The Breath of Life: Respiratory Function and Botanical Medicine

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**Introduction**

Even though we take breathing for granted, it is interesting to reflect that we share the air with all humans and many other life forms on the planet. The process of respiration shows us an oneness with the trees and other plant life as we have a symbiotic relationship with them through the oxygen and carbon dioxide exchange. This connects us deeply with the ecology of the planet, as well states of Being.

Remember inspire come from bringing the breath of spirit into you. Every time we breathe in, we not only bring air into both our lungs but Prana. The two lungs Hug our Heart with each Breath. Hugged by Prana.

Breathing is largely an autonomic process that most of us are unaware of until some stressor, be it strenuous exercise or the induction of fight or flight mechanisms, calls our attention to it. We especially become conscious of the act of breathing when we cannot breathe, for example when swimming or trapped underwater, or because of a disease such as asthma or anaphylaxis. Breath is our most immediate and vital form of nourishment, and from an Ayurvedic perspective, is synonymous with the flow of...
consciousness, and all activities of the body. Thus problems with respiration extend far beyond the health of the lungs or even the physiological status of gases such as oxygen (O₂) and carbon dioxide (CO₂): breath is life, and thus the maintenance of lung function is paramount to maintaining proper health.

We are not only what we eat; we are also what we breathe. Any problems with breathing will affect all other systems in the body. This means that two of the best preventative health considerations are regular exercise (even if it is only walking) and proper breathing a clean air.

Part I: Respiratory Anatomy and Physiology

Material from this section can be found in your text: Principles of Anatomy & Physiology by Tortora and Grabowski.

The cells of the body have a constant requirement for oxygen to power the various metabolic reactions that release energy from ingested nutrients to produce ATP. In the process of cellular metabolism carbon dioxide is created as a waste product, which if not eliminated accumulates in the body and dangerously lowers the pH of the tissues and blood, which inhibits a myriad number of vital chemical reactions. The primary method by which we obtain oxygen and eliminate carbon dioxide is respiration.

There are three major components to respiration:

1. Pulmonary ventilation: also called breathing, it is the inspiration (inflow) and expiration (outflow) of air between the atmosphere and lungs
2. Pulmonary respiration: is the exchange of gases between the blood and the lungs
3. Tissue respiration: refers to the exchange of gases between the blood and the cells of the body.
Respiratory anatomy

The respiratory system is comprised of the nose, pharynx (throat), larynx (voice box), trachea (wind pipe), bronchi and lungs. The upper respiratory system refers to the nose, pharynx and associated structures. The lower respiratory system refers to the larynx, trachea, bronchi and lungs. Functionally, the respiratory system is divided into two parts:

1. **Conduction portion**: consisting of interconnecting tubes and cavities: nose, pharynx, larynx, trachea, bronchi and terminal bronchioles;
2. **Respiratory portion**: referring to those portions of the respiratory system where the exchange of gases occur: respiratory bronchioles, alveolar ducts and alveoli.

**Words to remember or review**

**Nose**: external nares, or nostrils, internal nares or choanae, paranasal sinuses, nasolacrimal ducts, hard palate, nasal
cavity, nasal septum, vestibule superior, middle and inferior meatuses, olfactory epithelium, pseudostratified ciliated columnar epithelial cells, goblet cells.

**Pharynx:** nasopharynx, Eustachian tubes, or auditory canals, (mucus-forming foods such as dairy and flour products allow for the production of a thicker, more tenacious mucus), oropharynx, laryngopharynx, hyoid bone, esophagus.

**Larynx:** or voice box, nine pieces of cartilage, three of which are single, and six of which are paired, arytenoid cartilage forms the vocal cords, thyroid cartilage, Adam’s apple, epiglottis, glottis.

**Trachea:** or windpipe, hyaline cartilage, and adventitia (outer layer of areolar connective tissue), composed of 16 to 20 C-shaped rings of hyaline cartilage, tracheostomy, carina, associated with the cough reflex.
Bronchi: right and left primary bronchi, secondary bronchi, tertiary bronchi, bronchioles, terminal bronchioles, changes from pseudostratified ciliated columnar epithelium to nonciliated simple cuboidal epithelium in terminal bronchioles, parasympathetic mediators of the allergic reaction, histamine, promote the constriction, sympathetic promotes the dilation, asthma attack the smooth muscle of bronchioles contract, narrowing the lumen, can prevent oxygen from being circulated, leading to hypoxia and irreversible damage to the heart and brain. Herbs that act as muscarinic-antagonists such as *Datura stramonium*, and sympathomimetics such as *Ephedra sinica*, have long been used to treat to treat acute asthma attacks, dilating the bronchioles and bronchi, used along with herbs such as *Prunus virginiana* and *Verbascum thapsus* that help to thin the mucus and reduce mucosal irritability.
**Lungs**: are a pair of cone-shaped organs, located in the thoracic cavity, separated from each other by heart and other structures of the mediastinum, plural membrane, parietal pleura, visceral pleura, pleural cavity, filled with serous fluid, diaphragm, lobes fissures, oblique fissure, horizontal fissure, superior and inferior lobe, middle lobe, superior, middle and inferior secondary bronchi, bronchopulmonary segment, lobules, alveolar ducts, alveoli (plural), type I alveolar cells, type II alveolar cells that secrete alveolar fluid, surfactant, alveolar macrophages, pulmonary arteries and bronchial arteries, pulmonary trunk, pulmonary veins.

**Physiology of Respiration**

**Pulmonary ventilation**, or breathing, is the process by which gases are exchanged between the atmosphere and the alveoli, occurring due to the existence of a **pressure gradient**.

**Inhalation**: or breathing in, is called **inspiration**, before inspiration, the alveolar pressure is about 760 mm Hg (1 atmosphere), at sea level, lungs expand, which decreases the pressure in the lungs, causing the contraction of diaphragm and intercostal muscles, diaphragm is responsible for about 75% of the air that enters the lung, **intercostals** responsible for the remainder, volume of the lungs increases, the alveolar pressure drops from 760 to 758 mm Hg, establishing a pressure gradient, and air rushes into the lungs. Normal, quiet breathing is **eupnea**, **shallow breathing** is known as **costal breathing**, and **deep breathing** is called **diaphragmatic breathing**.

**Exhalation**: or breathing out, is called **expiration**, happens when pressure gradient is reversed and alveolar pressure is greater than the atmosphere (about 762 mm Hg). This is entirely a passive process, dependent upon the recoil of elastic fibers in the diaphragm and intercostal muscles, and the inward pull of surface tension due to the film of alveolar fluid.

**Pulmonary volumes**: normal breathing about 500 ml of air is inhaled, the **tidal volume**, only 350 ml reaches alveoli,
the remaining 150 ml is contained within the spaces of
respiratory tract, very deep breath, averaging about 3100 ml
above the 500 ml of tidal volume is called the **inspiratory
reserve volume**, exhaling forcibly allows for the expiration
of about 1200 ml in addition to the tidal volume, called the
**expiratory reserve volume**, 1200 ml of air remains in
lungs at all times to keep alveoli slightly inflated, called the
**residual volume**. (consider fig 6.6  p 57 physio rid)

**Pulmonary capacities:** are combinations of specific lung
volumes, **inspiratory capacity**, or the total inspiratory
volume of the lungs, is the sum of the tidal volume plus the
inspiratory reserve volume (3600 ml), **functional residual
capacity** is the sum of the residual volume plus the
expiratory volume (2400 ml), **vital capacity** is the sum of
the inspiratory reserve volume, tidal volume and expiratory
reserve volume (4800 ml), **total lung capacity** is the sum
of all volumes (6000 ml).

**Physiology of External Respiration:** exchange of oxygen
and CO₂, conversion of **deoxygenated blood** coming from
the heart via the pulmonary arteries to **oxygenated blood**, 
which then returns back to the heart via the pulmonary
veins, **partial pressure (p)**, a measurement of the pressure
of a specific gas in a mixture of gases, atmospheric
pressure at sea level for example is 760 mm Hg, the sum of
the partial pressure of oxygen, carbon dioxide, nitrogen and
water, i.e. \( p_{O_2} + p_{CO_2} + p_{N_2} + p_{H_2O} \), \( p_{O_2} \) is 159.6 mm Hg
(760 mm Hg X 0.21), amounts of CO₂ and O₂ vary in
inspired (atmospheric), alveolar air, and expired air, \( p_{O_2} \) of
alveolar air is 105 mm Hg, and the \( p_{O_2} \) of the deoxy-
genated blood in pulmonary capillaries is only 40 mm Hg,
net diffusion of O₂ from alveoli to the blood in the
capillaries until 105 mm Hg of O₂ in the blood is reached
and equilibrium is establish, conversely, the \( p_{CO_2} \) of
deoxygenated blood is 45 mm Hg and the alveolar \( p_{CO_2} \) is
40 mm Hg, there is net diffusion of CO₂ until equilibrium is
reached, at about 40 mm Hg.
**Physiology of Internal Respiration:** picks up the maximal amount of oxygen it can and returns it to the heart for distribution throughout the body.

![Diagram of respiratory process]

**Transport of Oxygen:** oxygen does not readily dissolve in water, very little oxygen is transported in the plasma of the blood (about 1.5%), remainder of the oxygen is transported in chemical combination with the hemoglobin inside of the red blood cells, every 100 ml of oxygenated blood there is about 20 ml of oxygen, 0.3 ml free in the cytosol and 19.7 ml bound to hemoglobin.

