CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)

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Project Number

J0303

Project Title

Football: Coming to a Crashing Halt

Abstract

Objectives/Goals

Over 300,000 sports related, traumatic brain injuries are reported yearly in the U.S.A. alone. Most of these injuries are because of receiving one or more blows to the head, causing a traumatic brain injuries or T.B.I. Of those, approximately eighty five percent or more occur on the football field. Many of these injuries can lead to permanent brain damage or a long term brain condition called chronic traumatic encephalopathy or C.T.E. In sports related accidents, TBI's are also a leading cause of death. My idea is to take some of the impact out of helmet to helmet hitting by applying outer padding to the average football helmet. I would like to lessen the amount of serious head injuries in the game of football.

Methods/Materials

I built a pendulum with two swinging football helmets to recreate helmet to helmet hits. I used a tool called an accelerometer placed inside one of the faux heads to measure the G-force obtained during these hits. I first measured helmet to helmet hits with no pads to create my baseline. I then tried 5 different foam materials in neoprene pockets and placed them on the impact zone. Each test was repeated 5 times using 5 different foam materials.

Results

Using the best foam and neoprene, I created a prototype design. It is essentially a removable foam jacket that can go over an existing helmet. It is designed to be waterproof and adds less than one pound to the helmets overall weight. My design was able to reduce the overall G force of an impact by an average of fifty-five percent.

Conclusions/Discussion

My conclusion is that outer padding has a dramatic effect on the impact taken by a helmet to helmet hit. I feel my prototype could reduce injuries and would be a functional design.I would like to help improve the lives of football players.

Summary Statement

What foam applied to the outside of a football helmet can be most effective in reducing the G force experienced during a helmet to helmet hit.

Help Received

Greg Hoshal from Instrument Sensor Technology, accelerometer rental; Rusty Haight from Crash Safety Institute, understanding Dynamax software and accelerometer use; Dr.Tracy Love from Cognitive Neuroscience Lab, research.