“Breath: The New Science of a Lost Art” by James Nestor

INTRODUCTION

Yes, breathing in different patterns really can influence our body weight and overall health. Yes, how we breathe really does affect the size and function of our lungs. Yes, breathing allows us to hack into our own nervous system, control our immune system, and restore our health. Yes, changing how we breathe will help us live longer.

No matter what we eat, how much we exercise, how resilient our genes are, how skinny of young or wise we are — none of it will matter unless we’re breathing correctly. That’s what these researchers discovered. The missing pillar in health is breath. It all starts there.

1. THE EXPERIMENT

THE WORST BREATHERS IN THE ANIMAL KINGDOM

Of the 5,400 different species of mammals on the planet, humans are now the only ones to routinely have misaligned jaws, overbites, underbites, and snaggled teeth, a condition formally called malocclusion.

Evolution doesn't always mean progress. It means change. And life can change for better or worse. Today, the human body is changing in ways that have nothing to do with the "survival of the fittest." Instead, we're adopting and passing down traits that are detrimental to our health. This concept, called dysevolution, and it explains why our backs ache, feet hurt, and bones are growing more brittle. Dysevolution also helps explain why we're breathing so poorly.

The more we cooked, the more soft, calorie-rich food we consumed, the larger our brains grew and the tighter our airways became.

In colder climates, our noses would grow narrower and longer to more efficiently heat up air before it entered our lungs; our skin would grow lighter to take in more sunshine for production of vitamin D. In sunny and warm environments, we adapted wider and flatter noses, which were more efficient at inhaling hot and humid air; our skin would grow darker to protect us from the sum. Along the way, the larynx would descend in the throat to accommodate another adaption: vocal communication.

Lowered larynx became less efficient at its original purpose. Sapiens would become the only animals, and the only human species, that could easily choke on food and die.

None of this mattered to the early humans, of course. For tens of thousands of years, our ancestors would use their wildly developed heads to breathe just fine.

MOUTHBREATHING

Simply training to breathe through your nose could cut total exertion in half and offer huge gains in endurance. The athletes felt invigorated while nasal breathing rather than exhausted.

How the body makes energy from air and food. There are two options: with oxygen, a process known as aerobic respiration, and without it, which is called anaerobic respiration.

Anaerobic energy is generated only with glucose (a simple sugar), and it's quicker and easier for our bodies to access. It's a kind of backup system and turbo boost when the body doesn't have enough oxygen. But anaerobic energy is inefficient and can be toxic, creating an excess of lactic acid.

When we run our cells aerobically with oxygen, we gain some 16 times more energy efficiency over anaerobic. The key for exercise, and for the rest of life, is to stay in that energy-efficient, clean-burning, oxygen-eating aerobic zone for the vast majority of time during exercise and at all times during rest.

Finding the best heart rate for exercise is easy: subtract your age from 180. The result is the maximum your body can withstand to stay in the aerobic state. Long bouts of training and exercise can happen below this rate but never above it, otherwise the body will risk going too deep into the anaerobic zone for too long.

Mouthbreathing, it turns out, changes the physical body and transforms airways, all for the worse.

2. THE LOST ART AND SCIENCE OF BREATHING

NOSE

The interior of the nose is blanketed with erectile tissue, the same flesh that covers the penis, clitoris, and nipples. Noses get erections. As sexual stimulation weakens and erectile tissue becomes flaccid, the nose will too.

Nasal erectile tissue mirrored states of health. It would become inflamed during sickness or other states of imbalance.

The right nostril is a gas pedal. When you're inhaling primarily through this channel, circulation speeds up, your body get hotter, and cortisol levels, blood pressure, and heart rate all increase.

The left nostril is more deeply connected to the parasympathetic nervous system, the rest-and-relax side that lowers temperature and blood pressure, cools the body, and reduces anxiety.

Our bodies operate most efficiently in a state of balance, pivoting between action and relaxation, daydreaming and reasoned thought. This balance is influenced by the nasal cycle, and may even be controlled by it. It's a balance that can also be gamed.

There's yoga practice dedicated to manipulating the body's functions with forced breathing through the nostrils. It's called nadi shodhana, or more commonly, alternate nostril breathing.

Working together, the different areas of the turbinates will heat, clean, slow and pressurize air so that the lungs can extract more oxygen with each breath. This is why nasal breathing is far more healthy and efficient than breathing through the mouth.

The health benefits of nose breathing are undeniable. One of the many benefits is that the sinuses release a huge boost of nitric oxide, a molecule that plays an essential role in increasing circulation and delivering oxygen into cells. Immune function, weight, circulation, mood, and sexual function can all be heavily influenced by the amount of nitric oxide in the body.

Nasal breathing alone can boost nitric oxide sixfold, which is one of the reasons we can absorb about 18 percent more oxygen than by just breathing through the mouth.

Keeping the nose constantly in use trains the tissue inside the nasal cavity and throat to flex and stay open

EXHALE

Just a few minutes of daily bending and breathing can expand lung capacity. With that extra capacity we can expand our lives.

