The Role Of Fiber Areas In The Tibial Footprint Of The Posterior Cruciate Ligament Changes Depending On Flexion Angle – A Biomechanical Robotic Investigation

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Conflicts of interest

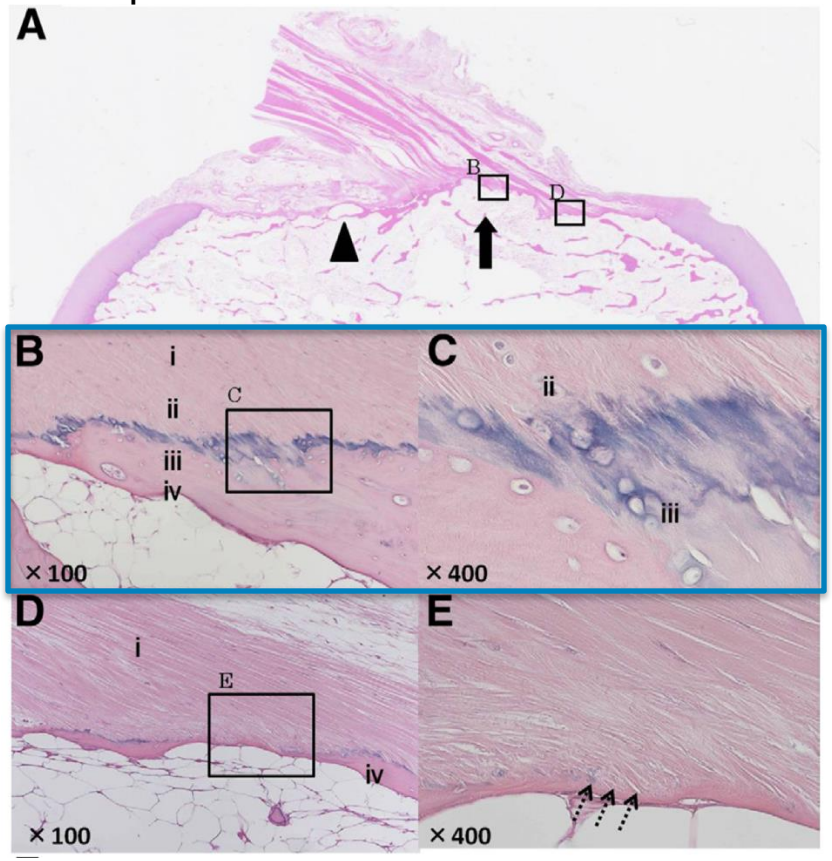
The authors declare no conflict of interest.

