

Pranayama Redefined: Breathing Less to Live More

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Illustrations by Roy DeLeon

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How Would Buddha Breathe?



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REMEMBERING OUR ROOTS

**“When Prana moves, chitta moves.
When prana is without movement,
chitta is without movement.**

**By this steadiness of prana,
the yogi attains
steadiness and
should thus restrain the vayu (air).”**

Hatha Yoga Pradipika
Swami Muktabodhananda
Chapter 2, Verse 2, pg. 150

**“As long as the vayu (air and prana)
remains in the body, that is called life.
Death is when it leaves the body.
Therefore, retain vayu.”**

Hatha Yoga Pradipika
Swami Muktabodhananda
Chapter 2, Verse 3, pg. 153



“Pranayama is usually considered to be the practice of controlled inhalation and exhalation combined with retention. However, technically speaking, *it is only retention.*”

Inhalation/exhalation are methods of inducing retention. Retention is most important because it allows a longer period for assimilation of prana, just as it allows more time for the exchange of gases in the cells, i.e. oxygen and carbon dioxide.”

**Hatha Yoga Pradipika
Swami Muktabodhananda
Chapter 2, Verse 2, pg. 151**

Yoga Breathing in the Modern Era

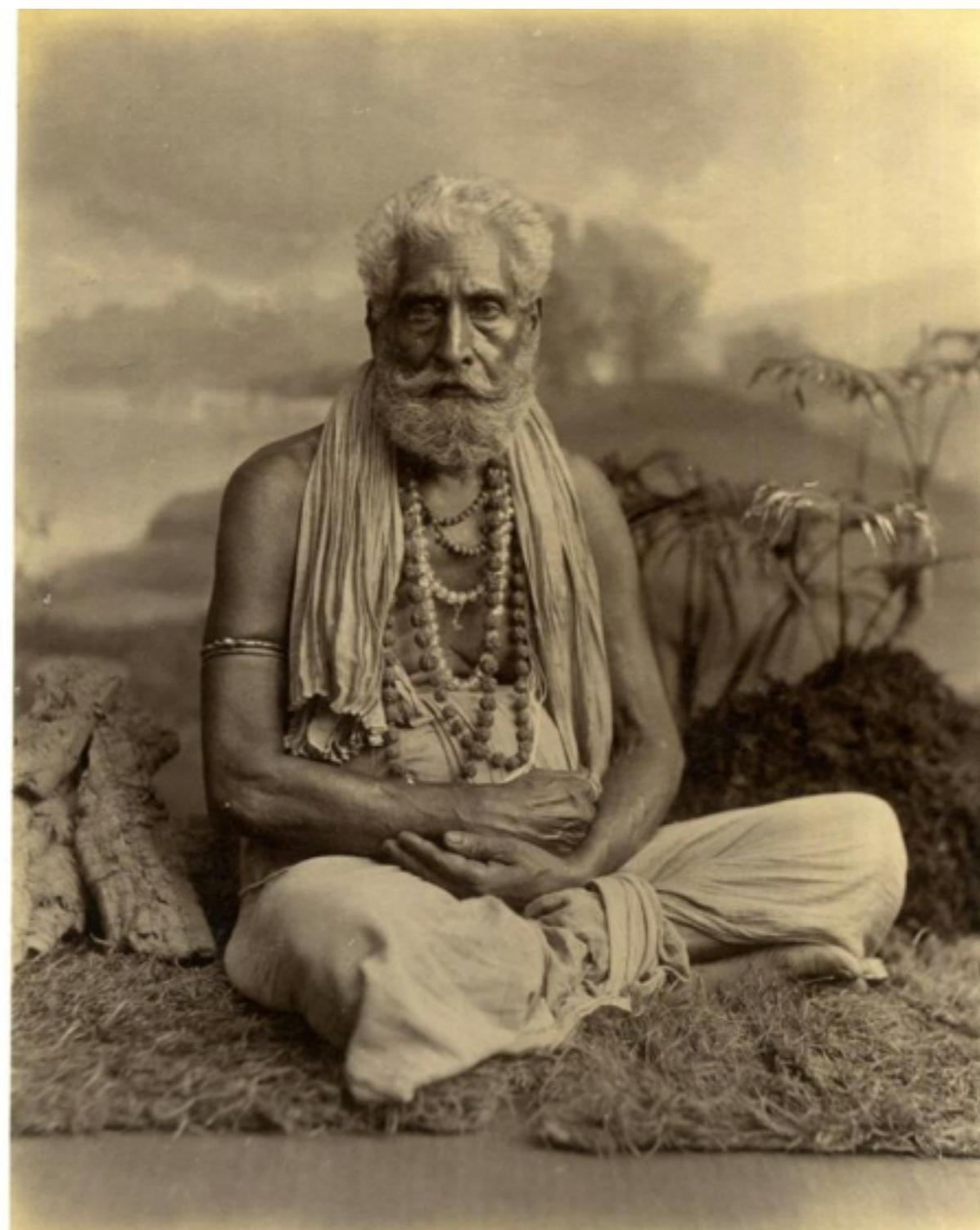
- Focus tends to be on lengthening the inhale/exhale
- Exhale to induce relaxation (PSNS activation)
- Inhale to increase energy (SNS)
- Big ujjayi - audible
- Nose breathing is emphasized at least with inhale. Some traditions teach mouth breathing on exhale.
- Focus on muscular action of chest, ribs, diaphragm, intercostals and abdominal muscles all used actively on inhale and exhale to create the 'yoga breath.'
- Retention after inhale and exhale used cautiously and to amplify the effect of inhale and exhale
- Emphasis with pranayama is on slowing the rate however no discussion on lowering volume.
- Size of movement of asana and volume of breath are linked, as in: The bigger or more strenuous the movement the bigger, more dynamic the breath

The Game of Telephone



The Ancient Yogis Starting Point for Pranayama

- Local, organic, sparse & healthy diet
- Physical activity a necessity for life
- Environment pollutant free (clean air, water, soil healthy - nutrient rich)
- Life-style: Internal focus; simple, in tune with nature; controlled
- Social engagement limited; Much time spent in quiet in meditation.



