It is common for strength and conditioning coaches to use arousal raising strategies (e.g., encouragement, music, challenges, or competitions) to pump athletes up and potentially enhance performance. Therefore, most athletes know how to become pumped up for a workout, practice, or competition. However, many strength and conditioning coaches do not know how to help athletes relax following exercise, and thus athletes typically do not learn how to turn off the switch and calm their brains and bodies when they should. Decompressing after a workout, practice, or competition is a beneficial habit to build that can be achieved through breathing. The remainder of this article will provide an overview of the autonomic nervous system and guidelines for how to use breathing to calm, or balance, the brain and body. The benefits of using breathing to enhance performance will also be explained.

THE AUTONOMIC NERVOUS SYSTEM
The autonomic nervous system is made up of the sympathetic and parasympathetic nervous systems, which work in constant opposition of one another. The sympathetic nervous system is responsible for the brain and body’s “fight or flight” response, which kicks into action during times of stress (2). The sympathetic nervous system responds to both distress and eustress. Distress is associated with events interpreted as undesirable, such as a car accident or an opponent passing you in a race (3). Eustress is experienced with events interpreted as desirable, such as a marriage proposal or a timely scored goal (3). Regardless of the type of stress, the sympathetic nervous system is responsible for controlling the following brain and bodily changes: blood pressure rises, heart rate increases, pupils dilate, skin cools and sweats, muscles tense, reflexes quicken, the mind becomes anxious, thoughts race, focus narrows, energy increases with less stamina, and digestion slows (1).

An appropriate amount of sympathetic nervous system activation in response to stressful events is vital for human survival. Depending on the athlete and activity, the aforementioned bodily and brain processes are also necessary for most exercisers and athletes to perform well. However, chronic sympathetic nervous system activation is not beneficial for performance or overall health. When an athlete maintains a heightened level of sympathetic activation for long periods of time, they become tired, anxious, and inflexible in adaptation. The body and brain are not able to relax and recover when they are in a fight or flight state. Chronic stress, which leads to chronic sympathetic activation, increases an athlete’s risk for developing many physical and mental health problems (4).

Conversely, the parasympathetic nervous system is associated with the brain and body’s “rest and digest” processes (2). When the body’s parasympathetic nervous system is highly active, the following things often occur: blood pressure lowers, heart rate slows, pupils constrict, skin warms and dries, muscles relax, reflexes slow, the mind relaxes, thoughts slow down, focus broadens, energy becomes lower or normal but with more stamina, and bowel habits become regular (3). Depending on the
athlete and activity, these processes of the body and brain do not happen when an athlete is performing well. However, when the body no longer needs sympathetic activation, it is important for the parasympathetic nervous system to take charge so that energy is conserved and “housekeeping” functions return to normal (2).

HOW BREATHING WORKS AND HOW TO IMPLEMENT IT

Paced breathing with proper mechanics is a simple, yet effective tool to use to activate the parasympathetic nervous system when sympathetic nervous system activation is no longer necessary. The following section explains how to use paced breathing.

A highly desirable benefit of breathing as a tool to activate the rest and digestive processes is that it is always available. While using breathing for rest and recovery, it is important to use the following mechanics:

- **Breathe diaphragmatically** – Expanding the midsection during inhalation, as opposed to raising the shoulders or chest, allows the diaphragm to contract and move down, which creates more space for the lungs to expand (2).
- **Inhale through the nose** – This allows the inhaled air to be warmed, humidified, and filtered before entering the lungs (2).
- **Breathe slowly instead of deeply** – Many people are encouraged to breathe deeply. However, deep breathing for extended periods of time can create an imbalance of oxygen and carbon dioxide in the body and cause hyperventilation (5). Instead, breathe slowly. Proper breathing should feel effortless.

Once proper breathing mechanics are developed, a key is to breathe at the pace most appropriate for the athlete. When an athlete breathes at the most optimal pace, a phenomenon known as respiratory sinus arrhythmia (RSA) occurs (5). With RSA, “respiration is independently associated with heart rate (HR) oscillations,” so much that an athlete’s HR increases on an inhale and decreases on an exhale (5). RSA cues the parasympathetic nervous system to kick in, allowing the body to adopt a restful, energy conserving state.

The average pace of breathing that allows the parasympathetic nervous system to activate is about 6 breaths per minute (5). However, most people’s optimal breath pace lies between 4.5 and 6.5 breaths per minute. In order to determine an athlete’s optimal pace, they should breathe at the following paces for 3 min each: 6.5, 6, 5.5, 5, and 4.5 breaths per minute (5). Following each set of 3 min, the athlete should ask the following questions:

- Was this pace comfortable?
- Did this pace feel effortless?
- Did the heart rate increase with inhalation and decrease during exhalation?

By testing out different paces and assessing the answers to the questions above, it often becomes very clear which pace is best for each athlete. There are a number of apps available on smartphones for pacing breathing as well. However, if an athlete is interested in obtaining more in-depth information about optimal breath pace, an appointment with a biofeedback therapist is recommended.

The best times for exercisers and athletes to use paced breathing are on recovery days; after or between workouts, practices, and competitions; and before bed. Athletes can take just a few breaths at their optimal pace to experience a smaller degree of parasympathetic activation, or they can breathe at their optimal pace for up to 20 min in order to gain stronger effects. Slow breathing for long periods of time should not be used during exercise.

Both the sympathetic and parasympathetic nervous systems are vital to exercisers and athletes at different times. Athletes should continue to practice their breathing routines to activate the fight or flight system and the rest and digest state.

REFERENCES

ABOUT THE AUTHORS

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The Ingredients For Keeping Her Strong

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You fueled her with Gatorade®:
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Backed by the Gatorade Sports Science Institute, Gatorade® Recover Protein Shake is specifically formulated to help rebuild and replenish your athlete’s muscles with postgame nutrition. Made with 20g of protein and 45g of carbs, every sip promotes muscle recovery and helps replenish energy to keep them coming back strong.