Running Biomechanics

The SAM Runners Clinic

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“A run begins the moment you forget you are running.”

-Adidas
Objectives:

• Discuss modifiable biomechanics of running
• SAM Runners Clinic
  – Return from/prevent Injury
  – Improve performance
Running Analysis Views
Biomechanical Analysis of Running

• Different body = different running form = different modifications
• Running form IS modifiable
• Running injuries
  • Over striding
  • Excessive Compliance
Over Striding (pogo stick)
Excessive Compliance
Phases of Running
Sagittal Plane “side view”

Initial Contact

• Foot Strike Pattern
  – Angle between the sole of the foot relative to the running surface

• Heel-strike
• Rear foot
• Midfoot
• Forefoot land on forefoot
Sagittal Plane “side view”

Initial Contact

• Tibial inclination
  – Within 5 deg of vertical-midline of the shank relative to true vertical
Sagittal Plane “side view”

Initial Contact

• Knee Flexion angle
  – angle between midline of thigh and midline of shank
Sagittal Plane “side view”

Mid-stance
• Ankle Dorsiflexion
• Knee Flexion Angle
Push Off

- Hip Extension
- Pelvic Tilt
- Lumbopelvic position
Frontal Plane “rear view”

Mid-stance
- Trunk side bend
- Lateral pelvic drop
- Knee center position
- Knee separation
- Foot-COM position
- Rearfoot position
- Forefoot position
Additional Features

- Trunk Rotation
- Arm Swing
- Heel height
How can SAM Runners Clinic help?
Why modify running form?

• Decrease external forces acting on the body
The SAM Runners Clinic

performance vs. injury
Gait Retraining

- Auditory
- Visual
- Verbal
Increased Step Rate

• Increased step rate:
  – Reduces Heel to COM distance

• Corrects Over-Striding
  – Reduces COM vertical displacement

• Corrects Over-Striding & Bouncing
  – Increases lower extremity stiffness

• Corrects Excessive Compliance
Summary

• Mechanics are modifiable
  – Can be verbal
  – Can be auditory
"The definition of insanity is doing the same thing over and over again and expecting different results."

Albert Einstein