



The science of breathing

Prana is a universal energy that flows in currents around your body.

Pranayama, the fourth limb of yoga, explores how this notion of

“life force” can shift your physiology. Are you ready to breathe

with conscious awareness and cultivate a higher vibration?

Words Jan Denecke Photography Gabrielle Fearn

Your breath is vital for your physical and mental health, something ancient yogis knew long before our time. They considered the breath an essential bridge between physical and non-physical, where controlled and conscious distribution of the breath supports energy and physical and mental clarity. The method for improving this quality is called *pranayama*.

Back to the roots

Pranayama (or *prānāyāma*) is a combination of two Sanskrit roots: *prana* and *ayama*. Prana means “life force” and is a subtle and vital energy that flows within. It is the force that gives you the ability to sense and develop physical and mental experiences. The second Sanskrit root, *ayama*, means “to stretch” or “to extend”, and it refers to the practice that enhances the distribution of prana throughout your body. But pranayama is not simply a spiritual practice. The physical and mental benefits of conscious breathing through pranayama have been established throughout multiple studies. It has been shown to improve cognition, alertness, anxiety, stress and overall wellbeing.

How you breathe

Your body automatically breathes in and out through the respiratory centre of your autonomic nervous system: you literally do not have to think about it. The medulla, or brainstem, is the part of your brain involved in involuntary functions of your body. It not only helps to regulate your breath; it also supports other functions such as your heart rate, digestion, sneezing and swallowing. Nerve cells in the medulla signal your diaphragm and intercostal muscles to contract and relax. The rate in which your body breathes is based on feedback signals. When oxygen concentrations in your blood are low and carbon

dioxide concentrations are high, and vice versa, nerves signal the respiratory centre in the medulla to increase the rate and depth of breathing. Unlike your heart rate and digestion, you can consciously control your breath. This is very helpful when you take a deeper breath before you dive into water, sing or play an instrument.

Take a breath

Diaphragmatic breathing, also known as abdominal breathing or belly breathing, uses a muscle called the diaphragm to pull and push air in and out of the lungs. It is a dome-shaped muscle that sits in the lower ribcage between the abdominal cavity and the thoracic cavity. During inhalation, the diaphragm and intercostal muscles contract and increase the volume of the chest. Breathing consciously and deep regularly trains and strengthens the diaphragm. This does not only increase the capacity of the lungs to expand and take in oxygen; it also improves the ability to relax more easily when you breathe out.

Deep diaphragmatic breathing increases the flow of oxygen to your cells, which improves the quality and performance of every single cell in your body, making your body more capable to stay healthy and do its work. This, for example, improves and strengthens your digestion, physical and mental performance, immune system, muscle strength, recovery, tension and detoxification.

Moving prana

Long before modern science, yogis understood the mechanism of conscious diaphragmatic breathing and its health benefits. There is only one difference: pranayama was seen as a spiritual and energetic process. According to yogic understanding, prana,

Pranayama enhances the restoration of the body’s physical and mental function by stretching the prana flow within the nadis.

or “life force”, is present and distributed through an intrinsic network of rivers called *nadis*. This network of approximately 72,000 nadis creates the link between your physical body and your mind and, if distributed well, helps you attain a higher state of vibrational energy and clarity. Pranayama often is wrongly translated as “breath control”. Even though the breath is consciously controlled, this does not capture the actual reasoning behind pranayama. Yes, several breathing techniques are used as a method to improve the potency of prana, but here the breath is simply the vehicle that transports and expands prana (energy) throughout the body.

The *Hatha Yoga Pradipika* is a compilation of yoga texts written around 1500 BC by yogi Swami Svatmarama. It describes the practice of pranayama as a method to clear the nadis from impurities, to steady the mind and to extend life by controlling prana through breath. In yogic physiology, it is believed that a blockage of nadis leads to a reduced flow of prana and, with that, reduced purity and vitality. For example, less healthy dietary choices, poor posture, negative and hateful thoughts or mental exhaustion can manifest in physical, mental or emotional difficulties. Pranayama therefore enhances the restoration of the body’s physical and mental function by stretching the prana flow within the nadis.

