

ACOUSTICS2008/2722
Ultrasound elasticity assessment of in vivo human achilles tendons
during a quick-release exercise

Marielle Defontaine^a, Mourad Bentahar^b and Francis Canon^c

^aLUSSE, 10 Bd Tonellé, 37032 Tours, France

^bENSIM - LAUM, Université du Maine, rue Aristote, 72085 Le Mans, France

^cCNRS UMR6600, Centre de Recherche de Royallieu - UTC, 60 200 Compiègne, France

An ultrasound (US) axial transmission technique has been developed to assess in vivo real time tendon biomechanical properties during calibrated exercises. The US propagation velocity changes are indeed related to the tendon visco-elasticity variations. We propose to monitor the propagation velocity changes during a very short period of time corresponding to the tendon/muscle complex release just after a sub-Maximal Voluntary isometric Contraction (MVC). This measurement is repeated for several sub-MVC amplitudes. The propagation velocity variations, linearly related to the torque measurements, allow to estimate a stiffness index, essentially due to the Series Elastic Component of the Achilles tendon. This study has been performed in collaboration with the UMR 6600 (UTC, France), and we have used the Ergometer they developed a few years ago. The US device is composed of a 1.8 MHz US probe (1 emitter, 20 receivers), and an electronic module (Althais Technologies, France) allowing real time and synchronous acquisitions of US RF signals and auxiliary inputs (Torque, angular position). Four healthy subjects were asked to develop several submaximal voluntary isometric contractions, and the sole was suddenly released (sub MVC to relaxed state, 2s, 2kHz). This protocol was repeated two times with foot and probe repositioning.