Barefoot Running
Good or Bad?

International Foot & Ankle Foundation
26th Annual Lake Tahoe Ski Seminar
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Disclosure

- Direct financial interest in Tarsal Instruments (owner)
- Inventor and patent holder of the Tarsal Joint Distractor
- No conflict related to this lecture

Points on Barefoot Running

- Why is it popular?
- History of barefoot running
- Current debate
- Current research
- Natural running biomechanics
- Trends
- Barefoot injuries
- Recommendations for your patients

Why Run Barefoot?

- More efficient
- Improve form
- Less risk of injury
- Feel the contact with the ground

New Trend?

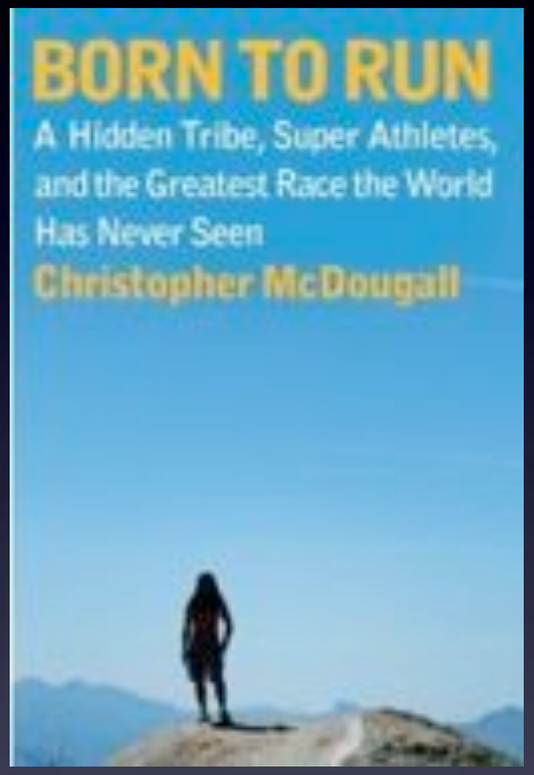
- Zola Budd
- Los Angeles 1984
- 15:01.83

- Abebe Bikila
- Rome 1960
- 2:15:16.2


IN MY MIND....
I'M A KENYAN


IT'S BEEN
DAYS

Why is it so popular now?



New York Times Best Seller

Mexico's Tarahumara runners

"The only way to halt the running-injury epidemic, it seems, is to find a simple, foolproof method to relearn what the Tarahumara never forgot."

- Christoher McDougall

McDougall C. Born to Run: A hidden tribe, superathletes, and the greatest race the world has never seen. New York: Knopf; 2009.

Current Debate

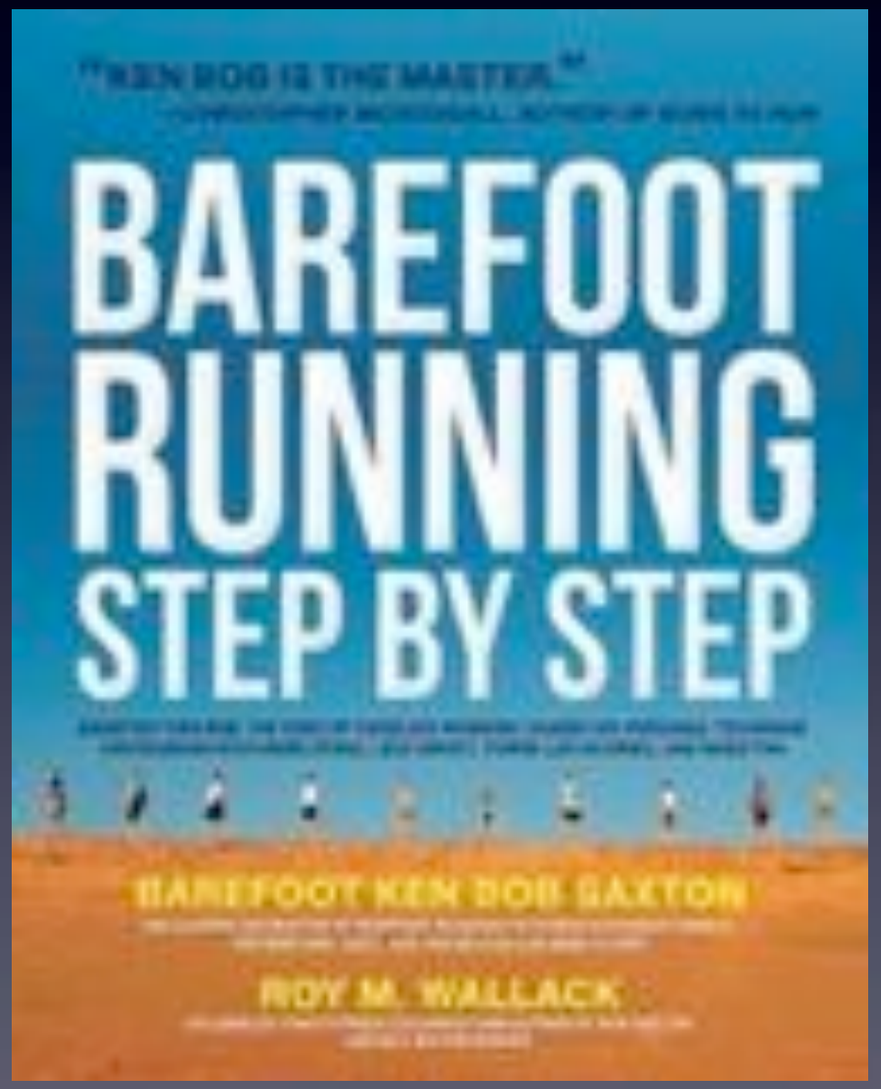
- Shoes protect the runner from pounding
  vs. shoes <u>cause</u> unnatural pounding form
- More efficient *vs.* less efficient running gait
- safe *vs.* risky

