# Composite Biomimetic Materials

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## Technology description

**Technical Summary**

It is well known that the key non-living constituents of biological structures are comprised primary of fibrous networks of collagen and elastin. However, accurate replication of the micromechanical properties of these biological networks by synthetic means has been elusive. Moreover, a suitable analog for the fibrous collagen component of soft tissues is not currently available.

Dr. Elliot Chaikof's research group has developed materials designed to mimic the two primary components of the extracellular matrix and soft tissues, collagen and elastin, as well as manufacturing methods to produce the materials in bulk quantities. The elastin component is comprised mainly of elastin-mimetic proteins and the collagen component is made from synthetic sources. The elastin-mimetic proteins and/or fibers can have selectable physical characteristics so that the composite material (and specifically the medical devices/procedures comprising the composite material) may be tailored to better match the physical environment in which the materials are to be implanted. The composites meet or exceed native tissue biomechanical properties.

The researchers have demonstrated favorablein vivodurability and biocompatibility of the materials for dermal filling; studies in rats suggesting the materials can be used to repair hernias (abdominal wall defects); andex vivostudies with baboons demonstrating the material is highly compatible with blood. Ongoing studies in pigs seek to establish the feasibility of using the materials in artificial blood vessels and other medical devices.The dermal filler market is estimated at $300 million annually in the US. Hernia repairs cost the US health system roughly $2.5B annually.

## Application area

Biomimetic and biocompatible materials that can be used as synthetic soft tissue, or for applications such as dermal fillers, hernia patches, and vascular grafts.

## Institution

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