Cambridge Polymer Group

Synthetic Tissue Models for Medical Device Development

Hydrogel Applications

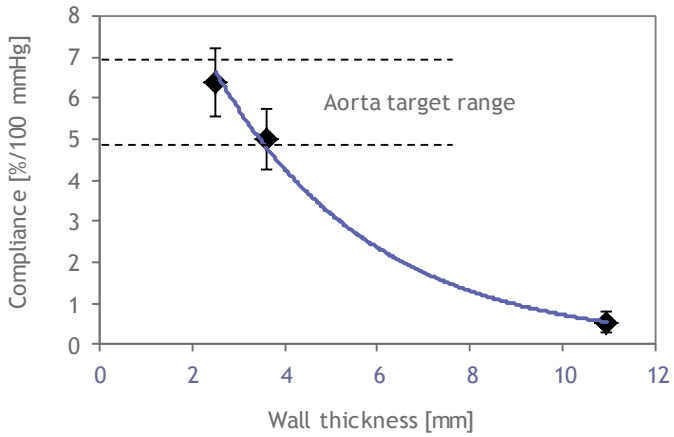
Summary

Synthetic tissue models have many uses in medical device development. Tissue phantoms are used as test pieces for the design of equipment, training for medical professionals on clinically-relevant instrumentation, preparations for regulatory submissions and quality control testing. Synthetic tissue models are reproducible with minimal manufacturing costs and allow variable (and degrading) cadaveric and animal parts to be replaced with reliable, stable and controlled synthetic alternatives.

Hydrogels are commonly used for tissue analogs due to their similarity to natural tissue. The high water content and variety of properties, many of which can be manipulated to suit different tissue models, make them an ideal choice as a synthetic replacement for tissue. Lesions, pores or other defects, or anisotropic mechanical properties, can be incorporated to mimic specific tissues and organs. For example, hydrogel tissue models have been prepared for cardiovascular, ocular and spine components, as well as specific organs.

Although matching the diverse properties of native tissue is extremely complex, choosing specific requirements for distinct applications allows testing and training to be simplified without the concerns associated with cadaveric tissue such as infection issues and limited life.

As an example, an arterial model prepared from a hydrogel at Cambridge Polymer Group was stiffened to match the compliance of human aortas, as shown below. The use of synthetic materials to replace tissues enables the ability to test over substantially extended periods without concern for natural variability or tissue degradation. By building composite structures out of hydrogels with fibers and fillers, unique, non-isotropic properties can be tailored for specific applications.



Applications

Standardized models for soft-tissue device testing	Support materials for surgical device development
Analogs for surgical staff training	Replacement of human and animal tissues

Cambridge Polymer Group, Inc. is a contract research laboratory specializing in materials. We partner with our clients to solve the world's toughest polymer problems utilizing our multi-disciplinary research team and full service laboratory.

We work with clients throughout the product life cycle to:

- Develop new materials
- Design prototypes for proof-of-concept studies
- Create and execute experimental design
- Validate and verify manufacturing processes
- Perform root-cause analysis in product failures

Cambridge Polymer Group, Inc. was founded in 1996 to provide a cost-effective resource for testing, research and development to clients who need periodic access to Ph.D.-level scientists and their support structure. We have developed a host of testing methods and materials for our clients, which number more than 1,000.

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