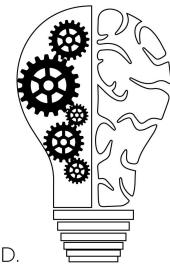


Episode 012: Performance Enhancement with Dr.

MaryEllen Eller

David Puder, M.D., MaryEllen Eller, M.D.

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There are no conflicts of interest for this episode.

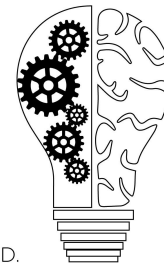
Our bodies are “wired” to perform. Learning how to consciously modulate your internal sympathetic state is the key to unlocking optimal performance. The autonomic nervous system (ANS) facilitates survival by generating the fight-or-flight response and promotes recovery following activation (the ability to relax). The ANS achieves this by balancing two complementary systems: the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS). For example, your ANS is currently adjusting your pupillary diameter, respiratory rate, blood pressure, heart rate, skin conductance, sweat production, sphincter tone and postural muscles (just to name a few) to allow you to focus your eyes to read this information without passing out, falling over, overheating or urinating on yourself.

The **sympathetic nervous system** (SNS) sends signals throughout the body to enhance its ability to respond to a perceived threat. For example, when a cave man encounters a bear, he must be able to rapidly harness enough energy to fight the bear or run away from it. The SNS achieves this by increasing oxygen mobilization, increasing heart rate and optimizing the utilization of stored energy to allow the cave man to quickly sprint away from the bear. If the threat becomes imminent (i.e. “I’m not fast enough”), “freeze” mode prompts the body to immediately enter an extreme state of energy conservation in a final attempt to maintain survival (decreased heart and respiratory rate, loss of muscle tone, etc). The **parasympathetic nervous system** (PNS) activates through myelinated nerve fibers from the **nucleus ambiguus** when the perceived threat has been removed and allows the body to rest and refuel. While instinct alone was sufficient to keep our cave man alive, this instinctual response system has not evolved with society’s modernization (not many of us are still being chased by angry bears).

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This disconnect allows the ANS to be hijacked by perceived threats on a continual basis and is an underlying cause of chronic stress, pathologic anxiety and poor performance.

The “freeze” mode can turn into a third system, with the activation of the **unmyelinated dorsal vagal parasympathetic system**. This system is “shut down mode” seen in animals that go limp when there is no escape possible. This is the place where public speakers lose their ability to get words out. This is also the place where athletes completely fall apart. This is the space our brain goes when traumatic things occur. We no longer feel our body and may feel light headed. Effective training prevents the performer to enter this place.

Breathing to relax

While the ANS has various “access points,” the most accessible conscious modulating benefit is often achieved through mastery of controlled breathing techniques. The goal of breathing exercises is to consciously create a desired state through stimulating the body’s chemoreceptors (located in the medulla oblongata) and subsequently causing the body to calm down.

The human body achieves maximized PNS activation during sleep. There are 3 major and distinct sleep stages, each with a correlating breath pattern. Relaxation through PNS activation is best achieved by controlled mastery of breathing patterns that replicate the unconscious breathing cycles seen in sleep onset and non-REM sleep. Sleep on-set is best replicated by utilizing “clearing” breaths. To use “clearing” breaths, exhale out fully and hold for as long as you can, which allows for an increase in pCO₂. Repeat this 2-5 times before transitioning into 4-8 cycles of relaxed breathing in a 4 second, 7 second, then 8 second pattern.

CLEARING BREATH:

Close your eyes

Breathe out through your nose regularly

Breathe out through your tightened lips until you feel a knot in your abdomen (about 8 sec)

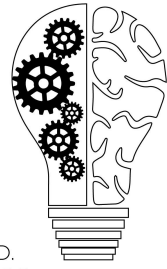
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Hold at full exhalation for 5-15 sec (the duration will increase with time and practice)

Repeat 2-5 times



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4-7-8 BREATHING CYCLE:

Close your eyes

Breathe in through your nose for 4 sec

Hold at maximum inspiration for 7 sec

Exhale through your nose over 8 sec

Repeat 4-8 times (~2 min)

As your skill and comfort increases with these breathing techniques, you can achieve deeper relaxation when combined with visualization, positive self-talk and guided meditation.

Breathing for activation

Breathing for activation is best achieved by replicating the rapid breathing pattern seen during maximum sympathetic activation. A hallmark feature of panic attacks is rapid, shallow breathing (i.e. hyperventilation). Hyperventilation leads to decreased pCO₂ which signals SNS activation, which jumpstarts physiologic shifts that can maximize your stored energy availability. Hyperventilation is followed by 1 or 2 clearing breaths to promote balanced activation of both the SNS and PNS. Without clearing breaths the SNS may become over-activated and lead to decreased performance.

RAPID CYCLING: diaphragmatic nasal breathing with use of accessory breathing muscles

Inhale rapidly over 1 sec

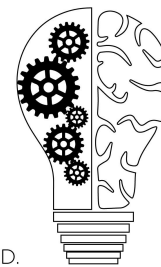
Exhale rapidly over 1 sec

Maintain pattern for 30-45 secs.

