

The influence of tibial rotations on hamstring muscle groups' coordination during a dynamic knee flexion assessment

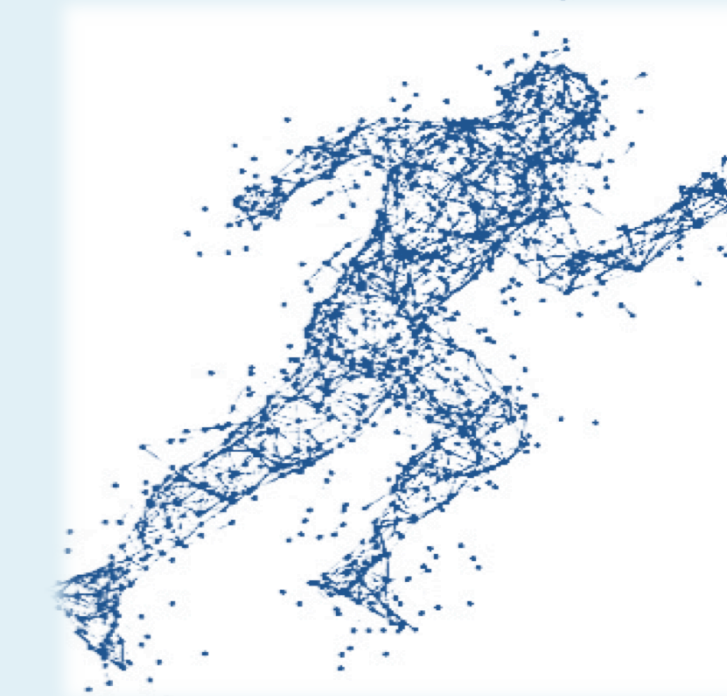
Introduction & Purposes

Hamstring muscles (HM) strength testing is commonly used in practice to help better prevent/rehabilitate any strength's weakness but :

- ◯ insight into the participation of medial (MH) and lateral (LH) hamstring muscle groups to the strength results itself,
- Imbalance between HM groups = lower performance + higher injury risk (1, 2),
- Underestimation of an abnormal strength or activation deficit (compensation) (3).

Tibial rotations → helpful to target more specifically the MH/LH groups (4) :

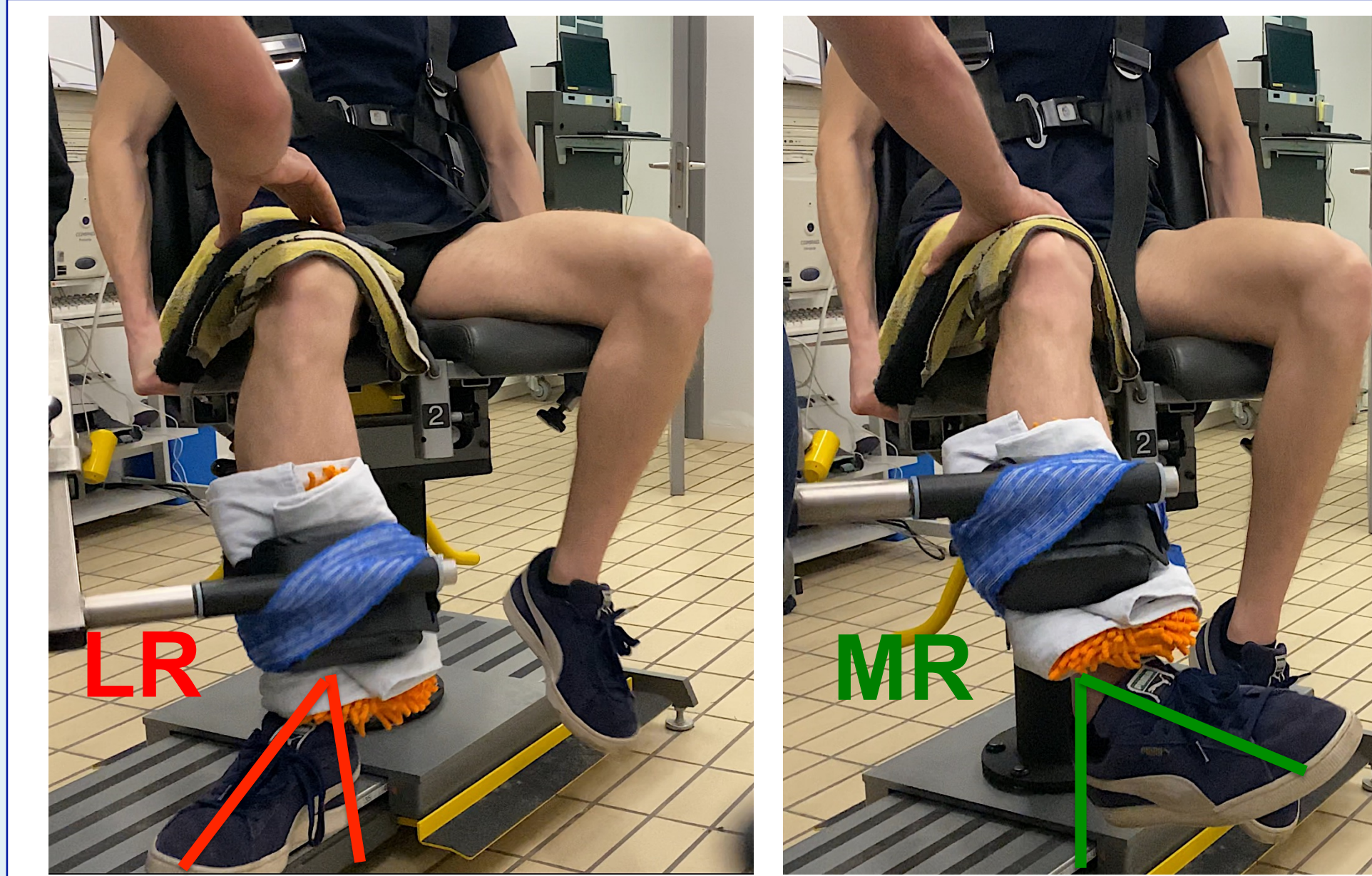
- No reference during a dynamic strength assessment of the knee flexion strength and the muscular activity of MH/LH groups.



