Volume 12

Washington University
Undergraduate Research Digest

Spring 2017

Mechanical Testing of Mice Achilles Tendons

Alexander Wirtz
Washington University in St. Louis

Mechanical Testing of Mice Achilles Tendons

Alexander Wirtz

Mentor: Spencer Lake

The Achilles tendon is one of the strongest tendons in the human body, yet this tendon accounts for a significant amount of injuries in athletic activity. A significant fraction of these injuries result in surgery for proper rehabilitation, with most surgical patients no longer participating in athletics post-operation. Understanding the dynamics loading mechanics of the Achilles tendon is an essential and initial step in improving the surgical and rehabilitation processes. Recent studies have shown that, due to the viscoelastic nature of the tendon, the response of the tissue to varying loading conditions can cause strain patterns to be unusual. These strain patterns are analyzed by observing the elastic fibers within the interfascicular matrix. Because it is crucial that tissue dynamics are understood, a successfully reproducible mechanical testing procedure must be conducted to determine the role of elastic fibers in multiscale mechanics. Achilles tendons were harvested from available mouse models and various uniaxial tensile testing techniques were observed. These techniques include incorporating a stability frame made of sandpaper, inducing various clamping intensities, altering the dissection procedures, compression in a phosphate-buffered saline bath, adding adhesives, and incorporating strain-tracking techniques. Various outcomes were observed and successful procedures were developed to be introduced in sensitive experimental procedures.