Introduction – The ACL is flat – Maybee also the PCL

Flat ACL anatomy

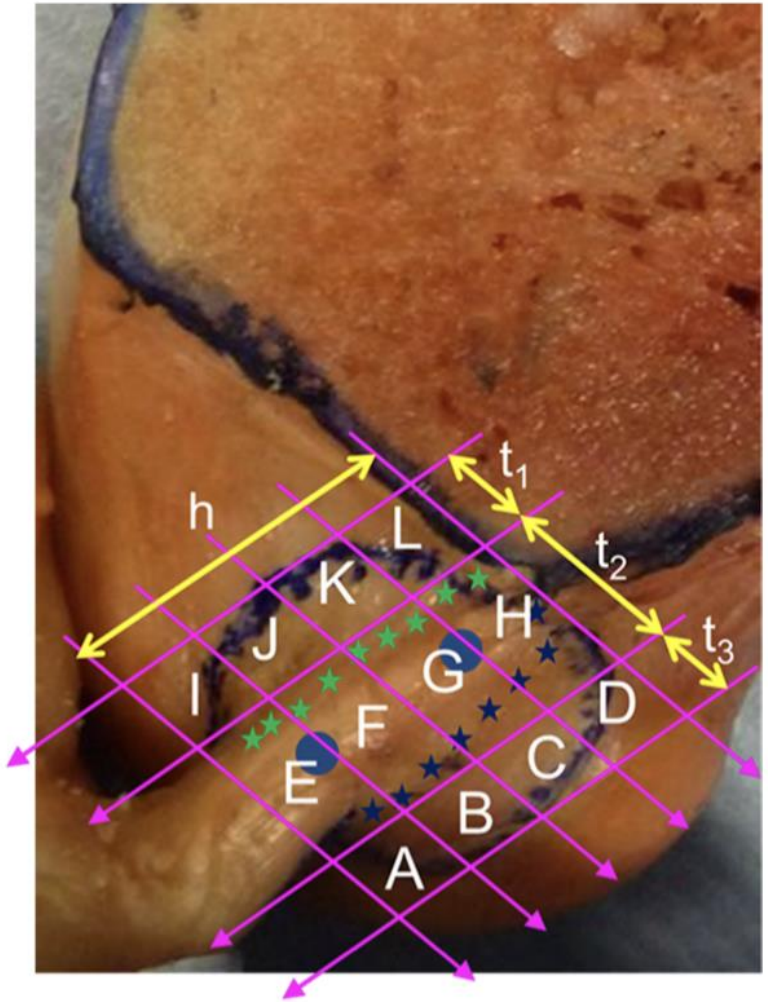
Smigielski et al. BJJ 2016

Corresponds to **“direct fiber”** insertions



Sasaki et al. Arthroscopy 2012

Biomechanically most important



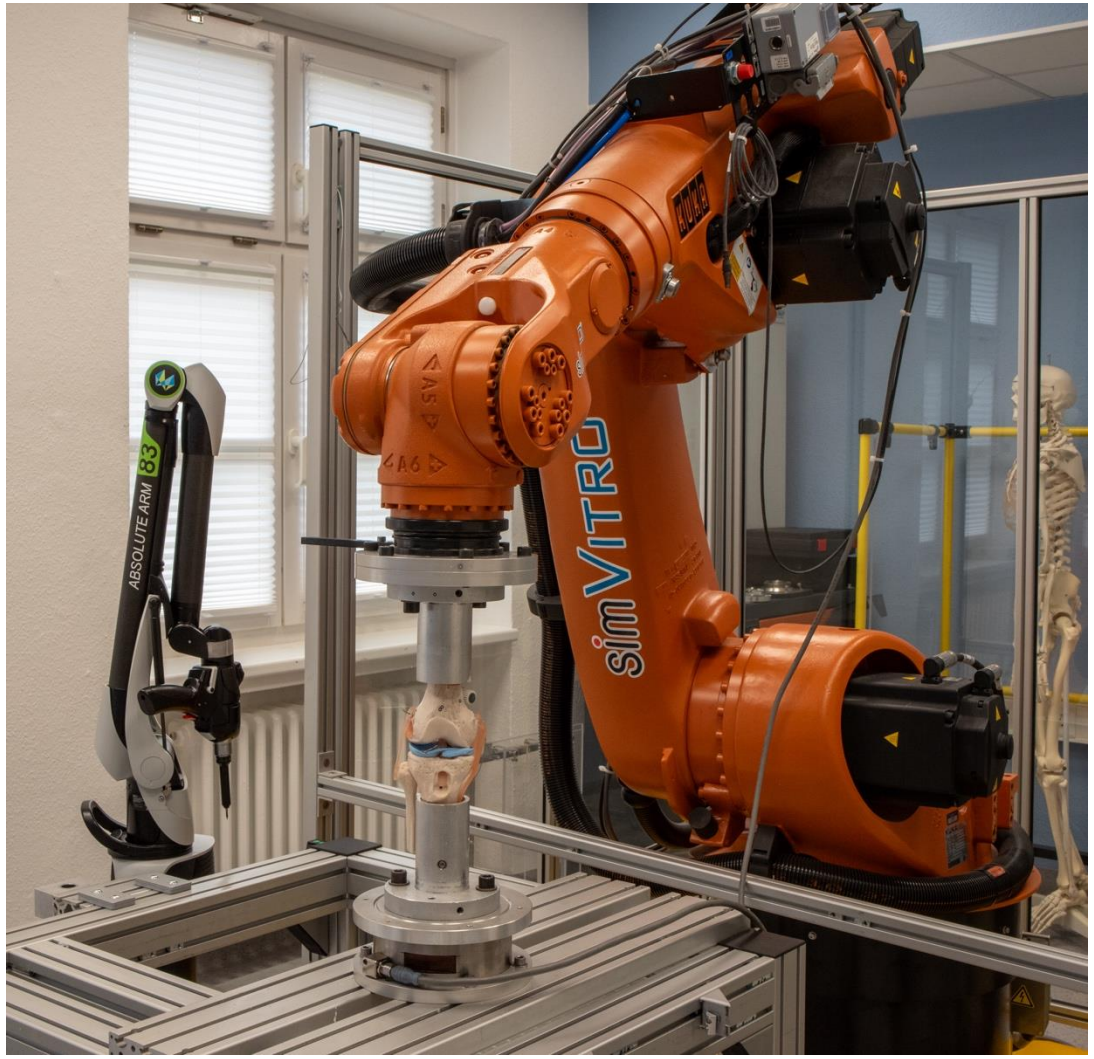
Kawaguchi et al. Arthroscopy 2015

The purpose of this study was to determine the role of different fiber areas of the tibial footprint of the PCL in restraining posterior tibial translation.

