The warm-up
By Ryan D. Andrews, MS, MA, RD, CSCS

What is warming up?
Warming up is meant to prepare the body for more intense movement and activity.

Why warming up is important
A proper warm-up consists of movements that (1-7):
- Stretch the body through a range of motion
- Enhance mobility
- Release connective tissue bonds
- Distribute fluid in the joint space
- Increase body temperature
- Enhance range of motion
- Boost speed/force of muscle contractions
- Amplify nerve impulse transmission
- Promote oxygen uptake

Specifically, movements used during a warm-up might include:
- Whole body activities intended to get the core temperature up, e.g., brisk walking, light jogging while swinging the arms, jumping rope.
- Static movements — the classic "stretch and hold" positions such as touching your toes for 30 seconds.
- Dynamic movements such as:
  - stretching while moving (e.g., walking lunges with an overhead reach for hip flexibility, or tipping your head side to side for neck mobility)
  - moving against light resistance (e.g., single-legged Romanian deadlifts with light or no weight, or jumping)

Flexibility, mobility, and injury
Some consider the warm-up a time to build flexibility and mobility. Flexibility is the capacity of a joint to move freely through a full range of motion. Mobility is our capacity to produce a desired movement. Both are based on the elasticity of muscle, ligaments, and connective tissues, but while poor mobility is correlated with injury, poor flexibility is not necessarily (1, 4, 6–7).

We want some areas of the body to be more mobile but other areas to be more stable and strong. For most people, this means it is important to improve mobility of the:
- front of the shoulders
- ankles
- front of hips and iliotibial band
- hamstrings
- thoracic spine

Tightness in these areas can contribute to injury.

For instance, nearly 70% of the population will suffer from a shoulder disorder at some point in their lifetime — largely due to the inherent instability of the joint combined with our modern kyphotic posture that pulls the shoulders forward and hunches the upper back (8).

While age-related connective tissue changes and water loss can contribute to inflexibility, most of it comes down to “use it or lose it.” A proper warm-up helps to counteract negative effects of aging while enhancing performance. Not warming up can lead to poor mobility/flexibility, injuries and stiffness (1-7).

Motor learning
Beyond the physiological benefits of warming up, engaging in movements that someone is about to execute during exercise/sport allows for visualization of positive motor outcomes. In plain language, this means you practice the movement pattern so your body knows what it is about to do (2, 9).

(Continued on page 10)
Muscle soreness
Despite the many benefits of warming up, it doesn’t seem to help prevent muscle soreness — regardless of which warm-up is selected.

Static exercises
Warming up with static movements has pros and cons. Static stretching can improve flexibility at a given range of motion. It can also improve balance — a bonus for yogis and gymnasts (9).

However, static stretching can create a temporary strength deficit, diminish jump performance and decrease running economy for up to one hour, since the sensitivity of tension receptors in muscle can decrease (2–3, 10–15). On the other hand, physiotherapists and strength coaches can actually use this strength inhibition to their advantage, by stretching areas that commonly tighten up and contribute too much to a movement (for example, stretching the front of the hips before running to weaken the involvement of the hip flexors, which tend to be over-strong and tight). Examples of static stretching would be touching your toes for 30 seconds or stretching your arm in a doorway for 15 seconds.

Dynamic exercises
A dynamic warm-up can improve nervous system activation, power, and range of motion at the joint. Dynamic exercises performed before exercise that requires high muscular forces can increase blood flow, metabolic activity, temperature, oxygen uptake, muscle compliance, nerve impulses, decrease resistance of connective tissues and reduce muscle tension. This type of warm-up creates minimal muscle damage, making it safe to do on a regular basis (2–3, 10–14).

When you have mobile soft tissue and a rapid response nervous system, you will be able to move better and perform exercises that challenge your body. This means more productive workouts and a healthier body. Adding static exercises to a dynamic warm-up may diminish the force increases from a purely dynamic protocol. Dynamic exercise examples include body weight walking lunges with an overhead reach, arm circles, or Frankenstein walks.

Dynamic exercises should not result in any sharp pains, but should feel challenging and strangely pleasant, especially afterwards. The goal is to find the edge of your range of motion, and work to gently expand this edge. Modifications may be necessary if any discomfort is felt following dynamic exercises.

