Preventing running injuries

Does footwear matter?
Definition of Running Injuries

Any physical complaint resulting in alteration of distance, speed, duration or frequency of running

Requiring the need to see a health professional or take medication

Prevention training or competition for at least 1 week

Pain or stiffness in the musculoskeletal system of the lower limb

38 injuries per 1000 hours of running – No change in 40 years
Most Common Running Injuries

- Runners Knee (iliotibial band syndrome)
- Shin Splints (MTSS)
- Heel pain (Plantar Fasciitis)
- Achilles Tendinopathy
- Patellofemoral Syndrome
- Patella Tendinopathy
Other Running Injuries

• Exertional lower leg pain
• Hip Bursitis
• Muscle Strains (calves/hamstrings)
• Ankle Sprains
• Gluteal and hamstring Tendinopathy
• Back Pain
Intrinsic Risk Factors

- Previous injury
- Age
- Limb length discrepancy
- 3.5% Women underweight/ 35% men overweight
- Abnormal anatomical alignment
- Faulty loading patterns
- Foot posture
Extrinsic Risk Factors

• Training routines
  • Sudden change of training routines, are the cause of 60–70% of all running injuries.

• Distance, surface, marathons
  • Foot strikes 42,180 times and up to 2.5 times body weight from ground forces

• Lack of experience
  • 16% had been physically inactive prior to starting programme
  • 52.3% Had not previously trained for marathon
  • 28% never completed a marathon

• Shoe Type
Injury Risk Studies

- Wearing running shoes for 4 to 6 months
  - > risk of injury in women than in men

- Use of orthotic/inserts

- Little evidence for pronation and impact forces as risk factors despite being considered primary predictors of running injury
## Mitigation of Injury Risk

<table>
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<th>Mitigation Methods</th>
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<tr>
<td>Running Technique</td>
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<tr>
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<td>Neuromuscular control</td>
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<td>Footwear modification</td>
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Mert Root

• Shock Absorber
• Mobile Adapter
• Rigid Lever
THE GAIT CYCLE

THE STANCE PHASE OF THE GAIT (100%)

CONTACT PHASE 27%
0% HEEL STRIKE

MIDSTANCE PHASE 40%
27% FULL FOREFOOT LOADING
67% HEEL-OFF

PROPULSIVE PHASE 33%
100% TOE
Assumptions

• Running shoes can control the magnitude and/or rate of both foot motion and impact loading
• Excessive pronation and/or impact forces are causal factors in the development of running related injuries
• A neutral gait pattern reduces injury risk
• Recent PHD demonstrates the efficacy of running shoes to reduce the magnitude of foot motion.
• Direct effect of Running shoes on running injuries not until 2012 in American Military
Footwear selection

Cushion/Control – Minimalist
### Shoe Selection Criteria - Foot type

<table>
<thead>
<tr>
<th>Arch Type</th>
<th>Foot Alignment</th>
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<tbody>
<tr>
<td>Normal arch</td>
<td>Neutral</td>
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<tr>
<td>High arch</td>
<td>Supinator</td>
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<tr>
<td>Flat foot</td>
<td>Pronator</td>
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- **Shoe type**
  - Neutral Shoe
  - Cushioned Shoe
  - Motion control or stability shoe

**Use of orthotics** – Neutral shoe recommended
Anatomy of a sports shoe
Motion Control Shoe
Stability shoe

More than controlling velocity of pronation

Hypermobile foot type or pes cavus

DKV
Cushioning Shoe

- Softer midsole
- Stiffer foot type
- Supinated or pes cavus
Barefoot Vs Standard Running Shoe

- Reducing impact loading variables and overstride
- Transitioning towards a midfoot or forefoot strike
- Vibram Five Fingers (VFF)n increased cadence and reduced stride length

- The difference in injury frequency between the two running shoes was about 200% (2012)
- Limited evidence supports the effectiveness of transition from rearfoot to forefoot strike and increase step rate
- Similar instruction to run “lightly, softly and quietly when wearing a standard running shoe leads to similar kinematic
Does footwear make a difference?

• Lower frequency of lower leg and foot injuries, and much of this change is attributed to improvements in footwear technology.  
  Clinical J of Sports Medicine, 1991

• More recent large scale in American Military – no difference

• Canadian study - to correct dysfunction might cause injury

• Comfort showed compelling evidence of injury reduction

• No evidence that pronation or impact forces is a predictor for injury
  • Based on study of all foot types in 1854 subjects over 1000km
Bottom Lines

• Despite running shoe design, running injuries remain consistent
• Comfort!
• Conditioning, training, strength, technique more important
• Interpretation of foot type and prescription advice
• Needs change – weight, fitness, strength, balance and range
• Each brand has a unique and multiple lasts
• Variety not monogamy - Different shoes for different runs
REFERENCES

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