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CLEARING BREATH:

Inhale regularly

Exhale until you feel a knot in your abdomen

Hold at full expiration for 5-10 sec (the duration will increase with time and practice)

Repeat 1-2 times (~30 secs)

As your skill and comfort increases with these breathing techniques, you can achieve heightened activation by combining focused breathing with visualization, positive self-talk and internal coaching.

CAUTION: Breathing techniques, especially hyperventilation, may trigger lightheadedness, extremity tingling and even loss of consciousness. Due to these risks, these techniques should be practiced in a safe environment with supervision (not in water, while driving, etc.). Additionally, these skills require practice to achieve optimal effectiveness. Start slowly and increase the duration of breathing exercises with your comfort level.

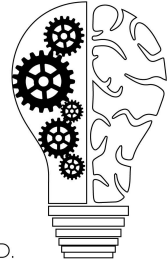
Performance Day

Many athletes struggle with over-activation on performance day. Without proper training, it is easy for the pressure of performance to push even the most highly-trained and physically fit athletes into “freeze” mode. To maintain optimal performance, athletes must be able to monitor and modulate their internal state to maintain optimal activation (see the performance activation curve below). It is also important to note that the level of necessary activation varies from sport to sport. For athletes who struggle with “freezing” or “choking” on game day, it is helpful to perform a retrospective behavior chain and begin to build a “game day routine” to build confidence and abort future over-activation. This requires focused attention on internal monitoring, effective usage of necessary breathing techniques, visualization, positive self-talk, internal coaching and relaxation techniques. The ultimate goal is to maintain performance within the “target zone” with the ability to implement learned techniques when the athlete catches their internal state trending towards under- or over-activation. The key to success is internal monitoring and prevention.

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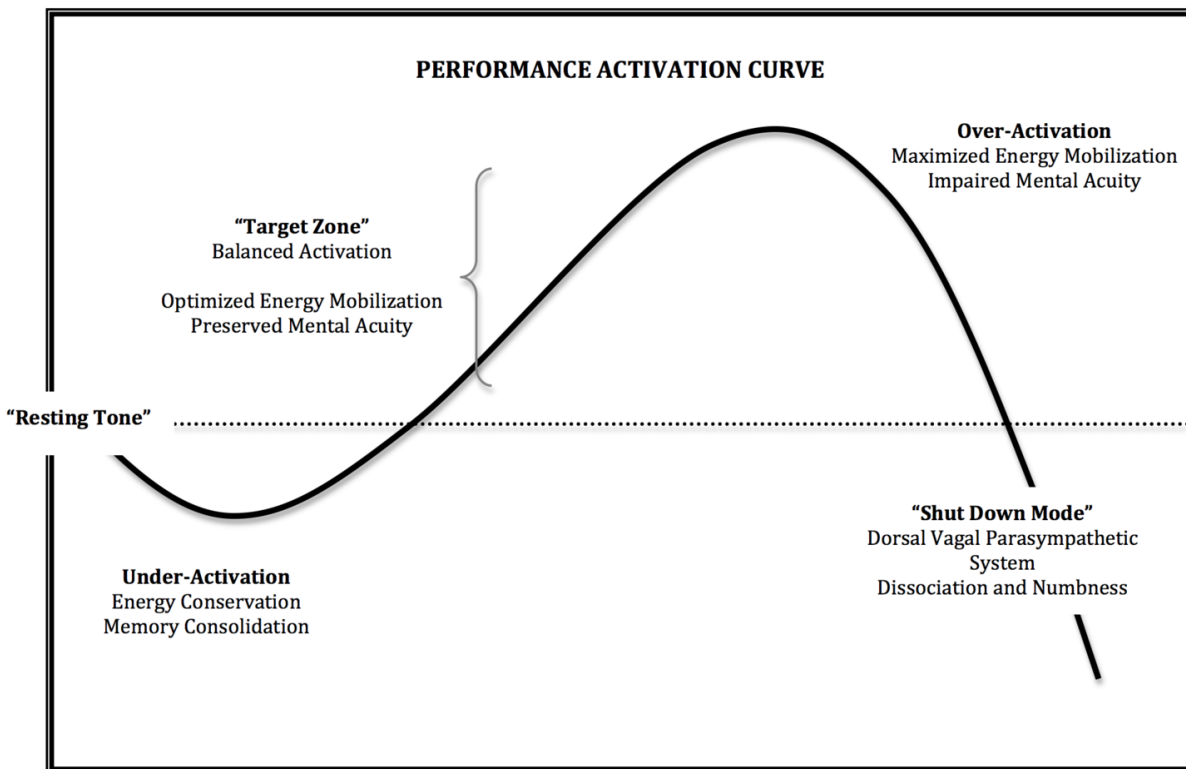
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Training Day

Many athletes struggle to consistently train at the level they perform. Often athletes report frustration that they can "turn it on" during a performance but feel unable to replicate that level of intensity in daily practice. For these athletes, it is important to understand the "performance activation curve" and learn to identify and replicate game-day performance on a routine basis. This requires focused attention on breathing techniques to achieve activation (rapid cycling and clearing breaths), visualization techniques, pre-performance routine, positive self-talk and internal coaching.

Join Dr. Eller on:

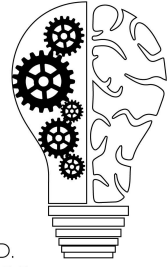
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