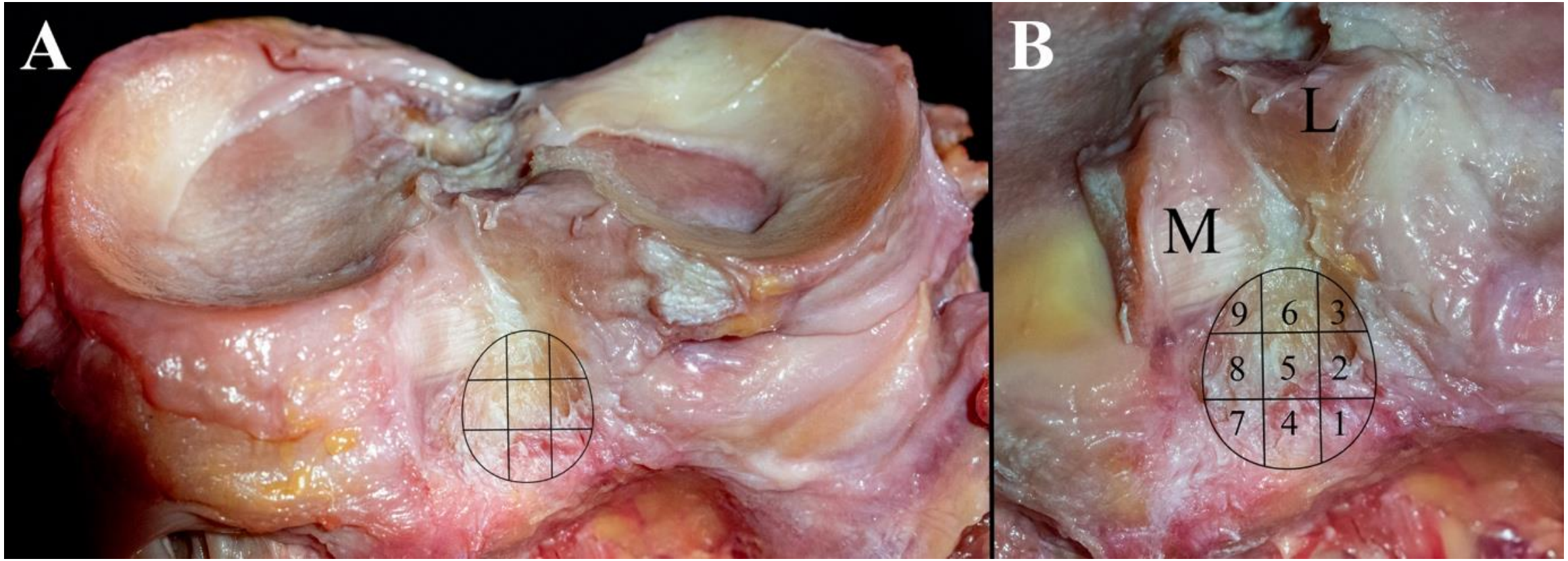
Methods – Robotic Test Setup

After determining the native knee kinematics (89 N anterior/posterior tibial translation (PTT)) in 0 – 90° of flexion, a position-controlled protocol was performed replaying the native displacements, while measuring the force.

