ELASTICITY OF FRESH, FROZEN OR EMBALMED HUMAN ILIOTOBIAL TRACT

Laure-Lise GRAS 1, Julien ROGER 1,2, Frédéric RONGIERAS 1,2, Patrick MERTENS 3, David MITTON 1, Karine BRUYERE 1

1. Univ Lyon, Université Claude Bernard Lyon 1, IFSTTAR, LBMC UMR_T9406, F69622, Lyon, France
2. Service Chirurgie Orthopédique et Traumatologie – Hôpital Desgenettes, 69003, Lyon, France
3. Univ Lyon, Université Claude Bernard Lyon 1, Laboratoire d’Anatomie de la faculté de médecine Lyon Est, Lyon, France

Contact: laure-lise.gras@univ-lyon1.fr

BACKGROUND: Mechanical properties of iliotibial tract (ITT) are required to better understand force transmission within the lower limb. The usual way to assess these properties is to perform experiments on animal tissue or post mortem human subjects. However, it is not always possible to test fresh samples, and freezing or embalming tissues with formalin-based solutions may alter their properties [1,2]. A new formalin-free embalming solution, SafeBalm® [3], could be another alternative. The aim of this study is to compare elasticity of ITT samples: fresh, frozen and embalmed with SafeBalm®.

METHODS: ITT samples were collected on four human subjects. For each subject, three fresh (FRE) and three fresh and frozen at -20°C for thirty days (THA) samples were collected on the anterior part of the left and right ITT respectively. Then embalming was performed. Three embalmed (EM00) and three embalmed and stored at 4°C for thirty days (EM30) samples were collected on the posterior part of the left and right ITT respectively. Tensile tests were performed on each sample. It consisted of a preload, ten loading-unloading cycles, stress relaxation at 5% strain for 15 minutes, and tensile test until rupture at 0.015 s⁻¹. Elasticity moduli, relaxation times, ultimate stress and strain were calculated.

RESULTS: Preservation method did not affect significantly the different parameters. Elasticity moduli were on average 270 MPa for FRE samples. It decreased by 7%, 0.7% and 5% for THA, EM00 and EM30 respectively.

CONCLUSIONS: Effect of preservation method compared to fresh tissue remained limited on ITT elasticity. Embalming with SafeBalm® affects the less the results, and thus this preservation method could be an effective alternative to freezing. Nevertheless, results should be interpreted with caution, because of few tested samples and high inter and intra-individual variability. Further experiments are required to confirm these results.

REFERENCES:

