



## Vocal Anatomy 102: Breath and Alignment

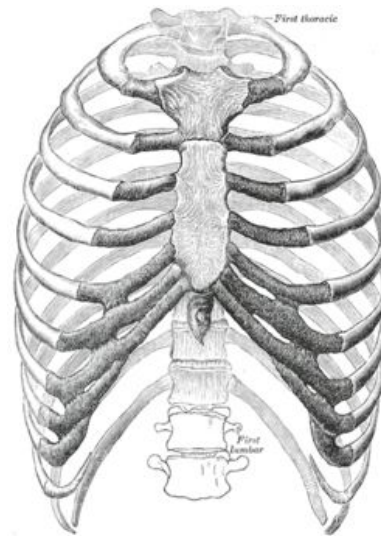
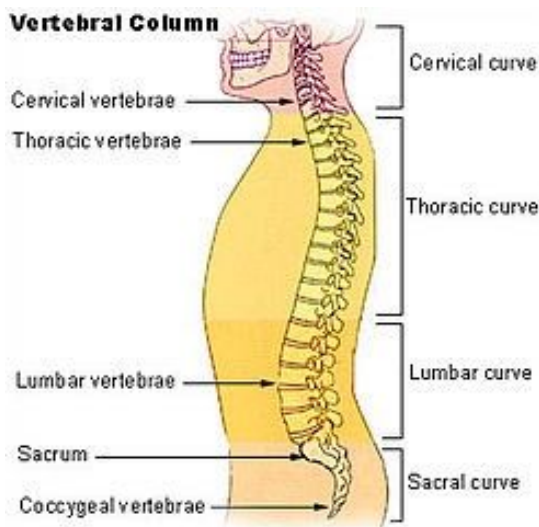
### The physics of breathing: BOYLE'S LAW

From Wikipedia:

This empirical relation, formulated by the physicist Robert Boyle in 1662, states that the pressure ( $p$ ) of a given quantity of gas varies inversely with its volume ( $v$ ) at constant temperature; i.e., in equation form,  $pv = k$ , a constant. (As pressure increases, volume decreases, and vice versa)

SO...If the pressure is greater in the lungs than outside the lungs, then air rushes out. If the opposite occurs, then air rushes in. In other words, when we inhale, we use muscle activity to increase the volume in the thoracic cavity and create an area of lower pressure for air to rush in. When we exhale, we decrease that volume and increase the pressure, so air rushes out.

### The structure of breathing: THE SPINE AND THE RIB CAGE



Images from Wikipedia

Our spine consists of 7 cervical vertebrae, 12 thoracic vertebrae, and 5 lumbar vertebrae. The rest of the vertebrae are fused together into the sacrum and coccyx, or tailbone. A typical spine has 4 curves, slightly forward in the cervical and lumbar, and outward in the thoracic and sacral. In between the vertebrae (except the atlas and axis) are spinal discs that act as shock absorbers and as joints to allow for some mobility, and also hold the vertebrae together. The spine is further strengthened and held together with ligaments, tendons, and fascia, allowing for a flexible but stable structure.

The rib cage, also known as the **thoracic cage**, is a **bony** and **cartilaginous** structure which surrounds the **thoracic cavity**. A typical human rib cage consists of 24 ribs in 12 pairs, the sternum and xiphoid process, the costal cartilages, and the 12 thoracic vertebrae.

## The muscles of breathing:

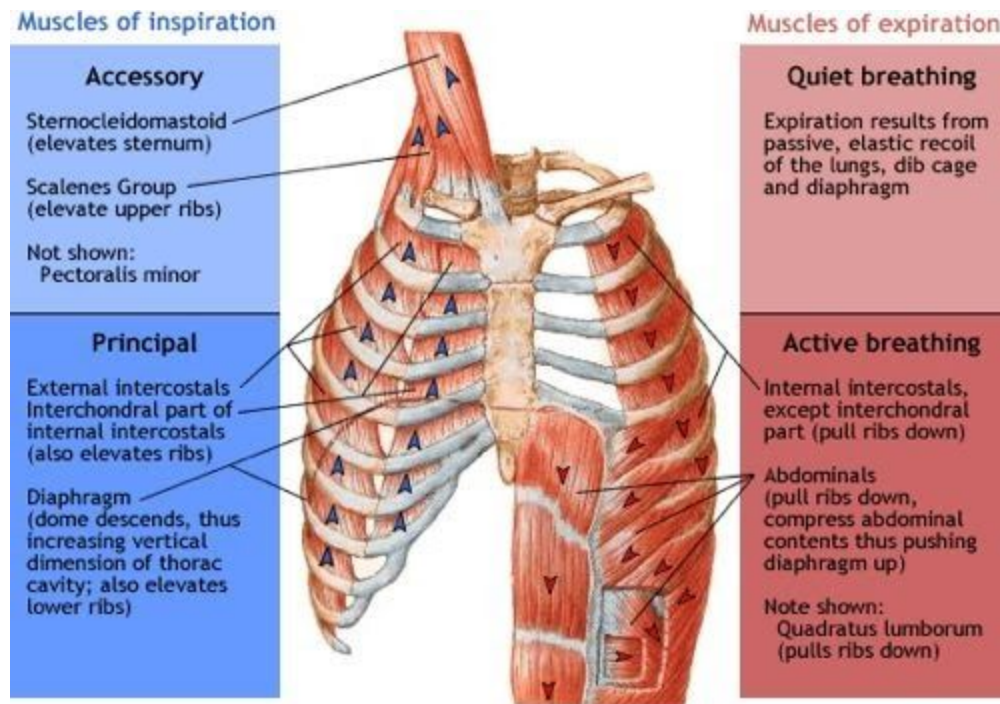


Image from [www.physio-pedia.com](http://www.physio-pedia.com)

**“The optimal breath is the one that will most efficiently facilitate the sound that you want.”**

-Sarah Whitten

<https://sarahwhitten.com>

**“Singers are not average breathers. We breathe to sustain tone as well as life. Although the muscle, bone, and cartilage used in breathing are essentially the same for everyone, they can be coordinated in different ways. Consequently, there are almost as many breathing methods as there are singers.”**

-Melissa Malde

“What Every Singer Needs to Know About the Body”

## Different types of breathing

The “belly breath”

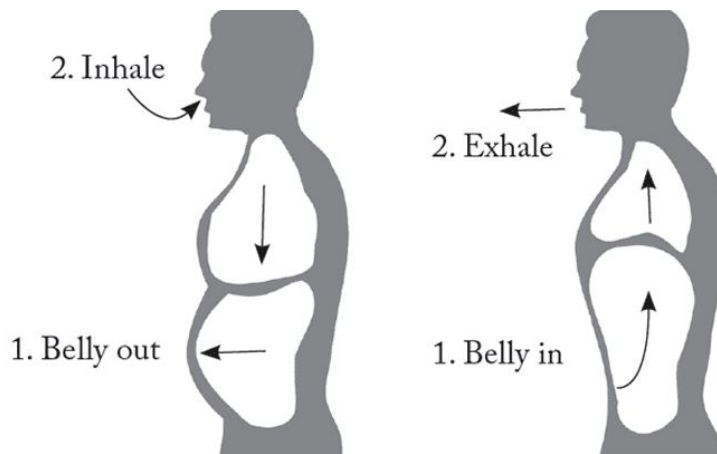


Image from <http://hfwni.com>

When the diaphragm contracts and descends, the viscera below need to go somewhere, so the muscles of the abdominal wall can release to allow a change of shape of the abdominal cavity. Upon exhalation, the abdominal wall gently contracts, guiding the viscera back toward the diaphragm as it ascends. In this type of breathing, movement is felt in the abdomen. But let's be clear: we are not taking any gaseous matter into the abdomen! Rather, we are feeling abdominal parts move in response to the descent of the diaphragm and displacement of the viscera..

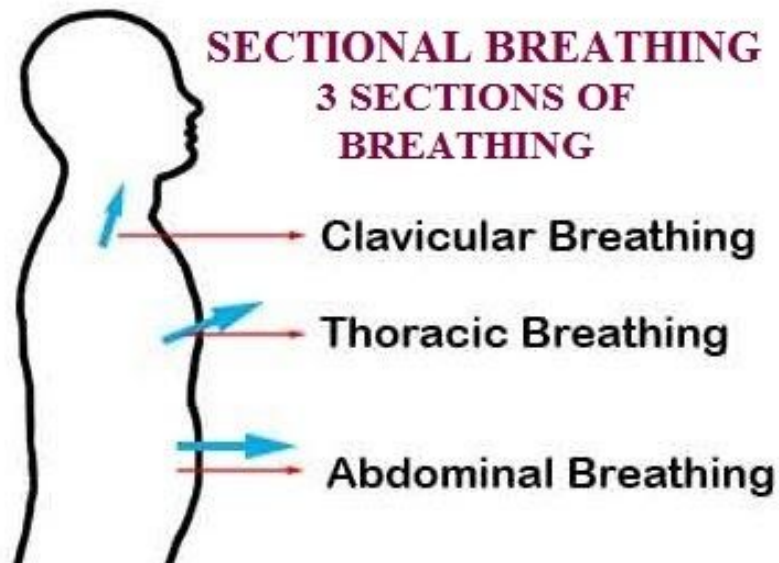


Image from [www.askyogaexpert.org](http://www.askyogaexpert.org)

We can also focus our expansion, or range of motion, in the thorax, for “chest breathing”, or thoracic breathing. In this type of breathing, most of the expansion of the thoracic cavity happens laterally, and from front to back. Often, this is where the average person could afford to expand their range of motion. Check out Katy Bowman's podcasts for great exercises. (end of handouts)

And finally, we also have clavicular breathing, where the focus of expansion in the thoracic

cavity is upward, engaging the secondary muscles of inhalation to raise the top of the rib cage structure in order to expand the volume of the thoracic cavity.

We can combine these styles of breathing in different ways to come up with unique breathing strategies for any given circumstance. Note that due to structural variations, dysfunction, or physical limitations of some bodies, one may be more efficient than another. No “one-size-fits-all”.

When breathing for singing, we might consider:

- phrase length, contour, & volume
- whether or not we are using amplification (microphone)
- Forces at work on our bodies (Wearing a corset?)
- Movement (are you dancing while singing?)
- Physical position (Are we lying down, sitting, or standing?)

All of these things might affect which breathing strategy or combination you choose.

### **Exercise: variation on yogic practice of *desha* breathing; varying our somatic focus**

Either standing, sitting, on all-fours, or lying on your back (with knees bent, feet on the floor).

Allow yourself to quiet your breath and normalize into an easy at-rest pattern.

Now focus your attention on one area at a time. Start with belly breathing.

Allow your abdominal muscles to release on each inhale so that you feel an expansion outward in the abdominal wall, followed by a gentle contracting of these muscles on the exhale. Practice this *desha*, or focal point, for several cycles of breath and then release.

Next, move your attention to the thorax. On each inhale, see how much you can move the ribs forward, back, and/or side to side to increase the volume of the ribcage. Allow the ribcage to collapse on the exhale. Continue for several cycles, then release.

If you're really feeling fancy, you can then go back and forth, with a belly inhale, relaxed exhale, then a chest inhale, relaxed exhale, etc.

Then try to combine the two. Allow the belly to release AND the thorax to expand fully on an inhale and notice how that breath feels different.

### **Alignment: whole body structure**

**“Alignment is inherently *dynamic* and therefore cannot be defined as an ideal position for singers to emulate.**

**What our vocal instruments require are spines free of postural distortions, dynamically stabilized rather than rigidly held, so that we can activate the internal moving parts and vibrating structures that contribute to singing while remaining externally free to dramatically embody our roles.”**

-Claudia Friedlander

“Complete Vocal Fitness: A Singer’s Guide to Physical Training, Anatomy, and Biomechanics”

## The goal of alignment for singers:

To provide ideal conditions through which our bone structure can hold us up efficiently, without much effort, so that our muscles and other moving parts are free to do other stuff, like breathe, sing, etc.

### Exercise: The Six Places of Balance

This comes from “What Every Singer Needs to Know About the Body” by Melissa Malde, MaryJean Allen, and Kurt-Alexander Zeller

Map these locations in your body so that you can align them vertically with one another as you stand. If you’re someone who sits all/most of the time, work from the hip joint up, making sure to be well-supported by your seat.