Methods

POPULATION

- ✓ 36 healthy males
- ✓ (23.0±3 y.o.; 178.0±6 cm; 75.0±10.3kg)
- ✓ Regular sport practice (3-7h/week)
- ✓ Dominant right leg



MATERIEL / STATISTICS



- 1) SPM in Matlab
- 2) ANOVA2 + Bonferroni post hoc → difference between lateral and medial rotations for peak strength and muscular activity (Biceps Femoris + Semitendinosus).

Results

ANOVA2 & Bonferroni post-hoc :

Strength :

- Lateral Rotation > Medial Rotation (p<0,001) for eccentric 30°/s and 120°/s and concentric 240°/s
- ◯ ≠ for the concentric contraction mode at 60°/s

Muscular activity:

Biceps Femoris : LR > MR at every contraction modes and speed (p<0,05; MR < LR)
 Semitendinosus : ◯ ≠ between MR and LR at any speed or contraction mode



Concentric mode at 60°/s	<ul style="list-style-type: none"> - Warm-up : 3 reps in NP - Test 1 : 3 reps in MR or LR - 2 min rest pause interval - Test 2 : 3 reps in MR or LR
2 min rest pause interval	
Concentric mode at 240°/s	<ul style="list-style-type: none"> - Warm-up : 3 reps in NP - Test 1 : 5 reps in MR or LR - 2 min rest pause interval - Test 2 : 5 reps in MR or LR
2 min rest pause interval	
Eccentric mode at 30°/s	<ul style="list-style-type: none"> - Warm-up : 3 reps in NP - Test 1 : 3 reps in MR or LR - 2 min rest pause interval - Test 2 : 3 reps in MR or LR
2 min rest pause interval	
Eccentric mode at 120°/s	<ul style="list-style-type: none"> - Warm-up : 3 reps in NP - Test 1 : 4 reps in MR or LR - 2 min rest pause interval - Test 2 : 4 reps in MR or LR

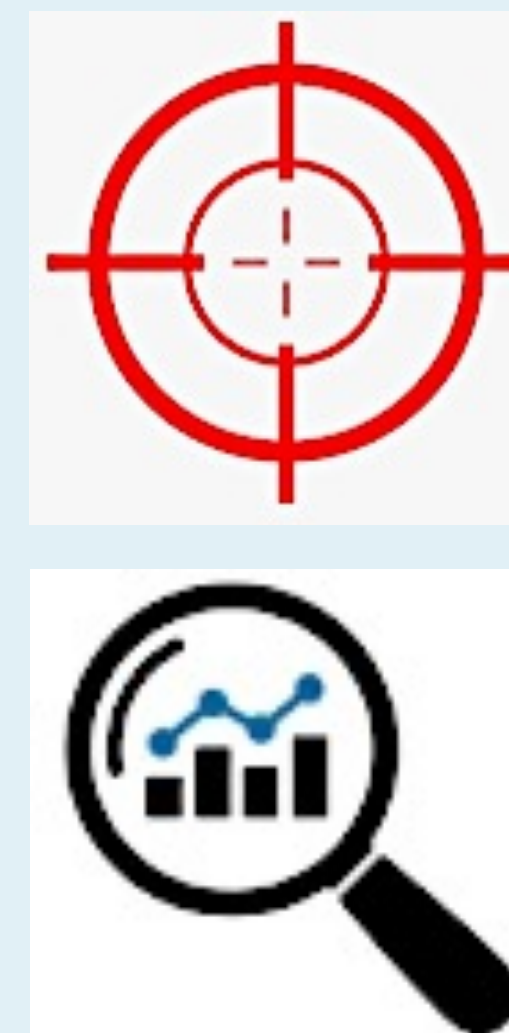
Conclusions

- Tibial rotations: useful to target a specific hamstring muscle group :

- Lateral (BF) or medial (ST)

- Further studies : develop the tibial Rotation-tests in a context of injury prevention and/or rehabilitation for :

- Biceps femoris injury
- ACL injury



Biceps Femoris :



Lateral Rotation



Semitendinosus :



Medial Rotation

