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ON THE ANISOTROPIC VISCO-HYPERELASTIC MODELLING OF THE PELVIC FLOOR MUSCLES DURING CHILDBIRTH

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Summary: During vaginal delivery women sustain stretching of their pelvic floor, risking tissue injury and adverse outcomes. Since studies in pregnant women are limited with ethical constraints, in recent years, computational models have become an interesting alternative to elucidate the pregnancy mechanisms and analyse its effects of the pelvic floor muscles. Still, these numerical frameworks can be improved by using more realistic biomechanical properties, which constitutes a key ingredient to achieve accurate simulations.

It is known that biological tissues present an anisotropic visco-hyperelastic behaviour and that viscoelasticity, in particular, can assume an important functional significance. Tissues exhibiting a more pronounced creep behaviour will stretch more under a constant load, and tissues presenting a higher relaxation behaviour will show a higher decrease in the stresses over time, when held at a constant length.

As such, the ultimate goal of this research was to study the pelvic floor tissue during a vaginal delivery, complementing the work developed by Parente, M. et al 2008, 2009 [1], [2] by considering the pelvic floor tissue as an anisotropic visco-hyperelastic material. The inclusion of viscoelasticity allows to investigate the impact of time dependent obstetrical factors on the efforts sustained by the pelvic floor, namely the duration of labour and the resting stages existent between contractions. Finally, it was intended to study the damage mechanism in this procedure, analysing the effect and influence of relaxation caused by the viscoelastic properties of the tissue.

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