

RUNNER'S

guide

TRAINING | NUTRITION | INJURIES

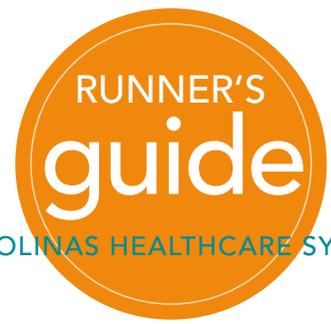
- Key Components of a Successful TRAINING PROGRAM
- NUTRITION
Before, During and After Events
- RUNNERS' INJURIES
Causes, Symptoms and Treatments

For specialist information, visit: CarolinasHealthCare.org/sports-medicine



Carolinas HealthCare System

A complimentary resource compiled from the Carolinas HealthCare System 2014 Running Symposium.



Develop a personal running plan to help avoid the most common pitfalls:

○ TRAINING CHECKLIST:

TOTAL WEEKLY MILEAGE
(increase mileage slowly)

TYPE OF TRAINING TERRAIN

WARM UP/COOL DOWN

STRETCHING

CONDITION FOR RACES
(cross train, rest days)

ADEQUATE HYDRATION

PROPER NUTRITION

CORRECT RUNNING FORM

MECHANICS OF RUNNING

Running impact can be up to five times your body weight with each step. Strong core, buttock and hips provide improved shock absorbing capability, lower extremity alignment, deceleration and propulsion force, allowing your body to supply more force to the ground quickly.

Most of the power for push-off comes from your hips, improved core strength and hip extension strength is vital for efficient running.

Core stability is how well you can stabilize your upper body on your lower body. Arching of low back or pitching forward due to weakness inhibits your core muscles. This affects your overall form, including your hip movement.

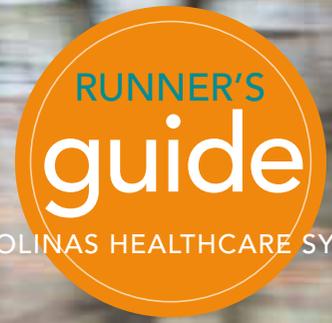
NOTE:

Running alone does not allow development of the high-end strength and power demands required to run quickly and efficiently.

Pitfalls Before and On Raceday

- Not trusting your TRAINING
- Improper NUTRITION *(bathroom issues)* | Improper timing of nutrition
Trying new foods or fuel for first time | Too much fiber, not enough fluid/electrolytes
- Not getting enough SLEEP the week before a race
- Not body GLIDING *(avoid the chafe!)*
- Starting out too FAST





STUDIES SHOW
10 WEEKS
OF WEIGHT TRAINING

>1 MINUTE
AVERAGE IMPROVEMENT TO
10K TIMES

WHY STRENGTHEN

- Helps runners avoid injuries.
- More than half of all runners (**as high as 66 percent**) are injured in any given year, **82 percent** will experience a running-related injury in their lifetime.
- Improves performance.
- Helps reduce the severity and overall risk of injury.
- Runner-specific strength exercises increases structural fitness – the ability of your bones, ligaments, tendons and muscles to withstand the impact of running.
- Resistance training also increases strength of bones and connective tissue (ligaments, tendons).
- Running economy – how efficiently a person uses oxygen while running at a given pace is improved. Increased runner's time to exhaustion.

Recent studies have shown that as little as 6 weeks of proper weight training can significantly reduce or completely relieve runner's knee, hip and low back pain.

CRITICAL COMPONENTS TO STRENGTH TRAINING:

- Postural alignment
- Stabilization – efficiency of core muscles
- Strength – ability to produce adequate force
- Power – ability to produce strength quickly

TRAINING

guide

Postural Exercises:

PUSH UPS

- 3 sets, 10 to 20 repetitions
- Progress from stable to unstable surfaces

Purpose: Instability forces body awareness. Use a dome balance ball, foam pads, dynadiscs or on a sling like a suspension training system.