Our Starting Point for Pranayama

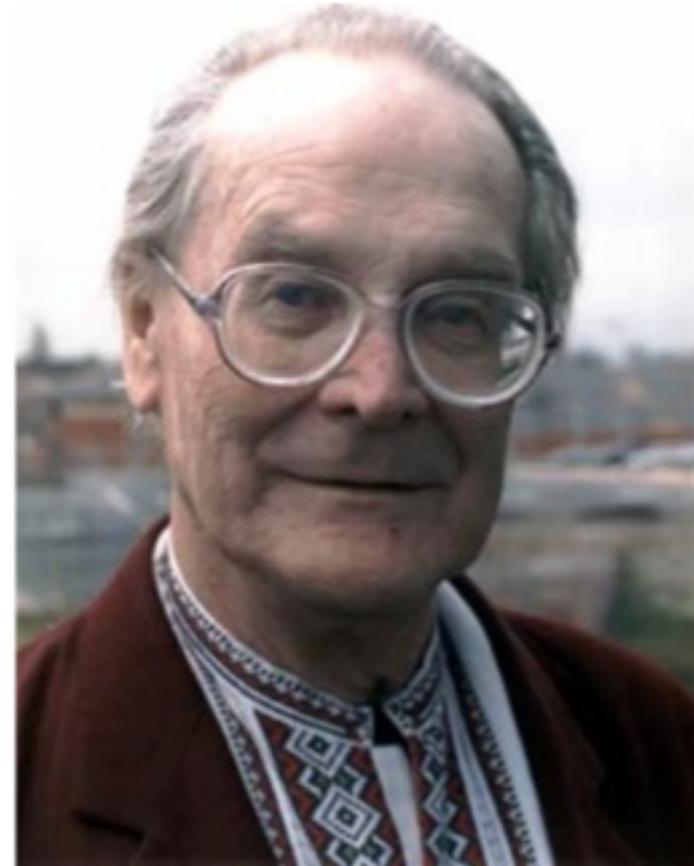


- Diet variable at best, laced with chemicals, stimulants and sugar
- Sedentary Life-Style
- Environment polluted (air, water, soil)
- Life-style: STRESSED; External focus; complicated, erratic; disconnected from nature; often feels out of control
- Overly warmed, highly insulated homes
- Social engagement on over-drive; constant talk, and communication with others via devices.



DR. BUTEYKO

- **1946- Commenced medical training at the First Medical Institute of Moscow**
- **Practical assignment involved monitoring breathing volume of patients**
- **Sicker they became- the heavier they breathe**
- **1952- brought down his high blood pressure by reducing his breathing towards normal**



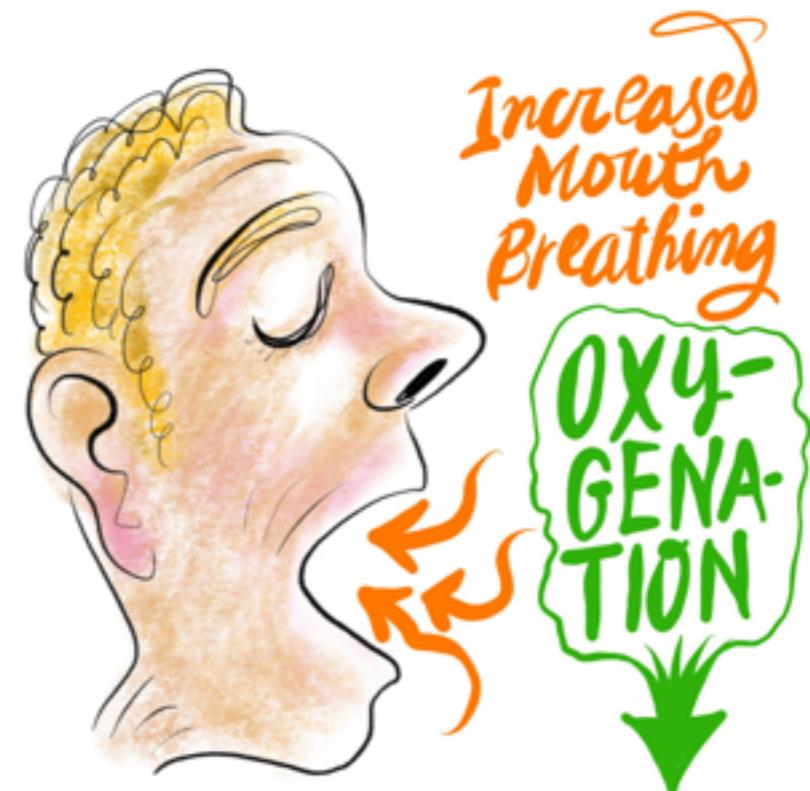
Functional Breathing

- Through the Nose
- Diaphragmatic
- Rhythmic (natural pause after ex.)
- Silent
- Invisible at rest
- Slow (between 8-12 breaths per minute)
- Low Volume
- Maintains proper CO₂/O₂ balance



Dysfunctional

- Often through the mouth
- Upper chest
- Irregular, chaotic
- Audible
- Visible
- Fast (between 15-20 breaths per minute)
- High Volume (sighing, coughing, sniffing, yawning, snoring)
- Lowers CO₂ to unhealthy levels



IMPACT OF CHANGING THE BREATH

- ANS - Autonomic Nervous System (fight-flight-freeze OR rest and digestion?)
- Heart Rate
- Blood pressure
- Oxygenation of tissue
- Digestion
- Elimination
- Immune Function
- Hormonal Balance
- Sleep
- Mental/Emotional state
- Cognition/Memory (due to circulation & levels of O2 to brain)
- pH balance
- Contraction/dilation of smooth muscle
- Energy levels

**The respiratory system is the only aspect of the ANS we can put in manual overdrive.
Through it there is the potential to transform every other system and the mind.**

HOW WE BREATHE MATTERS! ON AND OFF THE MAT!

In the beginning... there was the Nose



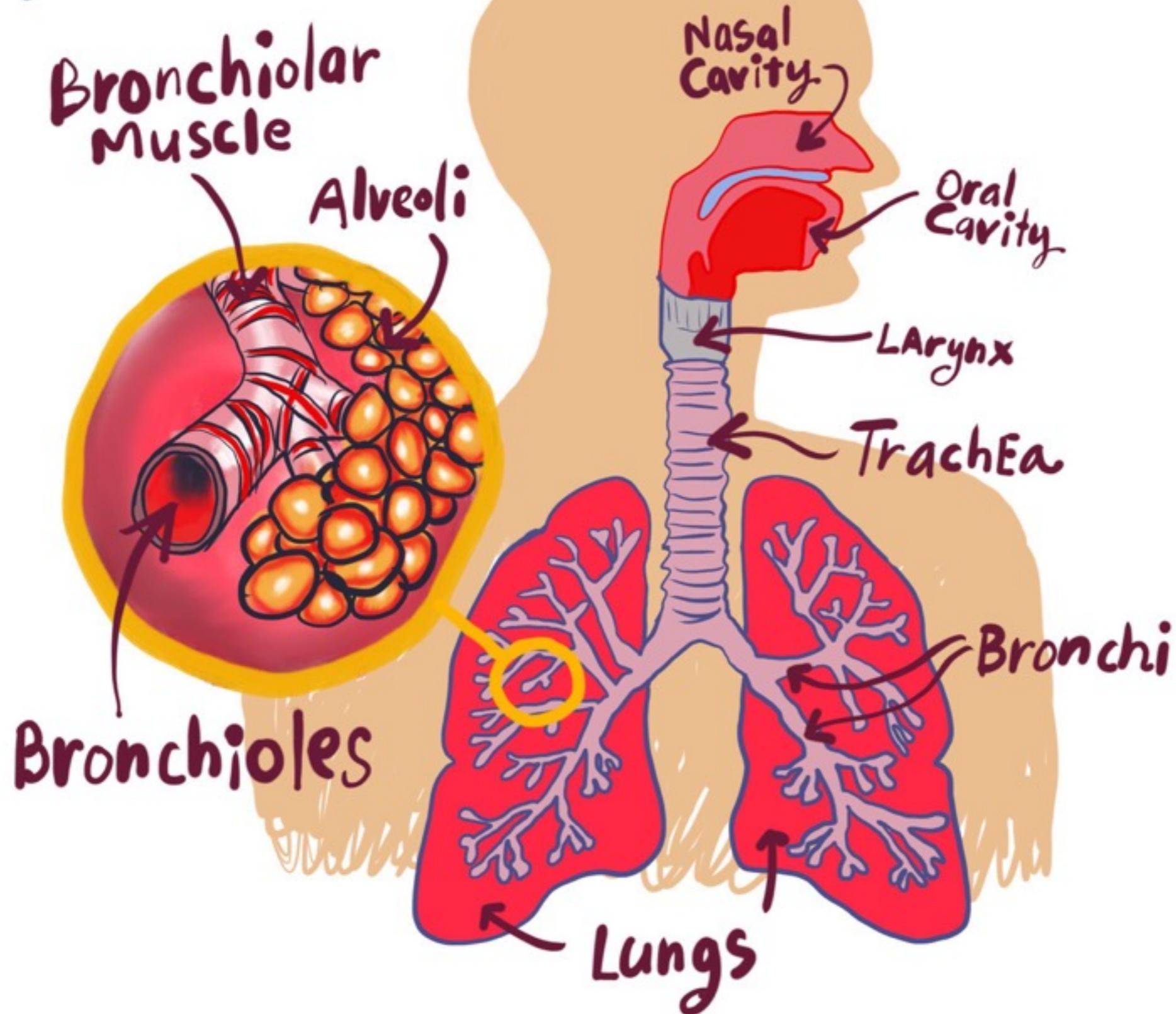
use less-
• congestion
• colds
• asthma
use more-
better health
& energy

