

THE RELATIONSHIP BETWEEN THE 'FOOT POSTURE INDEX' AND PLANTAR PRESSURE MEASUREMENTS

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intro

- clinical measurements foot posture
 - static foot alignment
 - foot type
- ? reliability and validity
- ? predictive for dynamic situations

- examples:

- arch height
- arch index
- arch angle
- navicular drop
- calcaneal deviation
- valgus index

=> no significant correlations with dynamic variables

limited in ability to predict 3D movement during walking/running

- FPI

The Foot Posture Index (FPI) is a diagnostic clinical tool aimed at quantifying the degree to which a foot can be considered to be in a pronated, supinated or neutral position.

It is intended to be a simple method of scoring the various features of foot posture into a single quantifiable result, which in turn gives an indication of the overall foot posture.

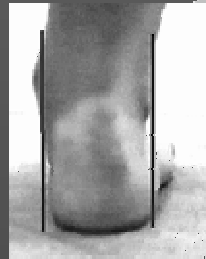
= valid and reliable tool

• FPI (6 item version)

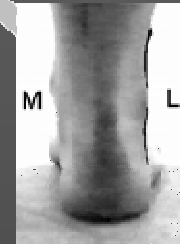
talar head palpation



abd/adduction
forefoot on
rearfoot



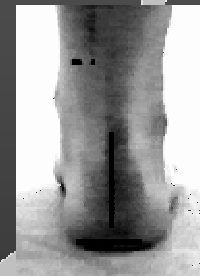
supra and infra
lateral malleolar
curvature



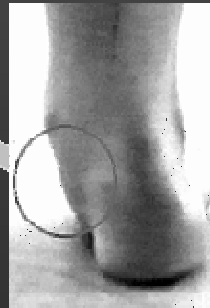
height and con-
gruence medial
longitudinal arch



calcaneal
frontal plane
position



bulging in talonavi-
cular joint region



- plantar pressure measurements

- easy to use
- easier accessible
- less time and money consuming
- reliable

=> idea about some gait parameters

research questions

significant correlation between FPI and PPM variables ?

FPI = predictive for PPM ?

methods

- subjects:

- 128 pp (60 M - 68 F)
- 18-60 yr (average 28yr)
- excluded:
 - LL injuries
 - <1 yr postop
 - system or neurological diseases
- EC-approval, IC

- FPI

- relaxed bipedal stance
- arms along the trunk
- quiet standing

- scoring 6 FPI items

Foot Posture Index Datasheet

Patient name

ID number

	FACTOR	PLANE	SCORE 1		SCORE 2		SCORE 3	
			Date_____	Comment_____	Date_____	Comment_____	Date_____	Comment_____
			Left -2 to +2	Right -2 to +2	Left -2 to +2	Right -2 to +2	Left -2 to +2	Right -2 to +2
Rearfoot	Talar head palpation	<i>Transverse</i>						
	Curves above and below the lateral malleolus	<i>Frontal/ transverse</i>						
	Inversion/eversion of the calcaneus	<i>Frontal</i>						
Forefoot	Prominence in the region of the TNJ	<i>Transverse</i>						
	Congruence of the medial longitudinal arch	<i>Sagittal</i>						
	Abd/adduction forefoot on rearfoot	<i>Transverse</i>						
TOTAL								

