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

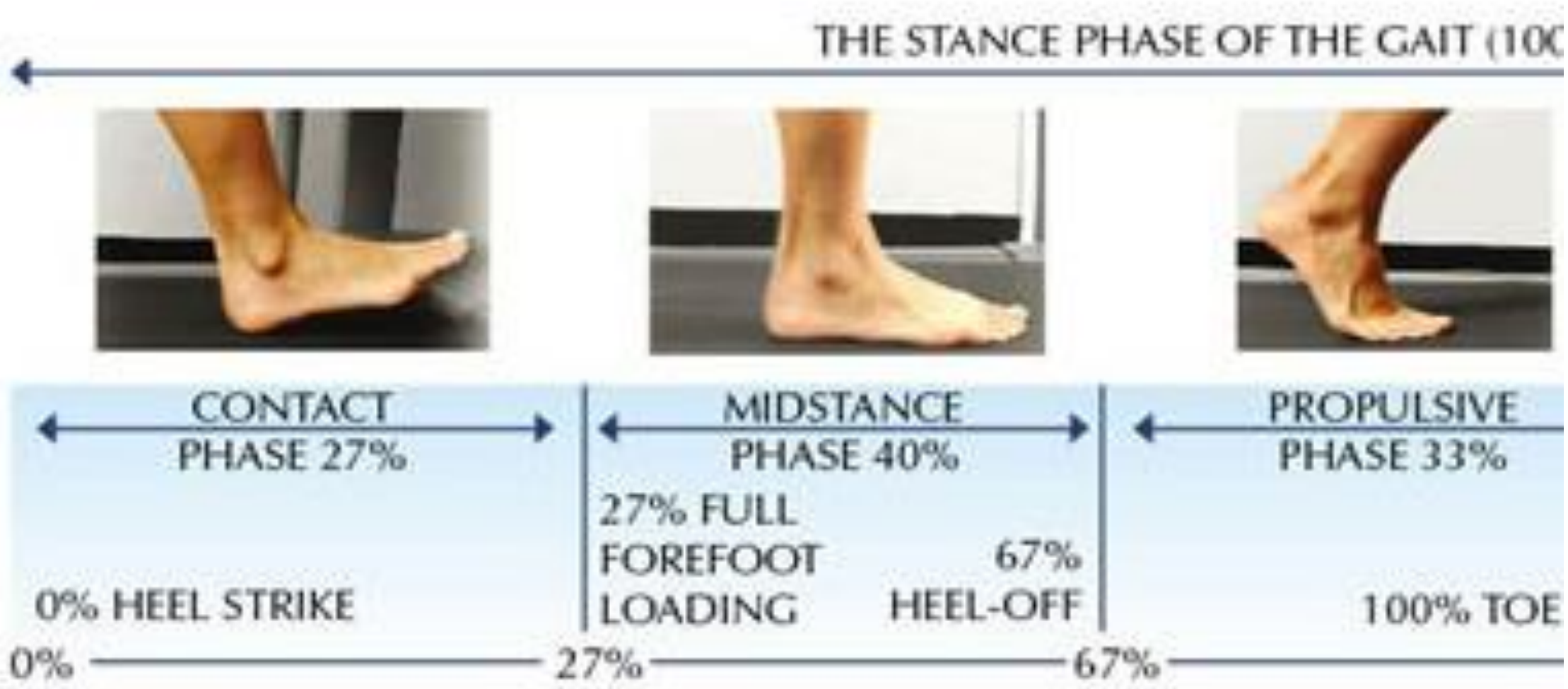
Mitigation of Injury Risk

- Running Technique
- Strength
- Neuromuscular control
- Flexibility
- Taping
- Orthotics
- Footwear modification