**Hemoglobin:** protein portion called globin and an iron-containing pigment called heme, each has four heme groups and can combine with one molecule of oxygen (O₂). Oxygen and hemoglobin combine in a reversible reaction to form oxyhemoglobin:

\[
\text{Hb} \quad \text{(deoxygenated hemoglobin)} \quad + \quad \text{O}_2 \quad \text{(oxygen)} \quad \rightleftharpoons \quad \text{Hb-O}_2 \quad \text{(oxygenerated hemoglobin)}
\]
The most important factor is how much O$_2$ combines with hemoglobin called the $p$O$_2$, hemoglobin is completely converted to HbO$_2$, it is said to be fully saturated, hemoglobin is a mixture of HbO$_2$ and Hb, it is said to be partially saturated, percent saturation of hemoglobin is the percentage of HbO$_2$ in total hemoglobin, the greater the $p$O$_2$ the greater the percent of HbO$_2$, in pulmonary capillaries, where the $p$O$_2$ is high, tissue capillaries, where the $p$O$_2$ is lower, oxygen is released into the tissue cells. Other factors however, besides the $p$O$_2$, contribute to hemoglobin-oxygen binding, in an acid environment hemoglobin’s affinity for oxygen is lower and oxygen splits more readily from hemoglobin, CO$_2$ is taken up by the red blood cells, it is temporarily converted into carbonic acid (H$_2$CO$_3$) by an enzyme called **carbonic anhydrase**:

\[
\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+ + \text{HCO}_3^-
\]

Low pH can also result from lactic acid build up due to anaerobic metabolism within muscles. Temperature: with the heat energy released by the metabolic activity of cells inducing the release of oxygen from hemoglobin, contracting skeletal muscles produces both heat and lactic acid, increasing oxygen supply. Lastly, a substance called **2,3-biphosphoglycerate (BPG)** found in red blood cells acts to decrease the affinity of hemoglobin for oxygen and thus helps to release oxygen. BPG is formed in RBCs from the breakdown of glucose to produce ATP. BPG binds with the terminal amino groups of the two beta globin chains of hemoglobin, causing O$_2$ to be bound less tightly to hemoglobin. Certain hormones, such as thyroxine, human growth hormone, the catecholamines and testosterone increase the formation of BPG. Typically, BPG is also found in higher amounts in people living at higher elevations.

**Transport of Carbon dioxide:** each 100 ml of deoxygenated blood contains about 53 ml of CO$_2$, carried in three main forms:

1. **Dissolved CO$_2$**: about 9% of the total, some of CO$_2$ is dissolved in the blood plasma, and upon reaching the lungs, diffuses into the alveoli.
2. **Carbaminohemoglobin**: about 13% of the CO₂ combines with the amino groups of amino acids found in RBCs to form **carbaminocompounds**, most of the amino-bound CO₂ combines with the globin portion of hemoglobin to form carbaminohemoglobin (HbCO₂):

\[
\text{Hb} + \text{CO}_2 \rightleftharpoons \text{HbCO}_2
\]

HbCO₂ is influenced by the \( p\text{CO}_2 \), in the tissue capillaries it is high, promotes the formation of carbaminohemoglobin, When \( p\text{CO}_2 \) is low however, the CO₂ readily splits from the hemoglobin to diffuse into the alveoli.

3. **Bicarbonate ions**: (78%) is transported in the plasma as bicarbonate ions, the same reaction noted earlier:

\[
\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+ + \text{HCO}_3^-
\]

**Regulation of breathing**: controlled by a group of neurons in the brain stem called the **respiratory center**, separated into three groups: the medullary rhythmicity area, the pneumotaxic area, and the apneustic area.

**medullary rhythmicity area**: controls the basic rhythm of respiration, nerve impulses are generated in the **inspiratory area**, for about two seconds, and are propagated to the external intercostal muscles via the intercostals nerves and to the diaphragm via the phrenic nerves, then inspiratory area becomes inactive for about 3 seconds, allowing the external intercostal muscles and diaphragm to relax, only to be stimulated again by the inspiratory center, neurons that form the **expiratory area** typically remain inactive during quiet breathing, but during forceful breathing during the excitatory area functions to cause the internal intercostals muscles and the abdominal muscles to contract, **pneumotaxic area** helps to coordinate the transition between inhalation and exhalation, transmitting inhibitory nerve impulses to the inspiratory area to prevent the lungs becoming too full of air, thereby shortening the length of inspiration, the **apneustic area** sends stimulatory impulses to the inspiratory center thereby prolonging inspiration, regulation of the basic rhythm established by the inspiratory center modified by build up of CO₂ and H⁺ strongly stimulates the inspiratory center, **Central chemoreceptors** located in the medulla oblongata monitor H⁺ and \( p\text{CO}_2 \) concentrations in the cerebrospinal fluid,
peripheral chemoreceptors are clustered as aortic bodies embedded in the wall of the arch of the aorta, and as carotid bodies located in the wall of the left and right carotid arteries. These chemoreceptors are sensitive to changes in $pO_2$, $H^+$, and $pCO_2$ in the blood. A decrease in the $pO_2$ and/or an increase in the $pCO_2$ (resulting in an increase in the $H^+$ concentration), stimulates the inspiratory center.

Part II: Western herbal perspectives on respiratory function

Among the vital organs the lungs have some particularly unique challenges to overcome. As Simon Mills describes in his text “The Essential Book of Herbal Medicine,” gas exchange in a fluid environment with relatively simple structures such as gills is a rather uncomplicated process, but when it comes to exchanging gases in the atmosphere with dissolved gases in the blood, the process is decidedly more complex. Firstly, because the exchange of gases between air and fluid is relatively inefficient, the body must maintain a large surface area of body fluids that serve as sites for the exchange of gases. To this extent the lungs are comprised of a huge network of capillaries that are surrounded by air: gills on the other hand are comparatively smaller structures. Secondly, there needs to be some kind of pumping mechanism by which the air is forced over these fluids. In the case of fish this is accomplished by having water move across the surface of the gills through more or less constant movement. In contrast, the human lungs require the muscular contractions and relaxation of the diaphragm to control the atmospheric pressure of the lungs.

One of the primary difficulties with lung function is the contamination of the inhaled air with a variety of air-borne particles, some of which are benign, some which can stimulate mucosal inflammation (e.g. pollen), some of which suppress mucosal function (e.g. tobacco smoke) and some which are pathogenic (e.g. viruses and bacteria).

As the air is inhaled it spirals down into the bronchus and bronchioles, the centrifugal forces propelling inhaled particles into the sticky respiratory mucosa. Once trapped in the mucus these foreign particles are moved upwards by
the action of the cilia to be deposited in the throat and unconsciously swallowed down into the esophagus to be consumed by the fiery secretions of the stomach. The result of this is that by the time the inhaled air reaches the alveoli it has been largely filtered, but in some cases where the particles are too fine or present in too great a volume the last resort are the billions of alveolar macrophages or "dust cells" that line these areas.

The first and most overt sign of respiratory distress is increased *catarrh*. Respiratory catarrh is produced in response to some kind of direct mucosal irritation, but in many cases represents the accumulation of metabolic wastes. Although this concept lacks hard scientific evidence, the lungs can certainly be regarded as an eliminative organ, not just of the debris that accumulate in the lungs from breathing or smoking, but also for wastes such as carbon dioxide.

Thus it stands to reason that alterations in lung function such as increased catarrh are similarly reflective of an increased burden of metabolic wastes, according to Priest and Priest, a relationship that extends especially to that of the liver, bowels and kidneys, which if in a weakened state or otherwise inefficient condition, “…throws the burden of excretion onto the respiratory system” (1982, 12). Thus in catarrhal states, it is important to review the function of the eliminatory organs, and the state of the diet, which may contain certain foods that act as allergens or otherwise promote a catarrhal response (e.g. dairy, flour).

A common response to the accumulation of catarrh is the *cough*, a reflexive act of the respiratory tract to some kind of irritation or obstruction. The most sensitive part of the bronchus is the *carina*, the point at which the trachea divides into the left and right primary bronchus. Although it is largely an autonomic response, the cough-reflex centre is located in the medulla of the brain and is partially mediated by voluntary control.

There is an embryonic link between the respiratory and digestive tracts, and thus the observed connection in traditional cultures between the digestive system and the respiratory system is supported by modern investigation. The respiratory and digestive tracts share common vagal innervation, and recent associations between asthma and H2
(histamine) receptors in the stomach support the idea of the interconnectedness of these two systems.

When a foreign particle enters into the respiratory tract, mucus secretions trap this particle and the muco-ciliary escalator moves this particle upwards into the nasopharynx for expectoration. During a respiratory viral infection the mucous membranes secrete a copious IgA-laden mucus flow in response to localized inflammation. This is the prototypical “runny nose” of a viral infection, and phytotherapeutic measures at this juncture should not work to inhibit this process. Coughing from such a situation is in response to excessive mucus flow, and is usually moist and easy.

Preparations containing Goldenseal (*Hydrastis canadensis*) are often marketed to people with these symptoms, but the usage of large doses of Goldenseal will dry out the mucous membranes and inhibit the IgA-laden mucosal secretions.

For viral rhinitis topical remedies such as a mustard plaster or inhalants such as the essential oil of *Eucalyptus, Tea tree, Spruce or Pine*, reduce congestion, are antiviral and enhance recovery.

**Warming expectorants** and **mucolytics** such as Garlic (*Allium sativum*), Aniseed (*Pimpinella anisum*), Ginger (*Zingiber officinalis*), Cinnamon (*Cinnamomum zeylanica*) and Angelica (*Angelica archangelica*) may also be used at this time, taken before meals. These herbs have a nature contrary to the cold and wet features of an upper respiratory tract infection, clearing the congestion from the lungs into the nasopharynx for expectoration.

**Respiratory spasmolytics** are also useful, to limit bronchial constriction and a feeling of tightness in the chest, such as Wild Thyme (*Thymus vulgaris*), Lobelia (*Lobelia inflata*), Gumweed (*Grindelia spp.*), and Hyssop (*Hyssopus officinalis*)

Respiratory demulcents are often contraindicated in URI infections because of their damp and congestive properties, but are useful for dry, tickling coughs. Demulcents include **Marshmallow root** (*Althaea officinalis*), **Slippery Elm** (*Ulmus fulva*), and **Irish Moss** (*Chondrus crispus*).
If the infection is not defeated, the mucous membranes become ‘boggy’ and congested. At this stage, **stimulating expectorants** such as herbs that contain saponin glycosides are useful to stimulate the activities of the muco-ciliary escalator to eliminate these components, including **Elecampane** (*Inula racemosa*), **Heartsease** (*Viola tricolor*) and **Cowslip** (*Primula vera*).

If irritation becomes chronic, or if coughing is painful, the judicious use of **respiratory spasmolytics** such as **Ma Huang** (*Ephedra sinica*), **Lobelia** and **Gumweed** (*Grindelia spp.*) are indicated, as are **antitussives** such as **Wild Cherry bark** (*Prunus serotina*), **Mullein seed** (*Verbascum thapsus*), and **Wild Lettuce** (*Lactuca virosa*).

