

Chronic traumatic encephalopathy (CTE) is a degenerative brain disease that can result from sustaining repeated blows to the head. Symptoms of CTE are similar to those of Alzheimer's disease and include memory loss, disorientation and confusion, and erratic behaviour. Other symptoms include tremors, slowed muscular movements, and impaired speech. Emerging research is focussing on the risk of CTE in football and hockey players, boxers, and soldiers exposed to explosions during combat. They all may face an increased risk of long-term brain injury from repeated small impacts accumulated over time. In this activity, you will investigate how the design of a model helmet can help reduce injury to the brain due to impact.



Researchers at the University of Ottawa's Neurotrauma Impact Science Laboratory are conducting tests to learn more about how helmets can help protect ice hockey and football players from brain injuries due to impacts.

Safety Precautions

- Wash egg from your hands and any other surfaces it contacts.
- Wash your hands upon completion of the lab activity.

Materials

plastic garbage bag	tape	tape measure	1 egg
paper towel	12 wooden craft sticks	sealable sandwich bag	water
glue	scissors	foam peanuts or a foam block	

Procedure

- 1.) Secure a garbage bag to the floor to prevent slipping and assist in clean-up.
- 2.) Your teacher will drop an egg from a height of 1.5 m to get a baseline reading of the damage that would occur as a result of an unprotected collision.
- 3.) Use the materials provided to construct a model "helmet" to protect your egg during a fall.
- 4.) Test your model by dropping it (with the egg in it) from a height of 1.5 m. Be sure to drop it over the plastic you laid down in step 1.

Analysis

- 1.) Explain why your helmet was successful or unsuccessful at protecting the egg?

2.) If you were to design another helmet, what improvements would you make and how would they affect the outcome of the egg being dropped?

3.) Does this experiment model the real-world situation of a person wearing a helmet while participating in a sports activity, such as football, cycling, or ice hockey?

4.) What factors would you consider if you were designing a helmet for an athlete to wear during competition?

5. How might the design of a helmet be related to CTE?