SWISS BALL RUSSIAN TWISTS

- 3 sets, 15 to 20 repetitions
- Progress from floor to Swiss ball

Purpose: To improve upper body on lower body stabilization while putting emphasis on a neutral spine. Place your hands on a bench and the ball under your feet in a plank position.

PLANKS

Purpose: Strengthen core muscles, abdominals, low back and hips.

BIRD DOGS

Purpose: Key spinal stabilizers – multifidi, buttock

Stabilization Exercises:

CLAMSHELL SEQUENCE

- 3 Sets, 10 to 15 repetitions

Purpose: For weak hip abductors/rotators. Isolates lateral hip muscles. Women are typically weaker here than men.

LATERAL BRIDGE

- 3 sets, 10 repetitions
- Use a chair, bench or exercise ball
- Push your bottom foot into the ball so that the entire body rises off the floor while keeping the spine stable.

Purpose: Lateral core stabilizers

SIDE-LYING HIP RAISES

- 3 sets, 10 to 15 repetitions

SIDE-LYING HIP ADDUCTION

- 3 sets, 10 to 15 repetitions
- Lie on side raise lower leg up towards midline. Increase difficulty with the top leg up on an air filled exercise ball or chair and push down, raising body up.

Purpose: Hip abductors

Strength:

ROMANIAN DEADLIFTS

- 3 to 4 sets of 5 to 8 repetitions
- Use dumbbells or kettle bells

Purpose: Strengthen hamstrings, low back, plus balance component

HAMSTRING CURLS WITH EXERCISE BALL

BULGARIAN SPLIT SQUAT

- 3 to 4 sets of 5 to 8 repetitions
- Back foot on bench or in a sling
- Keep your front leg vertical
- Use kettlebells or dumbbells

BACK SQUAT OR FRONT SQUAT

- 3 to 4 sets of 5 to 8 repetitions
- Initiate movement by hinging from hips, keep knees behind front of feet

SINGLE LEG BRIDGE

Purpose: Strengthen gluteals and hamstrings

LATERAL LUNGES

Purpose: Hip abductors, quads, hamstrings, buttock

Power Jump Training:

SQUAT JUMPS

- 2 sets, 20 to 30 seconds, 1 to 2 days per week
- Goal is to land as softly as possible. Begin in deep squat, hands behind ankles, explode up reaching to ceiling with arms, repeat.

BOX DROP JUMPS (advanced only)

- 3 sets, 5 repetitions
- Start on box, jump down landing softly, and then up as quickly as possible.

SCISSOR JUMPS

- 2 sets, 30 seconds
- Begin in half kneel position, explode up landing with legs in opposite position, repeat.

BARRIER JUMPS

- 2 to 3 sets, 30 seconds
- Jumping back and forth sideways over a barrier

Purpose: Recruits lateral hip stabilizers

A balance between ingested and expended energy optimizes physical performance, maintains lean body mass, maximizes positive training adaptation and protects your immune system.

GOALS OF NUTRITION:

- OPTIMIZE STAMINA
– MENTAL AND PHYSICAL
- PROMOTE ENERGY
- OPTIMAL TRAINING ADAPTATIONS
- PREVENT CHRONIC DISEASE
- GROWTH AND DEVELOPMENT
- OPTIMIZE BODY COMPOSITION
- INDIVIDUALIZE FOR SUCCESS

NUTRITION TIMING

Before an event:

- May eat a larger meal 3 to 4 hours prior to the event
- Some may prefer to slowly graze prior to event
- Fats and proteins slow down gastric emptying so carbohydrates are preferred
- Athletes in contact and high intensity sports may prefer to have an empty stomach prior to the event and need to only eat carbohydrates beforehand
- Snacks and fluids to “top off” before the event should be primarily made of carbohydrates
- Liquid meals can replace conventional foods if need be to ensure gastric emptying
- Do not try new foods and fluids prior to competition

