The Breathable Body and Continuum

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Breath. How can something so natural be so difficult? People speak of the effort it takes to breathe; they say, “I always seem to be holding my breath,” or “I’m often short of breath,” or “I can’t seem to get enough air.” Only when people are extremely relaxed does breathing seem effortless. Unfortunately, such relaxation is a rarity for many of us.

True relaxation makes our bodies *breathable*. A breathable body is a body that is responsive to the movement of breathing. The lungs take up the entire chest cavity from the top of the shoulders to the bottom of the rib cage and from the front of the chest through to the back. When air is moving in or out, causing the lungs to enlarge or shrink, the entire body must accommodate this change of shape. When your lungs are filling, your entire body is actually getting wider, and when your lungs are emptying, you are getting narrower. If you are holding tension in any place in your body, that place cannot move in response to the filling and emptying of your lungs, and your body cannot breathe fully.

When we speak of the breathable body, we don’t refer to the effort of breathing but to the process of breathing itself, to the play between the automaticity of breathing and our ability to be in command of our breathing. The more we can be aware of the movement of our breathing and the movement of our body in response to our breathing, the more we can use our breath as a tool to support our well-being. There are times when it’s advantageous to shift our breathing rhythm either to help settle our nervous system, to express our feelings more accurately, to enhance our speaking so that our message is heard, or to charge our breathing for exercise and strenuous activity. Continuum, with its use of sound, breath, and undulating movement, helps to direct our awareness, supporting the development of skills in shifting the pace, speed, and depth of breath.

Ventilation—Respiration

We breathe to stay alive, because we need to exchange gases with the environment in order to survive. Breathing is really comprised of two processes, ventilation and respiration. The process of moving air in and out of the body, the mechanical process of emptying and refilling the lungs, is called *ventilation*. The process of *respiration*, also called cellular respiration, takes place inside our cells. The oxygen in our cells moves to small organelles called the mitochondria. The mitochondria use oxygen combined with the sugars we eat and other molecules to produce chemical energy in the form of adenosine triphosphate (ATP). For every molecule of oxygen and molecule of sugar, the mitochondria produce thirty-eight ATP molecules. The by-products of this metabolic process are carbon dioxide and water, which our bodies put to use in other processes.

This process is actually called *aerobic cellular respiration* because the cell is using oxygen to produce energy. There is another kind of cellular respiration, *anaerobic cellular respiration*. In anaerobic respiration, the mitochondria produce energy using only sugar and other molecules, without oxygen. Anaerobic respiration is not as efficient as its aerobic counterpart; the mitochondria produce only eight molecules of ATP for every molecule of sugar, and the by-product of this process is lactic acid. Aerobic cellular respiration is a life-sustaining process whose by-products are useful in sustaining our bodies. Anaerobic cellular respiration is an emergency form of energy production, intended to support us when we need to move very quickly.

Anaerobic respiration is intended for only emergency situations and is not sustainable over a long period of time. The lactic acid that is the by-product of anaerobic respiration is what causes our muscles to feel sore after strenuous exercise. Anaerobic respiration is actually a state of cellular starvation that puts a great deal of stress on the body. This inner starvation makes it difficult to accommodate stresses in the external environment.

In the Beginning

Billions of years ago, the only life forms on earth were anaerobic bacteria (in other words, bacteria that don't require oxygen to live). The earth's atmosphere was composed mostly of poisonous gases, including high levels of carbon dioxide. This atmosphere obviously could not support human life as we know it, but the anaerobic bacteria *were* able to survive in this mixture. Interestingly enough, these types of bacteria still exist on the ocean floor, gathered around volcanic jets and living quite happily in the same kind of anaerobic environment that existed at the beginnings of the earth's physical history.

Anaerobic bacteria give off a gas as a by-product of their metabolism—oxygen. In that initial stage of the earth's development, so many bacteria gave off so much oxygen that the oxygen became a pollutant, killing 98 percent of life on earth. Following that mass extinction, a group of bacteria evolved that could use oxygen; those are the bacteria that survived, giving rise to life as we know it. The mitochondria in our cells are a result of the evolution of those bacteria. They live in a symbiotic relationship with our cells, using our oxygen for their survival and giving us energy in return.

Most of our attention is on the oxygen we inhale, because oxygen is the key ingredient that keeps us alive. But other gases also have an important function in respiration. Our atmosphere consists of 78 percent nitrogen, which keeps oxygen from being too combustible, 21 percent oxygen, and 1 percent other gases, including 0.03 percent carbon dioxide. We often think of carbon dioxide as harmful, especially in the effects of elevated carbon dioxide levels on the environment, or at best as a "waste gas" that must be disposed of by being breathed out, but it serves a very important physiological function. In some scientific circles, carbon dioxide is thought of as the body's master hormone; it regulates the our body's acid/base balance and helps to regulate the release of oxygen from the blood to the cells that make up our tissues. Without these regulatory processes, the other systems of the body would not function properly. Without the proper amount of carbon dioxide in our blood and lungs, we could not survive.