- The nose has 30 unique health supportive functions.
- Small valves (relative to the mouth), keeps air flow low and regulated.
- Sterilizes, filters, warms and moistens the air to prepare it to enter the lungs
- Body's first line of defense (immune function).
- Nitric Oxide (named Molecule of the Year in 1992) also a smooth muscle dilator opens the upper airways and increases O2 uptake in the lungs. High concentration in the nasal passageways.

BREATHING BASICS

- When we inhale, we breathe oxygen into the lungs where it is then diffused into the blood.
- The process of delivering oxygen from the lungs to cells via the arterial system *is a separate process* - and this process of oxygenation of the tissues is not made more effective by breathing in more O₂ into the lungs
- CO₂ is produced through metabolism in the cells of the body and moves from the tissues into the venous system and delivered to the lungs where it is breathed out.
- Oxygen is needed by the mitochondria within the cells to process carbohydrate, sugars & fats and turn it into fuel (ENERGY)
- CO₂ at sufficient levels is required to release the O₂ from the blood and into the cells. (Bohr effect)

RESPIRATORY TRACT



BREATHING BASICS

- Exchange of O₂ and CO₂ between the lungs and blood takes place in the alveoli (air sacs) This is known as ventilation/perfusion.
- There is more blood in the lower lobes of the lungs so emphasizing diaphragmatic breathing is more efficient. (by 15%!!)
- Gases are carried through the body via the blood cells (like buses traveling on highways - the arterial system)
- Gas exchange between blood and tissues happens throughout the body and converted into energy.

WHAT EFFECTS THE BREATH? EVERYTHING!!!

- Stress Levels
- Life-Style
- Diet
- Exercise
- Thought-patterns
- Health



- Emotional state
- Medications
- Habit
- Amount of talking during the day

First step is to get us to Functional

Since all the variables mentioned before INCREASE breath rate and volume, the first step in breathing practice is to REDUCE our breathing to normal functional levels.



Definition of Hyperventilation:

“Hyperventilation has a strict physiological meaning of breathing in excess of metabolic requirements. This means that ventilation is too high in relation to the rate of CO₂ production, thus leading to a fall in PCO₂ (Pulmonary CO₂) below the normal range, and therefore arterial hypocapnia (below normal CO₂ in the blood).”

Behavioral and Psychological Approaches to Breathing Disorders,
Edited by Beverly H. Timmons and Ronald Ley,
pg. 101

The Respiratory Center in the brain responds to function: *How we breathe develops our breathing pattern.*

***The more we breathe - the more we need to breathe.
The less we breathe - the less we need to breathe.***

What's better? MORE or **less** ?

VOLUME MATTERS!!

