

## Pranayama Breathing is better for Brain Function

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### Introduction

Pranayama (breathing exercises) has been practiced in India for more than several centuries. It is spreading all over the world due to its benefits on structural and functional aspects of all tissues in the body, specifically on cardio-respiratory system. Although the short-term effects of pranayama is on the respiratory system, the long-term effect has shown to improve nervous system, circulatory system, endocrine system, and helps to maintain homeostasis of internal organs and their functions [1,2]. It provides a balance between sympathetic and parasympathetic physiology of the body. Although the ancient practitioners of pranayama never dissected or studied the internal organs of the body, they felt the changes taking place due to practice of pranayama. They also have developed the proper practicing modules and sequences for each of the pranayama exercises.

The human lifestyle is changing very fast especially in the western world. Our activities of daily life lead to stressful and unmanageable situations. Therefore, there is a need to balance and integrate the structure and functional units of our body. Extensive research was conducted across the globe on the structural and functional changes taking place from the practice of pranayama. National Institute of Health (NIH) is providing financial and research support for research in yoga through National Center for Complimentary and Integrative Health.

Several researches have shown that pranayama not only help individuals to maintain health, it is also beneficial to people with cancer, sleep disturbance, high blood pressure, anxiety, and cardiovascular disorders [1-3]. The process involved in Pranayama is to control breathing. The utmost important molecule in our body is oxygen. Constant and steady supply of oxygen is needed for the tissues to function normally. Pranayama will enhance the function of oxygen delivery system to the tissues by way of improving structural and functional changes in the nervous system specifically in the medulla oblongata [4].

Pranayama involves various types breathing patterns that enhance different inspiratory and expiratory muscle groups, different systems, and brain centers. The rhythmic breathing pattern develops in the medulla after birth, but this needs modification based upon environmental factors, diet, body structures, lifestyle, etc. The breathing centers modify their functions based upon the input they receive from the sympathetic and parasympathetic response [5,6]. The deep breathing exercises helps to improve strength of diaphragmatic and intercostal muscle effectiveness in providing improved ventilation with less energy consumption. The long-term effect of the practice leads to decreased respiratory rate and increased tidal volume by decreasing residual volume. Increased residual volume in the lungs is one of the detrimental factors that will increase the work of breathing and fatigue in normal individuals and during physical performance [2,3,6,7].

Unlike other physical exercises, pranayama can be performed everyday early in the morning with empty stomach after a bath. Cold water bath is recommended to control sympathetic response. After all, the purpose of pranayama is to enhance the parasympathetic response. Practicing in a sunroom or outside in the sun is recommended. As you are performing pranayama, even on the first day, your body feels that it is gaining energy and feel relaxed. Due to our stressful lifestyle, the various tissues and organs are not fully functional. Therefore,

they lack efficiency. Pranayama helps those structures, systems, and muscles fully functional by providing oxygen at various levels and intensities. Currently, there is not enough research to provide evidence to show the structural and functional changes that may take place in the central nervous system by practicing pranayama. The pranayama researchers must collaborate with neuroscientists, anatomists, and neurophysiologists to decipher various aspects of each of the pranayama and verify where and how changes in the body taking place by practicing pranayama. One must also be careful that pranayama may be detrimental to certain individuals with respiratory and cardiac pathologies. This aspect of pranayama practice has to be investigated thoroughly before implementing for a person with certain diseases.

Overall, the benefits of pranayama have been the physiological changes taking place within the lung function. It improves tidal volume, inspiratory reserve volume, vital capacity, total lung function, and decrease in residual volume (air left in the lungs after exhalation). These changes have taken place due to increased efficiency of diaphragm, intercostal muscles, abdominals, and other accessory muscles associated with inspiration and expiration. Each of the pranayama exercises focus on different functional and structural priorities thereby a complete set of pranayama for 20-30 min would help to revitalize the body's energy needs and expenditures without undue stress. Therefore, I strongly recommend pranayama to everyone to refresh their mind and body every day and provide harmony to internal organs and systems to maintain homeostasis of the body.

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