APMA
Position Statement

"Barefoot running...
may lead to injuries such as puncture wounds
--and increased stress on the lower extremities."

http://www.apma.org/MainMenu/News/MediaRoom/PositionStatements/Barefoot-Running.aspx
posted on APMA website: 11/9/2009 3:21:53 PM

Barefoot Ken Bob



Barefoot Bob's Opinion

"Running Barefoot is probably not for everyone, only for people who were born with senses and bare feet."

-Barefoot Ken Bob Saxton

"If you want an "expert" opinion about Running Barefoot, do not ask the man behind the curtain selling shoes or orthotic supports!"

-Barefoot Ken Bob Saxton

http://barefootrunning.com/?page_id=1758

2005 Barefoot Running Research

- lower contact and flight time
- lower passive impact peak
- higher braking and pushing impulses
- higher preactivation of the triceps surae.

Divert C, Mornieux G, Freychat P, et al. Barefoot-shod running differences: shoe or mass effect? Int J Sports Med 2008;29(6):512-518.

2007 Research on Footstrike Patterns

- high-speed camera at the midway point of a elite international half-marathon
- 75% of the runners were rearfoot strikers
- 24% midfoot strikers
- 1.4% forefoot strikers

Hasegawa H, Yamauchi T, Kraemer WJ. Foot strike patterns of runners at the 15-km point during an elite-level half marathon. J Strength Cond Res 2007;21(3):888-893.

2008 Barefoot Running Research

- stride frequency is higher
- anterior-posterior impulse is higher
- vertical stiffness is higher
- leg stiffness is higher

Divert C, Mornieux G, Baur H, et al. Mechanical comparison of barefoot and shod running. Int J Sports Med 2005;26(7):593-598

2009 Study Barefoot Running vs. Shod Running

- increased external vertical loading rate
- earlier impact peak
- greater tibial acceleration
- flatter foot placement at initial contact
- larger minimal knee angle
- higher ankle joint stiffness and
- lower knee joint stiffness
- earlier maximal electromyographic (EMG) activity in the tibialis anterior.

Nigg B. Biomechanical considerations on barefoot movement and barefoot shoe concepts. Footwear Sci 2009;1(2):73-79.

2010 Treadmill Running Research

- barefoot athletes running on treadmill
- landed in more plantar flexion at the ankle
- which reduced impact forces
- shorter stride length
- higher stride frequency

Squadrone R, Gallozzi C. Biomechanical and physiological comparison of barefoot and two shod conditions in experienced barefoot runners. J Sports Med Phys Fitness 2009;49(1):6-13.

Does Research Show Barefoot Running is Efficient?

- Oxygen consumption is typically 4% to 5% lower in barefoot running
- factor including removing the shoes' weight
- energy demand increases about 1% for every 100g of additional mass on the foot

Nigg B. Biomechanical considerations on barefoot movement and barefoot shoe concepts. Footwear Sci 2009;1(2):73-79.

Does Research Show Running Shoes are Better?

- NO evidence to support wearing shoe shuch as "distance running shoes featuring elevated cushioned heels and pronation control systems tailored to the individual's foot type."
- NO studies published in peer-reviewed scientific journals that showed that running shoes either reduce injury rates or improve performance.