During the event:

- Should consume 30 to 60 grams/hour of carbohydrates and 4 ounces of fluid every 15 minutes

After the event:

- Carbohydrates should be consumed immediately following exercise to replenish glycogen stores in the muscles
- Protein in a recovery snack or beverage is good after muscle damaging workouts to stimulate protein synthesis

NUTRITION

guide

FATS:

- Fatty acids provide an alternate energy source and reserve during prolonged low intensity exercise
- Aerobic training enhances the ability of muscle to use fatty acids as fuel
- 20 to 35 percent of caloric your intake should be from fats
- Prefer healthy fats that have essential fatty acids, such as omega-three fatty acids and unsaturated fats
- Very low-fat diets (<15 percent) may harm both performance and health and are discouraged

CARBOHYDRATES:

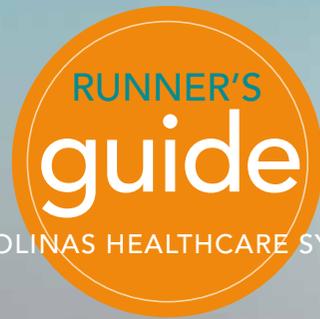
- Supplies 4 kcal/gram
- Preferred source of energy for the muscle at 65 percent of maximal intensity exercise
- 45 to 65 percent of calories consumed, or about 1/2 to 2/3 of a plate, should be carbohydrates
- As work-out intensity increases, more carbohydrates should be consumed
- During base work-outs, 5 to 7 grams per kilogram weight
- During bouts of high intensity work-outs and competition, carbohydrate intake should increase to 10 grams per kilogram of weight or more
- Carbohydrate supplements are very helpful for athletes having difficulty eating enough food for adequate overall energy and carbohydrate needs for training demands
- Sports drinks, recovery beverages, bars and gels can serve as good supplements

PROTEIN:

- Supplies 4 kcal/gram
- No actual storage of protein except in muscle
- Should account for less than 5 percent of total energy expenditure
- Need 1.2 to 1.7 grams/kilogram of protein each day – 1/3 of your plate should have sources of protein
- Prefer lean meats such as chicken and fish, which have lower saturated fat
- Vegetarians should consume on the higher spectrum of needed protein because of the lower digestibility and essential amino acid profile of plant protein
- Protein supplements are usually not needed or recommended if the athlete has a well-balanced diet. However, there is benefit to consuming a protein-containing snack or beverage after a muscle-damaging workout.

TOTAL **DAILY ENERGY EXPENDITURE** IS THE ATHLETES DAILY CALORIC NEED BASED ON AGE, GENDER, GENETICS, TOTAL BODY WEIGHT, AMOUNT OF LEAN BODY MASS AND EXERCISE THERMOGENESIS.

- Energy drain can occur when energy demands far exceed energy intake
- Can lead to abnormal menses and female athlete triad



Dehydration reduces endurance exercise performance, decreases time to exhaustion and increases heat storage.

VARIABLES AFFECTING THE RATE OF DEHYDRATION:

ACCLIMATIZATION TO THE EXERCISE AND ENVIRONMENT

INCREASING AGE

BODY MASS INDEX

CONDITIONING EXPERIENCE

HISTORY OF PREVIOUS HEAT INJURY

MEDICATIONS YOU ARE TAKING

PRESENCE OF SICKLE CELL TRAIT

STATE OF ILLNESS (ACUTE OR CHRONIC)

Fluid loss as little as 1 to 2 percent of total body weight can begin to elevate core body temperature during exercise and lead to a negative impact on performance.

Dehydration greater than 3 percent of body weight further disturbs physiologic function and can increase the risk for exertional heat illness because sweat production decreases.

At 6 to 10 percent loss of total body weight, the heart begins to pump less efficiently, leading to lower sweat production and reduced blood flow to the skin and muscles.