Reference values

Normal = 0 to +5

Pronated = +6 to +9, Highly pronated 10+

Supinated = -1 to -4, Highly supinated -5 to -12

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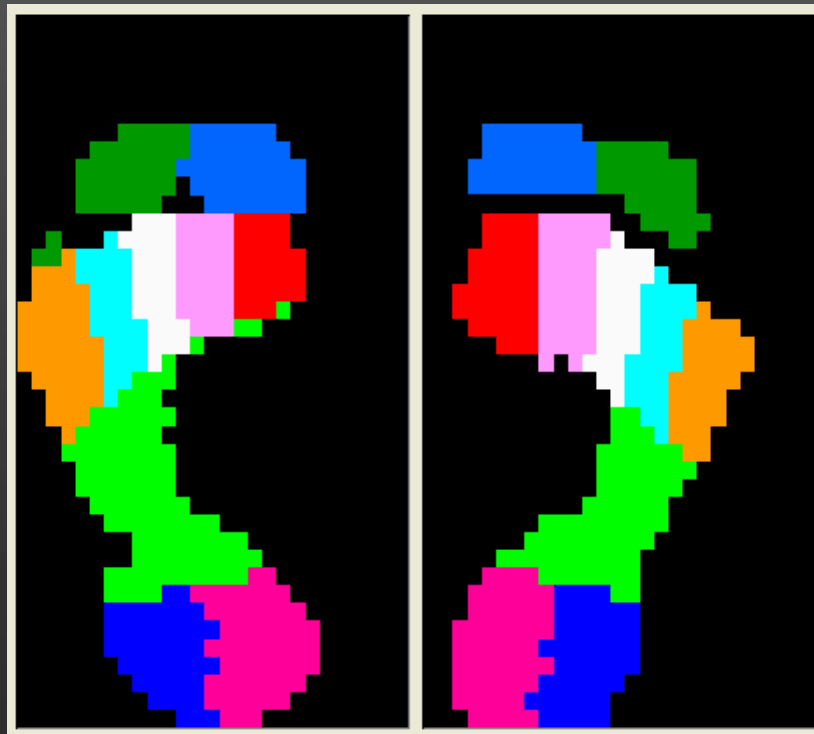
www.leeds.ac.uk/medicine/FASTER/FPI

- plantar pressure measurements

- Footscan® pressure plate (RSscan, Belgium)
- 2m x 0.4m in 8m walkway
- barefoot
- timing gaits
- walking and running at self selected speed
- at least 3 useful trials (L/R) per condition