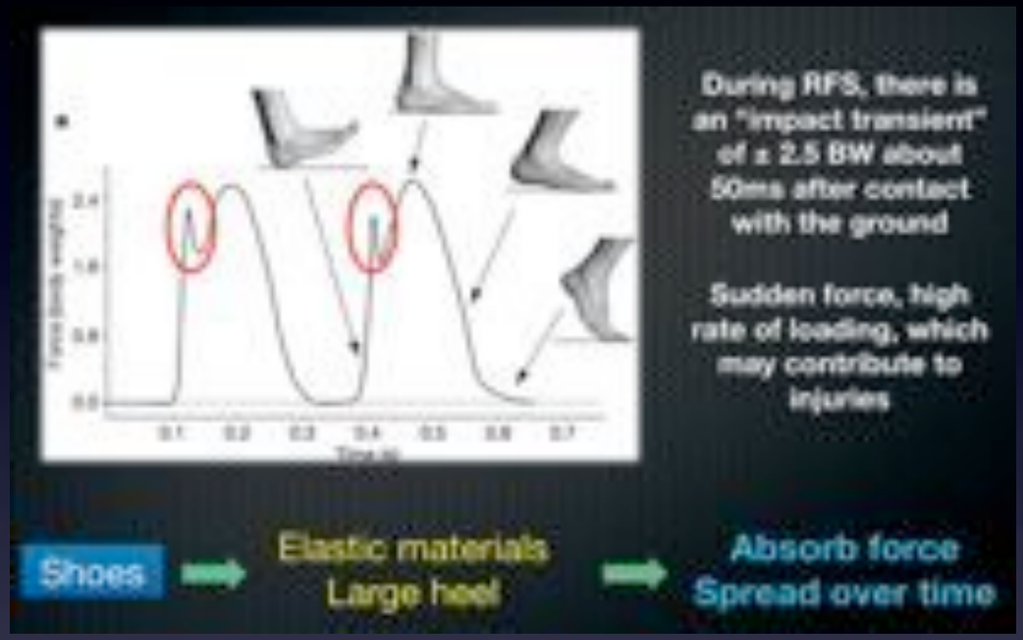
Richards, C E; Magin, P J; Callister, R (2009). "Is your prescription of distance running shoes evidence-based?". British Journal of Sports Medicine 43 (3): 159–62.

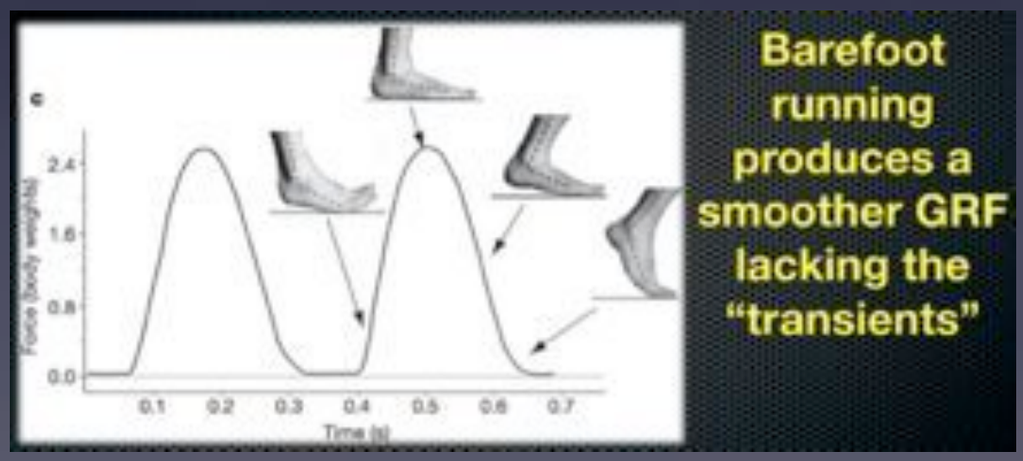
Why is force higher in shoes?

- shod running was associated with increased joint torques at the hip, knee, and ankle, probably due to the shoes' elevated heels and increased material under medial a foot.
- shoes may inhibit foot's natural compliance

Kerrigan DC, Franz JR, Keenan GS, et al. The effect of running shoes on lower extremity joint torques. PMR 2009;1(12):1058-1063.

