

*The RSscan footscan® system can predict  
and reduce injuries  
First study of link between footscan® analysis and injury  
rate successful*

A study of the Britannia Royal Naval College (Dartmouth) concludes that injury rate of military professionals can be predicted and reduced with the RSscan footscan® system. This was the first and largest randomised controlled study ever undertaken worldwide to compare orthotic use with injury-reduction. The RSscan Footscan system succeeded in dividing recruits in three risk categories (low, medium and high) and after a period of using the D3D orthotic system, a reduced injury rate of 31% was found.

For many years, the army suffers a high drop-out of new entry trainees caused by (mostly lower limb) injuries. For the soldiers injury means loss of income, while the army has to cope with extra costs. The cause of lower limb injuries can be of many kinds, but an abnormal running pattern seems to be the most present. Different studies<sup>1</sup> show that every year between 30 and 70% of all recreational and competitive runners get injured. Most suffered running injuries are Anterior Knee Pain, Ilio-tibial band syndrome, Patello-femoral disorder, Medial tibial stress syndrome, Stress fracture tibia/metatarsal, Plantar fasciitis and Achilles tendonopathy.

For professional athletes and militaries, which are dependent on their body to gain income, injury means a disaster for the career. Although civilians don't always lose income, injury can hinder daily life. Therefore, a method of reducing injuries is of great interest for public health, individual morbidity and career success.

### **Prediction**

RSscan footscan system® is used by many sports institutes and universities to scout athletes and help in staying injury free. The national army of Australia, Belgium, Holland, Germany and America already use the pressure measurement system to evaluate the injury risk of the recruits. Different studies use RSscan footscan system® to measure and treat athletes and patients and to look at many foot-types and variations in lower limb anatomy such as bow legs and knock knees.

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<sup>1</sup> Marti, B., and P. Vader. On the Epidemiology of running injuries: the 1984 Berlin GrandPrixStudy. American Journal of Sports Medicine.16:285-293, 1998 and Rochconger, P., F. Pennes, and Carne. Occurrence of running injuries. Sci. Sports.10:15-19, 1995.7.

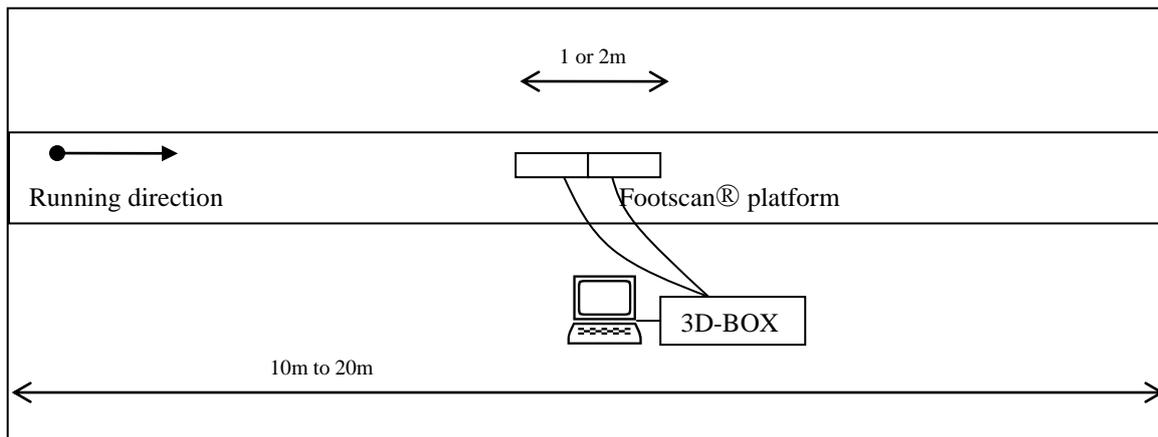


Figure 1: A footscan® pressure platform placed in a 18m long running way

To determine the predictive power of the RSscan Footscan® system a study was set up by the Britannia Royal Naval College<sup>2</sup>. 640 military new entry trainees participated. They were asked to walk barefoot over an 18m track with an integrated 1m RSscan footscan system® platform (Figure 1). Five complete right and left foot strikes were recorded and analysed using the RSscan Footscan system ® 7.0 software. After analysis, the biomechanical risk of each recruit was graded in low, medium and high risk (figure 2).

