Storage modulus of biological tissue

Overview

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The two moduli will form the so-called com-plex modulus with the in-phase modulus (also known as the storage modulus) being its real part and the out-of-phase modulus (also termed as the loss modulus) its imaginary part. The storage modulus defines the elastic property, and the loss modulus governs.

Biological hydrogels provide a conducive three-dimensional extracellular matrix environment for encapsulating and cultivating living cells. Microenvironmental modulus of hydrogels dictates several characteristics of cell functions such as proliferation, adhesion, self-renewal, differentiation.

Storage modulus of biological tissue

Standardized static and dynamic evaluation of myocardial tissue

The subsequent influence on the obtained modulus is one of the focuses of the study. Second, dynamic mechanical analysis (DMA), a commonly used polymer testing ...

Measuring Storage and Loss Modulus of Artificial Tissue

Introduction Real biological tissue is perishable and expensive, especially if the origin is human. Therefore, researchers prefer to develop techniques for imaging, testing, cutting, and so forth ...

Thermophysical and mechanical properties of ...

In this context, we present a systematic literature review on the thermophysical and mechanical properties of biological tissues, blood perfusion, and metabolic ...

Investigation of the Compressive Viscoelastic Properties of Brain

The storage modulus in viscoelastic materials characterizes the ability of the material to store

energy in the elastic phase and the loss modulus characterizes the ability of the material to ...

Young's modulus of natural soft tissues and organs in ...

Download scientific diagram , Young's modulus of natural soft tissues and organs in kPa. from publication: Hydrogels for Engineering of Perfusable Vascular ...

Biomechanics of soft biological tissues and organs, ...

1. Introduction Soft biological tissues serve myriad functions, some mainly structural and some mainly functional. They consist of the same ...

Elastic Energy Storage in Biological Materials: Internal ...

In this review, by considering examples of a broad spectrum of biological materials spanning shape-morphing plant seed pods, smart ...

Viscoelasticity in natural tissues and engineered scaffolds for tissue

When the shear wave produces a dynamic force in biological tissues, the complex modulus of the material is quantified as (4) G * = G + i G ' ' where G * is the complex ...

Viscoelasticity of ECM and cells--origin, measurement

The extracellular matrix (ECM) and cells are crucial components of natural tissue microenvironments, and they both demonstrate dynamic mechanical properties, particularly ...

Uncoupling shear and uniaxial elastic moduli of semiflexible

The shear storage modulus G?, of such networks is higher than that of flexible polymer networks with the same mass density 1.

Investigation of the Compressive Viscoelastic Properties of Brain

The storage modulus in viscoelastic materials characterizes the ability of the material to store energy in the elastic phase and the loss modulus characterizes the ability of ...

Distinct modulus of human tissues suggesting tissue ...

Distinct modulus of human tissues suggesting tissue-specific stiffness. Different tissues with their specific elastic modulus in the body are correlated with their ...

Viscoelasticity in 3D Cell Culture and Regenerative ...

Rheological data, including dynamic response and stress relaxation tests, show that biological tissues exhibit viscoelastic response with ...

Strain-stiffening universality in composite hydrogels and soft tissues

The nonlinear mechanical properties of soft biological tissues and composites are poorly understood. Their strain stiffening under compression and shear is now found to be ...

Time-dependent behavior of discontinuous biocomposites in soft tissues

Over the course of evolution, biological materials have a capability for reconciliation of the conflict between strength and toughness, as well as between stiffness and ...

Cross-platform mechanical characterization of lung ...

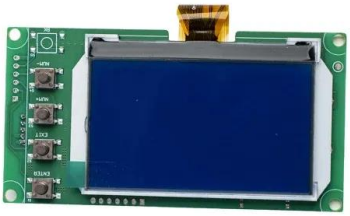
Published data on the mechanical strength and elasticity of lung tissue is widely variable, primarily due to differences in how testing was conducted across ...

Effects of extracellular matrix viscoelasticity on cellular

This Review explores the role of viscoelasticity of tissues and extracellular matrices in cell-matrix interactions and mechanotransduction and the potential utility of ...

Mechanically tunable conductive interpenetrating network

Conductive and stretchable materials that match the elastic moduli of biological tissue are desired for enhanced interfacial and mechanical stability. Here the authors show a ...



Physical, Spatial, and Molecular Aspects of Extracellular Matrix of

Values of different biological tissues elasticity are summarized in Table 1. Methods of Young's modulus measurement of biological tissues are shortly reviewed in Table 2.

Multiscale mechanical analysis of the elastic modulus of skin

Measuring the mechanical properties of the skin is essential for understanding dermal cell mechanobiology and designing tissue-engineered skin substitutes. However, ...

4.9: Modulus, Temperature, Time

Storage modulus is described as being proportional to cos ? whereas loss modulus is proportional to sin?. The ratio of cos? to sin? is just tan?. Why does ...

Viscoelasticity in 3D Cell Culture and Regenerative Medicine

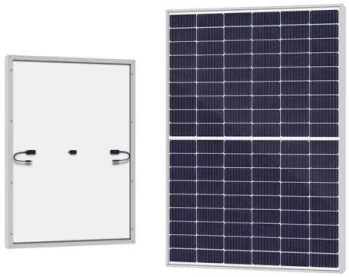
Rheological data, including dynamic response and stress relaxation tests, show that biological tissues exhibit viscoelastic response with a viscous modulus of about 10-20% of ...

Biological Tissue Hardness Evaluation using ...

We studied the hardness and elastic modulus via biological tissue nanoindentation of 3 separate areas of a biomaterial substitute on fat, light ...

Elastic and viscoelastic characterization of agar

As medical implants and engineered tissues become more prevalent and sophisticated, a better understanding of the mechanical properties of biological tissue is ...



Storage Modulus

The complex mechanical impedance of various types of biological soft tissue is typically described in terms of a real part, also called the storage modulus, that represents the elastic properties of ...

Soft-Tissue-Mimicking Using Hydrogels for the Development of ...

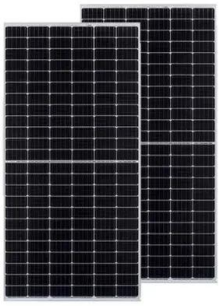
Secondly, this study measured a liver tissue storage and loss modulus of 1.2 ± 0.5 kPa and 0.27 ± 0.17 kPa, respectively. These results were similar to other studies [29, 30, 31] which showed ...

Viscoelasticity Imaging of Biological Tissues and ...

Changes in biomechanical properties of biological soft tissues are often associated with physiological dysfunctions. Since biological soft ...

Evaluating the viscoelastic properties of biological tissues in ...

Abstract In this paper, a new method for evaluating the viscoelastic properties of biological tissues such as tendons and ligaments is presented. This method obtains the complex modulus of ...



Soft-Tissue-Mimicking Using Hydrogels for the ...

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Mechanical properties of whole-body soft human tissues: a review

Table 1 summarizes the mechanical properties of human soft tissues, and accordingly, figure 4 shows the elastic modulus (mean ± S.D.) of different soft tissues.

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Changes in biomechanical properties of biological soft tissues are often associated with physiological dysfunctions. Since biological soft tissues are hydrated, viscoelasticity is likely ...

Viscoelastic parameterization of human skin cells characterize ...

The Storage (a) and Loss (b) modulus have been calculated from the parameterized Generalized Maxwell model for 2D adherent normal and cancerous human skin ...

Indentation Versus Tensile Measurements of Young's ...

In this review, we compare the reported values of Young's modulus (YM) obtained from indentation and tensile deformations of soft biological tissues. When the ...

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