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Summary
Consider the warm-up period an essential part of any workout — not optional free time. It may help to improve strength, body control, balance, movement mechanics, and agility.

Warm-up with static exercises
Useful for improving range of motion
Not ideal for a warm-up because they don’t appear to prevent injury and may limit force production
Best performed after a workout, as a “warm-down”

Warm-up with dynamic exercises
Most benefits of a warm-up come from actually warming up the body, which can be accomplished by 4 to 15 minutes of dynamic movements
Seems to enhance performance and power output when compared to static exercises

Help your clients find a warm-up that makes their body feel ready to exercise, and one that they can stick with. The variation in responses to warming up emphasizes the unique nature of individual reactions to different protocols. Targeting ankles, hips, back and shoulders will likely result in the most benefit. See example warm-up protocol on the following page.

Note: ITB pain
Iliotibial band (ITB) pain is one of the most common complaints among exercisers. If the ITB hurts, it is probably due to poor adductor and ITB flexibility along with weak abductors and glutes (16).

To remedy this, start including stretching exercises for the ITB, such as those recommended in Table 1.
Table 1

<table>
<thead>
<tr>
<th>Stretch</th>
<th>Description</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Standard ITB</td>
<td>The athlete stands with the involved foot behind the unaffected side. The athlete laterally flexes the trunk to the unaffected side without forward flexing or extending the trunk.</td>
<td>Hold this stretch for 20–30 s and repeat 2–3 times.</td>
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<tr>
<td>Hip thrusts</td>
<td>Reverse lunge with overhead reach</td>
<td>Hold this stretch for 20–30 s and repeat 2–3 times.</td>
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<td>Mountain climbers (slow pace)</td>
<td>Hip thrusts while keeping the upper body elevated</td>
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<td>Prayers (up and down for the forearms)</td>
<td>Fire hydrant hip circles</td>
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<tr>
<td>Wall dorsiflexion</td>
<td>Seated rotating thoracic mobilization</td>
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<tr>
<td>Foam roller</td>
<td>Foam roll the IT band</td>
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<tr>
<td>Supine partner stretch (Figure 3)</td>
<td>Place the athlete in a supine position and flex the hip on the involved side and adduct the leg across the body. Have a partner apply a downward pressure on the distal fibula and an upward pressure on the medial aspect of the knee during the entire stretch. This stretch elongates the distal portion of the ITB.</td>
<td>Hold this stretch for 20–30 s and repeat 2–3 times.</td>
</tr>
<tr>
<td>Supine rope stretch (7)</td>
<td>Similar to the supine partner stretch, the supine rope stretch uses an elastic band. Place the elastic band around the foot and adduct the involved leg across the body until a stretch is felt within the lateral leg.</td>
<td>Hold this stretch for 20–30 s and repeat 2–3 times.</td>
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<tr>
<td>Foam roller</td>
<td>Place the involved leg on the foam roller while using the upper body for support. The athlete rolls over the foam roller from the hip to the knee (origin to insertion of ITB). Continue back and forth.</td>
<td>Begin with 2 sets of 30 s and progress to 2 sets of 2 min.</td>
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</table>

ITB = iliotibial band.


Then, it’s imperative to strengthen the hips. This includes:
- Hip hikes
- Clams
- Step downs
- Lateral band walks
- Straight leg & 45 degree exercises (with or without bands) that focus on the gluteus medius (straight leg abduction, bridge, monster walks, etc.)
- Raised dorsiflexion
- Scapular wall slides
- Scapular pushups
- Shoulder dislocates with broomstick (this is an advanced movement, adjust range of motion and grip width accordingly)

**Note:** Complete all movements 1-2 times, for 4-8 reps (or 10-15 seconds if timed)

**Further resources**

Performance U: Warm-up Progressions
http://www.performanceu.net/products.html

Assess & Correct, Magnificent Mobility
http://ericcressey.com/products

**REFERENCES:**


Ryan completed his schooling and training in exercise physiology, nutrition, and dietetics at the University of Northern Colorado, Kent State University, and Johns Hopkins Medicine. He is a dietitian, strength/conditioning specialist, and works with various non-profit organizations. He has done numerous presentations and written hundreds of articles about nutrition, exercise and health. He currently serves as director of education for Precision Nutrition www.precisionnutrition.com.