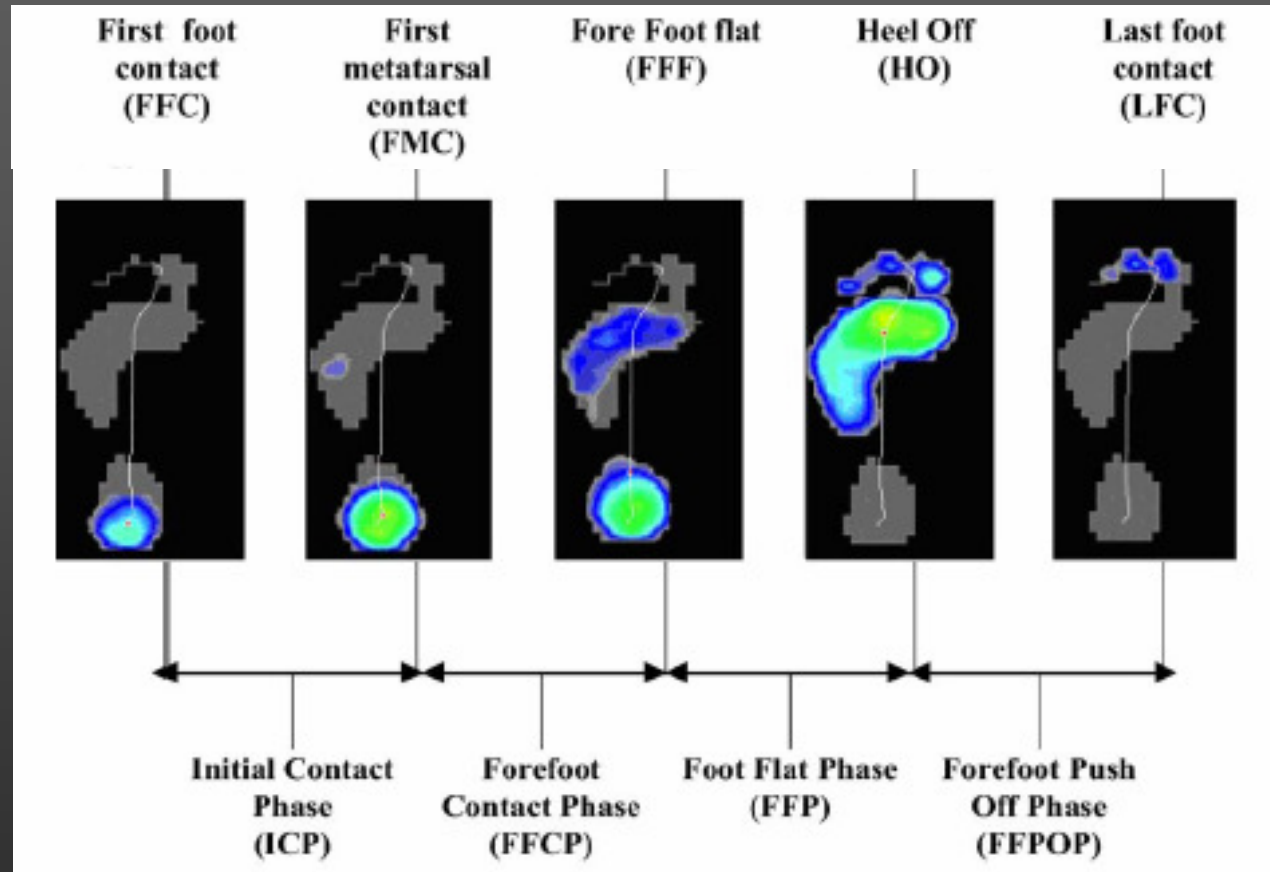
- plantar pressure measurements

- 3 L + 3 R steps selected for walking
- 3 L + 3 R steps selected for running



HL			M3
HM			M2
MF			M1
M5			T2-5
M4			T1

- plantar pressure measurements



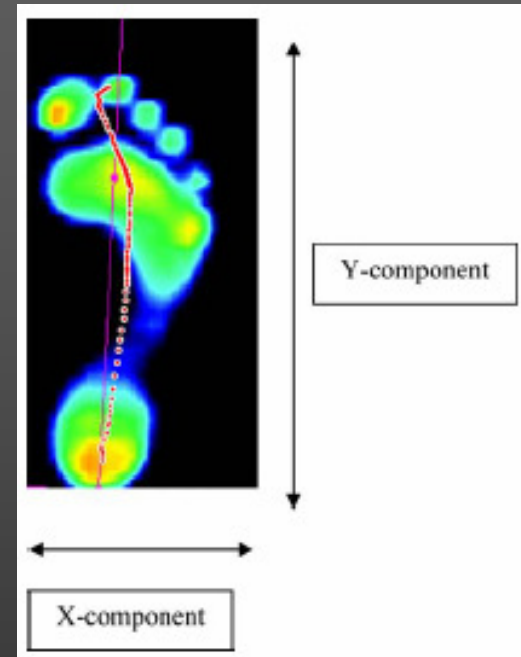
- plantar pressure measurements

- temporal data:
 - contact time
 - end contact time
 - time to peakforce

- peakforce

- impulses

- medial/lateral component of the CoF
at FFC, FMC, FFF, Heeloff, int 1, int 2, int 3



- medio-lateral ratios

$$[(H1+M1+T1)-(H2+M4+M5)]/\text{som}(T1:H2) \quad \text{ratio1}$$

$$[(H1+M1+M2)-(H2+M4+M5)]/\text{som}(T1:H2) \quad \text{ratio2}$$

$$[(H1+M1)-(H2+M4+M5)]/\text{som}(T1:H2) \quad \text{ratio3}$$

$$[(M1+M2)-(M3+M4+M5)]/\text{som}(M1:M2) \quad \text{ratio4}$$

$$(H1+M1+M2)/(H2+M4+M5) \quad \text{ratio5}$$

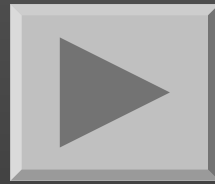
at FFC, FMC, FFF, Heeloff, int 1, int 2, int 3

- statistics

SPSS 12.0

Spearman correlations ($p < 0.05$)

results



results

- no meaningful correlation found
($p < 0.05$ and $r > 0.6$)
- highest correlation found
 $P_{\max M1} \sim \text{bulging TNJ}: 0.413$ (in walking)

=> linear regressions: no sense

conclusion

no correlation between FPI and PPM

FPI has no predictive value for PPM

discussion

- influencing factors clinical measurements
eg. skin movement, soft tissues, anatomical irregularities, individual and subjective NCSP
also in FPI
but moderate reliability > most current methods
- inadequate refinement FPI
=> not extreme foot types less easily categorized

- bipedal standing in FPI



bipedal and unipedal moving in PPM

- subjective observation in FPI
eg arch height
-> better to measure ?

- static \neq dynamic

static measurements predict dynamic moves

minority : yes

majority: no

our study: no

eg neutral in FPI - pes planus in PPM

future directions

- different parameters PPM
- different age groups
- different patient groups
- compare with kinematics
- ...