The smaller and less efficient lungs became, the quicker subjects got sick and died. The cause of deterioration didn't matter. Smaller meant shorter. But larger lungs equaled longer lives.

Any regular practice that stretches the lungs and keeps them flexible can retain or increase lung capacity. Moderate exercise like walking or cycling has been shown to boost lung size by up to 15 percent.

The most important aspect of breathing wasn't just to take in air through the nose. Inhaling was the easy part. The key to breathing, lung expansion, and the long life that came with it was on the other end of respiration. It was in the transformative power of a full exhalation.

Over time, shallow breathing will limit the range or our diaphragms and lung capacity and can lead to the high-shouldered, chest-out, neck-extended posture common in those with emphysema, asthma, and other respiratory problems.

SLOW

The best way to prevent many chronic health problems, improve athletic performance, and extend longevity was to focus on how we breathed, specifically to balance oxygen and carbon dioxide levels in the body. To do this, we'd need to learn how to inhale and exhale slowly.

For every ten pounds of fat lost in our bodies, eight and a half pounds of it comes out through the lungs; most of it is carbon dioxide mixed with a bit of water vapor. The rest is sweated or urinated out.

For a healthy body, overbreathing or inhaling pure oxygen would have no benefit, no effect on oxygen delivery to our tissues and organs, and could actually create a state of oxygen deficiency, leading to relative suffocation.

When breathing at a normal rate, our lungs will absorb only about a quarter of the available oxygen in the air. The majority of that oxygen is exhaled back out. By taking longer breaths, we allow our lungs to soak up more in fewer breaths.

The resonant breathing offered the same benefits as meditation for people who didn't want to meditate. Or yoga for people who didn't like to get off the couch It offered the healing touch of prayer for people who weren't religious.

LESS

Just as we've become a culture of overeaters, we've also become a culture of overbreathers. Most of us breathe too much, and up to a quarter of the modern population suffers from more serious chronic overbreathing.

The key to optimum breathing, and all the health, endurance, and longevity benefits that come with it, is to practice fewer inhales and exhales in a smaller volume. To breathe, but to breathe less.

Slower, longer exhales, of course, mean higher carbon dioxide levels. With that bonus carbon dioxide, we gain a higher aerobic endurance. This measurement of highest oxygen consumption, called V02 max, is the best gauge of cardiorespiratory fitness. Training the body to breathe less actually increases V02 max, which can not only boost athletic stamina but also help us live longer and healthier lives.

Breathing less offered huge benefits. If athletes kept at it for several weeks, their muscles adapted to tolerate more lactate accumulation, which allowed their bodies to pull more energy during states of heavy anaerobic stress, and, as a result, train harder and longer.

All of them claimed to have gained a boost in performance and blunted the symptoms of respiratory problems, simply by decreasing the volume of air in their lungs and increasing the carbon dioxide in their bodies.

CHEW

Our ancient ancestors chewed for hours a day, every day. And because they chewed so much, their mouths, teeth, throats, and faces grew to be wide and strong and pronounced. Food in industrialized societies was so processed that it hardly required and chewing at all.

For the majority of the population, the best medicine is preventative. It involves reversing the entropy in our airways so that we can avoid sleep apnea, anxiety, and all the chronic respiratory problems as we grow older. It involves expanding the too-small mouth.

Removing teeth and pushing remaining teeth backward only made a too-small mouth smaller. A smaller mouth might be easy for dentist to manage, but it also offered less room to breathe.

The first step to improving airway obstruction wasn't orthodontics but instead involved maintaining correct "oral posture". It just meant holding the lips together, teeth lightly touching, with your tongue on the roof of the mouth. Hold the head up perpendicular to the body and don't kink the neck. When sitting or standing the spine should form a J-shape — perfectly straight until it reaches the small of the back, where it naturally curves outward. While maintaining this posture, we should always breathe slowly through the nose into the abdomen.
"mewing" After a few months, mewers have claimed their mouths expanded, jaws became more defined, sleep apnea symptoms lessened, and breathing became easier.

As bone degrades deeper in the skull, soft tissues at the back of the throat have less to hang on to, so they can droop too, which can lead to airway obstruction. This bone loss partly explains why snoring and sleep apnea often grow worse the older we get.

Unlike other bones in the body, the bone that makes up the center of the face, called the maxilla, is made of a membrane bone that's highly plastic. The maxilla can remodel and grow more dense into our 70s, and likely longer.

Chewing. The more we gnaw, the more stem cells release, the more bone density and growth we'll trigger, the younger we'll look and the better we'll breathe.

Our noses and mouths are not predetermined at birth, childhood, or even in adulthood. We can reverse the clock on much of the damage that's been done in the past few hundred years by force of will, with nothing more than proper posture, hard chewing, and perhaps some mewing.

3. BREATHING+

MORE, ON OCCASION

Breathing, as it happens, is more than just a biochemical or physical act; it's more than just moving the diaphragm and sucking in air to feed hungry cells and remove wastes. The tens of billions of molecules we bring into our bodies with every breath also serve a more subtle, but equally important role. They influence nearly every internal organ, telling them to turn on and off. They affect heart rate, digestion, moods, attitudes; when we feel aroused, and when we feel nauseated. Breathing is a power switch to a vast network called the autonomic nervous system.