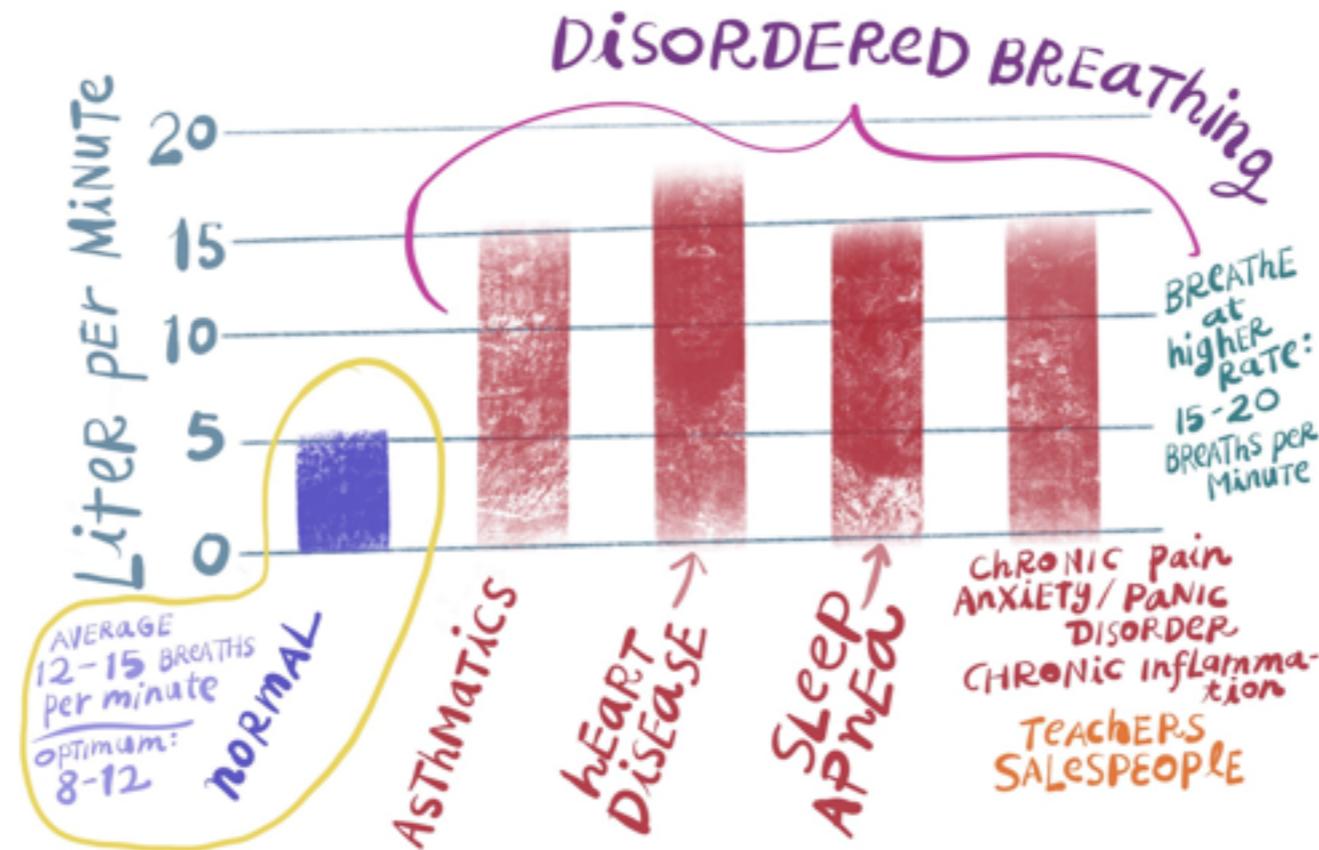
Signs of Hyperventilation

May not be obvious: The person may breathe a little more rapidly and deeply than metabolic needs. May cough, sigh, yawn or sniff frequently.

May be prone to snoring and sleep apnea.

May gasp before or during speaking as a matter of habit.

Increased respiratory rate does not increase O2 levels, but does decrease CO2 levels, first from the lungs and then from the bloodstream, which eventually de-oxygenates the tissues.



Slowing breath rate without addressing tidal volume does not normalize levels. This is the primary issue with most yoga approaches to pranayama.

Symptoms Linked to Hyperventilation

- Swollen lymph glands
- Dry Skin, Mouth, Eyes
- High Blood Pressure
- Food allergies
- Constipation
- Bloating
- Excessive flatulence
- Brain fatigue
- Abdominal spasms
- Anal irritation
- Hemorrhoids
- Food Cravings
- Sluggishness
- Depression
- Chronic fatigue
- Osteoporosis
- Seizure disorder
- Dizziness
- Cold Hands/Feet (Raynaud's Syndrome)
- Blood Pressure (high and low)
- Shortness of breath
- Chest Breathing
- Anxiety/Panic
- Asthma, COPD
- Insomnia
- Snoring/Sleep Apnea
- Restless Leg Syndrome
- Anaphylactic reactions
- TMJ
- Chronic Cough
- Stuffy Nose, Sinusitis, Hay Fever
- Anterior Head Carriage
- Postural Issues
- Heartburn (GERD)
- Migraines
- Muscle cramps
- Multiple chemical sensitivities
- Muscle pain
- Myofascial pain
- Mood swings
- Poor exercise tolerance
- Poor immunity
- Poor memory

Over breathing Can Happen to Anyone

- Anyone experiencing stress, short term or long term.
- Increased stress increases SNS activation which increases HR and Breath Rate
- Once the over breathing habit is started, one big sigh or deep (big) breath an hour is enough to perpetuate and create HV.
- One can be an over breather and nasal breathe.
- Once over breathing is established, tolerance to CO₂ goes down and attempting to raise that ceiling leaves one feeling out of breath which perpetuates the cycle.

Why CO2 Matters

THE POWER OF CO2

- CO2 regulates breathing (determines breath rate and volume)
- CO2 levels control whether or not O2 is released into the tissues. (known as the Bohr effect)
- CO2 dilates smooth muscle: arteries, airways, intestines and reproductive organs and more...
- CO2 creates carbonic acid which acts as a natural anti-oxidant or buffer from free radicals (created by too much O2) Reduces histamine production - lowers inflammatory markers
- CO2 controls the body's pH

Our life depends on CO2 levels being maintained at optimum levels, 40 mmHg. When those levels drop it sets off a cascade of physiologic and psycho-emotional imbalances which can lead to multiple health disease processes and disorders - and even death.



Gas Basics

- 21% of atmospheric air is O₂ and .04% CO₂
- Most of what we breathe in and out is nitrogen (78%)
- We live in a sea of O₂. There is an abundance of it!
- There is virtually no CO₂ in the air we breathe in. It must be synthesized by metabolism (we make it!)
- Loss or retention of CO₂ relies on how we breathe: How much and how fast (volume and rate)
- The lungs always retain some air inside (a reserve of O₂ at our disposal)

SEEMINGLY COUNTER INTUITIVE

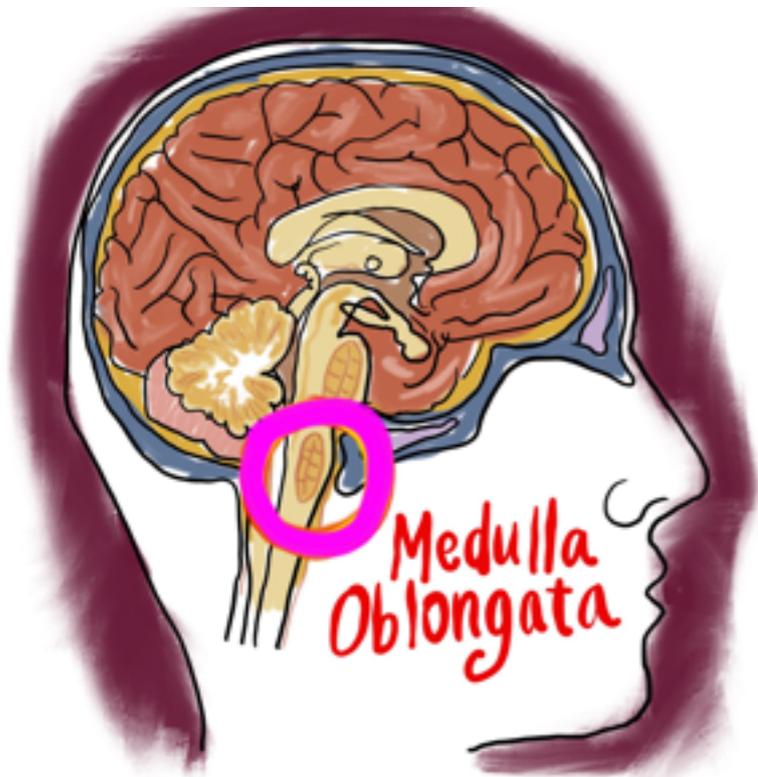
- Despite normal O₂ content in the blood, tissue cells can be starved of O₂ if the Hemoglobin holds onto the O₂ and does not release it to the cells.
- This can happen with hyperventilation because CO₂ drops in the blood which causes the Hemoglobin to hold onto its oxygen (The Bohr effect)
- When tissues don't get enough O₂ they produce lactic acid which makes muscles achy and tired (fibromyalgia, chronic fatigue)
- Hypocapnia (low CO₂) also reduces O₂ flow to the brain (2% decrease in flow per 1mmHg reduction in arterial CO₂), leading to brain fog, lack of concentration and memory problems.