Breathe and calm down

Physical and emotional stress influences your autonomic nervous system and changes your breath. Your autonomic nervous system consists of two components: the sympathetic nervous system and the parasympathetic nervous system. Your brain perceives stress as a threat, leading to a fight-or-flight response. When this happens, physical and mental energy as well as alertness will be essential to help you remove the threat. Your sympathetic nervous system will start a cascade of biochemical reactions where adrenalin accelerates your survival response and cortisol helps to keep you going. As a result, your heartbeat increases, pushing blood into the muscles, heart and organs, while energy supplies are pumped into the bloodstream. During the response, your breath speeds up to stimulate oxygen supply

to the brain. Once the threat passes, your parasympathetic nervous system will dampen the stress response and help you return back to balance.

Not all stress is bad, though. Moderate exposure to stress, with recovery in between, can train you to become mentally and physically stronger, less reactive and more skilful at coping with stresses. For example, exerting yourself with physical exercise helps to train your nerves. Repeated “chronic” stress, however, is related to high blood pressure, cardiovascular risks, obesity and diabetes. It affects your brain and can contribute to anxiety, depression, insomnia and addiction. Conscious diaphragmatic breathing calms the nervous system and increases focus and concentration. Here, the vagus nerve is the key player of your parasympathetic nervous system.

Stretching your nervous system

The vagus nerve forms the connection between your brain, heart and lungs. It sends out messages to the body and brain to counteract the sympathetic nervous system. You can train this nerve through deep, controlled and conscious diaphragmatic breathing, which improves and fastens your parasympathetic nerve response. By training your vagus nerve, you become more capable of calming your body and mind during stress as well as reduce the risk of stress-related conditions.

Getting clear

Even though ancient yogis did not know the anatomic existence of the vagus nerve, improving the vagal tone actually “stretches” and “extends” your ability to calm down and increase your alertness, which is something we do through pranayama. This was described around 400 BCE in Patanjali’s *Yoga Sutras*, one of the most significant yoga texts. It is a collection of 196 verses (sutras) that discuss the theory and practice of yoga through eight steps, or limbs. Ultimately, these steps will lead to a union of the body, mind and spirit. Patanjali’s work describes moral behaviours and virtues, the effects of practising yoga, as well as the continuously deepening states of awareness, concentration and meditation.

Here, pranayama is described as the method that helps you remove obstacles to reach clear perception. It is the step that connects the physical practice of yoga with the deeper stages of higher awareness. Here, asana is a method to prepare the body by improving physical and mental posture, resilience and flexibility. Pranayama is the step towards deeper breath

awareness to help calm the mind, improve energy and increase clarity. When mastered, the body and mind are ready to move into concentration and meditation.

Today's research shows that vagal nerve stimulation will have an overall effect on your mental and emotional wellbeing. It increases your alertness, cognitive function and empathetic ability and brings you more in touch with the perceptions of your emotions. No wonder pranayama helps you gain clarity and deeper insights in your psyche.

Yogic brush

Conscious deep breathing through pranayama works like a brush and helps to clear and focus the mind. It sweeps and cleanses your body and mind, releasing you from tiredness, fogginess, poor attention and stress. Incorporating pranayama in your yoga practice improves awareness and prepares you for deeper meditation. It is an essential element to help you create space for energy, clarity, calmness and concentration.

Starting your pranayama practice

Pranayama is safe as long as your reactions are monitored. If you feel any dizziness, nausea, fatigue or light feelings of panic, simply open your eyes and pause the practice. Do not practise if you are pregnant or sick.



Preparation exercise 1



Preparation exercise 2



Yogic breathing

"Tatah kshiyate prakasha avaranam."