The deeper and more softly we breathe in and the longer we exhale, the more slowly the heart beats and the calmer we become.

Professional surfers, mixed martial arts fighters, and Navy SEALs use Tummo-style breathing to get into the zone before a competition or black ops mission. It's also especially useful for middle-aged people who suffer from lower-grade stress, aches and pains, and slowing metabolisms. For them — Tummo can be a preventative therapy, a way to get a fraying nervous system back on track and keep it there.

Sometimes the body needs more than a soft nudge to get realigned. Sometimes it needs a violent shove. That's what Tummo does.

Breathing really fast and heavy on purpose flips the vagal response on the other way, shoving us into a stressed state. It teaches us to consciously access the autonomic nervous system and control it, to turn on heavy stress specifically so that we can turn it off and spend the rest of our days and nights relaxing and restoring, feeding and breathing.

Tummo heated the body and opened up the brain's pharmacy, flooding the bloodstream with self-produced opioids, dopamine, and serotonin. All that, with just a few hundred quick and heavy breaths.

This flip-flopping — breathing all-out, then not at all, getting really cold and the hot again — is the key to Tummo's magic. It forces the body into high stress one minute, a state of extreme relaxation the next. Carbon dioxide levels in the blood crash, then they back up. Tissues become oxygen deficient and then flooded again. The body becomes more adaptable and flexible and learns that all these physiological responses can come under our control.

HOLD IT

The nagging need to breathe is activated from a cluster of neurons called the central chemoreceptors, located at the base of the brain stem. When we're breathing too slowly and carbon dioxide levels rise, the central chemoreceptors monitor these changes and send alarm signals to the brain, telling our lungs to breathe faster and more deeply. When we are breathing too quickly, these chemoreceptors direct the body to breathe more slowly to increase carbon dioxide levels. This is how our bodies determine how fast and often we breathe, not by the amount of oxygen, but by the level of carbon dioxide.

Eighteen percent of Americans suffer from some form of anxiety or panic, with these numbers rising every year. Perhaps the best step in treating them, and hundreds of millions of others around the world, was by first conditioning the central chemoreceptors and the rest of the brain to become more flexible to carbon dioxide levels. By teaching anxious people the art of holding their breath.

Up to 80 percent of office workers suffer from something called continuous partial attention. We'll scan our email, write something down, check Twitter, and do it all over again, never really focusing on any specific task. In this state of perpetual distraction, breathing becomes shallow and erratic. Sometimes we won't breathe at all for a half minute or longer.

The breathholding that occurs in sleep and constant partial attention is unconscious — it's something that happens to our bodies, something that's out of our control. The breathholding practiced by the ancients and revivalists is conscious. These are practices we ourselves to do. And when we do them properly, I'd heard they can work wonders.

FAST, SLOW, AND NOT AT ALL

Ancient yogis spent thousands of years honing pranayama techniques, specifically to control this energy and distribute it throughout the body to provoke their "good visions," toned down a notch or two. This process should take several months or years to master.

The key to Sudarshan Kriya, Tummo, or any other breathing practice rooted in ancient yoga is to learn to be patient, maintain flexibility, and slowly absorb what breathing has to offer.

The names may have changed over the years, the techniques may have been repurposed and repackaged in different cultures at different times for different reasons, but they were never lost, They've been inside us all this time, just waiting to be tapped. They give us the means to stretch our lungs and straighten our bodies, boost blood flow, balance our minds and moods, and excite the electrons in our molecules. To sleep better, run faster, swim deeper, live longer, and evolve further. They offer a mystery and magic of life that unfolds a little more with every new breath we take.

A LAST GASP

Like all Eastern medicines, breathing techniques are best suited to serve as preventative maintenance, a way to retain balance in the body so that milder problems don't blossom into more serious health issues. Should we lost that balance from time to time, breathing can often bring it back.

The perfect breath is this: Breathe in for about 5.5 seconds, then exhale for 5.5 seconds. That's 5.5 breaths a minute for a total of about 5.5 liters of air. You can practice this perfect breathing for a few minutes, or a few hours. There is no such thing as having too much peak efficiency in your body.

Quotes:

"Each breath we draw in should take about three seconds, and each breath out should take four. We'll then continue the same short inhales while lengthening the exhales to a five, six, and seven count as the run progresses."

"Left-nostril breathing shifts blood flow to the opposite side of the prefrontal cortex, the right area that plays a role in creative thought, emotions, formation of mental abstractions, and negative emotions."

“he noticed that patients in the worst health all seemed to breathe far too much. The more they breathed, the worse off they were, especially those with hypertension”

“Prayer heals, especially when it’s practiced at 5.5 breaths a minute.”

“the greatest indicator of life span wasn’t genetics, diet, or the amount of daily exercise, as many had suspected. It was lung capacity.”

“50 percent of kids with ADHD were shown to no longer have symptoms after having their adenoids and tonsils removed.”

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