Western research is now proving what yogis have known all along: Breath work can deliver powerful mind and body benefits. Your body breathes on autopilot—so why worry about how to inhale and exhale when you could be mastering an arm balance? For one thing, breath control, or pranayama, is the fourth of Patanjali’s eight limbs of yoga.

For another, scientific research is showing that mindful breathing—paying attention to your breath and learning how to manipulate it—is one of the most effective ways to lower everyday stress levels and improve a variety of health factors ranging from mood to metabolism. “Pranayama is at once a physical-health practice, mental-health practice, and meditation. It is not just breath training; it’s mind training that uses the breath as a vehicle,” says Roger Cole, PhD, an Iyengar Yoga teacher and physiology researcher in Del Mar, California. “Pranayama makes your entire life better.”

Despite the inherently automatic nature of breathing, most people have a lot to learn and improve upon when it comes to the most basic of our physiological functions. We tend to huff at a fairly quick clip most of the time—anywhere from 14 to 20 breaths per minute is the standard, which is about three times faster than the 5 or 6 breaths per minute proven to help you feel your best, says Patricia Gerbarg, MD, assistant clinical professor of psychiatry at New York Medical College and co-author of The Healing Power of the Breath.

“There is a very direct relationship between breath rate, mood state, and autonomic nervous system state,” says Sat Bir Singh Khalsa, PhD, assistant professor of medicine at Harvard Medical School who studies yoga and meditation. The autonomic nervous system governs the body’s sympathetic (fight-or-flight) and parasympathetic (rest-and-restore) responses, dialing functions like heart rate, respiration, and digestion up or down as necessary in response to potential threats. Evolutionarily, this worked as a survival mechanism, but today’s nonstop barrage of smartphone pings, emails, and news updates also trips the body’s alarms—and often.

“We’ve long known that breath changes in response to emotion: When people get panicky and anxious, their breath becomes shallow and rapid,” says Khalsa. “But we now know from a number of really good studies that actively changing the breath rate can actually change autonomic function and mood state.”

Here’s how researchers think it works: With each breath, millions of sensory receptors in the respiratory system send signals via the vagus nerve to the brainstem. Fast breathing pings the brain at a higher rate, triggering it to activate the sympathetic nervous system, turning up stress hormones, heart rate, blood pressure, muscle tension, sweat production, and anxiety. On the other hand, slowing your breathing induces the parasympathetic response, dialing down all of the above as it turns up relaxation, calm, and mental clarity.
The Air Cycle

Follow along to see what happens during one long, deep inhalation and exhalation.

On an Inhale

As you breathe in, the **diaphragm** (the dome-shaped muscle that primarily powers the breath) contracts, lowering and flattening. This increases the volume of the **thorax** (chest cavity enclosed by the rib cage), which not only makes room for the air coming into the **lungs** but also changes the atmospheric pressure inside the lungs, pulling air in. That air travels through your nostrils and into your nasal cavities, down through your **pharynx** (throat) and larynx (voice box), and into your trachea (windpipe). Next, it gets routed through the **bronchi** (passageways leading to the lungs) and **bronchioles** (passageways less than 1 millimeter in diameter) and into the lungs. Once in the lungs, the air reaches the **alveoli** (small air sacs), which serve as the marketplace for gas exchange: Oxygen (**O₂**, the food your cells need to produce energy) is traded for carbon dioxide (**CO₂**, the waste produced by energy production in cells) into and out of the bloodstream. Simultaneously, as you inhale, your heart rate speeds up, thanks to a message sent by stretch receptors within the alveoli to the **brainstem** (controls heart rate) and the **vagus nerve** (commands autonomic function), increasing blood flow through arteries (tubes that carry blood away from the heart) to the lungs so more blood can be oxygenated.

From the alveoli, **O₂** molecules move into **capillaries** (thin-walled blood vessels) and attach to red blood cells, which start making their way through the **pulmonary veins** (vessels that carry oxygenated blood to the heart) to the **left atrium**, or chamber, of the heart. Next, blood moves into the heart’s left ventricle, which then contracts (beats). The contraction pumps oxygen-rich blood through every single cell in the body via the network of arteries and capillaries.

On an Exhale

Inside cells, **mitochondria** (the energy-production centers) use oxygen to burn sugars, fats, and proteins for energy, and **CO₂** is a byproduct of this process. **CO₂** is biochemical waste—you don’t need it—so your body starts the process of shutting it out. **CO₂** travels through cell walls into the capillaries and then veins that carry **CO₂**-rich blood to the right atrium and right ventricle of the heart. Next, the right ventricle contracts, pushing the **CO₂**-rich blood out of the heart through the **pulmonic valve** into the pulmonary artery and back toward the lungs. As the blood enters the alveoli, the **CO₂** leaves the bloodstream and passes into the lungs. The **diaphragm** relaxes, decreasing the volume of and pressure in the thorax, and initiating an exhalation. Meanwhile, the heart rate slows, decreasing blood flow to the lungs and discouraging gas exchange while the lungs are still full of **CO₂**-heavy air. The pressure change in the lungs forces the air and **CO₂** waste back up and out of the lungs into the trachea, through the larynx, pharynx, and nasal cavities, to be exhaled through the nostrils. Ahhh…

A Driving Force

“Getting rid of carbon dioxide, not bringing in oxygen, is the main stimulus that drives us to breathe under most circumstances,” Cole says. In other words, your body’s drive
to boot what it doesn’t need is greater than its drive to acquire what it does. This is because too much CO2 makes the blood more acidic, which can impair the function of all of your body’s cells. Your brainstem is finely tuned to maintain the pH of the blood, so when the pH skews more acidic, it triggers the stress response and sends an urgent message to the diaphragm to initiate a breath to bring in more O2 and rebalance the blood.

1. **Happiness + emotional stability**
Manipulating the breath can alter how we feel, accounting for as much as a 40 percent variance in feelings of anger, fear, joy, and sadness, according to findings in the journal Cognition & Emotion. The breathing instructions used to evoke joy in the study? “Breathe and exhale slowly and deeply through the nose.” Sounds a lot like Ujjayi!

2. **Weight Loss**
Yogic breathing practices increase levels of leptin, a hormone produced by fat tissue that signals the brain to inhibit hunger, according to research from Shirley Telles, PhD, director of the Patanjali Research Foundation in Haridwar, India.

3. **Better exercise stamina**
A cardiologist at the University of Pavia, Italy, compared a group of mountaineers who practiced slow breathing an hour a day for two years before attempting to climb Mount Everest to a group who didn’t. The breathing group reached the summit without needing the supplemental oxygen the other group did, and their blood and exhalation samples showed they were using 70 percent of the surface area of their lungs, an amount that maximizes the O2 taken in.

4. ** Longer life**
Just one session of relaxing practices like meditation, yoga, and chanting influenced the expression of genes in both short-term and long-term practitioners, according to a Harvard study. Blood samples taken before and after the breathing practices indicated a post-practice increase in genetic material involved in improving metabolism and a suppression of genetic pathways linked with inflammation. Since chronic inflammation has also been associated with such deadly diseases as Alzheimer’s, depression, cancer, and heart disease, it’s probably fair to say that better breathing may not only change your life but may also save it.