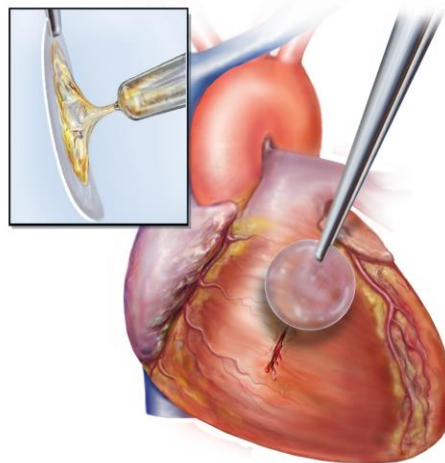


Next-Gen Bio-inspired Tissue Adhesive Technologies

Unfortunately there has not been significant innovation to provide effective technologies for sealing tissues, especially internal tissues that are wet. While sutures and staples have been used for decades, they exhibit considerable limitations (they can induce significant tissue damage and their placement is often slow and challenging during minimally invasive procedures). This talk will explore multiple Next-Gen bio-inspired adhesive technologies to address several unmet medical needs. Through inspiration from the gecko, nano- and micro-topography has been harnessed to achieve biocompatible and controlled tissue adhesion. Towards development of a tissue adhesive glue to seal septal defects in children, we have harnessed inspiration from insect footpads, slugs and sandcastle worm viscous secretions that can create stable underwater adhesive bonds. We have been inspired by porcupine quills to develop mechanically interlocking adhesives that could replace staples with strong adhesion yet less tissue damage. We have also been inspired by the spiny-headed worm to develop an array of microneedles with biomimetic swellable tips that can achieve strong bonds to tissue through a mechanically interlocking mechanism and can be used to securely affix skin grafts to prevent seromas. This design provides universal soft tissue adhesion with minimal damage and reduced risk of infection compared to staples, and provides opportunity for delivery of bioactive therapeutics.



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