

The Voice of the Speech-Language Pathologist

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## **Physiologically Optimal Breathing in Voice Training**

In recognition of the influence of breathing on vocal function, breathing tasks frequently are included in voice lessons and therapy. Voice professionals do not typically have extensive training in respiratory physiology and disordered breathing, and little attention has been paid to the breathing pattern of the voice client. Dysfunctional breathing (DB) is common but poorly understood and may go unrecognized and untreated by practitioners.

Breathing involves much more than the mechanics of moving air in and out of the lungs to support the voice. We regulate our biochemistry through breathing: therefore, breathing is fundamental to optimal health and physical function. Breathing patterns respond to mental, emotional, and physical states and often change when a person is sick, overly stressed, or traumatized. Changes in breathing can lower CO<sub>2</sub> levels and disrupt regulation of pH, interfering with homeostasis and healing in multiple body systems including the autonomic nervous system, postural and motor control, cardiovascular, and stress response regulation<sup>1,2</sup>.

DB underlies many disorders including asthma, snoring, sleep apnea, paradoxical vocal fold motion disorder, chronic cough, and anxiety. Common co-morbidities include pulmonary disease, psychological illnesses, and voice problems. Individuals with these disorders may require a different approach to breath training, as deep breathing practice may trigger hyperventilation and worsen their condition. Voice professionals should be aware that dysfunctional breathing can explain clients' lack of response to training or therapy and may underlie reports of dizziness or discomfort. Breathing-based therapies may be of benefit to these populations. Seemingly unrelated symptoms can resolve when breathing issues are productively addressed.

During rest, respiration is through the nose, warming, filtering and humidifying the air. Breath rate ranges between 9-14 breaths per minute, with 500 ml of air in each tidal breath, summing to a total of only 4-5 liters of air per minute. A common form of DB is over breathing or hyperventilation: Breathing beyond metabolic demands eliminates excessive amounts of CO<sub>2</sub> (hypocapnia) leading to respiratory alkalosis. This hinders release of oxygen from hemoglobin to tissues, resulting in decreased cellular oxygenation, or hypoxia (suppressed [Bohr effect](#)).

Paradoxically, the more you breathe, the less oxygen is available to tissues. Poor oxygenation leads to a myriad of problems. Hypocapnia can cause spasms in bronchi and other smooth muscle tissue, including blood vessels, gut, bladder, and uterus. Lightheadedness, visual changes, numbness, tingling, cold hands and feet, and dizziness are all symptoms associated with hyperventilation and low CO<sub>2</sub>. Biomechanical and psychophysiological symptoms include an inability to take a deep breath, chest tightness and shortness of breath<sup>3</sup>. People who snore, for example, breathe in ~15 liters per minute: they over breathe.

DB can be both the cause and the result of voice disorders. Abnormal respiration has been implicated in muscle tension dysphonia, and patients commonly complain of phonatory dyspnea. Vibratory pattern irregularities or incomplete closure of the glottis are often present in voice disorders.

Both interfere with the efficient valving of airflow and promote over breathing, i.e., women with vocal nodules use higher lung volumes during syllable train production <sup>4</sup>. In addition, over breathing through the mouth may result in dehydrated and inflamed tissues throughout the airway, as well as excessive mucus. These symptoms early in the morning are sometimes attributed to acid reflux but may be caused by mouth breathing during the night. Mouth breathing has been found to significantly increase phonation threshold pressures<sup>5</sup>.

People who are overly stressed typically exhibit dysfunctional breathing. Acute hyperventilation during a panic attack is obvious. More prevalent, but commonly unrecognized are the following behaviors typical of DB:

- Habitual or occasional mouth breathing
- Excessive sighing, yawning, sniffing, throat clearing/coughing
- Fast respiratory rate or breathing without a pause
- Audible breathing
- Taking large breaths and visible movement in the upper chest and/or abdomen
- Breathlessness while speaking or singing
- Hyper inflating the upper chest when speaking or singing
- Speaking to the end of the out breath, followed by a gasping inhalation

Most singers I see confess to “not using enough breath support.” In my experience, voice patients use too much breath. Both straining with excessive respiratory effort and guarding using a soft breathy style of speaking trying to spare the voice, are common maladaptive compensations. Many injured singers push breath, sometimes confusing it with “breath support.” Using low, gentle, quiet nasal breathing for vocal tasks will help maintain autonomic stability, and proper function of all body systems and increase phonatory efficiency. The following tips should help:

- The training baseline should not depart from physiologically correct breathing and natural functioning of inspiratory and expiratory muscles<sup>6</sup>
- Over use of chest, shoulders, and neck muscles interferes with effective diaphragmatic excursion.
- Explore Resting Expiratory Level (REL): Passive forces acting on breathing return the system to REL effortlessly, and inspiratory checking action counteracts the relaxation pressures to promote the steady lung pressure necessary for phonation. Many speakers and singers use too much effort for inhalation and/or exhalation.
- Subglottal pressure is determined by the degree of expiratory force and by the resistance against airflow provided by the glottis. The extent to which the vocal folds close, and the length of time they remain closed will influence subglottal pressure, directly influencing loudness. To get through longer phrases without having to take a breath in the middle, and to project the voice more efficiently, clients should learn that monitoring the glottal “valve” is as important as the size of the breath.

Simple phonation tasks such as counting or reciting the alphabet can be used to put all this information to practice:

- Sit in a tall comfortable posture. Maintain the tongue, jaw, neck, eyes, shoulders, and chest muscles relaxed.

- Count slowly aloud, “One, two, three, four, five.”
- Pause for breath. Keep the mouth closed and allow some air to come in slowly, quietly and passively through the nose. The volume should be no more than tidal volume. Avoid sucking the air in and taking more air than is necessary for only 5 numbers.
- Continue, “Six, Seven, Eight, Nine, Ten.” Pause for breath. Go on.
- Next, add to the number of numbers before the pause.
- Practice quiet nasal breathing with reading, 5-note scales, and progress to conversational speech or singing tasks.

## References

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