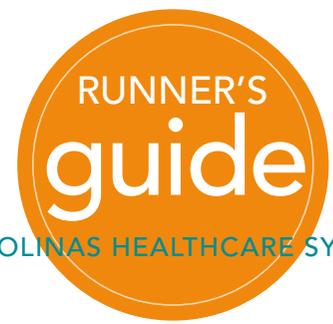
Thirst is not an adequate indicator of dehydration – the sensation of thirst typically starts at body weight loss of 5 percent or greater.

Acute Dehydration

- Can occur in 2 to 3 hours and is most commonly seen in endurance athletes

Chronic Dehydration

- Less visible and more dangerous, usually resulting from successive days of inadequate fluid intake



Hyponatremia: when your body becomes over hydrated.

A condition in which water consumption dilutes salt concentration in the body, creating a low salt level in blood stream. This often occurs in marathon participants who drink mainly water during competition.

Common complaints are of nausea, lightheadedness, malaise, lethargy, cramps and generally “not feeling well.” You could experience swelling of the hands/fingers/ankles, weight gain and vomiting, mental status change, fluid in the lungs, fast breathing rate, and fast heart rate.

Runners are encouraged to consume salty foods and beverages, prior to an event. If hyponatremia occurs, you should be transported to an emergency department for possible hypertonic IV fluids and diuretics.

REPLACING FLUIDS

Before an activity:

- Pre-hydrate before athletic activities so that your body's water content is appropriate for competition
- Drink fluids 4 hours prior to activity (5 to 7 ml per kg) and again at 2 hours prior to activity (3 to 5 ml per kg)

During an activity:

- Water is an excellent source of fluid for replacement for activities lasting less than one hour
- Athletes competing/exercising for greater than 1 hour should consume a sports drink with carbohydrates and electrolytes to maintain fluid levels and electrolyte balance
- Sports drinks with salt also help stimulate thirst

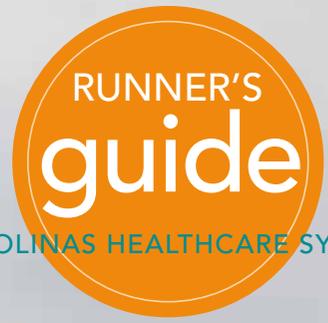
Recovery:

- Goal is to achieve euhydration or normal body hydration
- May simply be achieved with normal meals and hydration, if time permits before next athletic activity
- Sports drinks with salt will help stimulate thirst and replenish salt stores and achieve faster state of euhydration if little time between athletic activities

INDICATIONS OF DEHYDRATION:

- Thirst = severe dehydration
- Infrequent urination – dark yellow urine
- Headache
- Weakness
- Skin turgor
- More than 1 percent decrease in body weight between pre and post exercise weight checks





THERE ARE ABOUT
50 MILLION
RUNNERS IN THE
UNITED STATES

APPROXIMATELY
40-60%
SUFFER INJURY
EACH YEAR



FACTORS RELATED TO INJURIES:

TRAINING ERRORS:

- Increased running mileage more than 40 miles/week
- Sudden increased (speed) intensity
- Single severe training episode
- Running without rest days

FUNCTIONAL ERROR (FORM):

- Overpronation
- Excess supination
- Crossover striding

ANATOMICAL FACTORS:

- Flat feet
- Cavus feet
- Leg length discrepancy
- Increased Q angle (angle formed by the thigh bone and the shin bone)
- Genu valgum (knock-knee)
- Genu varum (bow-leg)

OUTSIDE FACTORS:

- Running surface
- Running environment (hills, weather)
- Improper running shoe selection

Important predictors of running injury:

- Increased weekly mileage
- Previous running injury

Running shoes

- Only piece of equipment needed
- Individual fit (go to store that specializes in runners)
- Lower oxygen demand if more comfortable shoes
- Change shoes every 300 to 500 miles or every 6 to 9 months
- Rotate shoes if daily runner