The Mighty Medulla

The Medulla contains the cardiac, respiratory, vomiting and vasomotor centers and therefore deals with the autonomic functions of breathing, heart rate and blood pressure.

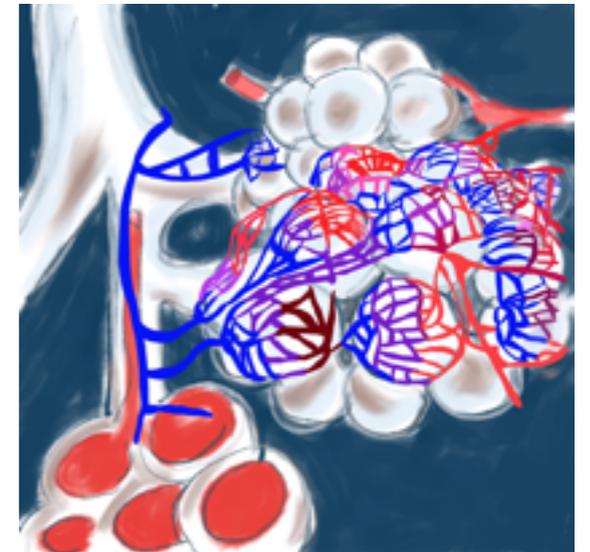
The Medulla 'reads' CO₂ levels in the blood in order to set breath rate and volume. Once a level is established (even if CO₂ level is sub-normal), the medulla is SLOW to change.



Respiratory Physiology in Brief



- Primary function of breathing is to oxygenate the cells of the body
- Proper oxygenation depends on the balance between O₂ and CO₂
- Healthy breathing is not a muscular process - it is about the exchange of gases in the lungs and in the tissues
- Breathing harder does not increase oxygenation (in fact: it does the opposite!)
- Use of the nose is critical to proper breathing
- The lower lobes of the lungs have more blood flow, therefore efficient breathing is diaphragmatically driven (not chest) to increase ventilation and perfusion.
- The respiratory center in the brain (the medulla oblongata) responds to CO₂ levels not O₂ levels to signal how much and often we breathe (CO₂ sets our respiratory rate!)
- Slowing the rate of breath without lowering the volume will not change the set-point in the medulla



O₂/CO₂ exchange in the alveoli

How Would Buddha Breathe?



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Improper Breathing in Childhood



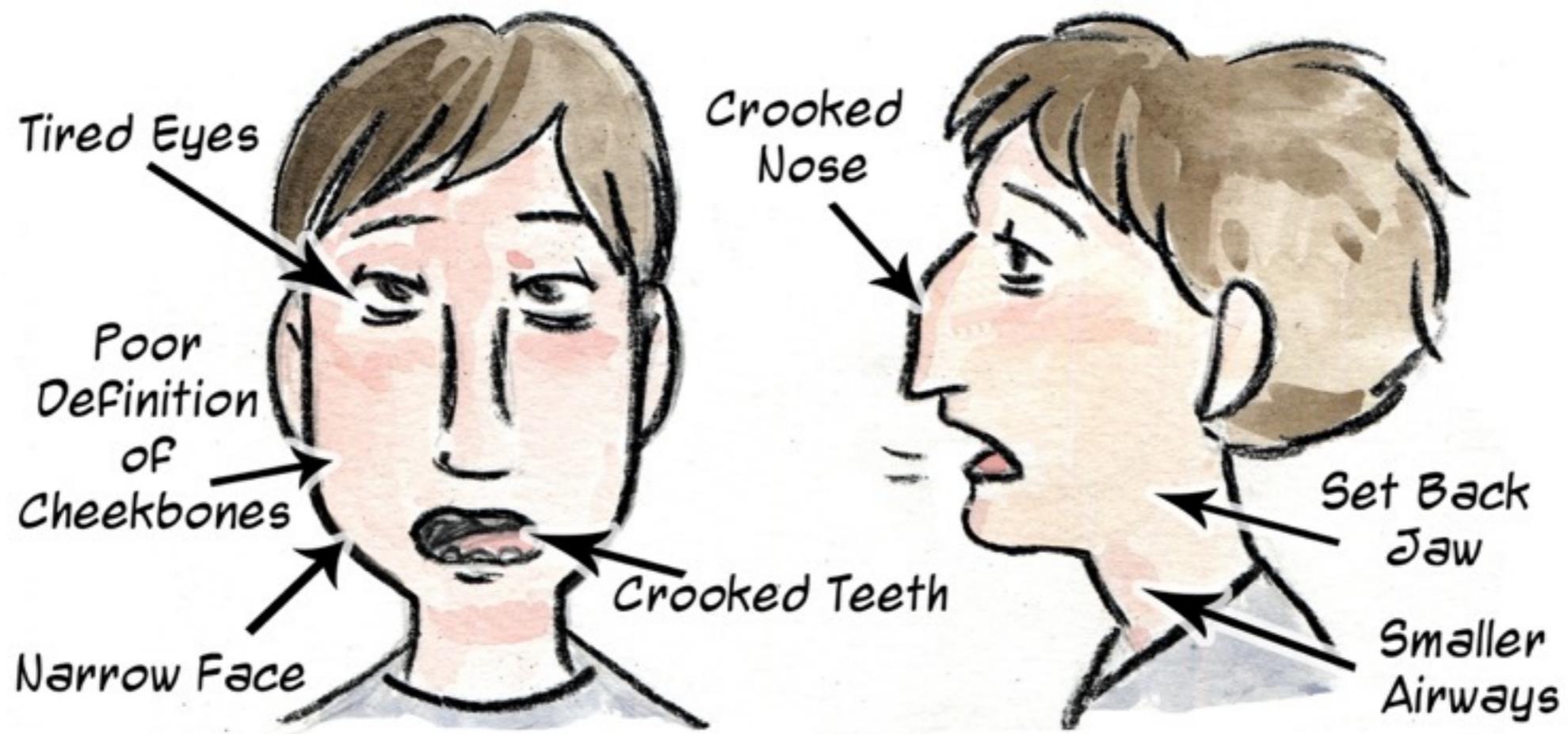
- Mouth Breathing in children can play a significant role in asthma, chronic respiratory infections, increase in cavities, sleep apnea and poor facial and jaw development and ADHD.
- The latter contributes to higher incident of orthodontic needs; structural maladies such as TMD; Anterior Head posture and kyphosis; and also impacts facial structure and appearance.

