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Discussion of "Localized characterization of brain tissue mechanical properties by needle induced cavitation rheology and volume controlled cavity expansion" [J. Mech. Behav. Biomed. Mater. 114 (February 2021) 104168]

The mentioned paper presents an experimental study of the mechanical properties of brain tissue based on the artificial cavity expansion techniques. These techniques are recent and interesting and the obtained experimental results will be useful. However, the theoretical interpretation of experimental results and the statement that strain stiffening behavior of material prevents cavitation instability are open to discussion. Indeed, Gent and Lindley observed cavitation in rubber materials in their famous poker-chip test (Gent and Lindley, 1959). Rubberlike materials do exhibit strain stiffening and the latter property does not prevent them from cavitation instability in contrast to the authors' statement. The improper use of hyperelastic (Ogden) constitutive model is the reason for the arguable statement of the authors. Indeed, traditional hyperelastic models, including the Ogden's one, describe intact material behavior while cavitation is a damage phenomenon. The latter is the cause why most intact material models do not provide convergence of the hydrostatic tension to a critical value – see (Lev and Volokh, 2016). The fact that the critical hydrostatic tension exists for the neo-Hookean material model is misguiding rather than insightful. Only theory incorporating material failure can describe cavitation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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