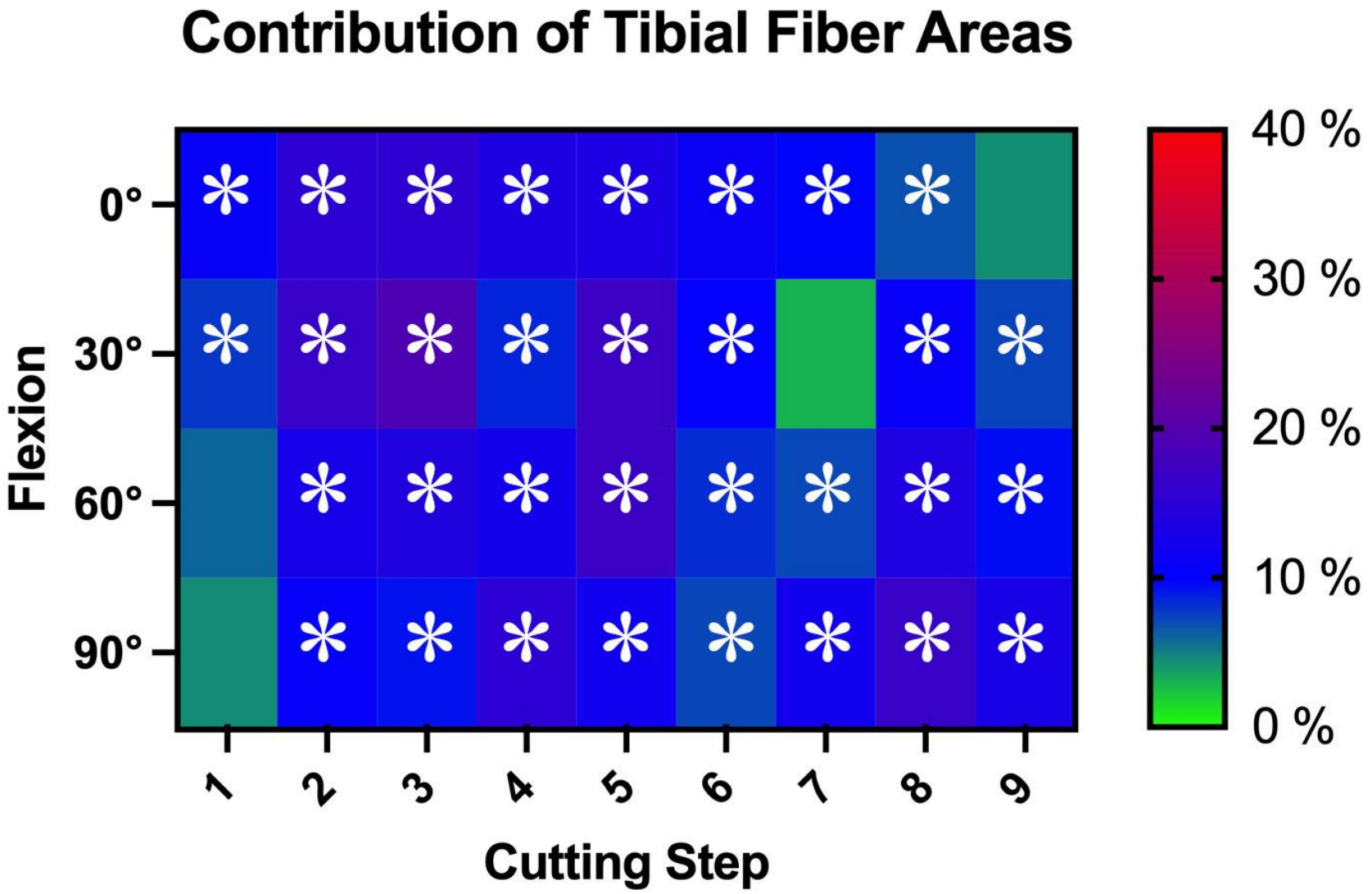
The percentage reduction of force was measured after each cut, by utilizing the principle of superposition