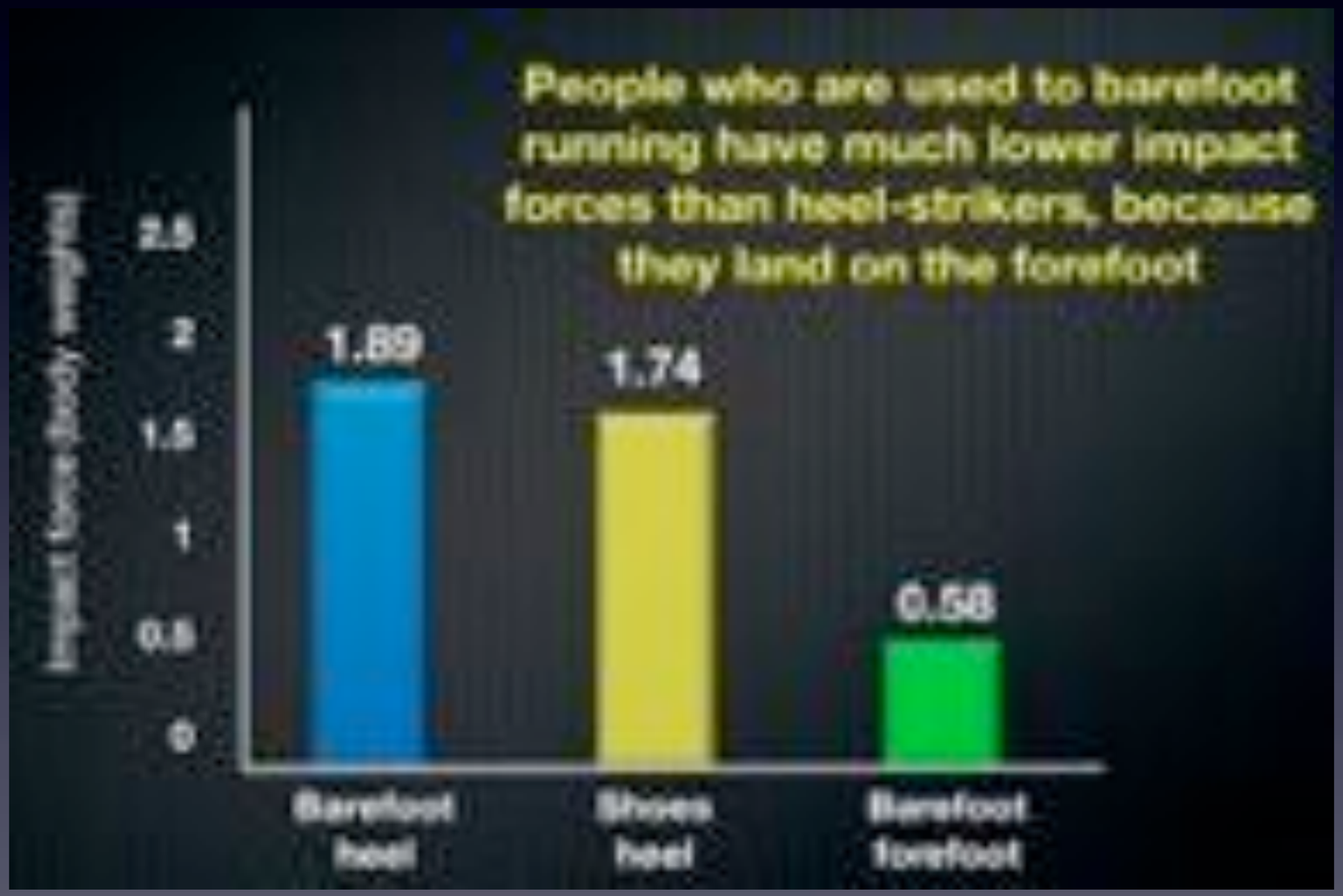
Barefoot Running Biomechanics





Lieberman DE, Venkadesan M, Werbel WA, et al. Foot strike patterns and collision forces in habitually barefoot versus shod runners. Nature 2010;463(7280):531-535.

