

**The „smart sock“: a diagnostic instrument to evaluate pressure distribution of the complete circumference of the foot inside a shoe**

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**Introduction:** Increased local pressure is the most important single pathogenetic factor in the development of defects in the diabetic foot. Reduction of local pressure using soles designed to optimize the pressure distribution according to a measured pedogram of the plantar region of the foot has been shown to improve the care of patients at risk. However, it is not unusual that expensive orthopaedic footwear leads to a defect in other regions of the foot. In order to prevent unnoticed pressure peaks induced by the shoe we developed a pressure measuring system reflecting the pressure which applies to the total surface of the parts of the foot which are covered by the footwear. This new diagnostic tool will give important information to the orthopaedic shoe maker. **Method:** This diagnostic system is based on a special fibre which can be used to create a textile sensitive to pressure. Using such a textile we have made a sock (“the smart sock”) that can be worn within the shoe. In principal the system consists of the following components: The “smart sock”, a connecting device to read the information deriving from the fibres of the tissue, a hardware box capable to transfer these data via USB to a lap top, and the software to convert the data into an online three dimension picture of the foot indicating the pressure distribution on the surface of the foot. **Results:** Wearing the “smart sock” connected to the system it is possible to follow the change of the pressure during walking. As far as the plantar region is concerned the system gives similar information as it is given with instruments which are available to date. However, in addition it also indicates the distribution at the foot edge and the dorsum of the foot. A video will be presented showing a 3-D online imaging of pressure distribution around the foot during walking.

**Discussion:** A new method introduced into medicine always has to prove superiority in diagnosis and care of patients in comparison to available approaches. The new device we developed to indicate the pressure on the surface of the complete foot inside a shoe offers new information on the potential contribution of footwear to damage in feet at risk. This might lead to optimized design of protective footwear and might decrease the risk of shoe-related injury in at-risk patients.