Improper Breathing in Childhood

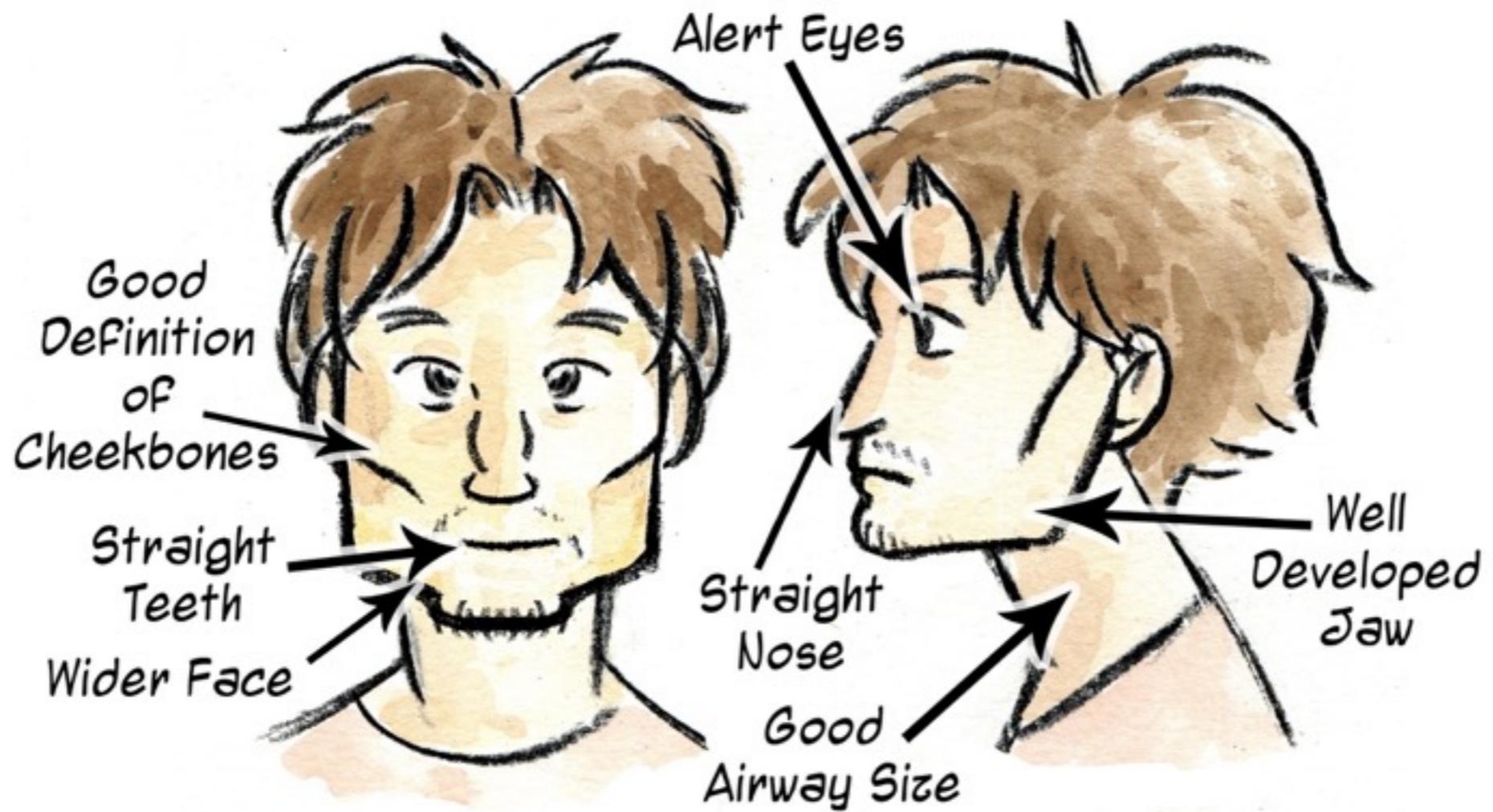
To identify the prevalence of mouth breathing in children at primary school ages from 6-9 years, researchers in Portugal examined 496 answered questionnaires from parents. It was found that **56.8%** of children in this study breathed through their mouth.

Felcar Jm, Bueno Ir, Massan Ac, Torezan Rp, Cardoso Jr. Prevalence of mouth breathing in children from an elementary school. *Cien Saude Colet*.2010 Mar; 15(2):437-44.



