

Why Warm-Up?

By Emily Dean, MS, PT

Jogging is so simple that we may sometimes forget the incredible amount of stress that it places on our bodies. The impact with each foot contact in walking is 70-80% of body weight; with jogging it increases to 275-300% of body weight. Our muscles have a big job to do, helping provide shock absorption to joints undergoing repetitive pounding. That's why it is so important that we take time to warm-up and physically prepare our muscles for the task ahead. Warming up can help prevent injury and muscle soreness, lubricate joints for smoother motion, increase elasticity of muscles and tendons, improve reaction time, and prepare you mentally for your workout. All of these factors lead to improved performance.

A number of physiological changes occur when we transition from rest to activity. Before warming up, our skeletal muscles contain approximately 15-20% of our blood supply and oxygen is tightly bound to the hemoglobin that carries it through the bloodstream. After warm-up, blood flow to skeletal muscle increases to 80-85% and oxygen more readily separates from hemoglobin. With this increase in blood supply to the working muscles, blood vessels dilate and capillary permeability increases making it easier for muscles to extract the oxygen and nutrients they need for efficient contraction and relaxation. Additionally, blood flow through the coronary arteries increases, assuring that the heart receives the oxygen it needs to pump efficiently. Abnormalities in the electrical activity of the heart have been documented in healthy subjects performing vigorous exercise without adequate warm-up.

Warm-up prepares muscle cells by increasing the activity of mitochondria, which are the "power-houses" where energy is generated for muscle contraction. Enzymes are proteins that speed up chemical reactions in our cells. Enzymatic activity increases with muscle temperature. With the increase in mitochondria and enzymatic activity we can produce and use energy at a faster rate. Many people do not know that relaxation of individual muscle fibers requires chemical energy. If this energy is not created or used efficiently, portions of muscle can remain in a state of contraction leading to cramps, stiffness, and pain.

Neurological changes also occur as we warm-up. Not only do we prepare mentally, but changes occur in nerve receptors located in muscle bellies and tendons. These changes ultimately allow us to stretch our muscles further with less resistance.

With all that said, what does warm-up mean? The American College of Sports Medicine recommends 5-15 minutes of warm-up. Since physiologically it takes 10 minutes to reach a steady temperature state in muscle, I recommend at least 10 minutes. Intensity can be determined by a percentage of your maximum heart rate (maxHR). The easiest way to *estimate* your maxHR is to subtract your age from 220. Your general warm up should start at 50-60% of your maxHR and increase to 60-70%. You can achieve this with any form of low intensity aerobic activity. If you're warming up for a run, walking or jogging is your best option as you will be using the

same muscles during the warm-up and the work-out. Following your 10 minute warm-up, running drills and dynamic stretches can be performed if you are using these for improved performance. Any static stretches that you like to perform should be saved for after your workout as recent research shows that static stretches before running can actually inhibit your performance. More on this in an upcoming newsletter.....

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