Mert Root

- Shock Absorber
- Mobile Adapter
- Rigid Lever

THE GAIT CYCLE

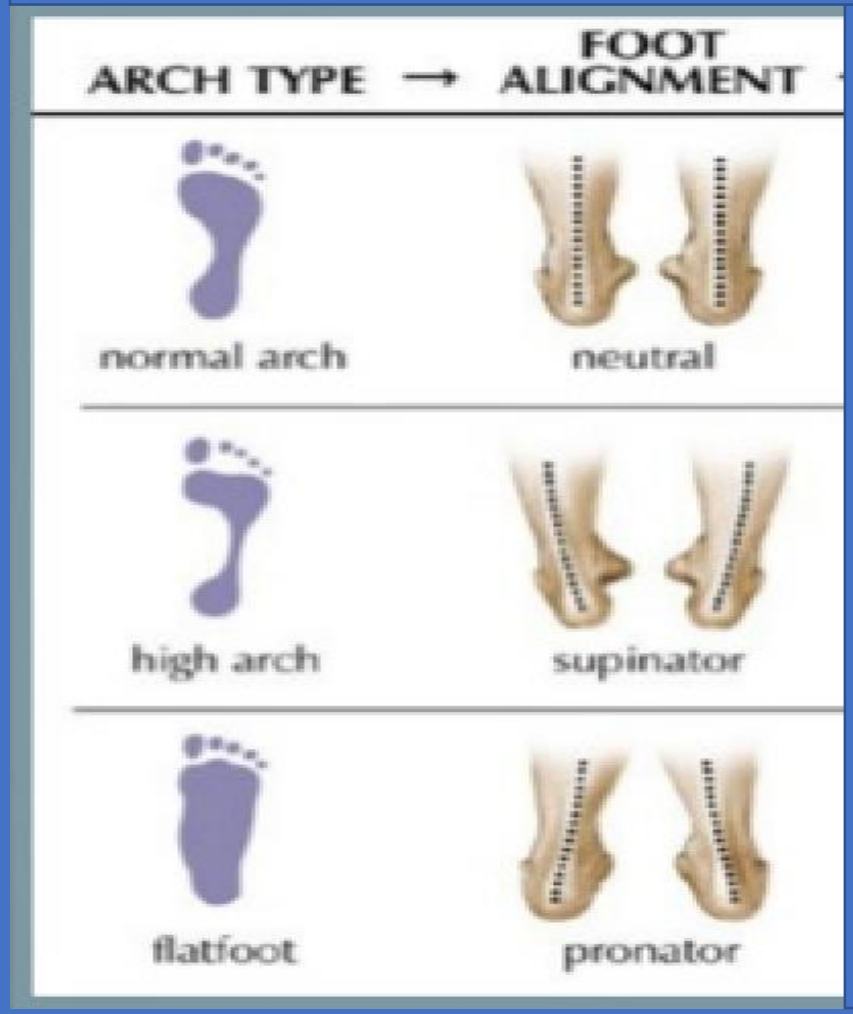


Assumptions

- 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

Shoe Selection Criteria - Foot type



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 consistant
- 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 monogomy - Different shoes for different runs

REFERENCES

Running retraining to treat lower limb injuries: a mixed-methods study of current evidence synthesised with expert opinion (2017) Barton CJ., Bonanno DR., Carr N., Neal BS., Malliaras P., Franklyn-Miller A., Menz AJ. *BJSM* 50 (9)

Injuries in Runners; A Systematic Review on Risk Factors and Sex Differences. (2015) van der Worp MP ., ten Haaf DSM., van Cingel R., de Wijer A., Nijhuis-van der Sanden MWG., Bart Staal J. https://doi.org/10.1371/journal.pone.0114937

Training errors and running related injuries: A systematic review (2012) Nielsen RO., Busit I., Sorensen H., Lind M., Rasmussen S. *International Journal of Sports Physical Thearpy,* Feb 7(1): 58-75 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3290924

The effect of minimalist footwear and instruction on running: an observational study (2017) Barcellona MG. Buckley L., Palmer LJM., Ormond RM., Owen G., Watson DJ., Woledge R., Newham D. *BMJ Open Sport and Exercise Medicine.* 3.

Running Injuries: A Clinical Study of 4,173 Cases. (1991)Macintyre, J. G., Taunton, J. E., Clement, D. B., Lloyd-Smith, D. R., McKenzie, D. C., Morrell, R. W. *Clinical Journal of Sport Medicine*

Is your prescription of distance running shoes evidence-based? Richards CE., Magin PJ., Callister R (2009) *BJSM.* 43 (3)

The effect of three different levels of footwear stability on pain outcomes in women runners: a randomised control trial (2010) Ryan MB., Valiant GA., McDonald K., Taunton GE. *BJSM*

Influence of midsole hardness of standard cushioned shoes on running-related injury risk (2013) Theisen D., Malisoux L., Genin J., Delattre N., Seil R., Urhausen A. *BJSM*

Running shoes and running injuries: mythbusting and a proposal for two new paradigms: 'preferred movement path' and 'comfort filter' (2015) BM Nigg, Baltich J., Hoerzer S., Enders H. *BJSM*

Relationships among self-reported shoe type, footstrike pattern, and injury incidence (2012) Goss DL., Gross MT. US Army Med Dep J 25–30.

Examining injury risk and pain perception in runners using minimalist footwear (2014) Ryan M., Elashi M., Newsham-West R. *BJSM* 48:1257–62

Griffiths I. (2012) Choosing Running Shoes. The Evidence behind the Recommendations. SportEx Dynamics. 33 28-

Nielsen RO, Buist I, Parner ET, *et al*. (2014) Foot pronation is not associated with increased injury risk in novice runners wearing a neutral shoe: A 1-year prospective cohort study. Br J Sports Med;**48**:440–7