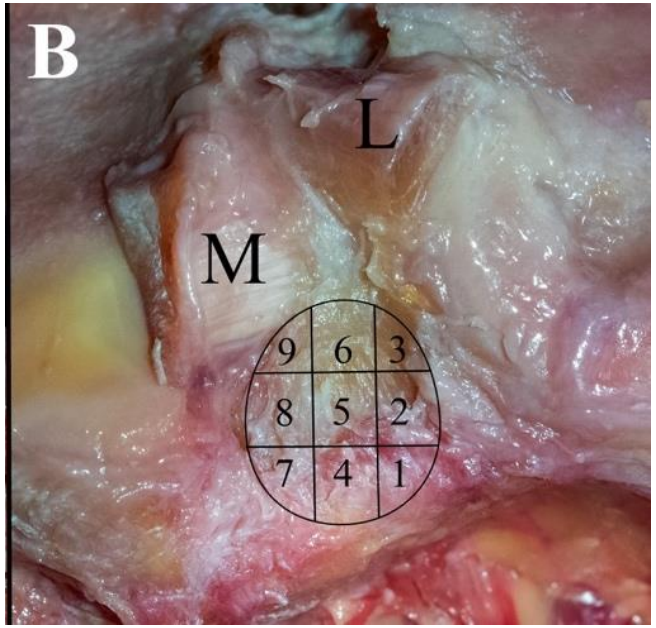


Methods – Cutting sequence

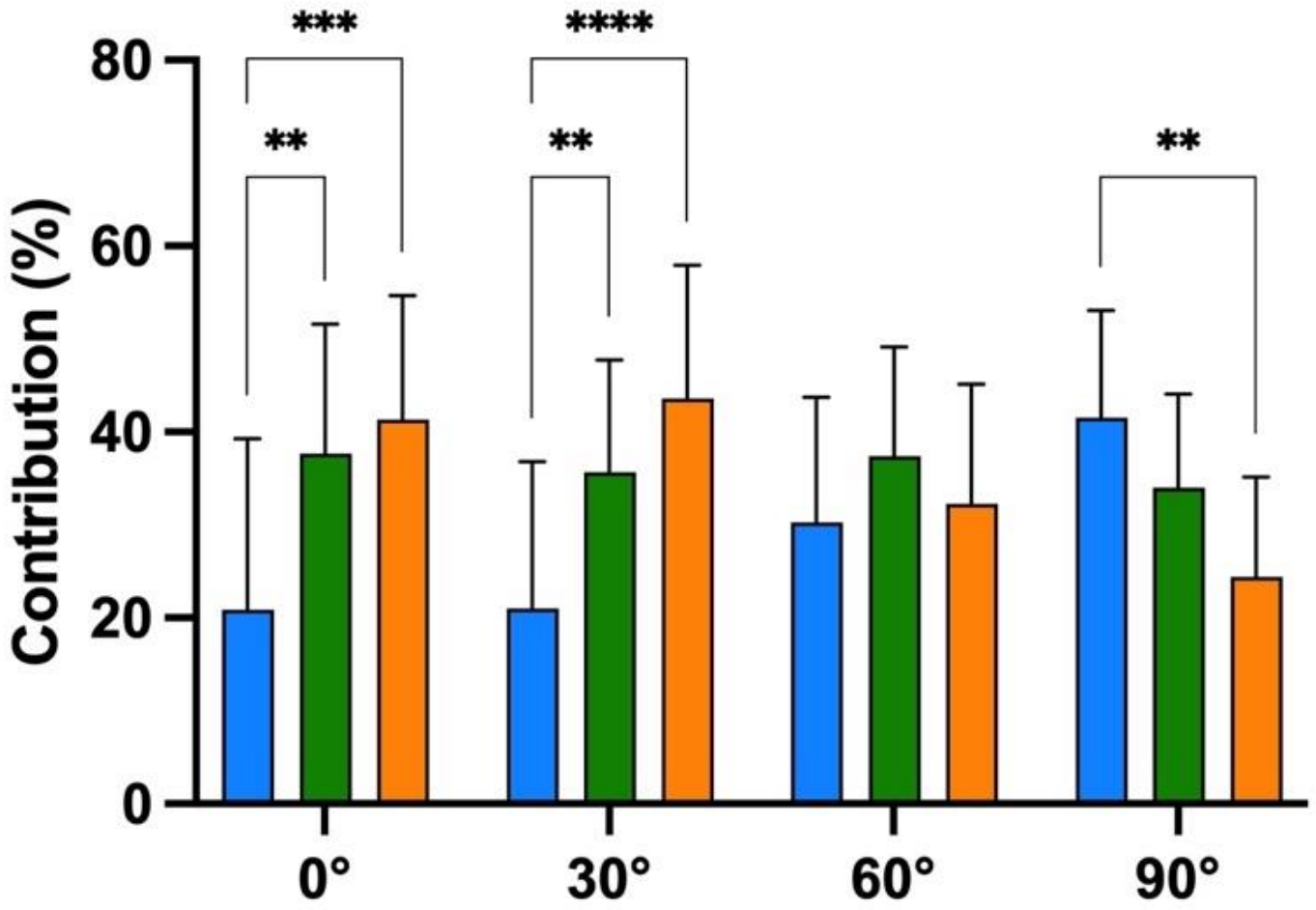


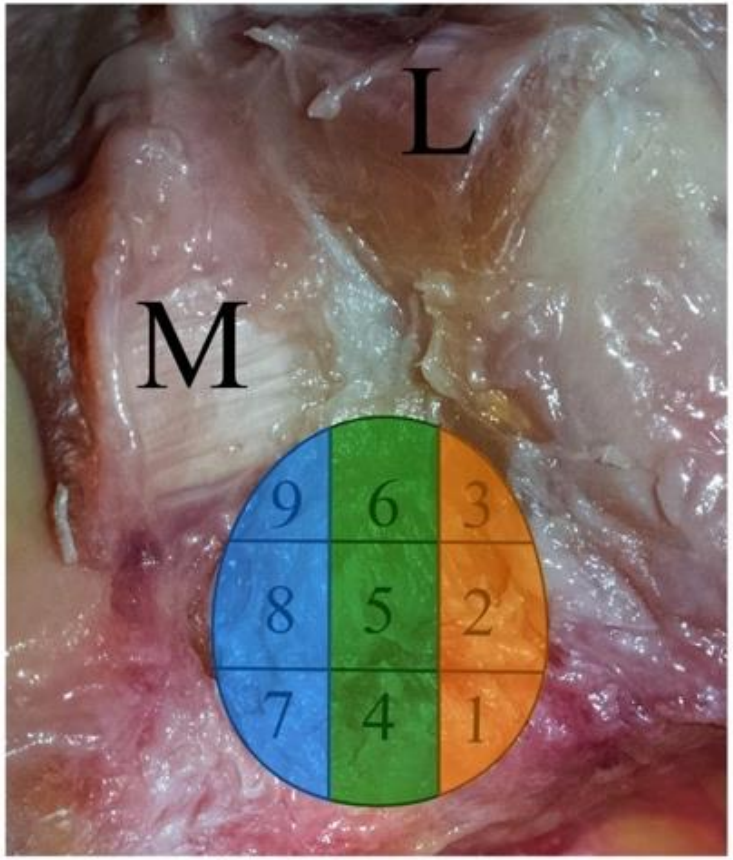
