CHANGES IN THE SURFACES AND PROPERTIES OF INSOLES AND PLANTAR PRESSURES

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SUMMARY

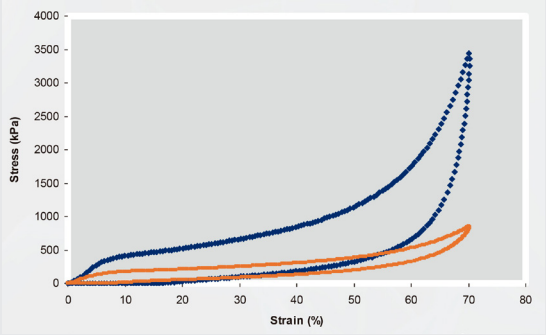
Orthopaedic insoles are normally the treatment of choice when the foot is suffering from different mechanical pathologies.
Different variables that affect the right outcome of this treatment must be taken into consideration:

- Main and/or secondary pathology
- **Patient's weight and activity level**
- **Material of choice for the insole**
- **Plantar pressures**
- Patient kinetics and kinematics

This study aims to define the relationship between some of these variables: weight of the individual, their level of activity and the changes in PLANTAR PRESSURES according to changes in the properties of the material after its use.

Prescribing an insole may have several goals: relief from or absorption of impacts, and the right balance of foot moments1. However, one of the main functions is to produce the right distribution of plantar pressures with a little cushioning2.

The materials used to achieve this must have relatively low stiffness and be combined with good recovery, low compression and maintain their capacity to distribute forces over a prolonged period of use. The most widely-used materials are closed-cell foams (EVA).



KEY WORDS

Orthotic, EVA, Bench testing, DMA, SEM, Insole simulator

MATERIAL AND METHODS

- 24 healthy subjects: 12 women // 12 men
- Mean age 36.4
- Mean weight 75.8
- Mean height 170.1
- Divided into 3 activity groups:
  - Low: Mainly seated, <750 min
  - Medium: 750 min > activity > 1200
  - High: Mainly standing or walking > 1200 min
- Insoles with generic geometry designed using custom 3D in R
- **Used for at least 8 hours a day for 10 days**
- **Same footwear (KELME-MICHELIN START-TREA 360o)**
- **RT3 activity monitor (Stay Healthy USA)**
- **Plantar pressures measurement with PEDAR system (Novel, Munich, Germany) operating at 50 Hz and measuring MCP, MMP and impulse**
- **Treadmill at 5 km/h for 3 min. Data collected for 60 seconds and taken 50 map.s-1.**
- **Thickness measured in 3 defined areas every 2 days**
- **Post-processing of data and statistical analysis with PASW STATISTICS 18 SW (IBM Corporation, NY)**

RESULTS

	Forefoot (meta 1)	Midfoot (meta 2-3-4)	Heel
MCP	Status Status-activity-weiht	Status Weight Status-weight Status-activity	Status
MMP	Status	Status Weight Status-weight Status-activity	Status Weight Status-activity-weiht
IMP	Status	Status Weight Status-weight Activity-weight	Status Weight

CONCLUSIONS

In a short-term real use scenario (10 days), the cumulative load using the thickness of 4mm showed significant changes in the **PLANTAR PRESSURE** parameter, in particular in the forefoot (first metatarsal), due to the patient's weight and activity level (status) in line with the results from the tests for this material (dual density EVA, 50-30).

Consequently, weight, force and activity duration are variables that must be taken into consideration when deciding which materials to choose when designing insoles.

Further research is necessary to be able to predict the mean useful life of insoles according to the patient's weight and level of activity, and to determine the ideal materials depending on the mechanical function required by patients.

The changes observed over this short time period suggest that we must be careful when interpreting the effectiveness of insoles. The choice of material should be assessed in more depth.

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