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**Magnetic Resonance Imaging Assessment of Epimuscular Myofascial Force Transmission in Human in Vivo**

## Abstract

Recent developments have been evolving magnetic resonance imaging (MRI) to a combined tool in order to assess human anatomy and physiology in vivo. In the present thesis 3D high resolution anatomic image and diffusion weighted image acquisition capabilities of MRI were combined with nonrigid registration technique in order to quantify principal strains and fiber direction strains locally. The presented method was used to assess the effects of epimuscular myofascial force transmission (EMFT) and external mechanical load simulating ischemic compression manual therapy technique in human lower leg in vivo.

In healthy subjects, global length changes of gastrocnemius muscle-tendon complex were shown to cause sizable and heterogeneous local principal strains and fiber direction strains within the all muscles of the limb. It was concluded that EMFT has determinant role in human muscles that affects the mechanical characteristics of synergistic and antagonistic muscles as changing heterogeneity of fiber lengths. Thus it was proven that muscles are not isolated functioning units in vivo.

Even all muscles of lower leg were kept isometric, external mechanical load imposed on gastrocnemius muscle caused pronounced and quite heterogeneous principal strains not only within that muscle but also in other muscles of the limb. These findings may lead therapists to relate the mechanical load and the size and penetration of deformations it creates.

Keywords: Epimuscular myofascial force transmission, manual therapy, ischemic compression, magnetic resonance imaging, diffusion tensor imaging, nonrigid registration, in vivo biomechanics, motion analysis.

## PUBLICATIONS

### Journals

1. **Yaman A.**, Ozturk, C., Huijing, P.A. and Yucesoy, C.A., 2013. MRI Assessment of Mechanical Interactions between Human Lower Leg Muscles in vivo. Journal of Biomechanical Engineering, 135, 091003 1-9.
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