Results – Contribution of fiber areas





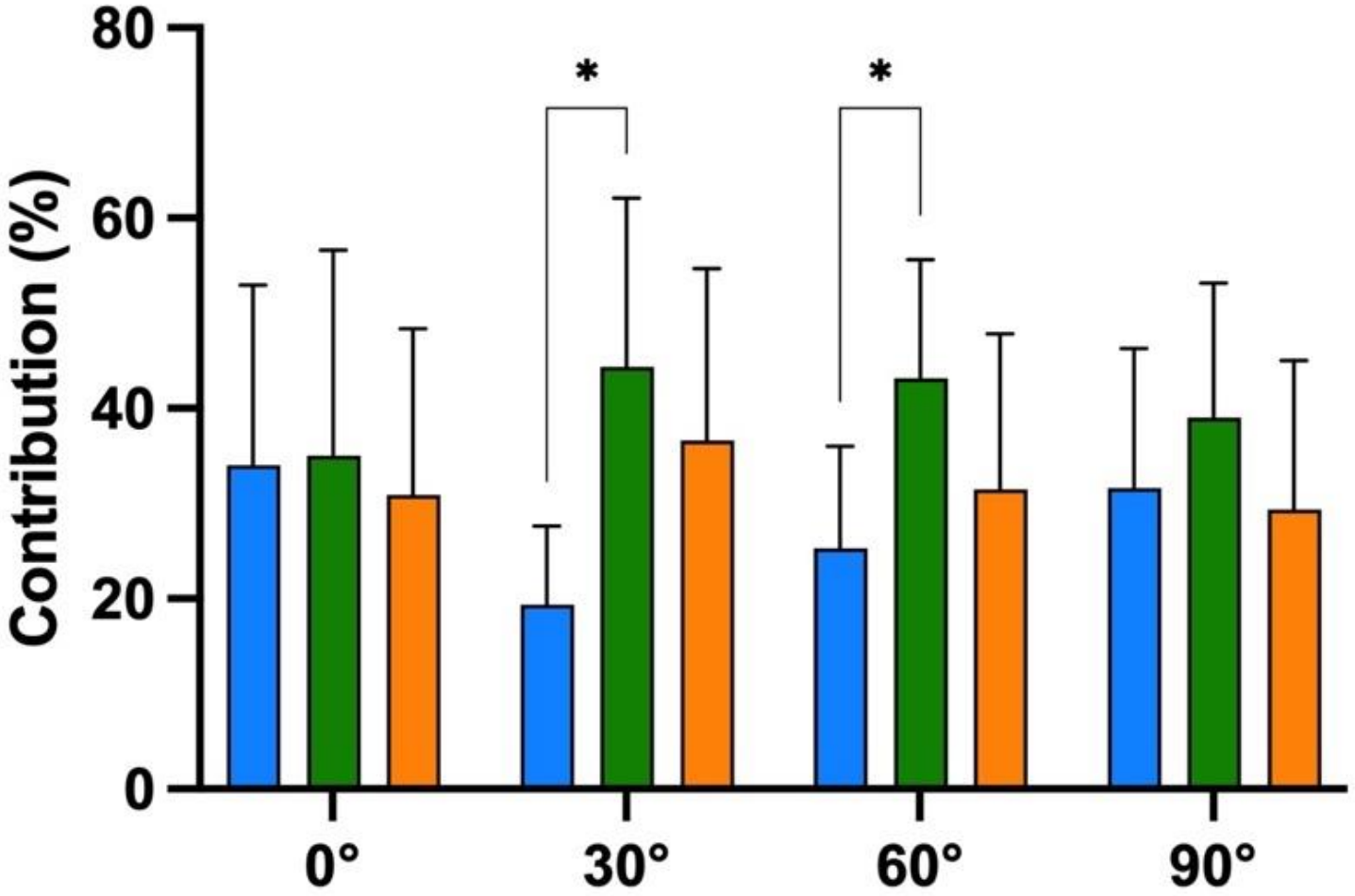
Results – Contribution of fiber areas (medial to lateral)

