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# Impact of a thin plantar orthopaedic insert on posture and locomotion

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## INTRODUCTION

EMI® (Medio-Intern Element):

- Podiatrist tool included in insoles
- Correction of postural deficiency:

Contralateral effect of a 3 mm high EMI® on ML displacement of the CoP of healthy participants<sup>1</sup>

- Effect on Eye convergence<sup>2</sup>

=> Lack of evaluation

=> Only on static tasks



EMI® on insoles

## AIM AND HYPOTHESIS

Aim: Evaluate the effect of the EMI® on posture and locomotion

Hypothesis: effect of EMI® on ML and AP axis and on Ellipse surface

## DESIGN AND ANALYSIS

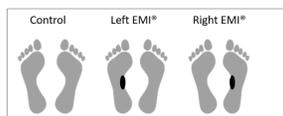
Participants: 19 healthy volunteers (9♂, 10♀, 27.05 yrs (±4.24))

EMI® conditions: control (without), under left foot, under right foot

### • Static (Force plate ATMI®)

Conditions:

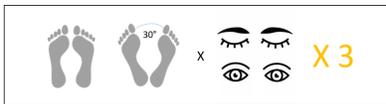
- Feet: parallel and 30° angle
- Eyes: open and close



Analysis:

CoP displacement on ML and AP axis :

- Average position:  $\overline{ML}$   $\overline{AP}$
- Between trials within subject variability:  $BTV_{AP}$ ,  $BTV_{ML}$
- Within trial within subject variability



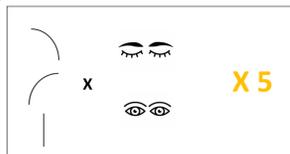
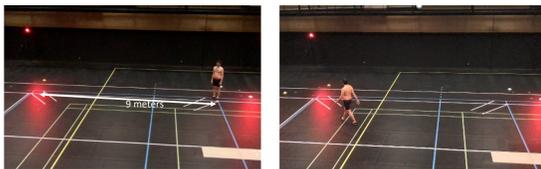
Ellipse Area

### • Locomotion (Vicon®)

Design based on Podokinetic after rotation (PKAR) protocol<sup>3,4</sup> (30' of walking stimulation)

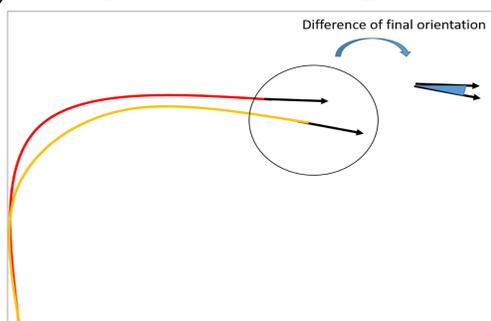
Conditions:

- Eyes: open and close
- Trajectory: straight, turn left 90°, turn right 90°



Analysis:

Comparison between the difference in final orientation of locomotion with/without vision, with a EMI® and without a EMI®



## RESULTS

### STATIC:

Only significant effects on feet position, eye condition and interaction between eye and feet position.

No significant effect of EMI®

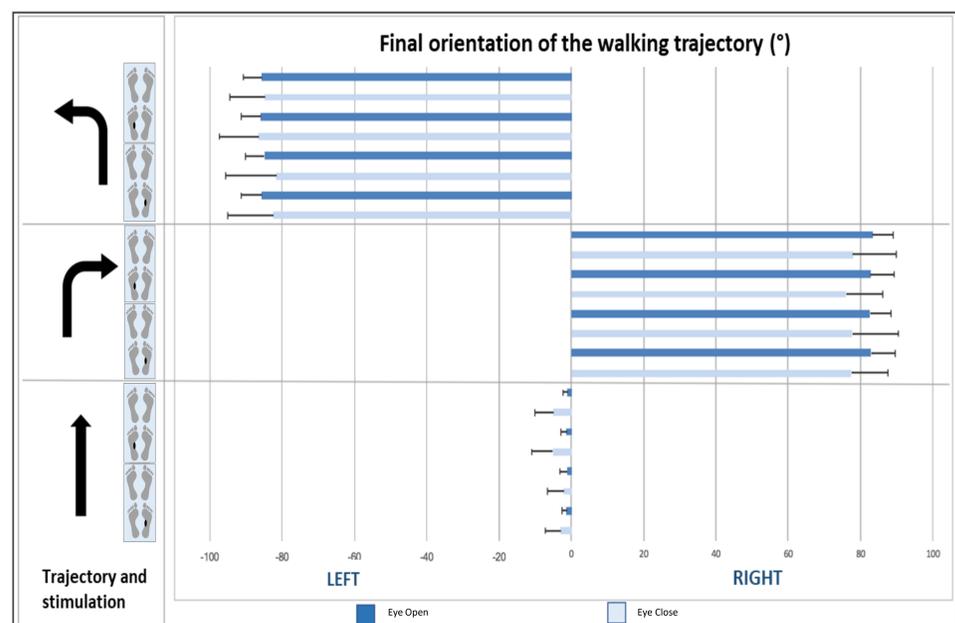
	Control	EMI®	EMI® x Eye
$\overline{ML}$	*** $\eta^2_p = 0,618$	*** $\eta^2_p = 0,511$	*** $\eta^2_p = 0,526$
$\overline{AP}$		** $\eta^2_p = 0,359$	** $\eta^2_p = 0,287$
Surface Area		*** $\eta^2_p = 0,776$	
$BTV_{ML}$	* $\eta^2_p = 0,210$		
$BTV_{AP}$		*** $\eta^2_p = 0,871$	

Results of the 4 ways repeated measures ANOVA (EYExFOOTxEMIxEMISide)

Significant effects are represented as well as their size effect ( $\eta^2_p$ )

### LOCOMOTION:

No significant effect of EMI® on the final orientation of the walking



## CONCLUSION AND FUTURE WORKS

Our protocol, involving **healthy participants**, was not able to show significant effect of EMI® on posture and locomotion

Feet positions has significant effects on posture: clinical activities have to be standardized to be able to compare CoP movement.

### Future works:

- Evaluate population with foot postural deficiency: More effect of EMI® on eye vergence on a population with foot postural deficiency<sup>2</sup>
- Normalize the evaluation of foot postural deficiency: No standardized procedure (compare foam effect<sup>2</sup> on CoP with Depron®)

## BIBLIOGRAPHY

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<sup>4</sup>Earhart, G. M. (2013). Dynamic control of posture across locomotor tasks. *Movement Disorders*, 28(11), 1501-1508.