**Overview of expectorants**

The nature and quality of the cough and the mucus calls for different types of **expectorants**, a broad class of botanicals used to enhance the elimination of catarrh and restore normal function to the lungs. The following is an overview of the different classes of expectorants:

- **Stimulating expectorants** are used to provoke the activities of the muco-ciliary escalator, primarily due to an irritant effect they have upon the mucosa. Stimulating expectorants are reserved for chronic catarrhal conditions such as chronic bronchitis. Some botanicals within this category are contraindicated in dry lung conditions, dyspeptic conditions, asthma and in young children, especially those that have a high saponin content, including **Viola**, **Urginea**, **Stillingia**, **Primula**, **Bellis**, **Polygala**, and **Euphorbia**. Stimulating expectorants act by decreasing the viscosity of the mucus, indicated in profound catarrhal states exacerbated by coldness or humidity. Some stimulating expectorants are noted for their resinous content, including **Commiphora**, **Populus candicans**, **Cannabis** and **Grindelia**.

- **Mucolytic expectorants** are digestive stimulants masquerading as expectorants, working by virtue of their ability to enhance blood flow to the mucosa, increasing mucosal secretion and thereby making the mucus less viscous and therefore easier to expectorate. The traditionally ascribed activity of mucolytics was to
enhance the efficiency of digestion secretion and excretion, which takes the burden of eliminating metabolic wastes off of the lungs. Mucolytics are contraindicated in GERD and GI inflammation, but are otherwise safe for most people. Mucolytics include pungent-tasting botanicals such as Zingiber, Elettaria, Cinnamomum, Pimpinella, Capsicum, Zanthoxylum, Allium and Angelica. Of note is Inula which is an excellent mucolytic and a lesser known digestive stimulant. Another related class of mucolytics are astringing expectorants, which dry up excessive mucus secretions, including botanicals such as Euphrasia, Abies, Solidago, Verbascum, and Hydrastis. Some astringing mucolytics are also digestive stimulants, such as Myrica, and for this reason Myrica is among the best mucolytics. Often stimulant and astringent herbs can be combined for the same effect.

- **Respiratory antispasmodics** are used to relax bronchial constriction, alleviating dyspnea and difficult breathing associated with asthma and allergic triggers. This class of expectorants is also used as antitussives, often used along with demulcents to relieve the mucosal irritability. Contraindications for respiratory antispasmodics are dependent upon the herbs chosen. Some plants function by virtue of their parasympatholytic properties, such as Datura, whereas others are noted for their sympathomimetic activity, such as Ephedra and Ammi. Other respiratory antispasmodics include those that work in a diversity of ways, often lacking the potentially dangerous effects of their cousins noted above, including Lobelia, Ganoderma, Cordyceps, Prunus, Verbascum, Inula, Populus candicans, Thymus, Draconitum, Lysichiton, Drosera, Grindelia, Lactuca, and Sanguinaria.

- **Respiratory demulcents** are used in dry, irritative coughs, when the mucus is dry, hard and sticky, often seen in chronic allergies and in asthmatic patients. Respiratory demulcents include those which contain mucilage and therefore soothe irritation, or act as antispasmodics to check the excessive irritability of the lungs. Many respiratory demulcents are contraindicated in profuse catarrhal conditions, especially those that contain an abundance of mucilage. Examples of respiratory demulcents include Chondrus, Asclepius,
Antimicrobial expectorants are a broad class of expectorant herbs that also have a reliable antimicrobial activity, for viral conditions (e.g. Ligusticum, Lomatium, Angelica), fungal conditions (e.g. Tabebiuia, Berberis, Commiphora) or for bacterial conditions (e.g. Allium, Echinacea, Baptisia).

The usage of the different classification of expectorants above is based upon the presenting signs and symptoms of respiratory dysfunction. In his text Herbal Energetics in Clinical Practice Michael Moore provides an overview of constitutional tendencies in respiratory function that can manifest as either deficient or excess states.

**Respiratory deficiency symptoms and treatment**

Symptoms of respiratory deficiency include chronic lung problems, dyspnea (difficulty breathing), dry mucus membranes, difficult expectoration, with frequent yawning and sighing to increase oxygen intake. Moore states that patients with a respiratory deficiency often smoke as an unconscious mechanism to stimulate lung reflexes, but then often quit some years later because of the toll it takes upon their lungs.

**Herbs to stimulate**

The primary strategy is to stimulate cardio-pulmonary activity and increase mucosal secretion through vascular stimulants. Generally speaking, the best method to promote an increase in cardio-pulmonary function is through simple diaphragmatic breathing exercises and regular physical exercise. Moore states that as mucosal secretions are a kind of excretory as well as secretory substance, addressing liver function as the model of excretions is an important approach. Associated with this latter method is the usage of mild para-sympathomimetics to down-regulate adrenergic response and promote relaxation, as well as demulcents to soothe mucosal dryness.
e.g. **stimulating expectorants**: Viola, Primula, Sanguinaria, Polygala, Drosera

**vascular stimulants**: Asclepius, Zanthoxylum, Capsicum

**cholagogues**: Mahonia, Berberis, Menyanthes, Leptandra

**parasympathomimetics**: Lobelia, Scutellaria, Verbena

**respiratory demulcents**: Althaea, Glycyrrhiza, Ulmus

**Respiratory excess symptoms and treatment**

According to Moore symptoms of respiratory excess include the tendency to hyperventilate under stress, with excessive expectoration.

**Herbs to relax**

Moore states that herbal interventions for respiratory excess are not “…an important consideration,” the focus instead is to see symptoms of respiratory excess as a kind of thyroid excess, or the result of liver and cardiovascular stress.

Herb like *Ganoderma*, and *Cordyceps* will reduce excess, while working on liver and cardiovascular system.

**Part III: Ayurvedic perspectives on respiration**

According to Ayurveda the breath relates to the intelligence of the body, called *prana*. *Prana* is the vibratory power that underlies all manifestation, received primarily from the breath, but also from the food and water we consume. The *prana* that we obtain through breathing however is the most important kind of *prana*, and the quality and nature of breathing, as well as the quality and nature of the air, influences the activity of *prana* in the body.

*Prana* is not a substance per se, but functions within the *sukshma sharira* or subtle body, giving rise to and
activating the physical body. Through the act of breathing prana enters into the body and courses through the 72,000 nadis or subtle channels that are said to spiral outwards from the umbilicus. The movement of prana through these channels feeds all the tissues of the body with the spark of life, the élan vital, which separates the animate from the inanimate.

The dominant flow of prana occurs through the ida and pingala nadis, which course upwards on either side of the body from the kanda or ‘bulb,’ and roughly speaking, relate to the activities of the parasympathetic and sympathetic divisions of the autonomic nervous system, respectively. As they rise the ida nadi terminates in the left nostril, and the pingala nadi terminates in the right nostril. The flow of prana through the shushumna nadi, located along the spinal axis of the body between the ida and pingala nadis, represents unfolding of human consciousness and the awakening of kundalini.

During gestation the mother supplies the fetus with all the nutrients needed for its proper growth and development, supplying the fetus with prana. Upon exiting the birth canal however the flow of prana through the umbilical cord ceases, and the first breath taken by the newborn baby becomes a resident prana called apana vayu that resides in the umbilical region of the body, which subsequently regulates the flow of prana in the body for the remainder of life. Upon death prana moves out of the body, taking with it the psychic imprints or samskaras that are generated by the act of being, and carries them forward into the next manifestation.

The activity of Vata dosha is dependent upon the nature and function of prana in the body. Vata is a clear, colorless and highly volatile energy in the body that relates to regulatory control mechanisms, typically associated with the activities of the nervous system. Given that the doshas are related to physiological dysfunction, Vata can be seen to be representative of prana in a dysfunctional state. In order to better understand the activities of prana in the body, it is divided into five subtypes or vayus (‘winds'): prana vayu, udana vayu, samana vayu, apana vayu and vyana vayu.
Kapha and prana

Although prana most closely relates to the activities of Vata, its status is also under the control of Kapha, whose seat or sthana is the lungs. Thus in Kaphaja afflictions the lungs are typically affected, promoting mucus congestion and catarrh. The origin of this congestion more often than not relates to disorders of digestion, where the food isn’t properly broken down and promotes congestion and the excessive accumulation of Kapha in the lungs. Thus measures to improve digestion are helpful to decrease the accumulation of Kapha. Botanicals that have this property are often pungent and aromatic in taste and flavor, called dipanapachana remedies, including Maricha (Piper nigrum), Shunthi (Zingiber officinalis), Lavanga (Caryophyllus aromaticus) and Ela (Elettaria cardamomum). These herbs can be added to the diet as well as taken in larger doses as part of a therapeutic regimen.

The inhalation of burning smoke, called dhuma, may also be used to cleanse the accumulated Kapha from the respiratory tract. The smoke is inhaled through the nose with the help of a paper funnel – the pointed end inserted in the nostril and the open end over the burning ember – and exhaled through the mouth. A typical preparation is made by taking a pinch each of the powders of Haridra rhizome (Curcuma longa), Maricha fruit (Piper nigrum), and Yashti madhu root (Glycyrrhiza glabra), and mixing them with a small quantity of ghee (clarified butter). Other powdered Western herbs with a similar activity on the respiratory tract may be used (e.g. Verbascum), along with a small quantity of ghee. Dhuma is never utilized more than two to three times per week, and no more than one to two inhalations in each nostril per session. Dhuma is contraindicated in active inflammation of the nasopharynx and in dry, hyposecretive mucosa.

An alternative to dhuma is the usage of Kapha reducing herbs in conjunction with humidification, using an electric humidifier with a medication well, or more simply, the use of boiling water. Essential oils that have a Kapha reducing property can be instilled in the medication well of the humidifier or dropped in the boiling water. Humidifiers can be used while sleeping while the boiling water method is best used twice to three times daily for 10 minutes each time. The latter method is performed by dropping the essential oil into a pot of boiling water, removing it from
heat and then leaning one’s head over the pot and covering the head and torso with a sheet – care must be taken to remove all sources of heat and flame, and to not place the head too close to the steam. Examples of essential oils that have a Kapha reducing property include Cedar, Pine, Spruce, Rosemary, Basil, Frankincense, Myrrh, Eucalyptus, Cajeput, Camphor, Ginger and Clove.

