

## INTRODUCTION

### WHY BREATHING?

To maintain the body and mind in optimal health, the systems of circulation, digestion, endocrine, lymphatic, immune activities, tissue regeneration, elimination, and detoxification are all important. Each of these systems are directly impacted by the autonomic nervous system (ANS).

The ANS controls the unconscious “automatic” processes of the body, the ones we do not have to think about consciously to control, such as our heart rate, blood pressure, breathing rate, body temperature, digestion, sweating and pupil dilation. The ANS consists of two branches – the Sympathetic Nervous System (SNS) and the Parasympathetic Nervous System (PNS).

In general, stimulation of the Sympathetic Nervous System (SNS) brings the body into a state of raised activity and alertness, known as the “fight, flight, freeze” response. The body’s systems are naturally designed to be in this state for short bursts only in order for us to meet a threat or challenge. Continual or chronic activation of the Sympathetic Nervous System (for example through chronic stress) is linked to the exacerbation of existing physical and mental health conditions, as well as inducing new health problems and diseases [1, 2]. In this lifted state where the SNS is activated, the body’s systems are not resting or repairing.

In contrast, the Parasympathetic Nervous System (PNS), known as “rest, digest, relate” returns the body’s functions towards homeostasis and is a counterbalance to the Sympathetic Nervous System (SNS). When the PNS is active the body’s systems are resting and repairing. Healing and health maintenance processes are turned on when the body is in the parasympathetic state, and as such, the more time we spend in the PNS state the healthier we are.

In order to recover from disease, ward off illness and optimise overall health and wellbeing we must cultivate parasympathetic dominance as our default state. So how do we achieve this? Many practices have shown positive outcomes in supporting the PNS state including Yoga Therapy, Mindfulness, Meditation and Breathing Practices. However out of all of these, it is the breath which is the most readily accessible for the majority of people. Furthermore, the breath is also the direct link into the Autonomic Nervous System.

Below is a Breathing Protocol which employs: Nasal Breathing, Diaphragmatic Breathing, and Slow Breathing combined with Elongation of the Exhale which, when combined, elicits parasympathetic dominance in the system and therefore provides the foundational conditions the body needs to be well.

## **BENEFITS**

### Nasal Breathing

- Filters the air - reduces exposure to foreign substances
- Sinuses release nitric oxide (NO), increasing circulation and delivery of oxygen into cells [3]
- Opens blood vessels in the lungs allowing better oxygen diffusion
- Balances blood gases - maintaining balanced pH and enhancing access to oxygen in the blood [4]
- Additional nasal cavity resistance results in 10 to 20% better oxygenation [5]

### Diaphragmatic Breathing

- Decreases stress as measured by physiologic biomarkers [6]
- Increases lung capacity
- Improves blood oxygen levels
- Enhances vagal activity - stimulates and “tones” the Vagus Nerve (the main nerve of the PNS) [7]
- Increases Heart Rate Variability (HRV)-a marker of healthy vagal tone & nervous system resilience [8]

### Slow Breathing

The typical respiratory rate in humans is within the range of 10–20 breaths per min (0.16–0.33 Hz)[9]. Slow breathing is defined as any rate from 4 to 10 breaths per min (0.07–0.16 Hz) and is the optimal breathing rate for increased RSA/HRV [10, 11, 12].

Slow breath correlates with physiological markers of good health including:

- Increases tidal volume [13], chemoreflex and baroreflex sensitivity, respiratory sinus arrhythmia (RSA), enhanced ventilation efficiency and blood oxygenation [14, 15, 16], cardiorespiratory coupling and increased Vagal Activity (Vagal Tone) [17, 18]
- Suppresses Sympathetic Nervous System (SNS) activity [19, 20]
- Promotes Parasympathetic (PNS) dominance [21, 22, 23]
- Maximises HRV and autonomic function - associated with decreased mortality in pathological states and longevity in the general population [24, 25-33]

### Elongation of the Exhale

Heart rate increases during inspiration (inhale breath) (SNS dominance) and decreases during expiration (exhale breath) (PNS dominance) [34]. Therefore when we intentionally elongate the exhale we tip the nervous system toward parasympathetic dominance [35], stimulating vagal activity, the relaxation response, and the conditions to renew, repair and heal. [36, 37].

## PRACTICES

### Protocol Technique

#### 1. Preparation

- Find a comfortable seated position or lay down on the floor or a bed.
- If sitting, have an upright spine and soften the shoulders away from the ears.
- Place the tip of the tongue behind the front teeth (where teeth & gum meet) to help relax the jaw.
- Decide if you would like to have the eyes closed or alternatively a gentle gaze.

#### 2. Awareness

- Bring your awareness to the natural breath – notice the qualities of the natural breath without altering the breath in anyway- do this for 30 seconds to 1 minute.

#### 3. Nostril Breathing

- Breath in and out through the nose (have the lips softly closed so as to prevent breathing through the mouth). Only breath through the mouth if the nasal passage is blocked e.g. if you have a cold.

#### 4. Diaphragmatic Breathing

- Guide the inhale breath down to the base of the lungs so that the upper abdomen (belly) gently rises on the inhale and gently lowers and returns back to neutral on the exhale. (To assist with this you may like to place one hand on the chest and one hand on the upper abdomen above the naval to determine where you're breathing. The bottom hand which is on the belly rises on the inhale and lowers on the exhale; while the upper hand on the chest moves very little).

#### 5. Slow Breathing and Elongated Exhale

- Once comfortable with the above steps, begin to elongate the exhale breath so that it is twice the length of the inhale. Count the ratios in your mind - For example you may use a 3:6 ratio (inhaling for a count of 3 and exhaling for a count of 6. Note this ratio creates a breath rate close to 6 breaths per minute which optimises HRV. However if this ratio feels too long start with a 2:4 ratio or even 1:2 to begin with and build up to longer ratios over days or weeks of practice. If the ratio feels to short you may use a 4:8 or even 5:10. Make sure the breath ratio you choose is comfortable for you.

#### 6. Length of Practice

- You may start with as little as 3 to 5 minutes and build up to a longer practice over time. Great benefits are shown when these techniques are practiced for 20 to 30 minutes at a time, 2 to 3 times per day and include improvements in overall physiological health along with psychological wellbeing including increased comfort, relaxation, vigor and alertness, improved sleep, and mood and reduced symptoms of arousal, anger, anxiety and depression. [38]

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