Barefoot Running Impact Forces



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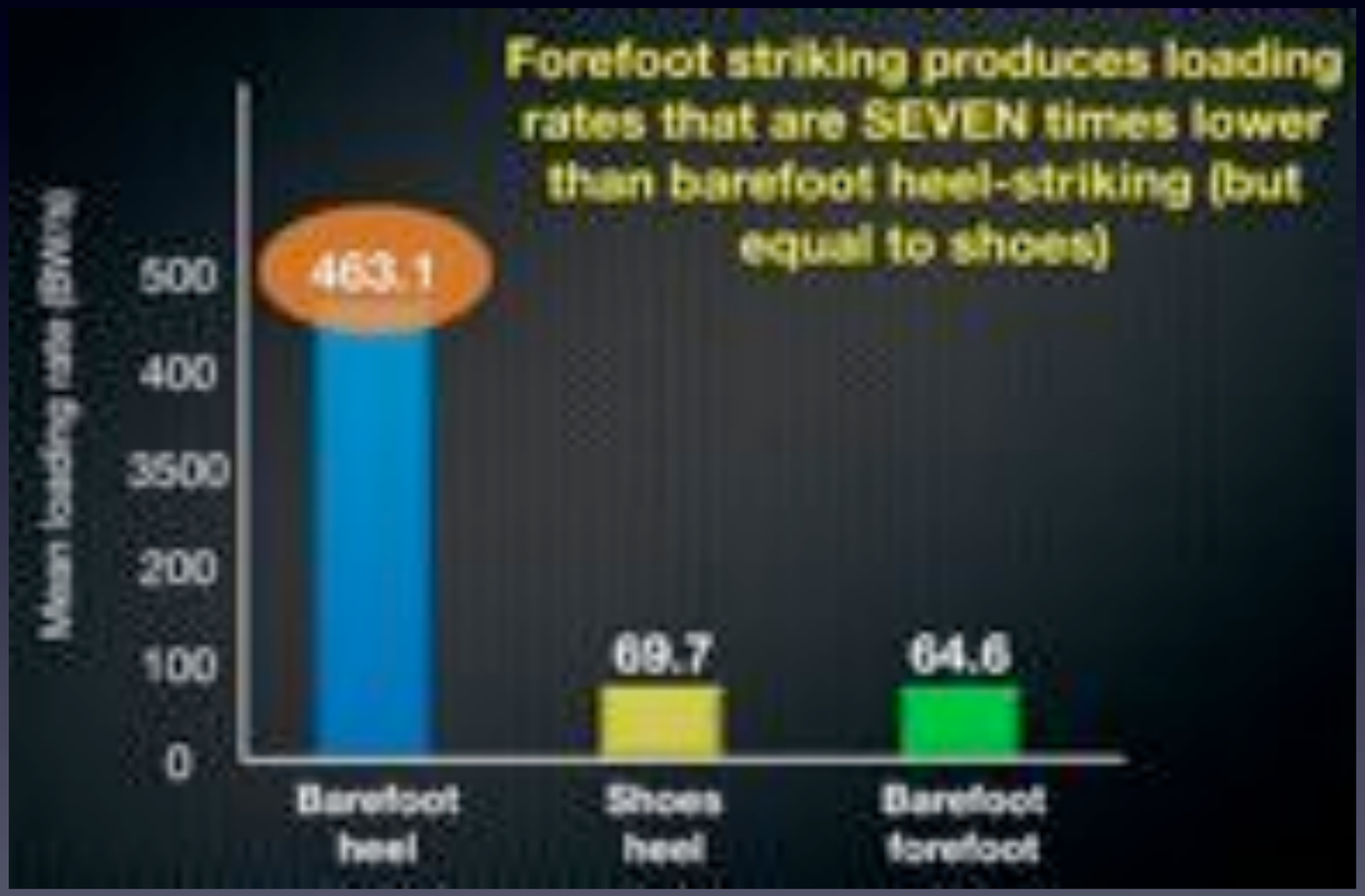
Barefoot Running Impact Forces



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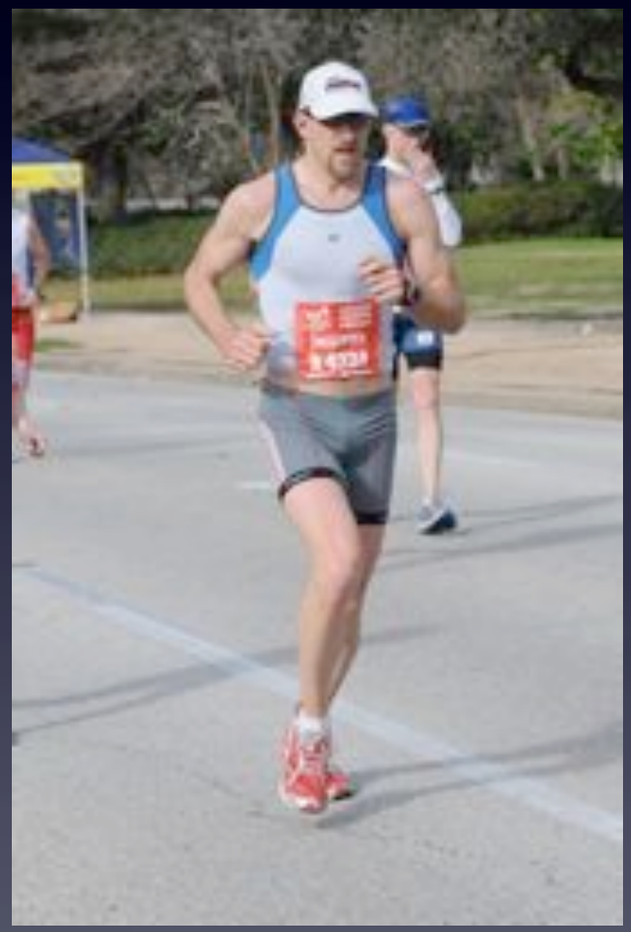
Heel strike