Another allied method to remove the accumulation of Kapha in the respiratory tract is nasya and neti. Nasya involves the application of a few drops of an unrefined oil such as sesame oil or a medicated oil such as Anu tailam into each nostril, which is then inhaled into the nasal passage. Such forms of nasya are tikshna or sharp, and mildly irritate the nasal passages causing the liquefaction of Kapha, which is then subsequently expectorated. This type of nasya can be performed by most people, but is contraindicated in acute conditions of the nasopharynx, such as in a cold, fever or flu.

Neti or nasal irrigation involves the use of small pot (i.e. a neti pot) that is used to administer an isotonic aqueous solution into the nasal passages, sinuses and nasopharynx via the nostrils. The best place to perform neti is over a bathroom sink in front of a mirror so you can observe the process. An isotonic solution can be prepared by adding a little sea salt to purified water, which given the capacity of most neti pots, is about 1/4 tsp. per 125 mL of water. The spout of the neti pot is inserted into the right nostril, and the head tilted to the left so that the left nostril is below that of the right. The water is poured into the right nostril, and will travel through the nasopharynx and exit through the left nostril. Care should be taken not to bend the head to far forward so that the nose is below that chin as the water will not easily exit the nose. Performed properly no water will escape into the throat, and it is even possible to talk while performing neti. Once complete the procedure is repeated by inserting the neti pot into the left nostril and pouring it through the right, now tilting the head to the right. Following neti there may still be a small amount of water remaining the nasopharynx. To remove any remain water the hands are placed on the hips and the body is first tilted to the left and a series of rapid, short and diaphragmatic exhalations (i.e. kabalabhati) are performed to eliminate the water; once the water is cleared from the right nostril the body is then tipped to the left and the same procedure is
undertaken to clear out any remaining water from left nostril. *Neti* is a very helpful technique to treat hyposecretory states of the mucosa, to treat chronic ‘dry’ stuffiness, and to prevent respiratory allergies and sensitivities. It is contraindicated when the nasal passages are completely blocked.

**Pranayama**

*Pranayama* is a unique development in our understanding of the nature of breath, and the knowledge that by controlling breath we control the intelligence of the body. It is a technique that evolved in India but has since been integrated in a variety of related disciplines. Given that *pranayama* is orientated to the control and function of *prana* in the body, it usage as a therapeutic tool extends beyond the treatment of respiratory disorders, although for these conditions the regular practice of *pranayama* is an excellent way to provide impressive and lasting results.

*Pranayama* is a breath control technique that modulates the nature and duration of breathing, emphasizing aspects of inhalation, exhalation, and the pauses that exist between them. As we inhale *prana* is brought into the body, where it descends down and meets with *apana vayu*. During exhalation *apana* rises to meet with *prana*. Holding the breath after inhalation moves *prana* towards *apana*, and holding the breath after exhalation moves *apana* towards *prana*. The activities of *prana* and *apana*, in turn, impact upon the function of *agni*, the flame of digestion and metabolism that resides between them. During inhalation *prana* activates *agni* causing it to rise upwards, burning the ingested food. Upon exhalation *agni* is drawn downwards, transferring the waste products of digestion downwards to *apana vayu* to be eliminated. Thus an exhalation that is twice as long as the inhalation ensures that waste products are properly eliminated. When *apana vayu* is excessive it limits the capacity of *prana* to enter into the body, and thus the general practice of lengthening the exhalation in relation to the inhalation is a useful approach to rid the body of wastes and optimize health.
Part IV: A Guide to Breathing

A facet of the hectic pace of modern life is chronic stress and the induction of the flight or fight response as a coping mechanism. In most cases the induction of these responses are sub-acute, masked by social conventions. For example, everyday social and financial stressors can produce in some people a release of adrenaline equal to that which would be released if one was to be almost hit by a car, or chased by an animal. The ‘normal’ response to being almost hit by a car or chased by an animal is to shout and run, but since it is socially unacceptable to shout or run when faced with an everyday social or financial stressor, we attempt to internalize the stress.

Chronic stress has a significant impact upon the way we breathe. In addition to impacting our breathing patterns, chronic stress also down-regulates digestive secretions, increases muscle spasticity, and induces compensatory secretions from the adrenal cortex, which can have an immunosuppressant activity, Chronic stress habituates the body to become used to the induction of fight or flight responses, and overtime we forget how to relax, and ultimately, how to breathe.

As we saw in Part III, Ayurvedic medicine places an enormous importance on the function of the lungs, as the source of prana, which regulates all life processes. When we obstruct the flow of breath through stress-induction we cut ourselves off from the most accessible and renewable source of energy we have. Although the title of this section, “A Guide to Breathing,” is somewhat tongue-in-cheek, it also demonstrates how unconscious many of us are when it comes to something as basic and simple as breathing. This section discusses the necessary skill of being able to deconstruct something most of us take for granted. Imagine what it would be like to be trapped under water without a tank of oxygen: suddenly the importance of breath comes to the forefront.

In deconstructing the process of breathing it is important first to be aware of the way we breathe, to discern if it is disordered in any way. Sit comfortably in a chair with your back upright and feet firmly planted on the floor, and breathe normally, not holding your breath or taking especially deep breaths. As you breathe, ask yourself, or if
this is part of consultation, ask the patient the following questions:

1. **Where do I feel my breath?** Place one hand on your abdomen and one hand on your chest, and feel where the breath originates. This isn’t a process of determining what is right or wrong, but simply becoming conscious of the dynamics of breath. As you breathe in and out, does the breath appear to originate in the abdomen, the chest, the ribs, the shoulders, or the nose?

2. **What does my breathing feel like?** What is the quality of your breath? Does it feel labored, difficult, obstructed, rough, jerky, or flowing? Is there any hesitation, even momentary between inhalation and exhalation, or between exhalation and inhalation?

3. **How fast do I breath?** Breathing normally, count the number of breaths you take per minute (one breath equaling a complete cycle of inhalation and exhalation).

These exercises will help to bring you or your patient more in touch with the dynamics of breathing.

Most problems with breathing, if they aren’t due to a functional disturbance of the lungs themselves, relate to the activities of the diaphragm. In healthy breathing the diaphragm moves without restriction, descending as we inhale and rising with exhalation. The movement of a natural, normal breath is analogous to filling a bucket with water: as we inhale the diaphragm slowly contracts, opening the lungs and pulling the breath downwards, filling the bucket from the bottom (abdomen) upwards (to the chest). Upon exhalation the air contained in the chest is released first, and gradually the air in the abdomen is let out, all in one fluid movement, as if we are pouring the bucket out.

Several patterns that relate to diaphragmatic control are at the heart of understanding breathing problems, and are described as follows.
Reverse breathing

**Reverse breathing** occurs when the abdomen moves in upon inhalation and out upon exhalation. This often occurs with restrictive clothing or tight belts that inhibit the movement of the diaphragm. In some cases however these people are simply unconscious of breathing and when asked to feel their diaphragm contracting or relaxing they find they cannot.

Reverse breathing is a kind of confused state of the diaphragm and the other muscles of respiration, and produces a concomitant confusion in the mind. There may be chronic tension in the upper body, especially around the back of the neck, the upper shoulder, upper back and jaw.

Other problems may include poor digestion, gastric reflux, bloating, and flatulence. Reverse breathers often have a difficult time coordinating physical movements, and are often clumsy. Reverse breathers may be confused when you ask them to breathe in or out, often doing the reverse, or they may have no sense of when or how they are breathing. Since reverse breathers have little kinesthetic knowledge of breathing ask them to look down and visually observe their abdomen when they breathe.

Exercises to train reverse breathers to breathe properly include:

1. **Slowing down breathing.** Reverse breathers often breathe with shallow breaths. Ask them to breathe more slowly so they can begin to become aware of this dysfunctional breathing pattern.

2. **Relax the abdomen.** Ask them to relax the abdomen, and experiment with having them push the abdomen out upon inhalation, and letting it fall back with exhalation. Another strategy may be to ask them to lie prostrate on an examination table, place their hands under their abdomen, and ask them to breathe into their hands, becoming aware of the contraction and relaxation of the diaphragm.

**Chest breathing** is a natural breathing pattern that occurs when fight or flight mechanisms are induced, or with intense physical exercise. In the case of the former, something startles us, we gasp, pulling the abdomen in and
breathe high into the chest. The increased abdominal tension that can occur with stress prevents the diaphragm from moving down, and thus we take in another quick chest breath, and without becoming conscious of the increased abdominal pressure, the breathe continues more or less along this line.

Chest breathers restrict the movement of breath into the abdomen, causing the breath to ascend higher into the chest, often accompanied by shoulder movements. When chest breathing is the dominant form of breathing there is an excessive reliance upon secondary respiratory muscles in the upper chest and neck, including the pectoralis, trapezius and scalenes.

In normal breathing the diaphragm, the intercostals and abdominal muscles dominate. In chest breathing the reliance upon weaker secondary muscles to breathe can promote chronic tension in the thoracic spine, shoulders and neck, often resistant to any kind of bodywork like massage because the cause has not been addressed. The chronic tension within the abdominal muscles can impair pelvic circulation, interfering with the processes of digestion and elimination, and causing problems such as gastric reflux and hiatus hernia.

In many cases chest breathers are Type A personalities, or over achievers, ambitious, willful and driven, often lacking the ability to completely relax and thus can experience a kind of chronic, free-floating anxiety.

Place your hands on your abdomen and chest, or if this is part of consultation, ask the patient to do this. Which hand moves more? Do you feel the abdomen expanding or not much at all? Is there any increase in shoulder and neck tension during inhalation? Do the shoulders rise with inhalation instead of relaxing and broadening outwards?

Exercises to dismantle a chest breathing pattern include:

1. **Releasing the tension in the upper shoulders and neck.** During breathing ensure that these areas are completely relaxed. When sitting for extended periods of time, such as working at the computer, make sure that you or your patient regularly stretches the
shoulders, neck and arms. Ensure that the workplace is ergonomic.

2. **Relax the abdomen.** As in reverse breathing, ask chest breathers to practice relaxing the abdomen, allowing it to expand upon inhalation and fall back with exhalation.

3. **Ground yourself in the present.** Chest breathers are often several steps ahead in their thinking, a feature of fight or flight induction where planning escape routes becomes necessary. Chest breathers need to focus on the present moment, and allow life events to unfold naturally.

