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# Extracting attenuation and wave speed from diffuse wave field in soft tissues : a semi-analytical study.

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## Abstract

Estimating the elasticity and the viscosity is a major concern for diagnosis. These parameters represent important biomarkers for tumor detection. Standard approaches are based on active generation of shear waves, either by external source or acoustic radiation force. However, the human body is full of natural waves. These waves propagate in every direction as diffuse wave field which can be used for elasticity estimation using passive elastography algorithms. These techniques are based on the assumption of far-field sources for a purely elastic medium, neglecting the effect and thus the possibility to directly estimate the attenuation. However, the feasibility of retrieving the attenuation has been demonstrated in seismology with noise correlation techniques on diffuse wave field generated by volumetric distribution of sources, distribution of sources directly present in the medium to characterize. The study aims at investigating the condition to retrieve wavespeed and attenuation in soft biological tissues. We perform semi-analytical simulations using analytical Green's function to create random diffuse wave field. The viscoelastic parameters are then estimated using spatial auto-correlation to obtain coherence function whom the shape is directly linked to medium characteristics. The effects of the source distribution compared to the attenuation length and wave length is studied.

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