Mammals actually need a higher proportion of carbon dioxide in their lungs than is available in the current atmosphere—in the range of 5.5 to 6.5 percent. To compensate for this, the lungs perform a truly amazing transformation. The gap between the 0.03 percent of carbon dioxide in the air and the 6 percent or so our bodies require is bridged by the mitochondria, which excrete carbon dioxide as one of the by-products of aerobic cellular respiration.

An old folk remedy proves the point. A common remedy for someone who is hyperventilating—that is, breathing too fast for his or her activity level, to the point of faintingor, sometimes, triggering a panic attack—is to have the person breathe into a paper bag.
Essentially, the paper bag traps the carbon dioxide the person breathes out, allowing him or her to breath it back in. The process restores equilibrium to the system, resolving the hyperventilation.

So, our bodies must have the proper ratio of gases in their blood, lungs, and other tissues. A body has difficulty breathing when the ratio of gases in the body becomes unbalanced. This can be caused by a mismatch between our breathing rate and our physical effort, as in hyperventilation. It is healthy to breathe quickly when we are exercising and more slowly when we are relaxing. The problem arises when we are physically quiet but find ourselves breathing quickly or holding our breath. This can happen while driving a car or watching television (which are the two most common times people have panic attacks) or when we become occupied by thoughts that make us anxious.

Respiratory gases may also become unbalanced when lung tissue loses its flexibility due to long-term, sustained tension, which does not allow the lungs to relax. Lung tissue is very elastic, but, just like a rubber band that is stretched over a long period of time, it can lose its elasticity. The result is that the lungs cannot function properly.

Irregular breathing patterns, whether due to an imbalance in respiratory gases or a loss of lung elasticity, can lead to a host of ailments, including asthma, allergies, eczema, fatigue, insomnia, snoring, sleep apnea, foggy brain, forgetfulness, poor digestion, anxiety, blood clots, and panic attacks.

"Fight or Flight"

The role of carbon dioxide in respiration was first laid out in a scientific principle discovered in 1904 by Christian Bohr; Bohr's discovery, still used in respiratory science, is now called the

Bohr effect. In simple language, Bohr discovered that the carbon dioxide carried in the bloodstream regulates the release of the oxygen carried in the hemoglobin in red blood cells. In other words, when carbon dioxide levels are low, the atmosphere of the blood is not conducive to the transference of oxygen from the red blood cells to the rest of the body.

If we breathe too fast when we should be breathing slowly, or we hold our breath and then breathe in big gulps of air, we give off too much carbon dioxide, upsetting the balance of respiratory gases in our blood. As a result, the rate of oxygen moving from the bloodstream to the cells slows. Oxygen-starved cells cannot make enough energy to meet the body's needs. When the nervous system begins to detect that not enough oxygen is flowing to the cells, it responds as if our life is threatened—and in a way, it is. When this happens, signals are sent that prompt a response we call "flight or flight." The fight or flight response involves a variety of systemic changes, all related to an increase in anxiety: a rapid heart rate, fast breathing pattern, decreased immune response, increased sweating, and a suspension of some bodily functions, such as digestion and elimination. What we perceive as anxiety, then, is often the body's response to insufficient oxygen. Anxiety can be a signal that our blood gases are imbalanced.

The ironic piece of this is that the fight or flight response was originally designed as a mechanism for self-preservation. In those extreme times when a saber-toothed tiger was chasing you through the savannah, or some other physical threat loomed, you *wanted* your breathing to be fast, you didn't want to have to take the time to go to the toilet, and sweating helped you to cool down as you battled, or fled, the danger. This is still a useful response to a physical threat.

The problem comes from the body not understanding the difference between an actual physical threat and an imagined threat. When we are worried about the future or the health of a loved one, our body thinks it is under physical attack, and it acts accordingly. The result is an impulse to breathe as though we are running for our life. Except we're not actually moving that fast, so the rate of the breath does not correspond to physical activity. The result is a mismatch that feeds an imbalance in blood gases and creates tension.

Tension is itself a problem for breathing. An overly tense body is not a breathable body. Tension is produced by tight muscles. When muscles are tight, they are exerting a lot of effort and using a lot of energy. Remember the body makes the energy it uses by metabolizing oxygen, so when you are using extra energy by being overly tense, the body's demand for oxygen increases. When the oxygen gets used up very quickly, the fight or flight response kicks in, keeping your breathing rate very high. Once again, breathing—and hence blood gases—are out of balance.