4. **Assess body image.** Another reason for chest breathing is an unconscious negative body image. Proper breathing causes the abdomen to protrude, which to some people, may seem undesirable, looking like or adding girth to their waste. While measures should be taken to overcome truncal obesity, a healthy self-image should not come at the expense of breathing.

**Hyperventilation**

Although **hyperventilation** is not usually recognized in its chronic form, it can manifest as a subtle and chronic dysfunctional breathing pattern. The normal breathing rate in adults is about 13 breaths per minute, men tending to be a little slower (between 12-14 BPM) and women a little faster (14-15 BPM). Hyperventilation refers to a rate of breathing that is higher than normal, and is usually related to the pattern of chest breathing. Increasing the rate of respiration typically accommodates the decreased volume of oxygen taken in during chest breathing.

**Hyperventilation syndrome (HVS)** is a clinical entity that has been defined for well over a hundred years, but the specific medical causes have not been identified. Patients with HVS tend to breathe by using the upper thorax rather than the diaphragm, resulting in chronically over-inflated lungs. When stress induces a need to take a deep breath, the deep breathing is perceived as dyspnea. The sensation of dyspnea creates anxiety, which encourages more deep breathing, and a vicious cycle is created.
The excretion of CO₂ is absolutely crucial to maintaining the acid-base balance of the body, and dysfunctional breathing patterns such as hyperventilating can cause us to lose too much CO₂, promoting a general shift towards increasing the pH of the body, making the blood and tissues slight more alkaline. This effect reverberates in a variety of physiological changes:

- the arteries in the brain constrict, impairing the flow of blood to the brain, possible causing headaches, memory problems and difficulty concentrating
- hemoglobin will retain oxygen, a feature which may perpetuate the hyperventilating pattern, and promote problems such as dizziness and breathlessness
- the peripheral arteries constrict, impairing circulation to the extremities, promoting problems such as cold hands and feet
- the increase in alkalinity causes the net movement of calcium ions into the muscles, promoting muscle contraction and possible problems relating to chronic muscle spasm
- low levels of CO₂ can promote an increase in nervous system excitability, promoting nervous distress and muscular irritability

In addition to the symptoms above, hyperventilation can cause a variety of problems including exhaustion, palpitations, dizziness, visual disturbances, peripheral numbness, dyspnea, yawning, chest pain, a feeling of a lump in the throat, abdominal pain, and insomnia.

The test to determine for hyperventilation is counting the number of breaths per minute. In many cases however the patient may consciously slow the rate of respiration down during assessment, and thus this may not be the most effective method for assessing hyperventilation. Ask the patient to pull the abdomen in and chest breath – if they regularly hyperventilate this will be a familiar pattern.

Another clue is determining whether or not they allow exhalation to reach its maximum completion before the next breath. Normal breathing manifests a quick pause after exhalation – in hyperventilation there is no pause. Does the patient appear to “pull” the inhalation in the body, as opposed to letting the inhalation come naturally into the body? Remember, the first stages of inhalation are a
passive process, only if exhalation has been sufficient enough to reduce the lung pressure to slightly below that of the atmosphere, allowing air to move in passively, which is then continued by the contractions of the diaphragm and intercostals. The process of dismantling the hyperventilation pattern consists of practicing the techniques outlined under chest breathing, in addition to:

1. **Slowing down.** Breathing patterns compliment physical movements – try to slow down, reducing the speed at which you move, walk, and drive.

2. **Meditation and menial tasks.** Practice regular meditation, or just “sitting,” focusing on the complete in and out breath, fully extending and slowing inhalation and exhalation. Another method is to engage in menial tasks such as gardening, washing dishes or folding laundry. Very often fun, creative endeavors that requires your full attention, such as writing, painting, knitting or drawing, is another highly effective way to change this pattern.

3. **Assess the need to hurry.** Often the need to rush about and hence hyperventilate is an imagined need – based on the induction of fight or flight mechanisms. Instead, prioritize what is most important to accomplish, and what cannot be done in a relaxed peaceful manner can wait for another time. Of course there will always be times when we are rushed and need to move quickly, but if this becomes a chronic pattern then it needs to be addressed. Imagine that if today was your last day, what things would be most important to accomplish, and what things don’t really matter.

4. **Address anxiety and fear.** In many cases the hyperventilation pattern represents emotional issues that cause the patient to be in a more or less constant state of fear, essentially being afraid of taking a deep breath, a kind of plunge into their own physical consciousness. In such cases it may be important to refer the patient to a therapist to work some of these issues out.
Collapsed breathing

Collapsed breathing is essentially the same pattern as chest breathing, but looks substantially different. Instead of the chest rising and expanding with each breath, the chest in collapsed breathers is drawn inwards, the shoulders hunch and the abdomen protrudes forward and downwards. Nonetheless upon inhalation the abdomen doesn’t change position but the shoulders and upper chest rise to accommodate the inhalation. In many cases collapsed breathers sigh upon exhalation, and frequently gasp to obtain more air.

The collapsed breathing pattern has numerous effects upon the body. In most scenarios the muscular tone of the abdomino-pelvic cavity is poor, and the circulation is stagnant, leading to prolapsed organs and hemorrhoids. It is a pattern that often accompanies depression, shame or a poor self-esteem. This may be the result of disconnectedness between the mind and body, where the mind looks for an escape beyond the confines of physicality. In such cases the person may appear lively and motivated, but only from the head up: the body tells the truth of the matter.

Collapsed breathing is also a pattern that can manifest in emotional trauma, where ignoring or suppressing sensations and memories becomes an important coping strategy.

In a sitting position place one hand on the abdomen and the other on the chest. Collapse your shoulders forward, allowing the head to come down and forward and the sternum downward. Does this feel comfortable? If so, you may be a chest breather. Now push with your feet and straighten your back, allowing the chest to expand, the vertebrae to balance upon one another like there is wire that pulls your head up, allowing the shoulders to roll back. Does this feel uncomfortable? If the answers are yes to both questions, you may be a collapsed breather.

Dismantling the collapsed breathing pattern consists of using the lower body, the legs and the knees, to take on the burden of bearing the weight, creating a kind of rebounding force that lifts and elongates the vertical axis of the spine. The head should be up, eyes forward, like a Russian aristocrat. If this is too difficult it may be that the patient
needs to be referred to a therapist that can help them work through their emotional issues. Consider Flower Essences or Family Constellation therapy.

As we can see, the three basic dysfunctional breathing patterns discussed relate to chronic tension in the diaphragm, intercostals, abdomen and the muscles of the shoulder and neck. Beyond the methods already discussed there are a variety of herbal remedies that can be used to help relax these areas:

- **over-thinking, circular thinking**: Ganoderma, Ceanothus, Aesculus, Passiflora. *Flower Essence (FE)*: Nasturtium, Dill
- **anxiety and fear**: Withania, Valeriana, Stachys, Anenome. *FE*: Chaminile, Labrador Tea, Trembling Poplar, Yarrow Yellow, Goldenrod, Fireweed, Arnica, Black Currant, Cinquefoil, red Clover
- **too busy, no time**: Verbena, Scutellaria, Agrimonia, Lycopus, Leonorus, Chamomila
- **environmental and social sensitivities**: Achillea, Hypericum, Ganoderma. *FE*: Red Clover, Trembling Poplar
- **depression and poor self-esteem**: Mahonia, Gentiana, Calendula, Hypericum, Cimicifuga. *FE* Borage, Gorse

In addition to the above remedies, a calcium/magnesium supplement (800-1000 mg ea.) may be helpful to reduce muscle spasm, as well as vitamin B complex to support nervous function.

**Part IV: Etiology, Pathology and Treatment of Respiratory Disorders**

*Sinusitis*

Sinusitis is the inflammation of one or more of the paranasal sinuses (frontal, sphenoid and maxillary sinuses), often as a complication of rhinitis. With the inflammation of the nasal mucus membranes the openings from the sinuses may be obstructed promoting the accumulation of sinus secretions, causing pain, pressure, headache, fever
and local tenderness. Sinusitis can be either acute or chronic, but it can be difficult to distinguish between the two, and as both are attributed to bacterial infection they are treated identically with antibiotics.¹,²,³

It is estimated that 40 million people in North America suffer from chronic sinusitis, making it one of the most commonly experienced conditions. Similar to acute sinusitis, chronic sinusitis is thought to be bacterial in origin, and is typically treated with antibiotic therapy. Most patients however, while obtaining some temporary benefit, find that their symptoms return with a matter of a few weeks. In a recent study of chronic sinusitis patients, researchers at the Mayo clinic found that 93% of 210 consecutive patients diagnosed with chronic rhinosinusitis were found to be suffering from fungal infections, and that all cases were characterized by the presence of eosinophils in the nasal tissue and mucus. Thus the routine use of antibiotics may be contraindicated in chronic sinusitis, and may end up making the problem worse by tipping ecological factors in favour of the fungi.⁴

The most important component in sinusitis is the outflow tracts (ostia) of all of the sinuses into the nose, but most importantly, those of the maxillary and ethmoid sinuses. Within the sinuses the cilia move mucus toward these channels, and when the function of the cilia are impaired in some way, such as in exposure to tobacco smoke, the result is the stagnation of mucus. In situations where the ostia are obstructed, such as paranasal inflammation caused by an infection or allergy, or from the presence of foreign bodies or polyps, the activity of the cilia will be impaired. As the mucus stagnates it becomes a breeding ground for bacteria – the more chronic the obstruction the greater the chance of secondary infection.

Typical pathogens include *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, *Streptococcus pyogenes* and *Staphylococcus aureus*. Fungal pathogens have also been identified in acute sinusitis in immunocompromised patients, or in patients that have been treated for extended periods of time with antibiotics. Allergic fungal sinusitis (AFS) is commonly caused by *Aspergillus*, as well as *Fusarium, Curvularia, Candida* and other fungi. It is the changes in air pressure within the
sinuses caused by the obstruction that promotes the pain of sinusitis.

