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عنوان مقاله:

Visco-hyperelastic Properties of White and Gray Matters under Tension: an Ex-vivo Study

محل انتشار:

بیست و هشتمین کنفرانس سالانه بین المللی انجمن مهندسان مکانیک ایران (سال: 1399)

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خلاصه مقاله:

The central nervous system consists of white and gray matters. In response of mechanical forces and due to differences between material properties of white and graymatters, stress concentration may occur and cause damage. While recent studies have shown that brain tissue under tension and shear is most vulnerable to injury, most of studies have compared the mechanical properties of white and gray matters under compression and indentation. The aim of the current study is to investigate the mechanical properties of brain white and gray matters under tension. We performed uniaxial stressrelaxation tests of up to 30% on bovine brain samples. To calculate the nonlinear and time-dependent properties of brain tissue, several visco-hyperelastic models such as neo-Hookean, Mooney-Rivlin, generalized Rivlin, and Ogden were used. The results showed that the trends of both hyperelastic and relaxation response curves between white and gray matters are significantly different ($p<0.05$). Also, the results exhibited that the shear modulus of white matter is ~ 1.8 times higher than that of gray matter. Since white matter has a higher percentage of axonal fibers than gray matter, we hypothesize that the difference in stiffness can be attributed to these .fibers

کلمات کلیدی:

brain tissue, visco-hyperelastic model,isotropic model

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