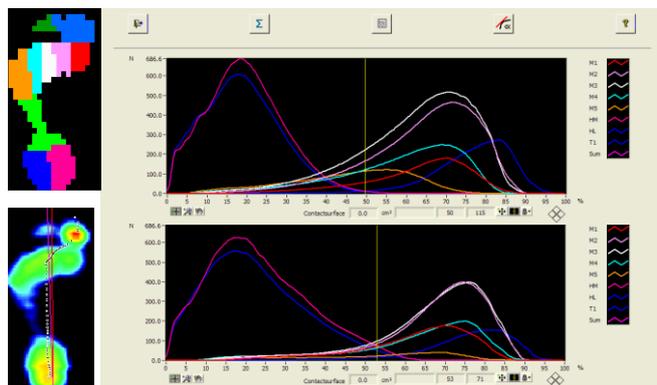
Risk Category	%	% of injuries in 7 weeks
High	19	56.5
Medium	21	30.4
Low	60	13

Figure 2: Injury risk of the recruits

There was a clear significant difference between the 3 groups. Subjects placed in the high risk category got more injuries then subjects in the low risk category. The RSscan footscan® system can be used for measurements to predict injury risk.

### Prevention

After dividing the recruits in different risk categories, D3D insoles were made based on the analysis. The trainees who were indicated as having a high and medium risk to injuries were randomized in two groups of 200 recruits. For the first group, D3D orthotics were made while the second group didn't undergo any intervention.



The footscan® system measures the vertical force that is applied by the body through the foot to the ground during the stance phase. Because of this, it is possible to calculate pressure by knowing the area that the force is being applied over. The system detects maximum pressures/forces applied in these different areas, and the timing of this application of

<sup>2</sup> Andrew Franklyn-Miller, Can the RS Scan footscan D3D orthotic reduce lower limb injury in an initial Military training setting

force. This allows a detailed analysis of when and where force is being applied during the stance phase. If there is an imbalance occurring in any of these key stages, the D3D™ section of the software will highlight where the imbalance is, and the type of correction suggested.

HIGH RISK	ONE OR MORE CORRECTIONS SUGGESTED BY D3D® ON BOTH FEET
MEDIUM RISK	ONE CORRECTION SUGGESTED BY D3D® ON ONE FOOT
LOW RISK	NO CORRECTION

Figure 3: Risk and D3D insoles

All trainees were followed up after 14 weeks of training to measure the presence of injuries (figure 4). In the control group, 49 recruits missed training for 2 days or more because of injuries of the lower limb while only 8 trainees who wore D3D orthotics got injured. This means that the prescription and application of the D3D® orthotics reduced injury rate (ARR) by 59% in subjects with a high injury risk and with 31% over all categories.

Group	Risk	n/640	Injury (n/82)	%
Control group	High/medium	200	49	59
Orthotic	High/medium	200	8	9
Background	Low	240	25	32
<b>Absolute risk reduction</b>		$0.59 - 0.09 = 0.31$ (31%)		
<b>Number needed to treat</b>		$1/0.31 = 3.2$		

Figure 4: Comparison of injury rates in control to intervention group

## Conclusion

This study of the Britannia Royal Naval College (Dartmouth) showed that the injury rate of military professionals can be predicted by the RSscan Footscan system, while the wearing of D3D insoles succeeds in preventing injuries. A reduced injury rate of 31% was found. This was the first randomised controlled study to compare orthotic use with injury-reduction.