Common Causes of Sinus Infection

- Colds or upper respiratory infections
- Hay fever or allergies
- Air pollution and cigarette smoke
- Nasal or dental procedures
- Reaction to GERD, digestive issues
- Traveling at high altitudes or swimming under water
- Hormone changes that occur with puberty
- Pregnancy
- Aging
- Sinus blockages
- Health conditions such as diabetes and AIDS

Medical treatment

Medications used in the treatment of sinusitis consist of topical steroids, decongestants, antihistamines, antibiotics, antifungals and surgery. The most commonly used medications for chronic sinusitis are steroids (e.g. fluticasone propionate), applied as a nasal mist, or in the form of injections into the turbinates. Steroids often improve symptoms dramatically for the first few days after usage, but overtime can cease to be effective and promote ecological changes in the nasal and sinus mucosa that can make the condition worse.

Topical decongestants include ephedrine hydrochloride, ipratropium bromide, phenylephrine, oxymetazoline, and xylometazoline hydrochloride. Oral decongestants include pseudoephedrine, and up until relatively recently phenylpropanolamine (PPA), which has since been taken off the market due to concerns over hemorrhagic stroke.

Both oral and topical decongestants act as adrenergic agonists, promoting vasoconstriction in the capillary mucosa, thereby decreasing blood flow and mucus secretion. Although OTC and prescription decongestants are widely used, their usage for even more than one week may cause rebound sinusitis (‘rhinitis ridicamentosa’). Antihistamines are sometimes resorted to as well, particularly in allergic sinusitis, but as they tend to dry
secretions and inhibit the flow of mucus through the ostia they should be avoided.

Oral antibiotics are considered the mainstay of the medical treatment of sinusitis and in practice are often prescribed without the necessary tests to determine the pathogen. The challenge in diagnosis is to obtain a sample of sinus secretions, which may be different from nasal secretions. Antibiotics penetrate into the sinuses rather poorly, and as a result treatment is usually at least two weeks and can extend to 6-8 weeks in particularly recalcitrant cases. Broad-spectrum antibiotics such as amoxicillin and clarithromycin are typically used during the initial treatment, but the presence of antibiotic resistant organisms may call for the usage of newer classes of antibiotics including ciprofloxacin, levofloxacin and moxifloxacin. Needless to say, the usage of antibiotics can dramatically worsen fungal sinusitis, damage the bacterial ecology of the body, and when used chronically (as is often the case) contribute to antibiotic resistance.

The relatively recent discovery of the prevalence of fungal sinusitis in chronic sinusitis has stimulated the usage of topical antifungals such as amphotericin B, but because of the drug’s sensitivity (i.e. it must be protected from light and refrigerated) it is inconvenient to use.

Surgical methods in the treatment of sinusitis are typically resorted to only after topical and oral medications have failed. Surgeons will attempt to improve sinus drainage by making the ostia wider or puncturing new holes in the sinus bones, although the development of scar tissue may reverse this latter procedure. In some cases surgeons may trim the turbinates, but the excessive loss of tissue may create an increase in nasal congestion similar to the phantom limb syndrome, and is called the ‘empty nose syndrome’.6 Depending upon the patient, the anterior and/or posterior ethmoid sinuses may also need to be removed, either partially or in total. The success rate and operative complications are dramatically related to the skill of the surgeon, and professionals note that there is a very long and steep learning curve.
Holistic treatment

The holistic treatment of sinusitis is a comprehensive approach based upon the causative factors.

In Ayurvedic medicine sinusitis is discussed under the classification of pratishtayya and related conditions including pinasa. According to the Madhava nidana pratishyaya is caused by several factors, including the suppression of natural urges, ingestion of uncooked foods, exposure to smoke, dust and pollen, abnormal climate, injury to the head, excessive talking, anger, insomnia, sleeping during the day, drinking very cold water and exposure to cold weather.

Symptoms that include a dry throat, scanty mucus, excessive sneezing, hoarseness, and pain in the temples is associated with Vata, especially if other Vattic symptoms are present, including constipation, anxiety, and exhaustion.

Pitta variants of pratishtayya are manifest as sinus inflammation, a yellowish to red discharge, fever, and burning sensations.

Kaphaja pratishtayya is identified by symptoms such as a thick whitish discharge, itching of the throat, palate, lips and head, facial swelling and sleepiness.

Symptoms of pratishtayya that appear and reappear are caused by all three doshas. The Madhava further states that when pratishtayya is not treated at the proper time the result may be an incurable form.

Chinese medicine differentiates sinusitis based upon specific afflictions of organ dysfunction, including Wind-Heat of the Lungs (usually caused by changes in weather), Damp-Heat of the Gallbladder (often caused by emotional problems), Damp-Heat of the Spleen and Stomach (typically caused by eating greasy and spicy foods), a Deficiency and Cold of Lung Qi (more often found often in chronic illness) and a Deficiency of Spleen Qi (caused by an improper diet). Treatment is directed to the specific pattern presented.

In Western herbal medicine sinusitis is similarly seen as the result of an improper diet and exposure to food allergens, depressed immunity, climactic factors, smoking
and environmental toxins, nutrient deficiency and auto 
toxicity.

The holistic treatment of sinusitis consists of the following:

1. **Remove causes.**
   - quit smoking
   - limit exposure to environmental toxins, especially in air-conditioned indoor environments where viral, bacterial and fungal pathogens are continuously re-
circulated. Personal air filters in such environments are recommended.
   - address the issue of dietary intolerances and food allergens by implementing a elimination-challenge diet (see *The Fire Within: Digestive Function and Botanical Medicine*). Generally speaking heavy and sticky foods such as dairy, sweets and flour products should be avoided.
   - assess patient for air-borne allergens (see *Asthma* below)

2. **Clear the body of toxins**
   - **Cholagogues and hepatotrophorestoratives** to enhance liver detoxification with cholagogues and supportive nutrients (see *The Inner Alchemist: Hepatobiliary Function and Botanical Medicine*). Consider a Herbal D-tox. Chronic sinus problems often underlie an impairment in hepatic detoxification; e.g. *Berberis, Peumus, Silybum, Haridra (Curcuma longa), Bhumyamalaki (Phyllanthus amarus), Katuka (Picrorrhiza kurroa), Huang Qin (Scutellaria baicalensis), Guduchi (Tinospora cordifolia).*
   - **Diuretics:** Priest and Priest state that in addition to liver detoxification the kidneys maintain a special relationship with the lungs, and thus an increase in respiratory catarrh can indicate a relative insufficiency of renal function (1982, 10-11), e.g. *Apium, Galium, Urtica, Solidago, Equisetum.*
   - **Lymphagogues:** *Phytolacca, Thuja, Galium, Ceanothus*

3. **Re-establish healthy body ecology.**
   - **Antibacterials:** *Echinacea, Baptisia, Hydrastis, Allium, Guggulu (Commiphora mukul), Huang Lian (Coptis chinense), Lian Qiao (Forsythia suspens),*
Jin Yin Hua (*Lonicera japonica*), Ban Lan Gen (*Isatis tinctoria*), Huang Qin (*Scutellaria baicalensis*)

- **Antifungals:** *Allium, Artemisia, Tabebuia, Berberis, Echinacea, Spilanthes, Nimba (Azadirachta indica), Huang Lian (Coptis chinense), Tulsi (Ocimum sanctum), Bhringaraj (Eclipta alba), Haritaki (Terminalia chebula), Hingu (Ferula foetida), Bibhitaki (Terminalia bellerica)*
- **Probiotics:** e.g. lactobacilli, bifidobacterium
- **Prebiotics:** e.g. fructo-oligosaccharides, inulin (e.g. found in *Inula* and *Taraxacum* root)

4. Check mucus production and restore tone to respiratory tract.
   - **Mucolytics:** *Myrica, Hydrastis, Armoracea, Hamamelis, Verbascum, Solidago, Euphrasia, Zingiber, Cang Er Zhi (Xanthium sibiricum), Xin Yi Hua (Magnolia liliflora), Ma Huang (Ephedra sinica), Pippali (Piper longum), Ela (Elettaria cardamomum)*
- **Expectorants:** *Verbascum, Inula*

5. Modulate inflammatory and immune processes.
   - **Immunomodulants:** *Ganoderma, Cordyceps, Huang qi (Astragalus membranaceus), Amalaki (Emblica officinalis), Wu Wei Zi (Schizandra chinense)*
   - **Antiinflammatories:** *Glycyrrhiza, Hypericum, Symphytum, Plantago, Althaea, Stellaria, Nimba (Azadirachta indica), Bhringima (Andrographis paniculata), Guduchi (Tinospora cordifolia), Ju Hua (Chrysanthemum moriflora), Amla (Emblica officinalis), Haridra (Curcuma longa), Sheng Di Huang (Rehmannia glutinosa), Shi Hu (Dendrobium nobile), Mai Men Dong (Ophiopogon japonicus), Yin Chai Hu (Stellaria dichotoma), Shi Hu (Dendrobium nobile)*
   - **EPA/DHA, 1000 mg each daily, to down-regulate inflammatory mechanisms**
   - **Quercetin and bioflavonoids, 5 g daily, to stabilize mast cells and histamine release**
   - **Immunosupportive nutrients,** including vitamins A (25,000 IU daily), B complex (50 mg daily), C (to bowel tolerance) and E (800 IU daily), as well as zinc (50 mg daily)
6. **Hydrate nasal and sinus mucosa.**
   - *Neti,* with isotonic water, twice daily
   - Humidification, especially at night, with essential oils (e.g. Spruce, Eucalyptus, Rosemary, Cedar, Pine, etc.)
   - *Nasya,* 2-3 gtt of sesame oil instilled and inhaled into each nostril, once daily on an empty stomach
   - **Demulcents:** *Althaea, Ulmus Glycyrrhiza,* Kumari juice (*Aloe vera*)

7. **Dietary changes.**
   - Mucus-producing foods must be eliminated, including dairy, flour, and sugar.
   - Animal proteins and fats should be reduced in favor of lightly cooked vegetables and boiled whole grains for the duration of the illness.