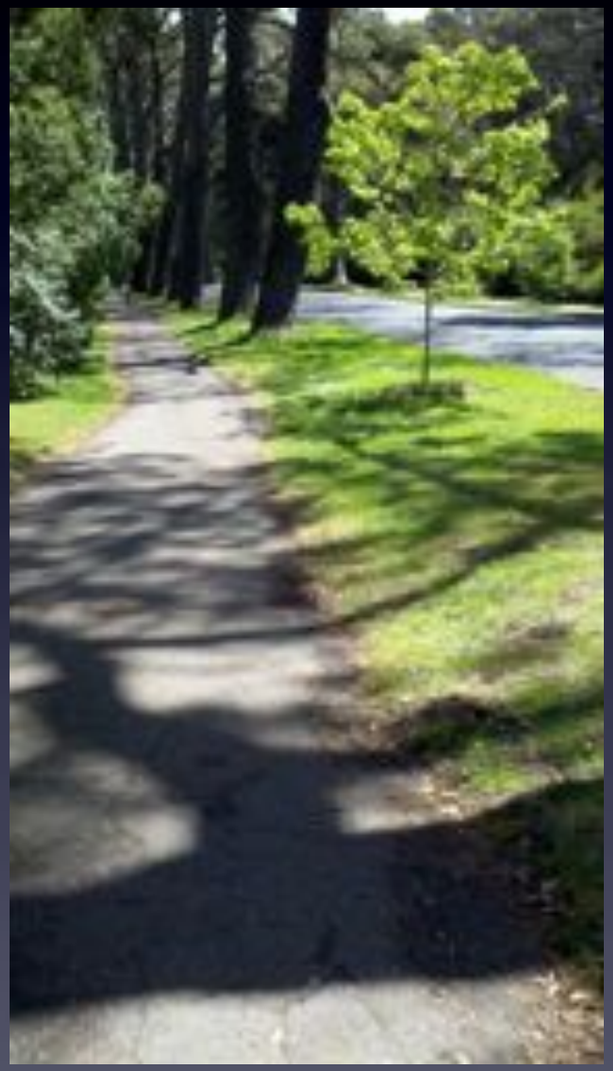
Forefoot vs Rearfoot Strike

Can a runner unlearn?



Running Surface

Running Surface Choice



Hazards

Barefoot Running Trends

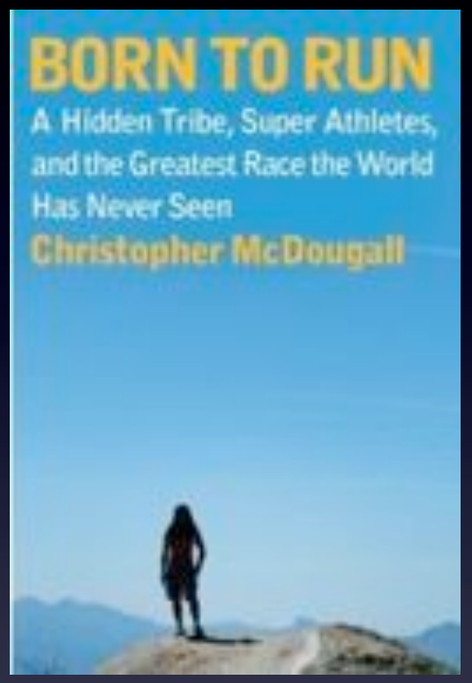
- 1.7 billion dollar industry
- shoe manufactures adding minimalist models
- coaches routinely include barefoot running as training