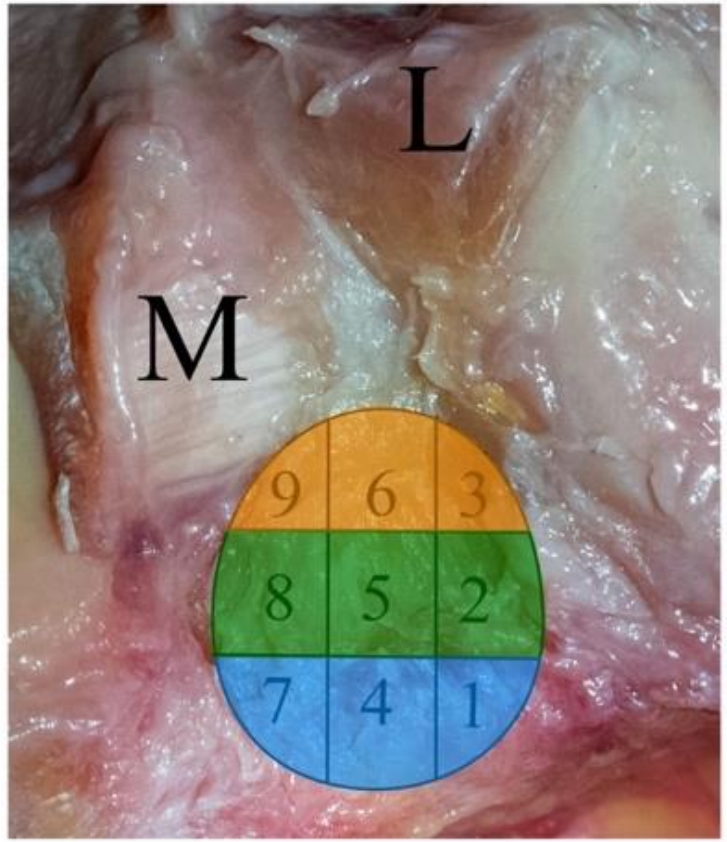




Deichsel et al. JEO 2025

Results – Contribution of fiber areas (anterior to posterior)





Deichsel et al. JEO 2025

All fiber areas in the tibial footprint of the PCL significantly contributed to restriction of a posterior tibial translation force.

The central areas were identified to be the main contributors inside the tibial footprint, while, depending on the flexion angle, the more medial or lateral fiber areas were more active.

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Thank you!

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The official journal of ESSKA

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