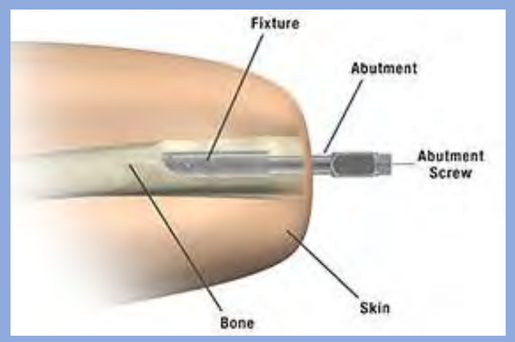
Team BioShield's
Protective Cap for Upper Extremity Osseointegration

SAN DIEGO STATE UNIVERSITY

What is Osseointegration?

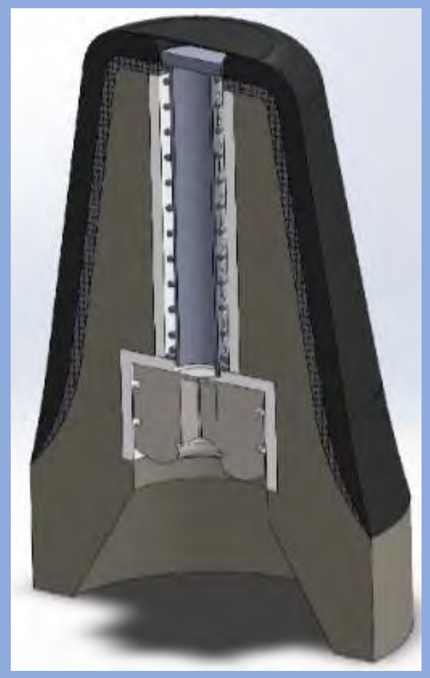
Osseointegration is the direct structural and functional connection between living bone and the surface of a load-bearing artificial implant. It provides many prosthetic users with an increased sense of comfort and range of motion. However, when the prosthetic limb is not attached it is vulnerable and at risk to injury or discomfort to the users.



Current OPRA Implant System

Challenger

Our challenger is USMC Sgt Nick Kimmel. He joined the Marines in 2008 and became a combat engineer. In 2011, he landed on an IED and lost both of his legs and 1 of his arms. Nick has always been mechanically inclined and will be attending University of Arizona on a golf scholarship studying Mechanical Engineering. He is still a very active person despite his hardships. He enjoys Baja racing in the desert and snowboarding when he is able to.



SolidWorks of Inside:

3 layers: Shock, Protection and Comfort

Spring and Rod Assembly with Button Press Fit Casing with Attachment Piece

Final Product

Left: Silicone covered, water resistant button at top

Right: Smooth Polyurethane foam and opening for insertion of attachment piece

What is our Project?

Our goal was to design and manufacture a protective cap to be worn in lieu of an upper extremity prosthetic. The cap is able to fit around an attachment piece given by the challenger. It will also provide protection, comfort, and support to facilitate our Challenger's return to leisure and sport activities.

Team BioShield

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Left to Right: Jade Sommers, Tatyana Guerrero, Kelly Bernal and Sophia Stepp

USMC Sgt Nick Kimmel

Evolution of Prototypes

Prototype 1

Prototype 2

Prototype 3

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