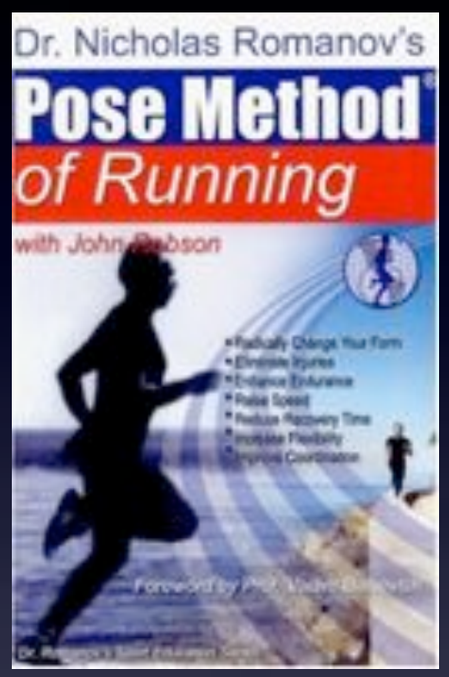
SF Tri Track Workout

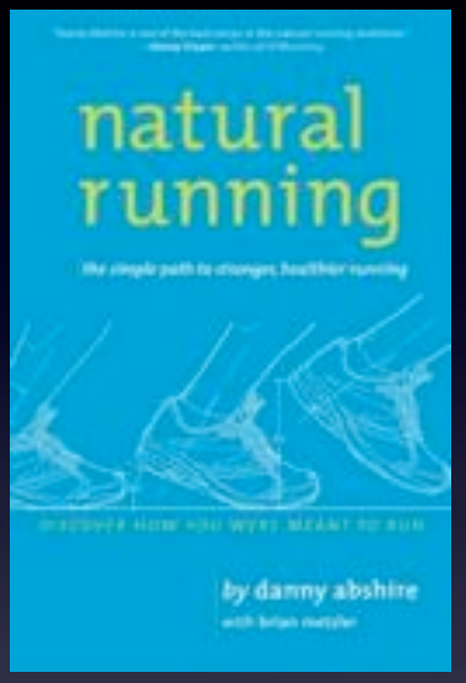
1. 6:30-6:45 PM - Check in; given workouts
2. 6:45-6:50 PM - Quick Intro about workout/objectives
3. 6:50-7:05 PM - Easy jog at conversational pace
4. 7:05-7:15 PM - Stretching on infield
5. 7:15-7:18 PM - Break into groups
6. 7:18-7:20 PM - Calf/Achilles stretch against the wall
7. 7:20-7:25 PM - Drills/Stride
8. 7:27 PM - Start intervals
9. ~7:50 PM - Cool down on the grass with bare feet

