

用光声技术测量生物组织粘弹特性的研究

李江华、唐志列*、郑楚君、李凌燕、刘小宝、何永恒
华南师范大学物理与电信工程学院

报道了一种用光声技术测量生物组织粘弹特性的新方法。根据粘弹性理论，应力波在粘弹性介质传播时的松弛时间等于介质的粘弹比，因此先用脉冲激光在生物组织中激发出光声信号（应力波），从光声信号的振幅衰减特性曲线中测量出生物组织的松弛时间。由于不同生物组织具有不同的粘弹特性，相应的光声信号呈现出不同的时间衰减特性，因而从光声信号的振幅衰减特性曲线可以准确测量出生物组织的粘弹比。实验表明用光声方法测量的粘弹比与用流变仪测量的结果完全一致（符合率达到97%），证明此方法测量生物组织粘弹特性是可行的。光声测量方法具有实时、无损、应用范围广等优点，而且测量灵敏度高、重复性好，因此在生物医学领域具有潜在的应用前景。

Viscoelastic characterization of biological tissue by photoacoustic technique

The text describes a new method for measuring the viscoelastic characterization of biological tissue by photoacoustic technique. Based on the theory of viscoelasticity, The decay time of stress-wave propagating on viscoelastic medium equals the medium's viscosity-elasticity rate. So we first get the tissue's photoacoustic signals (the stress waves) which induced by Q-YAG, which we can calculate the tissue's viscosity-elasticity rate from. For different tissues have different viscoelasticity so that we get the different decay time, that is, we can get the viscosity-elasticity rate of biological tissue from the different photoacoustic signal decay curve. The result shows the viscosity-elasticity rate measured by photoacoustic measurement almostly equals by conventional rheometer (the difference is only 3%). So we can conclude the method is realizable. Photoacoustic measurement has so many virtues such as the real-time characterization, the noninvasive characterization and the wide application, the high sensitive and the good repetition that it has the potential application on biology and medicine.

关键词