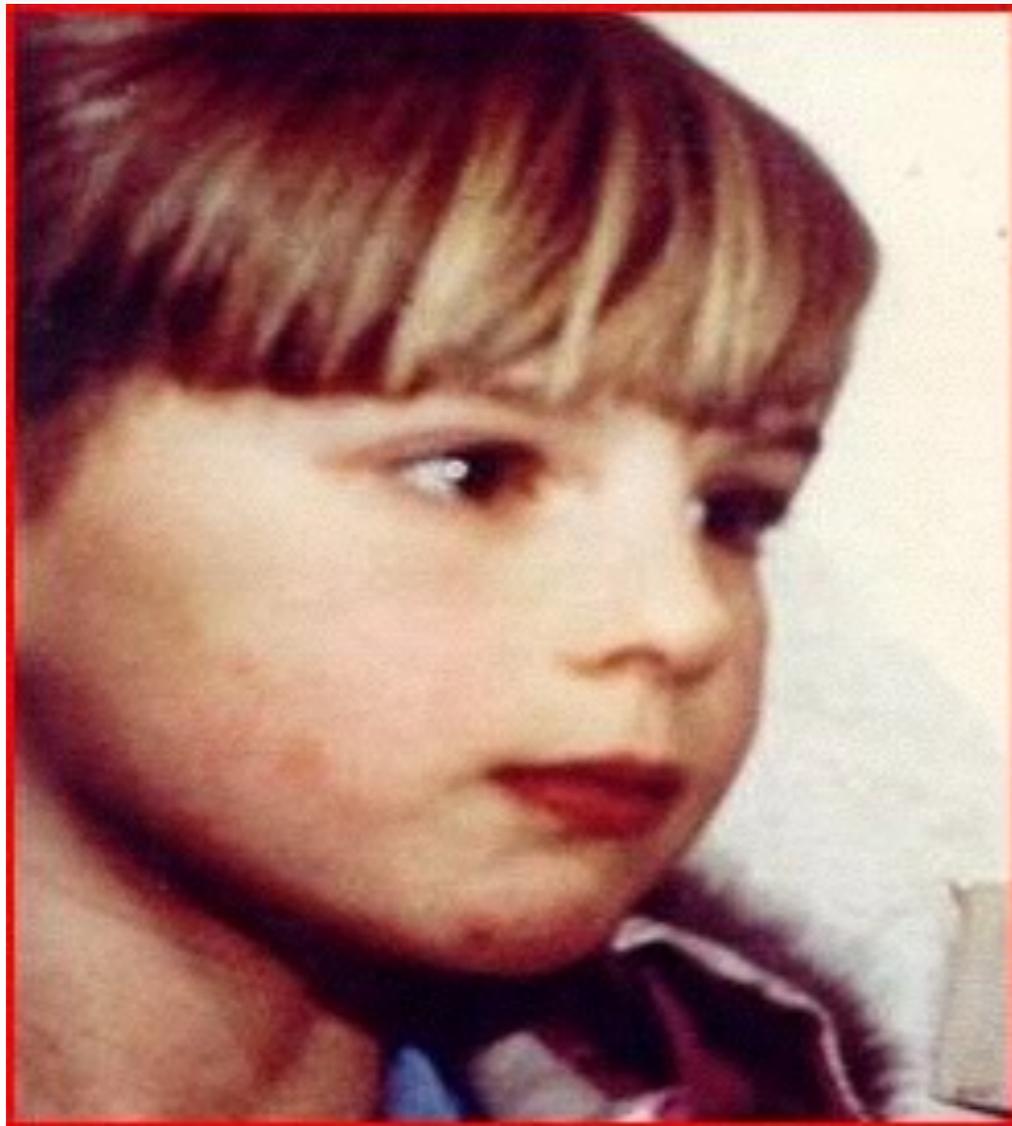


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Kelly 7 years



Samantha 8 ½ years

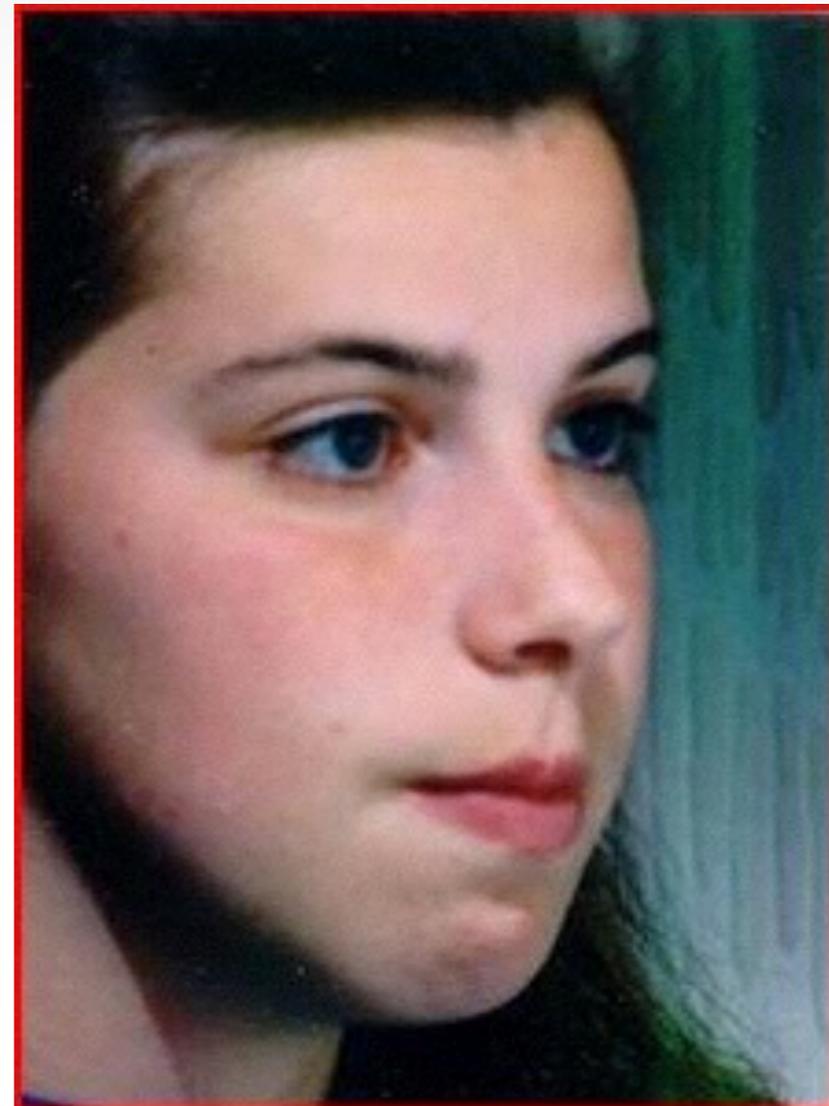


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Samantha



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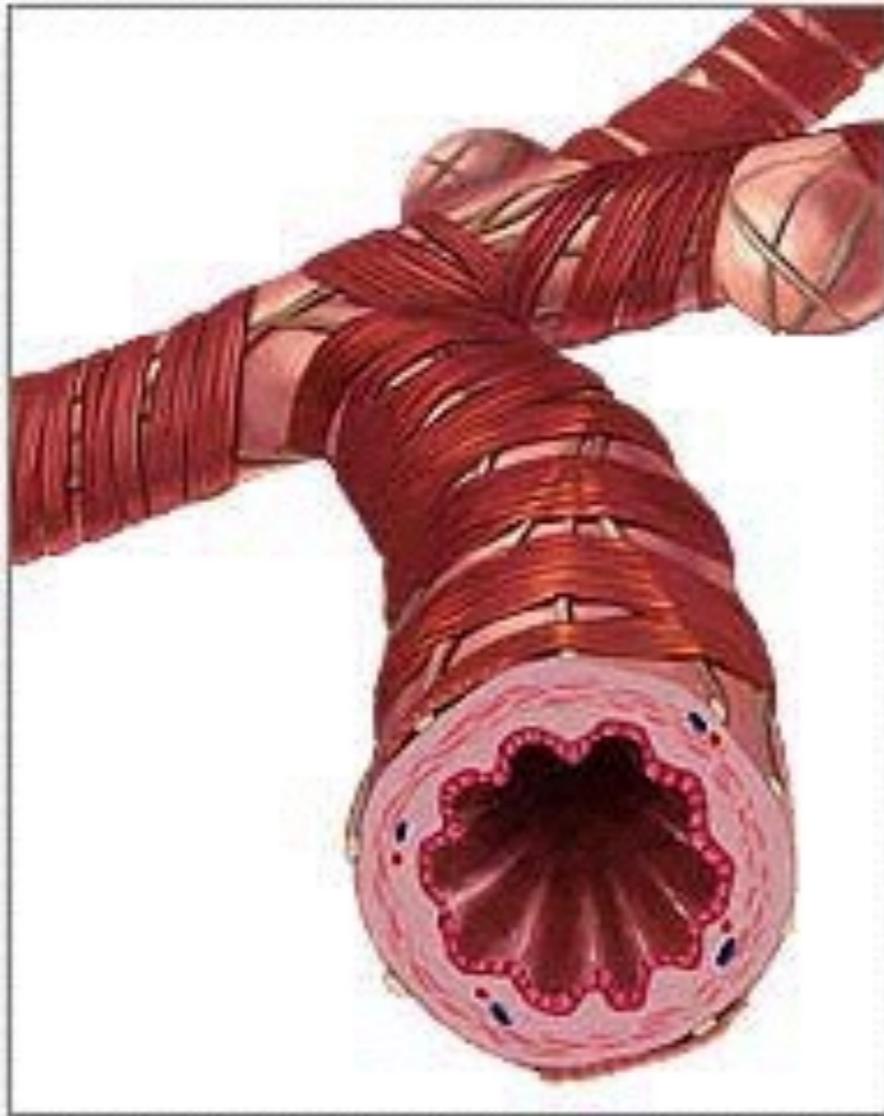
ASTHMA



