

## **SHARPER ANGLE, HIGHER RISK?**

THE EFFECT OF CUTTING ANGLE ON KNEE MECHANICS IN TEAM SPORT ATHLETES.

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### **Abstract**

Introduction: Cutting is an important skill in team-sports, but unfortunately is also related to non-contact ACL injuries. The purpose was to examine knee kinetics and kinematics at different cutting angles. It was hypothesized that cutting to sharper angles lead to greater knee joint loads.

Material and Methods: 13 males and 16 females performed cuts at different angles (45°, 90°, 135° and 180°) at maximum speed. 3D kinematics and kinetics were collected. To determine differences between cutting angles (45°, 90°, 135° and 180°) and sex (female, male), a 4×2 repeated measures ANOVA was conducted followed by post hoc comparisons (Bonferroni) with alpha level set at  $\alpha \leq 0.05$  *a priori*.

Results: At all cutting angles, males showed greater knee flexion angles than females ( $p < 0.01$ ). Where males performed all cutting angles with the same amount of knee flexion (average  $-43.0^\circ \pm -8.8^\circ$ ), females decreased their knee flexion angle from  $-40.6^\circ \pm 8.6^\circ$  at 45° cut to an average of  $-36.9^\circ \pm -9.0^\circ$  when cutting at 90°, 135° and 180° ( $p < 0.01$ ). Knee flexion moment and vertical ground reaction force decreased for both sexes when cutting angle increased ( $p < 0.05$  and  $p < 0.01$  respectively). At 90°, 135° and 180°, males showed greater knee valgus moments than females. For both sexes, knee valgus moment increased towards the sharper cutting angles and then stabilized compared to the 45° cutting angle ( $p < 0.01$ ).

Conclusion: Sharper cutting angles place the knee more at risk. However, females and males handle this differently, which has implications for injury prevention.