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Methods for Determining Soft Tissue Viscoelasticity and Its Relationship to Cell and Tissue Biology

AIMS & SCOPE

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Soft tissue biomechanics is very complicated and changes drastically during wound healing and cancer. While there are many studies on the biomechanics of soft tissues, there is a need for new methods to relate the changes that occur to the basic biology of the tissues studied. While it has been known for many years that cancerous cells and tissues are stiffer than normal cells and tissues, the pathobiology of the alterations is not well understood and how they relate to the effects of stress, strain, and changes in energy applied to tissues on mechanotransduction. While the change in the modulus of cells and tissues is well documented, it is not clear whether the viscoelasticity of the tissues is altered during the pathobiology of disease.

The elastic modulus and tissue strain represent energy stored in the tissue that can be translated into changes in pathways involved in mechanotransduction while the viscous loss of energy and the displacement of cells and tissues can be related to fluid flow behavior that also affects other mechanotransduction pathways. Therefore, there is a strong need for new methods that can relate the viscoelasticity of tissues to the well-documented changes in cellular and tissue behavior associated with development, growth, and the pathogenesis of diseases.

KEYWORDS

- Biomechanics
- Soft tissue
- Elastic behavior
- Viscous behavior
- Mechanotransduction
- Cellular and tissue behavior
- Cancer

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