8. **Additional formulae:**
   - Pin Ming Kan Wang 2 -3 tab, tid
   - Trikatu churna, 2-3 g bid-tid with honey and water
   - Shiva gutika, 12 g bid-tid with water or soup
   - Chitraka Haritaki churna, 6-12 g bid-tid with water
   - Bi Yan Pian (for Wind-Cold and Wind Heat), 6 pills bid-tid
   - Bi Tong Pian (Wind Heat, Phlegm, Liver Heat), 4 pills bid-tid
   - Long Dan Xie Gan Wan (Damp Heat in Gall Bladder), 4-6 pills bid-tid

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**Laryngitis and pharyngitis**

**Acute laryngitis** is a typically mild and self-limiting condition usually due to infection by adenoviruses and parainfluenza viruses, sometimes followed by secondary infection by organisms such as *Streptococcus pneumoniae,* *Streptococcus pyogenes,* and *Neisseria catarrhalis.* It is characterized by fever, local lymphadenitis, and swelling of the larynx, sometimes accompanied by mild epiglottitis. The characteristic symptom found in laryngitis is a loss of voice, due to the temporary swelling of the vocal cords.
In **chronic laryngitis** the mucus glands may become hyperplastic leading to enhanced mucus secretion. Another possibility with chronic laryngitis is squamous metaplasia, which results in a loss of ciliary function and a tendency to recurrent infection. The most common cause of chronic laryngitis is smoking, but other factors such as excessive talking or singing, chronic allergic reactions or chronic exposure to noxious inhalants.\(^7,8\)

**Pharyngitis** or **sore throat**, refers to the inflammation of the pharynx or throat, and can have a variety of causes including the rhinoviruses, influenza viruses, adenoviruses and EBV, as well as bacteria such as Group A *Streptococcus*, Corynebacterium, Arcanobacterium, *Neisseria gonorrhoeae* and *Chlamydia pneumoniae*. In up to 30% of cases, no infectious agent can be identified, indicating that other factors such as excessive talking or singing and allergic reactions could play a role. The condition may be accompanied by fever, headache, and local lymphadenitis. In severe cases a throat swab is usually performed to rule out Group A *Streptococcus*, which causes **strep throat**. Complications of strep throat include rheumatic fever, and glomerulonephritis (kidney inflammation). In particularly severe forms of pharyngitis airway obstruction may occur.\(^9,10\)

### Medical treatment

The recognized causes of laryngitis and pharyngitis in modern medicine extend to the pathogenic activity of viruses, bacteria and in some cases, fungi, and thus the focus of the treatment is upon inhibiting microbial activity. For viral conditions little treatment is recommended other than bed rest and hydration, although in immunocompromised patients antiviral agents may be prescribed (e.g. acyclovir, famciclovir, and valacyclovir). Antibiotics (e.g. amoxicillin, penicillin, erythromycin) are reserved for prophylactic use in severe viral conditions or where a bacteria pathogen has been isolated from the swab of the pharyngeal mucosa. Oral and inhaled corticosteroids (e.g. prednisone, dexamethasone) may be prescribed short term to provide symptomatic relief, but comprise immune function. Antifungals (e.g. nystatin, fluconazole) are used in fungal infections (e.g. candidiasis).
Holistic treatment

The focus of treatment in holistic medicine is to recognize the underlying mechanism of the condition, particularly in chronic or unruly cases, and to re-establish the normal ecology of the oropharynx by the use of topical and internal treatments.

In Ayurvedic medicine the underlying mechanism of laryngitis and pharyngitis is usually the accumulation of Kapha (identified by an increase in mucus and swelling of the throat), but given specific symptoms, may be classified as Vata (e.g. airway obstruction, pharyngeal dryness, physical exhaustion) or Pitta (e.g. acute inflammation, mucopurulence). Chronic pharyngitis is typically caused by ama, and the subsequent vitiation of the doshas.

In Chinese medicine the causes of acute pharyngitis is typically Wind-Heat or Heat Toxin, whereas chronic forms may be related to a Lung Yin Deficiency or Qi Stasis and Stagnation of Phlegm.

Any protocol for laryngitis and pharyngitis must distinguish between acute and chronic forms, and ideally, the specific pathogen involved (i.e. viral, bacterial or fungal):

1. **Reduce throat inflammation and swelling.**
   - **Demulcents and vulneraries**, best used in acute inflammation and not in profound catarrh, used as a gargle in combination with antimicrobial botanicals (see below), e.g. Glycyrrhiza, Hypericum, Symphytum, Plantago, Althaea, Stellaria, Mai Men Dong (Ophiopogon japonicus), Shi Di Huang (Rehmannia glutinosa), Shi Hu (Dendrobium nobile)
   - **Antiinflammatories**, to reduce heat and inflammation, e.g. see demulcents and vulneraries, as well as heat-reducing botanicals including Salvia, Echinacea, Hydrastis, Berberis, Coptis, Nimba (Azadirachta indica), Bhumiba (Andrographis paniculata), Guduchi (Tinospora cordifolia), Ju Hua (Chrysanthemum morifolium), Amal (Emblica officinalis), Haridra (Curcuma longa), Sheng Di Huang (Rehmannia glutinosa), Shi Hu (Dendrobium nobile), Mai Men Dong (Ophiopogon japonicus), Yin Chai Hu (Stellaria dichotoma), Shi
Hu (*Dendrobium nobile*), Lian Qiao (*Forsythia suspensa*), Jin Yin Hua (*Lonicera japonica*), Ban Lan Gen (*Isatis tinctoria*), Huang Qin (*Scutellaria baicalensis*)

- **Analgesics:** Gelsemium, Aconitum

2. **Restore the ecology of the oropharynx.**
   - **Antivirals:** Hypericum, Coriolus, Ligusticum, Lomatium, Bhunimba (*Andrographis paniculata*), Guduchi (*Tinospora cordifolia*), Ban Lan Gen (*Isatis tinctoria*)
   - **Antibacterials:** Echinacea, Baptisia, Hydrastis, Allium, Guggulu (*Commiphora mukul*), Nimba (*Azadirachta indica*), Bhunimba (*Andrographis paniculata*), Katuka (*Picrorrhiza kurroa*), Guduchi (*Tinospora cordifolia*), Haridra (*Curcuma longa*), Huang Lian (*Coptis chinense*), Lian Qiao (*Forsythia suspensa*), Jin Yin Hua (*Lonicera japonica*), Ban Lan Gen (*Isatis tinctoria*), Huang Qin (*Scutellaria baicalensis*)
   - **Antifungals:** Allium, Artemisia, Tabebiua, Berberis, Echinacea, Spilanthes, Nimba (*Azadirachta indica*), Huang Lian (*Coptis chinense*), Tulasi (*Ocimum sanctum*), Bhringaraj (*Eclipta alba*), Haritaki (*Terminalia chebula*), Hingu (*Ferula foetida*) and Bibhitaki (*Terminalia bellerica*)
   - **Probiotics:** e.g. lactobacilli
   - **Prebiotics:** e.g. fructo-oligosaccharides, inulin (e.g. found in *Inula* and *Taraxacum* root)

3. **Mucolytics and anticatarrhals**
   - **Antiinflammatory mucolytics**, e.g. Hydrastis, Hamamelis, Verbascum, Solidago, Euphrasia
   - **Stimulating mucolytics**, used with caution in symptoms of heat, e.g. Myrica, Capsicum, Armoracea, Zingiber, Pippali (*Piper longum*), Ela (*Elettaria cardamomum*), Cang Er Zhi (*Xanthium sibiricum*)

4. **Support immune function.**
   - **Lymphagogues** as supportive, and specifically with lymphadenopathy, e.g. Echinacea, Ceanothus, Phytolacca, Thuja, Galium, Trifolium
   - **Immunomodulants** in chronic or recurring conditions, e.g. Echinacea, Tabebiua, Ganoderma,
Huang qi (*Astragalus membranaceus*), Amalaki (*Emblica officinalis*), Wu Wei Zi (*Schizandra chinensis*)

- **Immunosupportive nutrients**, including vitamins A (25,000 IU daily), B complex (50 mg daily), C (to bowel tolerance) and E (800 IU daily), as well as zinc (50 mg daily)

5. **Dietary changes.**
   - Mucus-producing foods must be eliminated, including dairy, flour, and sugar.
   - Animal proteins and fats should be reduced in favor of lightly cooked vegetables and boiled whole grains for the duration of the illness.
   - Emphasize moistening and nourishing foods, including meat and vegetable broths

6. **Specific formulae.**
   - Composition powder, 3-5 g tid-qid:
   - White Flower embrocation (Chinese Pak Fah Yeow): few drops as needed
   - Katukadi kvatha, 30-60 mL bid-tid
   - Pippalyadi churna, 2-3 g bid-tid
   - Chuan Xin Lian, 3-5 pills tid-qid
   - Huang Lien Shang Ching Pien, 4 pills bid-tid
   - Liu Shen Wan, 10 pills bid-tid
   - Lian Qiao Bai Du Pian, 2-4 pills bid-tid
   - Niu Huang Water-melon frost, applied topically, ad lib.

**Bronchitis**

**Bronchitis** refers to the inflammation of the large and medium bronchi. **Acute bronchitis** is typically the result of an acute viral URI (upper respiratory infection) of the pharynx, throat, and bronchial tree, sometimes with secondary bacterial infection. Fever, lymphadenopathy, myalgia and other symptoms of a URI are typically present (see *Herbal Immunity: Nonspecific Resistance, Immunity and Botanical Medicine*).

Viruses that cause acute bronchitis include adenovirus, coronavirus, influenza A and B viruses, parainfluenza
virus, respiratory syncytial virus, coxsackievirus, rhinovirus, and the viruses that cause rubella and measles.

Bacterial causes include *Mycoplasma pneumoniae*, *Bordetella pertussis* and *Chlamydia pneumoniae*.

Acute bronchitis may also be caused by acute exposure to various dusts, fumes and smoke. Acute bronchitis is usually a self-limiting condition in most patients, with maximal symptoms occurring within three to five days after the onset of the condition, resolving over a two-week period. Complications usually only occur in patients with an underlying respiratory illness, including bronchiolitis and bronchopneumonia.\(^{11,12}\)

Acute bronchitis is characterized by mucosal inflammation and the abundant production of sputum that is often mucopurulent (secretion containing mucus and pus). As the sputum accumulates in the bronchi it initiates the cough reflex, which along with the ciliated epithelia, allows the sputum to be cleared from the air passages. In some cases dyspnea results from edema and spasm of the bronchial walls. Upon auscultation (listening to internal sound, usually with stethoscope) the breath sounds may exhibit occasional crackling, scattered ronchi (a rattling sound somewhat like snoring), and wheezing after coughing.

