

Running without (too many) injuries!

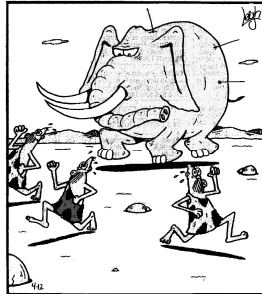


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Health benefits of exercise

RUBES* By Leigh Rubin



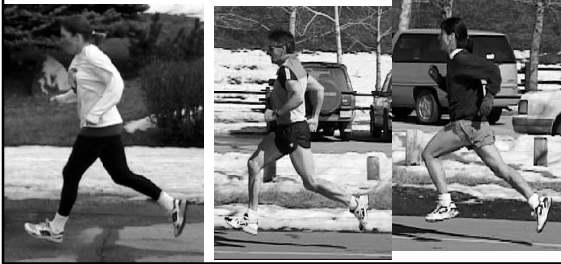
Primitive hunters had a simple but effective health care plan...RUN!!

Running is a healthy sport like no other

- Convenience
- Inexpensive
- Increased metabolic load from large number of muscles used
- Less bone and muscle loss with aging
- Coordination
- Postural changes from sitting
- Natural?
 - The fossil evidence suggests that endurance running, originating about 2 million years ago, may have been instrumental in the evolution of the human body form Bramble and Lieberman Nature 2004

The running stride

- Lots of different ways to describe it
- Cadence (turnover) X stride length (flexibility) gives speed
- The metabolism to support the speed



Running is notorious for repetitive stress injuries

- Balance between physiological stress giving training benefits or injuries
- Years of experience getting injured
- Annual rates of running injuries of 24–65% Mascera et al., Arch Intern Med 1989
 - Compared to about 60% suffering pain in sedentary jobs

Too much to cover all the possible injuries

- Objectives:
 - Answer your questions
 - Implications of kinetic, kinematic and anatomical chains
 - Top 3 intrinsic prevention strategies
 - Hip strengthening
 - Flexibility of the multi-joint muscles
 - Variety

Most common running injuries Knee is often the location of pain

- Tauton et al, Br J Sports Med 2002 studied the charts for over 2000 patients at a sport medicine center

1. Patellofemoral pain syndrome
 2. Iliotibial band friction syndrome
 3. Plantar fasciitis
 4. Meniscal injuries of the knee
 5. Tibial stress syndrome
- Stress fractures
 - Muscle – tendon injuries

A typical injury pattern

- Risk factors (e.g. having that injury before)
- Predisposing conditions (e.g. extended sitting)
- Extrinsic causative factors
 - Shoes
 - Surface
 - Rate of change of training program
- Intrinsic causative factors
 - Intrinsic e.g. lack of calf flexibility
- Pre-clinical tissue changes
- Symptoms
- Exacerbation and remission
- Chronic changes
- Continued symptoms
- Decrease in running tolerance
- Loss of health benefits of running

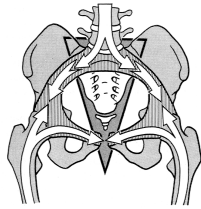
Kinematic (motion), kinetic (force) and anatomical chains

- The **Kinematic** chain is about 3-D motion
- Limited flexibility in one direction gives abnormal in another direction
- Limited muscle control in one area gives abnormal motion at another area
 - Core stability



Kinetic chain – Forces

- Impact forces from the foot (up to 5 times BW)
- Through entire body



Anatomical chain

- Interconnected structures like iliotibial band, plantar fascia, hamstrings ...



Hamstring range of motion self-test

Flexibility

- The required range of motion is large!!
- 2 joint muscles
 - Hip flexors
 - Hip adductors
 - Hip abductors
 - Hip internal and external rotators
 - Iliotibial band ***
 - Quadriceps (Rectus femoris)
 - Hamstrings
 - Calf muscles
 - Plantar fascia ***

Self-tests

- Warm-up
 - Be ready for your activity
- Calf injuries related to strength and flexibility



Two flexibility exercises

- Plantar fascia stretch
- Iliotibial band stretch



Muscle weakness/strength

- Injured runners had a pattern of weak hip muscles.

Niemuth et al., Clin J Sport Med 2005;



Types of strengthening

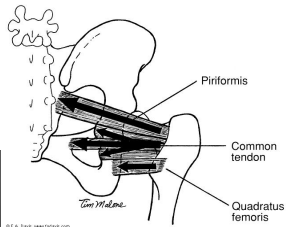
- Strengthening with no motion
 - Isometric
- Muscle shortening exercises
 - Concentric
- Eccentric loading

Key areas to strengthen

- Abdominals
- Hip rotators**
- Hip abductors**
- Hip extension
- Knee flexion (hamstrings)**
- Knee extension (quads)**
- Calf

Hip rotators

- Key to protect the leg from rotating
- Isometric
- With tubing



Hip abductors

- Moving your thigh away from your body
- Essential to keep your body weight aligned over your leg



Quadriceps

- One leg squats
 - To 90 degrees
- Lunges
- Jump training
- Other eccentrics



Hamstrings

1. Propulsion during push-off
2. Reversing the direction of the leg



Coordination

- Tai Chi....
- Balance ***



Variety The spice of running

- By purpose
 - Speed hiking
 - Geocaching
 - Orienteering
 - Socialization
- By intensity X duration
 - Hard/easy
 - Long/short
- By focus
 - Hills
 - Speed
 - Efficiency



Periodization

“You are what you eat”

- BE PATIENT!! Multiyear plans
- Macrocycles
 - Most commonly one year
- 1. Base training
- 2. Increasing physical capacity
- 3. Sharpening
- 4. Tapering
- 5. Peaking
- 6. Recovery

Get beyond slow distance!

- Not the best for aerobic capacity + other exercise benefits
- Mesocycles (focus)
 - Approximately three months for best results
- Microcycles
 - Usually 1 week
- Intervals
 - American College of Sport Medicine Guidelines
 - Best for aerobic conditioning 2:30 minute intervals
 - Tempo training moderate duration higher intensity
 - Time trial - race pace

Cross-training

- E.g. circuits, elliptical, rowing machine...
- Additive benefits
- Psychological
- Additive stresses



Thanks

- University of Washington
- Mergeo.com
 - BEAST
 - Street Scramble