In most situations, then, the slower you breathe, the healthier you are. The average resting respiration rate is one breath every five seconds, or about twelve breaths per minute; the *optimal* breathing rate while resting is four and half to six and half breaths per minute, or one breath every ten seconds. Observe a baby sleeping sometime; a baby's breathing pattern is soft and slow with long pauses at the end of each exhale as the body rests. This restful breathing, which regulates the respiratory blood gases, is the complete opposite of breathing in fight and flight. Learning how to rest the body deeply can be a natural process. But with today's fast pace, it can be difficult to find space in our day-to-day activities to allow the body to fully rest and relax. The practice of Continuum provides the tools to help renewour ability to soften and rest.

The Practice of Continuum

By using sound, breath, and movement to explore the dynamics of breathing, we begin to bring awareness to the respiratory process so that we can maximize our breathing potential. Begin by recognizing your breathing. Take a baseline of your breathing rate and depth in whatever position you are currently in. As soon as you notice your breath, it changes; there is nothing you can do about that. Take a minute or so to get an overall impression of how and where your breathing is moving at this moment. Again, you are interested in its depth, speed, and rhythm.

Next, place yourself on the edge of a chair. Make sure that the chair is the right size for you. Your knees must be lower than your pelvis. Sit quietly without using the back of your chair for support. Have your legs spread apart as if you were riding a horse. Keep your feet flat on the ground and imagine that you have the neck of a giraffe looking for leaves in the top branches of a tree. Don't stretch the neck, just let it be long.

When you get yourself comfortable, with your back a bit straighter than if you were using the back of the chair for support, check the speed, rhythm, and depth of your breath again. Is there a difference? What is that difference? You may find that your breath is slower and deeper and the rhythm has changed; from that, we can deduce that the way your body is arranged has something to do with how the breath moves in your body. In this case, the position we've described frees the stomach and intestines so that they don't push up against the diaphragm. The diaphragm is a primary muscle of ventilation that requires ample space for free movement. When it is crunched against the digestive organs, it can't move easily and the movement of air into the lungs is limited, leaving you feeling short of breath.

Let's continue this exploration a bit further. Imagine a tree and its roots. When we see a tree with extensive, spreading branches, we imagine the root system must be very deep and wide to support this expansion. There is an analogous structure inside of the lungs, a large branching network of tubes referred to as the *bronchial tree*. Just like the branches of a tree, this network brings in air to allow the lungs to expand.

If we continue our metaphor, then we have to imagine that this expansion needs a root system for support. While you are sitting on the edge of your chair with your feet flat on the ground, imagine that your feet and the bottom of your rear end are the beginning of the root system. Soften your feet and buttocks and let them receive the support of the floor (earth) beneath them. Instead of trying to hold yourself up, allow yourself to be supported by your roots. When you have a sense of this supportedness, observe your breath again. Notice the speed, rhythm, depth, and effort of your breathing. What I hope you are finding is that your breathing has slowed, it feels easier and deeper, and the rhythm has a clear beginning and end point.

What we have played with here is changing the structure of the body to influence the breath, as opposed to trying to do something different with the breath itself. The breath, you should have discovered, will accommodate a change in structure. You can work with this concept in any position. It takes a moment to find yourself in space and allow your body to rest on what is supporting it, but when you do that, your breath will naturally shift and become coherent with your activity level.

This is just the beginning of a simple exploration of the relationship of breath to structure. There are numerous other explorations that include increasing awareness of how breath moves through the passages of the nose, sinuses, throat, and lungs and observing how the body accommodates and responds to the presence of breath.

Breath Is the Greatest of All Teachers

Breathing dynamics can teach us so much about how to be human and about the tides of change that being human includes. Each breath offers us an opportunity to learn about letting go. As we inhale, we fill our bodies with air and in doing so we recognize both the present moment and the life force that we contain. As we begin an exhalation, we realize that we are in the process of letting this moment go. The exhalation is an opportunity for us to dissolve for a short period of time. The inhale gives us form; the exhale lets that form fall away for just a moment.

This cycle offers our bodies a chance to rest in each breath. It is a waveform. On a more cosmic scale, this is the cycle of life and death. As we release each breath, we really have no idea whether or not we will take another one. This kind of presence with each breath can teach us to be comfortable with change. Each breath brings change because when you are engaged in this profound attention, nothing is perceived as the same from one breath to the next.

Our bodies are actually more space than anything else. This space, which in many cases is filled with breath, offers us another level of support. What would it be like to move around in our lives realizing that we can rest on the space within? That whenever we feel a tension or a kind of holding, we can let go of it and find a way to allow ourselves to be held by the space within? That the space within will cradle and comfort and soften so that aches and pains can be massaged from within?

Thus, breath and body are partnered in a mutually responsive relationship. When we participate in the dynamic movements of breath and body, we discover breath as a process rather than a fixed pattern. Becoming more conscious of this interpenetrating and interreceptive co-creating partnership, we can make choices that propel its growth rather than weaken its processes, providing energy, harmony, and health at all levels of the organism.