The regular practice of pranayama reduces the obstacles that inhibit clear perception. Patanjali's *Yoga Sutras*, Sutra 2.52

Aim to do your pranayama in the morning, as your mind often feels less cluttered at this time. Start with your yoga practice, then do your pranayama work and finish off with your meditation practice.

Practise pranayama in a comfortable seat. Ensure your spine is long and the upper body is upright, without causing any physical tension or tightening

Pranayama breathing consists of four parts: the inhalation, the exhalation and the pauses in between each breath. The short pauses in between the breaths help to distribute prana and stimulate deeper concentration. The best way to start is by counting the inhalation, the pause after the inhalation, the exhalation and the pause after the exhalation. A count of 3-1-3-1 is a great rhythm to start with.

Be patient and practise one pranayama technique at a time. Start with less repetition of the technique and build up from there.

Three pranayama techniques

Each round of each technique can be repeated 5-10 times. Rest after each technique for a minute or two in a comfortable meditation seat.



Nadi shodhana (alternate nostril breathing)

Shodhana means purification in Sanskrit. This technique purifies the nadis and nourishes the body and mind with extra oxygen supply. It is an optimal pranayama technique that creates clarity and focus as it helps to reduce stress and anxiety.

Sit upright with the right thumb on the right outer nostril and the right ring finger on the left nostril.

Rest your index and middle fingers in between the eyebrows. Close the right nostril with the thumb and slowly inhale through the left (to a count of 3), close the left nostril and pause the breath (to a count of 1), exhale out through the right (to a count of 3), pause the breath (to a count of 1). Now inhale through the right, keeping the same count, close the right nostril and pause the breath, then exhale through the left and pause the breath. This is one round of nadi shodhana.



Sheetali (cooling breath)

This technique cools the body and mind and should be done only during warmer days. It is believed to support digestion by generating a better awareness of satisfaction. It relaxes the muscles and is a mental tranquilliser that can improve sleep.

Rest your hands on the legs and roll the side of your

tongue up into a tube as you stick your tongue out. If this is not possible, hold the teeth slightly together and separate and open the lips exposing your teeth. Steadily inhale through the mouth and feel a cold breeze moving on the tongue and inside of the mouth. Close the mouth and exhale slowly out of the nose.

Bhramari (humming bee breath)

Bhramari relieves stress and reduces anger, anxiety and insomnia.

Raise your arms out to the side, bend the elbows and close your ears with your thumbs. Close and cover the eyes with the rest of your hands. Gently close your lips, with the jaw and inside of the mouth relaxed. Breathe in through the nose. Exhale slowly out, creating a humming sound like that of a bee. The sound should be steady and soft and continue throughout the full exhale. Perform 5 rounds.

Preparation: These two exercises create space in your upper body, which enhances deep diaphragmatic breathing. These exercises stretch your intercostal muscles and diaphragm, enhance lung capacity and lengthen the spine.

1. Reach the arms overhead and interlace the fingers, except your thumbs and index fingers. Rest the chin towards the chest, creating a gentle stretch in the neck. Breathe in, relax and soften your shoulders, elbows and wrists. Breathe out, extend the arms and reach the index fingers out to the sky and the thumbs to the space behind you.
2. Spread the arms out at shoulder height. Bend and soften the elbows towards the body as you breathe in. Exhale and

spread the arms and fingers out as wide as you can without tightening in the shoulders.

After these exercises, you can practise yogic breathing. Sit in a comfortable seat, inhale slowly and deeply, feeling the breath reach deep into the lungs and the abdomen. When fully inhaled, slightly lift your chest bone and take in a little bit more air to help fill the upper parts of the lungs. This might lift your shoulders and collarbones, but avoid holding on to any tension. Now empty the lungs fully by slowly breathing out and gently pulling the abdomen in. Hold the breath for a moment after the exhalation and then repeat 5-10 times. ♀