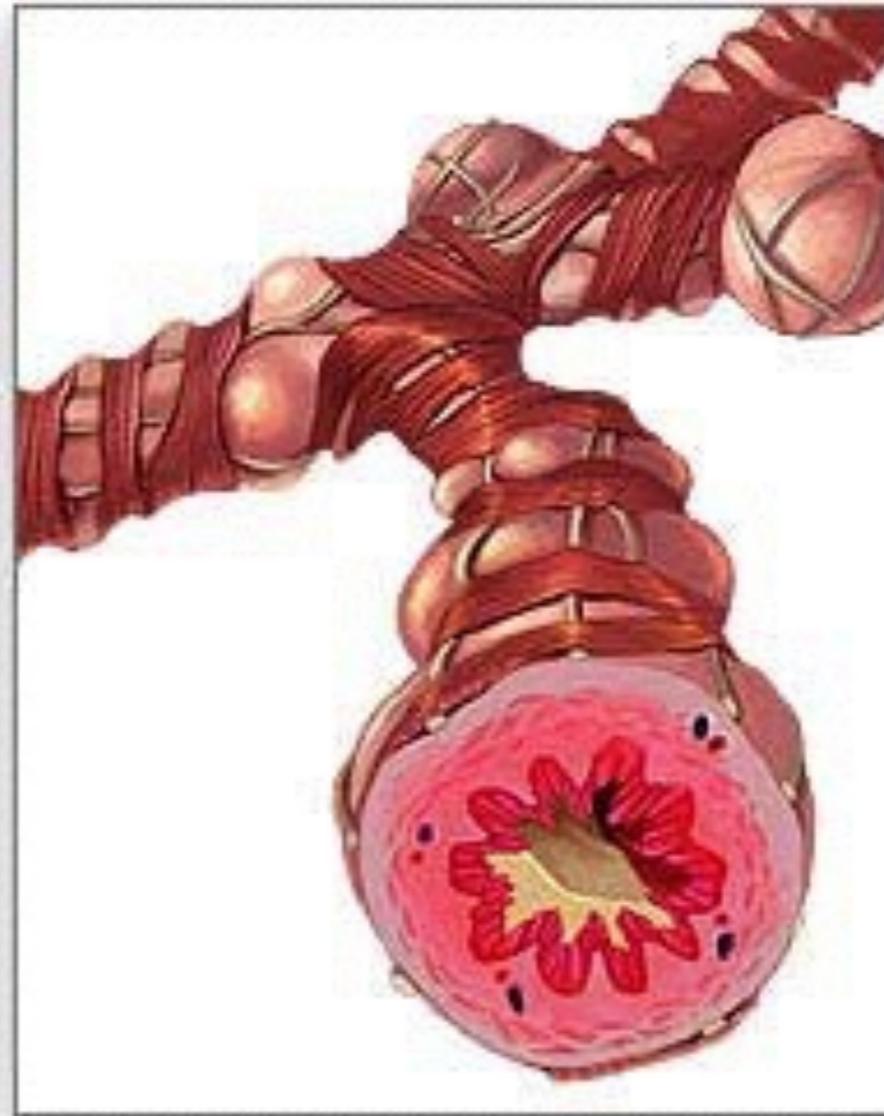
- 4-7% WORLDWIDE
- 4000 die in the US per year
- Rate has increased since 1970 but the mortality has decreased in the same time span
- Greater than 20 million in the US affected
- Greater than 6 million children - 8%!!!!
- Boys before puberty and girls after puberty
- Increased rate in African and Latin Americans
- Number of physician's visits: 10.5 million
- Leading cause of hospitalization and chronic illness in kids

ASTHMA AIRWAYS

Normal bronchiole



Asthmatic bronchiole



SNORING & SLEEP APNEA

- As we relax and prepare for sleep the breathing rate decreases with a slight increase in CO₂
- If our breath rate and volume are chronically high during the day, and CO₂ set-point low, we'll breathe heavily at night (snoring)
- On our back it's easy to mouth breathe which will decrease CO₂ levels further leading to Central Sleep Apnea
- Higher air volume will put excessive pressure on the upper airways causing them to collapse - Obstructive Sleep Apnea
- When on our side we breathe through the top nostril while the lower one is more full of fluid. This tends to support better breathing while asleep.
- *The heavier we breathe during the day, the heavier we will breathe at night!*



“The effect of heavy breathing explains decades of medical research and clinical observations that sleep and especially early morning hours (4-7 am) are the times of highest mortality rates for asthma, angina pectoris, stroke, seizures, and many other conditions.”

**Behavioral and Psychological Effects of Disordered Breathing Edited
by Timmons and Ley**

CONTINUOUS POSITIVE AIRWAY PRESSURE DEVICE (CPAP)





Functional Breathing in a Nutshell

- Always breathe through the nose 24/7
- Tape the mouth at night to ensure nasal breathing
- Breathe less and silently!
- Breathe diaphragmatically - not chest
- Breathe rhythmically with **low tidal volume** and at a slower rate - **LESS NOT MORE!!!**
- Build capacity to suspend the breath (hold after exhale) without disturbing breath flow (no gasping).



What's a Yoga Therapist To Do?



- **Practice subtle breathing and good breath hygiene:**
Observe what happens to you!
- **Encourage your students to become functional NOSE breathers!**
- **Experiment gently with pauses after exhale or work with the short breath holds only.**
- **Ask for feedback as to how students experience the softer breath. What do they notice?**
- **Educate yourself about the breath! Study with a Buteyko practitioner, read the original texts and learn more!**

IT'S ALL IN THE CUES

Relaxed: Maintain a gentle relaxation while working with the breath

Diaphragmatic: chest passive - gentle flare of the lower rib-cage.

Silent: if you can hear yourself breathe - it's too much!

Slow: a gentle wave of breath in & out, then pause between the breaths.

Subtle: LOW AND SLOW... light - like a feather, like Buddha

Nose: breathe through the nose 24/7 except with eating and talking - and do those less!

Slow Subtle Breathing

- Raises pulmonary CO₂ levels
- Cuts lung ventilation in half prompts blood levels of CO₂ to double.
- Brain blood vessels dilate and MORE blood can go to the brain
- Decreases inflammatory processes and restores pH balance
- Results in calm alertness and increased awareness.
- Increases vitality, decreases the need for sleep, reduces craving and supports aerobic fitness



Benefits of Pranayama According to the Sutras

“Lightness of the body, brilliance [on the face], increase of the digestive fire, and slimness of the body —- these occur definitely”

Yoga Sutras of Patanjali, (from the Yoga-bhaskara, referencing the effect of pranayama, specifically kumbhaka retention to be practiced intensely four times a day),

Yoga Sutras of Patanjali, Swami Veda Bharati, pg. 724

“By regular and prolonged practice of pranayama, the breath can be effortlessly suspended for lengthy periods. The breath is then considered to be long (dirgha) and subtle (sukshmah), which is highly supportive of deep concentration and samadhi.”

**Yoga Sutra 2:50 of Patanjali, Sadhana Pada,
Baba Hari Das, pg. 184**

air diet



“The greatest tapas of all is to transform the breath.”

**Commentary by Vyasa
Patanjali’s Yoga Sutra**

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