TIP

INJURY

guide

ACHILLES TENDINITIS:

CAUSES

- Tight heel cords
- Biomechanical abnormality
Genu varum, cavus feet, over pronation
- Increase in hill running

SYMPTOMS

- Burning pain early in run
Usually subsides then worse after the run
- Tenderness along the tendon
Sometimes fusiform swelling and crepitus

TREATMENT

- Relative rest
- Ice massage
- Ultrasound
- Orthotics
- NSAIDs
- Stretching
- Heel lift

PATELLAR TENDINITIS:

SYMPTOMS

- Also seen in jumping athletes
- Pain over the tendon
- Difficulty running/jumping
- Tenderness/swelling along the tendon
- Tenderness at inferior pole of patella
- Can sometimes palpate taut cord in tendon

TREATMENT

- Relative rest
- Ice massage after activity
- Increased flexibility
- Absorptive running surface

PATELLOFEMORAL SYNDROME:

CAUSES

- Lateral musculature tightness
- Medial musculature weakness
- Increased Q angle
- Increasing mileage
- Usually associated with malalignment

SYMPTOMS

- Increased pain with prolonged sitting
- Anterior knee pain peripatellar area
- Pain climbing stairs

TREATMENT

- NSAIDs
- Patellar bracing
- Possible surgery
- Orthotics
- Distal quad strengthening
- Ice

PLANTAR FASCIITIS:

CAUSES

- Biomechanical abnormalities
Over pronation, cavus feet
- Pain is most severe at the calcaneal insertion
- Painful with plantar fascial stretch
Dorsiflexion of foot and toes
- Increased pain with first morning steps

TREATMENT

- Stretching, stretching, stretching
- Check biomechanics
- Heel cup, orthotics
- Relative rest
- Physical therapy
- Injection
- Dynamic night splint
- Recalcitrant cases need surgery

TIBIAL STRESS SYNDROME:

BACKGROUND

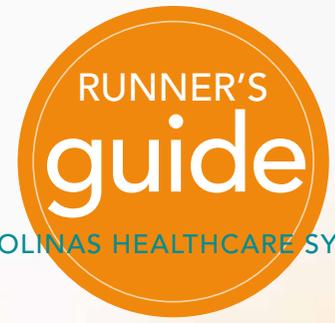
- Includes posterior tibial tendonitis, periostitis and stress fracture
- Seen in early season
- Also seen in inexperienced runners

CAUSES

- Anatomically predisposed
- Poor running technique
- Training error

TREATMENT

- Relative rest
- Stretching
- Orthotics
- NSAIDs
- Change shoes
- Ice



CAROLINAS HEALTHCARE SYSTEM

General principles for avoiding or reducing your risk of injury.

- Change running shoes every 300 to 400 miles
- Ice is always a good idea
- Stretching is very important particularly during your cool down
- Consider changing running surfaces
- Decrease mileage
- Decrease frequency of runs
- Cross training to maintain aerobic fitness

TRIGGER POINT DRY NEEDLING

Dry needling is used for injury recovery and to increase athletic performance.

Trigger points:

Restrict your range of motion | Decrease muscle strength | Altered motor control | Numbness

How dry needling works:

- Local twitch responses (a spinal cord reflex) help to break the pain cycle
- Inserting a needle into a trigger point normalizes the biochemical environment
- Most patients do not feel needle insertion
- Local twitch response lasts less than 1 second
- Described as shock, jolt or cramp
- Most often seen as therapeutic

One

CONTRIBUTORS:

guide



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Team physician for Johnson C. Smith University and the Charlotte Knights. Dr. Price is an expert on the common pitfalls in training and preparing for a race.



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See a board-certified physician within 24 hours at one of our Sports Medicine & Injury Care locations. Getting you back to your best takes a System working as One.



For more information, call 704-512-6934
or visit CarolinasHealthCare.org/SportsCare



Carolinas HealthCare System