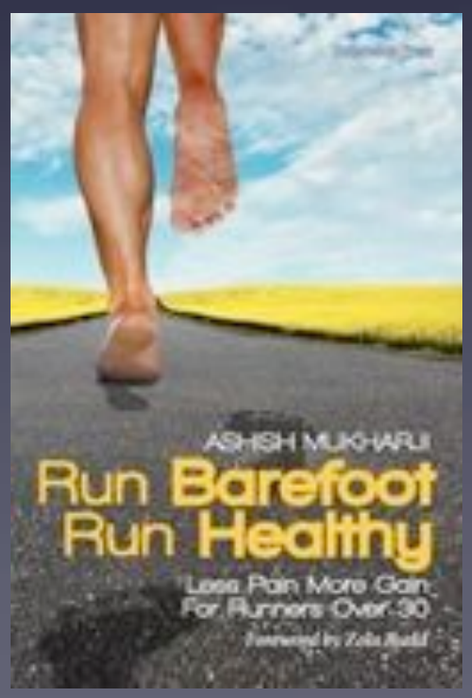
Social Media Hype

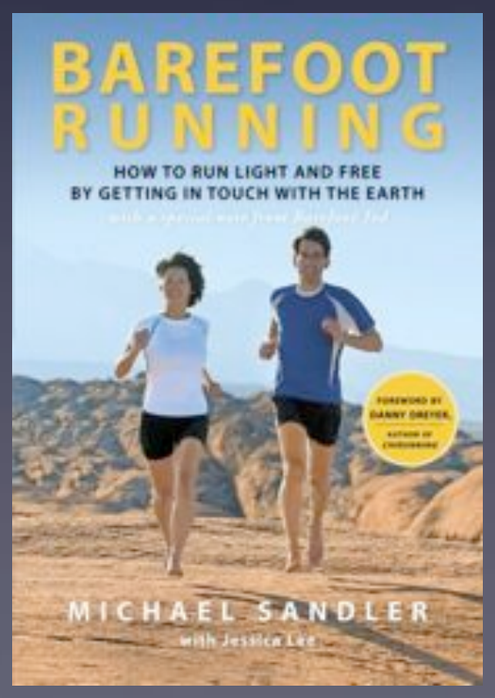
Natural Running Books

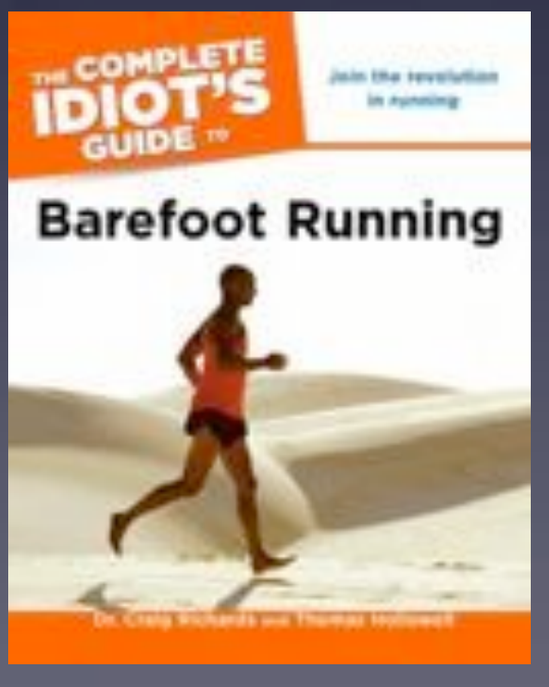












Barefoot Running Injuries

- Achilles Tendinitis
- Peroneal Tendinitis
- Metatarsal Stress Fracture
- Plantar Intrinsic Soreness
- Blisters and Lacerations

Barefoot Running Injuries

The Modern Running Shoe

Vibram Five Fingers Minimalist Shoes

Asics Gel Nimbus(cushioning)
vs.
Saucony Kinvara (minimalist)

12mm drop

8mm drop

Newton Minimalist Shoes

Newton Wear Patterns

Barefoot Running Injuries

November 8

December 19

February 1

Left foot pain for 2 weeks. Wearing Vibrams to do some errands. Then she wore them for a 3-4 mile walk but decided to run in them for last mile.
She felt tenderness while running. Throbbing, painful, redness. Pain at the second met head.
Feb 1st new onset of pain, maximum at the 3rd met head. 3rd met was clear on x-ray. MRI positive for stress fracture.
Bone density scans : T-score was –2.6

Barefoot Running Injuries

New runner, marathon training program. Started running 9 months ago. ~6 miles 3x/wk. Blisters in NB running shoes. Decided to to Vibrams - had to “back off” due to Achilles tendon issues. Had some foot pain, saw PCP who diagnosed plantar fasciitis (no x-rays).
Left foot pain (severe) for 10 days, previously left foot pain x 2 weeks.

Who Should *NOT* Run Barefoot?

- Hx or concern for Osteoporosis
- Hx of PT Tendinitis
- Medical column instability
- Hx of Sesamoiditis
- active Achilles tendinopathy
- at risk Diabetics

Pearls for New Barefoot Runners

- Start GRADUALLY
- Run barefoot on track, grass or beach
- Think of natural running as cross-training tool
- Vary shoes to spread risk
- If any Equinus - don't walk in minimalist shoes
- Analyze wear patterns and adjust stride

Minimalist Running Beginning Schedule

- Week 1
  - Run 1 mile (yes I said ONE mile) qod max
- Week 2
  - 2 miles, 1 mile, 2 miles
- Week 3
  - 2 miles, 2 miles, 2 miles
- Week 4+
  - Advance, slowly,
  - **NO back to back runs.**

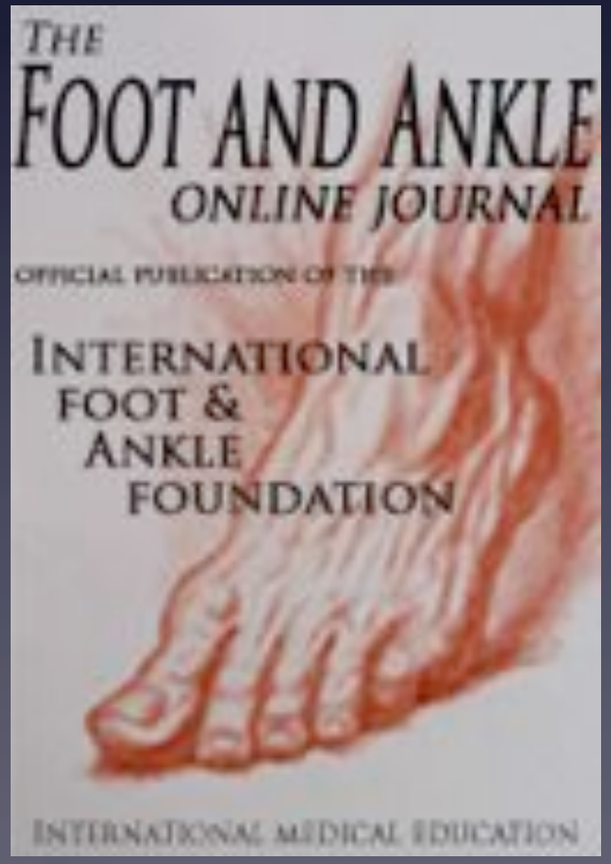
You can never be too careful!

DrSegler@DocOnTheRun

Thank you!

SOLE SUPPORTS
WE MAKE PEOPLE BETTER

INTEGRA
FOUNDATION
Regenerating Health, Rebuilding Lives



baiko
Podiatric Pathology Services