

Testing Tools and Devices Using Analogs for Tissue

Summary

Tissue analogs have many uses in tissue engineering. The analogs are used as test pieces for the design of equipment, training for medical professionals on clinically-relevant parts, preparations for regulatory submissions and quality control testing. The analogs are reproducible with minimal manufacturing costs and allow irreproducible cadaveric and animal parts to be replaced with reliable and controlled synthetic alternatives.



Description

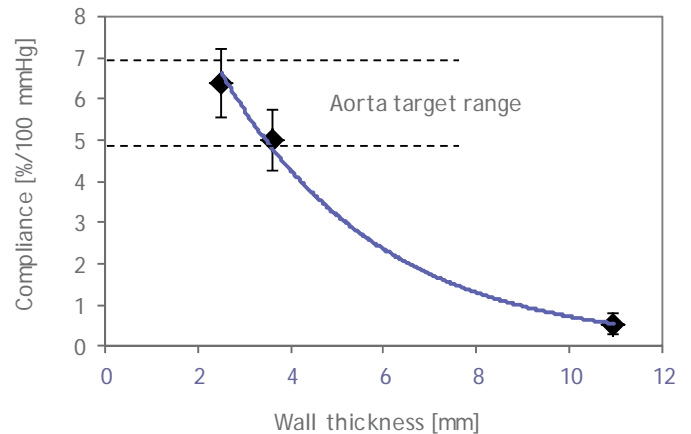
Hydrogels are commonly used for tissue analogs due to their similarity to natural tissue. The high water content and array of properties, many of which can be manipulated to suit different tissue models, make them an ideal choice. Lesions, pores and other defects, or mechanical reinforcement, can be incorporated to mimic specific conditions. Analogs have been prepared for cardiovascular, organ and spine components.

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.



Discussion

As an example, an arterial analog prepared from a hydrogel at Cambridge Polymer Group was stiffened to match the compliance of human aortas, as shown. The use of synthetic materials opens up 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.