guards and dropped different weights from progressive heights, calculating the force and kinetic energy of the falling weights and documenting fracture incidence.</p> <p>Results I found that the one inch foam padding prevented the most fractures, preventing fractures up to 24.6 joules of energy. Those shin guards that were composed mostly of hard plastic performed the worst, allowing fractures at 20.0 joules of energy.</p> <p>Conclusions/Discussion I concluded that the shin guard with the most padding was the most effective at preventing fractures. My initial hypothesis that the biggest and heaviest shin guard (Umbro) would prevent the most fractures was incorrect. I therefore recommend to parents and athletes that they purchase shin guards that have the most padding.</p>	
Summary Statement My project is about determining what properties a shin guard should possess in order to prevent tibia fractures.	
Help Received My mom and dad helped me find the literature and helped me understand the physics behind the project. My brother helped me make charts and graphs on the computer. My teacher helped me organize my project and gave me tips on the presentation of the project.	