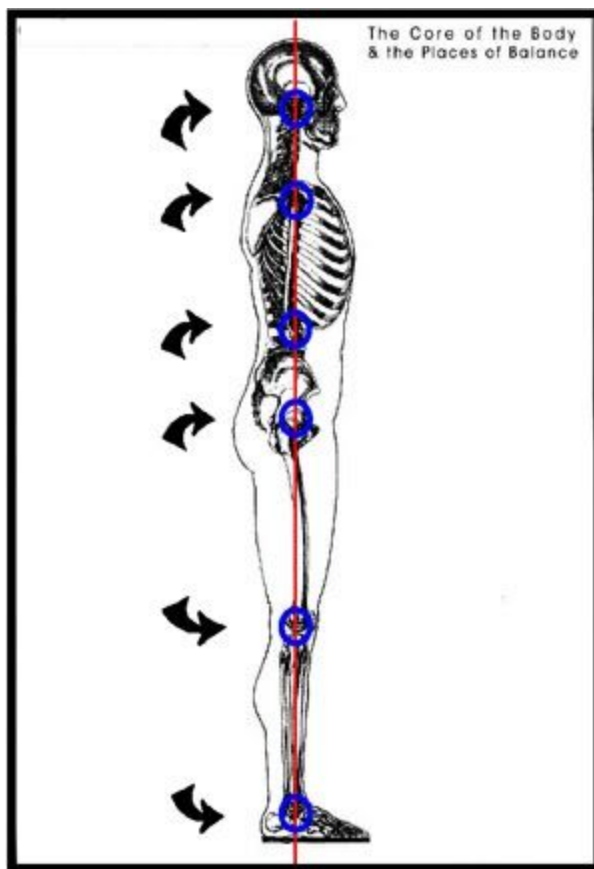


Image from Bodymap.org

### The Six Places of Balance

1. Atlanto-occipital joint (put your fingers in your ears!)
2. Shoulder/arm structure (align last!)
3. Lumbar spine just below thorax
4. Hip joints
5. Knee joints
6. Ankle joints

Map each of these places as accurately as possible, using hands to palpate, pictures to orient, and mirror/camera to look at your own body. Once you have a clear picture of where these parts are, then you can move into alignment (with the arm structure as your last focus!)

This exercise comes from the Body Mapping tradition, developed by William Conable, who was an Alexander Technique practitioner.

Another exercise, one that moves from the feet up instead of from the head down, is learning to align yourself in “Mountain Pose” or *Tadasana*, in yoga. There are many excellent videos to be found for this..

### Watch out for unexpected cross-body connections!

- The Psoas is connected to the diaphragm (and the spine, and the legs)! Hip or lower back issues can affect your breathing function and vice versa!
- The bottoms of your feet are connected to your neck and head through fascia trains! Many seemingly disparate parts can experience connections through these long webs of fascia. Try myofascial release on the bottoms of your feet to loosen the fascia and bring a little more ease to your breath. (I like Yoga TuneUp balls for this)
- Remember that wearing positive heeled shoes significantly affects our alignment, and builds patterns of compensation into our bodies! More barefoot time = good for our alignment! Calf stretches are a great corrective exercise for this issue.

“Good breathing is the foundation for all other aspects of singing. An adequate, accurate map of the structures and movements of breathing will help singers reach their full potential. As we refine our breathing map, we also refine our phrasing, tone, and diction so that we can follow our innate artistic impulses to new heights of expression.”

-Melissa Malde

“What Every Singer Needs to Know About the Body”

**For more information, here are MORE deliciously nerdy resources!**

Singer-specific anatomy, physiology, and body mapping:

“What Every Singer Needs to Know About the Body” by Melissa Malde, MaryJean Allen, Kurt-Alexander Zeller <https://www.pluralpublishing.com>

“Complete Vocal Fitness: A Singer’s Guide to Physical Training, Anatomy, and Biomechanics” by Claudia Friedlander [Buy it here on Amazon.com](https://www.amazon.com)

The Liberated Voice Blog  
<https://www.claudiafriedlander.com/the-liberated-voice/>

“Aligned and Aware: Solutions for the Singing Body”; Sarah Whitten, Voice and Yoga  
<https://sarahwhitten.com>

More on biomechanics and general alignment, plus info on feet and pelvic floor function:

“Alignment Matters”, “Movement Matters”, “Move Your DNA”, “Diastasis Recti”, & “Whole Body Barefoot”, all by Katy Bowman  
<https://www.nutritiousmovement.com> (also a great source for foam half-domes for calf stretches)

On the biomechanics of breath, with helpful exercises for increasing your thoracic range of motion:

“Move Your DNA” Podcast episode 121:  
<https://www.nutritiousmovement.com/move-your-breathing-parts-better-podcast-121/>

“Mover Your DNA” Podcast episode 122:  
<https://www.nutritiousmovement.com/breathing-shapes-podcast-122/>

More info on fascia and anatomy trains:

<https://www.anatomytrains.com>

Source for the balls is use on the bottom of the feet (and lots of other places!):

<https://www.tuneupfitness.com/shop/self-massage-therapy-balls>