



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Jensen L. Boyt	Project Number J2004
Project Title Testing D3O: Impact Padding Effectiveness in Football Helmet Technology	
Abstract Objectives/Goals After playing tackle football for the past three years in a Schutt brand helmet, I noticed I had less concussions in the 2015 season. D3O, a non-newtonian padding made from silly putty technology, was the difference in the padding. I wanted to test the effectiveness to see if the foam, air, or D3O padding really made a difference in shock impact, and therefore less injury to a player's head. Methods/Materials I used a ten foot ladder, pool broom, leather dog leash, and heavy duty clip to make a pulley release to drop the helmet from 8 feet to a laminate floor. In doing this, I wanted to simulate helmet to helmet impact at the back of the head, where most trauma occurs. I put an egg in a plastic bag and placed it in the helmet. I released the clip to drop helmets. I recorded results each time. Results The egg had no breaks or cracks 100% of the time when dropped from 8 feet with the Schutt helmet containing D3O padding. The egg broke most of the time with the other two types of padding, protecting 0% with the air padding and 25% with the foam padding. Conclusions/Discussion D3O padding is more expensive than foam and air padding. It is well worth the cost to protect football players from life long head trauma such as chronic trauma encephalopathy (CTE). I plan on advocating for football player safety equipment, so players can have a productive life even after their gaming careers are long over. I would also like to see this padding used in kidney and heart protection for sports' uniforms.	
Summary Statement I demonstrated that D3O is effective padding for football helmets in head trauma protection.	
Help Received I designed, built, and performed the experiments myself, and my mom recorded video and took pictures.	