**Project Title:** Thermo Responsive Patch for Ocular Trauma  
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**Background:**  
**Objective:** Fabricate a novel, suture less ocular adhesive bandage and contact shield to close sclera trauma and promote healing, and prevent scarring between the sclera and conjunctiva and/or Tenon’s capsule.  
**Hypothesis:** A biocompatible, reversibly adhesive patch for the purpose of either: 1) suture less closure of sclera traumatic wounds or 2) prevention of scarring between sclera and conjunctiva can be fabricated from a pNIPAM-on-parylene structure such that it will meet the most significant safety and efficacy concerns for treatment of combat-related ocular trauma.

**Specific Aims:** 1) Fabricate a series of sclera patches with different design and fabrication specifications. 2) Test the adhesion to tissue performance of these patches. 3) Determine elapsed time to attach and detach the patches to sclera. 4) Identify patch specifications showing required adhesion strength and ease-of attachment/detachment. 5) Selected patches will then be implanted in an *in vivo* rabbit model to evaluate performance, biocompatibility and ease-of-use for two applications: sclerotomy closure, and scarring prevention in exploratory peritomies.

**Study Design:** The bandage or patch is made from a unique polyacrylamide polymer that attaches to ocular tissue at body temperature and releases from tissue when cooled several degrees below room temperature. Direct and well thought out experiments are outlined to test the use of temperature reversible adhesive patches for ocular trauma. This is a preclinical, sub chronic, *in vivo* study that will evaluate the function of the device and characterize its performance.

**Relevance:** Combat-related ocular trauma continues to be of critical concern to our armed services, because of its incapacitating nature and due to the increased incidence of ocular trauma with the most recent campaigns in the Middle East. Unlike, domestic civilians sustaining ocular trauma, combat casualties sustaining severe eye trauma typically are delayed in receiving full intervention and treatment because either: 1.) other, life threatening injuries have been sustained, or the facilities where they are first admitted lack the necessary personnel or specialty ocular surgery equipment to perform ocular reconstructive surgery. In almost all cases, procedures to repair internal ocular trauma (retina, lens, etc.) and save or restore function are postponed at least 5-7 days or longer and are performed at either tier 3 or tier 4 military medical facilities. During this waiting time, maximizing patient comfort and minimizing risk of further damage and infection to the tissue is critical. This approach for traumatic wound closures has the capacity to dramatically alter the treatment of ruptured globe injuries.