Along with emphysema and asthma, **chronic bronchitis** is a **chronic pulmonary obstructive disorder** (CPOD) that is defined as a chronic, productive cough experienced for more than three consecutive months. The primary pathological features are characterized by an increase in goblet and mucus cells with a commensurate loss of serous glands and ciliated epithelium, resulting in thick, viscous sputum that is difficult to expectorate. With repeated inflammation there is fibrosis and a thickening of the bronchial wall, which further impairs airflow. In progressed conditions hypertrophy of the right heart ventricle (*cor pulmonae*) can occur.

( table 6.1 p 93 w/ cartoons)

In most cases the patient is a smoker, although environmental pollution is another important factor and is probably an increasing trend, especially in highly congested urban areas. Nutrient deficiencies such as vitamin A,
essential fatty acids and accessory antioxidants also facilitate the condition.

**Medical treatment**

In acute bronchitis bed rest and hydration are the usual therapies, along with antipyretics such as ASA (Aspirin) and acetaminophen (Tylenol). Antitussives used to inhibit or suppress the cough reflex do so by depressing the medullary cough center, and include drugs such as chlophedianol, levopropoxyphene, dextromethorphan, and codeine.

Expectorants are also used to help expel the congested sputum from the respiratory tract by decreasing its viscosity, and include iodides (side-effects include acne, coryza, erythema of face and chest, painful swelling of the salivary glands, and hypothyroidism with long term use), syrup of ipecac (nausea and vomiting), guaifenesin (generally well-tolerated), ammonium chloride, terpin hydrate, and even creosote.

Demulcents are often used as an adjunct to antitussive preparations including acacia, glycerin, honey, sugar syrup (a questionable antitussive) and sometimes an extract of *Prunus virginiana* bark.

Antibiotics are the mainstay of treatment in purulent acute bronchitis, including tetracycline, erythromycin, amoxicillin or ampicillin; hopefully the choice is based on a cytological analysis of a sample of the sputum.

The treatment of chronic bronchitis is directed towards the removal of the cause, which may include regular vaccination if chronic bronchitis is a common sequela to a URI, and smoking cessation. Patients may undergo allergy testing to determine the presence of potential allergens, and may be recommended desensitization therapy in weekly injections.

Symptomatic therapy consists of bronchodilators such as β₂-agonists (e.g. metaproterenol, albuterol, terbutaline, and pirbuterol) and anticholinergics (e.g. ipratropium). In some cases corticosteroids may be prescribed, either orally or topically, but there is little evidence of their benefit. Antibiotics are also sometimes used in acute exacerbations of chronic bronchitis, including increased cough, catarrh,
dyspnea, and fever. In more severe forms of chronic bronchitis oxygen therapy may be administered.

**Holistic treatment**

In **Chinese medicine** bronchitis is differentiated based on the pathological factors, including the Retention of Phlegm with Extrinsic Cold (coryza with whitish sputum, floating pulse), Stagnation of Phlegm-Heat (thick yellow sputum, rapid pulse), and a Lung and Spleen Qi Deficiency (weak cough, SOB, thin and deep pulse).

In **Ayurvedic** medicine *kasa* (cough) is caused by the inhalation of dust and noxious fumes, excessive exercise, foods that are dry, and the suppression of natural urges.

There are five variants of *kasa*, including **Vataja** (dry cough), **Pittaja** (heat and inflammation), **Kaphaja** (swelling and mucus), **Kshataja** (caused by injury) and **Kashaya** (caused by asthenia and wasting, i.e. tuberculosis).

From a **Western herbal** perspective the causes of acute and chronic bronchitis are identical to that of modern medicine, although underlying factors are taken into consideration, include diet and nutrition, immune status and the efficiency of eliminative organs.

1. **Ease cough.**
   - **Demulcents and vulneraries**, used in acute inflammation and dryness, and not in profound catarrh, e.g. *Glycyrrhiza, Hypericum, Symphytum, Plantago, Althaea, Stellaria*, Mai Men Dong (*Ophiopogon japonicus*), *Shi Di Huang* (*Rehmannia glutinosa*), *Shi Hu* (*Dendrobium nobile*).
   - **Stimulating expectorants**, used in highly congestive conditions with a thick profuse catarrh e.g. *Viola, Urginea, Stillingia, Primula, Bellis, Polygala*, and *Euphorbia, Commiphora, Populus candidans, Grindelia*.
   - **Respiratory antispasmodics**, used in bronchial constriction, and spasmodic (whooping) cough, e.g. *Datura, Ephedra, Ammi, Lobelia, Prunus, Verbascum, Inula, Populus candidans, Thymus, Dragonitum, Lysichiton, Drosera, Grindelia, Lactuca, Sanguinaria,*
• **Mucolytic expectorants**, to decrease viscosity of mucus secretions, e.g. *Zingiber, Elettaria, Cinnamomum, Pimpinella, Capsicum, Zanthoxylum, Allium* and *Angelica*.

• **Astringing expectorants**, to dry up excessive mucus secretions, e.g. *Myrica, Euphrasia, Abies, Solidago, Verbascum, Hydrastis*

2. **Remove causes.**
   - **quit smoking** (tobacco, cannabis)
   - **limit exposure to environmental toxins**, especially in air-conditioned indoor environments where viral, bacterial and fungal pathogens are continuously re-circulated. Personal air filters in such environments are recommended.
   - **address the issue of dietary intolerances and food allergens** by implementing an elimination-challenge diet (see *The Fire Within: Digestive Function and Botanical Medicine*). Generally speaking heavy and sticky foods such as dairy, sweets and flour products should be avoided.
   - assess patient for air-borne allergens (see *Asthma* below)

3. **Treat infection and reestablish the body’s ecology.**
   - **Antivirals**: *Hypericum, Coriolus, Ligusticum, Lomatium, Bhunimba (Andrographis paniculata), Guduchi (Tinospora cordifolia), Ban Lan Gen (Isatis tinctoria)*
   - **Antibacterials**: *Echinacea, Baptisia, Hydrastis, Allium, Guggulu (Commiphora mukul), Nimba (Azadirachta indica), Bhunimba (Andrographis paniculata), Katuka (Picrorrhiza kurroa), Guduchi (Tinospora cordifolia), Haridra (Curdica longa), Huang Lian (Coptis chinense), Lian Qiao (Forsythia suspens), Jin Yin Hua (Lonicera japonica), Ban Lan Gen (Isatis tinctoria), Huang Qin (Scutellaria baicalensis)*
   - **Antifungals**: *Allium, Artemisia, Tabebuia, Berberis, Echinacea, Spilanthes, Nimba (Azadirachta indica), Huang Lian (Coptis chinense), Tulasi (Ocimum sanctum), Bhringaraj (Eclipta alba), Haritaki (Terminalia chebula), Hingu (Ferula foetida) and Vibhitaki (Terminalia bellerica)*
   - **Probiotics**: e.g. lactobacilli, bifidobacterium
• **Prebiotics**: e.g. fructo-oligosaccharides, inulin (e.g. found in *Inula* and *Taraxacum* root)

4. **Support immune function.**
   • **Lymphagogues** as supportive, and specifically with lymphadenopathy, e.g. *Echinacea*, *Ceanothus*, *Phytolacca*, *Thuja*, *Galium*, *Trifolium*
   • **Immunomodulants** in chronic or recurring conditions, e.g. *Echinacea*, *Tabebuia*, *Ganoderma*, *Cordyceps*, Huang qi (*Astragalus membranaceus*), Amalaki (*Emblica officinalis*), Wu Wei Zi (*Schizandra chinensis*)
   • **Immunosupportive nutrients**, including vitamins A (25,000 IU daily), B complex (50 mg daily), C (to bowel tolerance) and E (800 IU daily), as well as zinc (50 mg daily)

5. **Clear the body of toxins.**
   • Of particular importance, where chronic bronchitis represents the cumulative effects of congestion and stasis in other eliminative systems.
   • **Cholagogues and hepatotrophorestoratives** to enhance liver detoxification with cholagogues and supportive nutrients (see *The Inner Alchemist: Hepatobiliary Function and Botanical Medicine*), e.g. *Berberis*, *Peumus*, *Silybum*, Haritaki (*Terminalia chebula*), Haridra (*Curcuma longa*), Guduchi (*Tinospora cordifolia*). Bhumyamalaki (*Phyllanthus amarus*), Katuka (*Picrorrhiza kurroa*), Huang Qin (*Scutellaria baicalensis*),
   • **Diuretics**: Priest and Priest state that in addition to liver detoxification the kidneys maintain a special relationship with the lungs, and thus an increase in respiratory catarrh can indicate a relative insufficiency of renal function (1982, 10-11), e.g. *Apium*, *Galium*, *Urtica*, *Solidago*, *Equisetum*
   • **Lymphagogues**: *Phytolacca*, *Thuja*, *Galium*, *Ceanothus*
   • **Hydration and heat**: showers, baths, steam baths, sweating under blankets; drinking 2 liters of water daily

6. **Hydrate nasal and sinus mucosa.**
   • *Neti*, with isotonic water, twice daily
Humidification, especially at night, with essential oils (e.g. Spruce, Eucalyptus, Rosemary, Cedar, Pine, etc.)

Nasya, 2-3 gtt of sesame oil instilled and inhaled into each nostril, once daily on an empty stomach in the morning

Demulcents: Althaea, Ulmus Glycyrrhiza, Kumari juice (Aloe vera)

7. Dietary changes.

- Mucus-producing foods must be eliminated, including dairy, flour, and sugar.
- Animal proteins and fats should be reduced in favor of lightly cooked vegetables and boiled whole grains for the duration of the illness.

Asthma

Asthma is another COPD, characterized by inflammation and obstruction of the bronchus and bronchioles, mediated by a hyper-reactivity to a variety of stimuli, including smoke, noxious gases, pollen, animal dander and dust, heaving breathing that accompanies exercise, laughing, crying or emotional stress. Recently, the role of volatile organic compounds (VOCs) found in carpeting and building materials have been identified in the pathogenesis of asthma. Another factor is a concurrent respiratory infection, such as coryza or pneumonia.

With asthma it is thought that these factors or combination of factors initiates the release of inflammatory mediators promoting the release of histamine and arachidonic acid metabolism. When activated these inflammatory chemicals promote the smooth muscle spasm of the bronchial wall and edema of the mucosa, enhancing mucus production and bronchial injury by activated immune cells (primarily eosinophils, lymphocytes and neutrophils). It is important to note that production of inflammatory mediators is enhanced by a pre-existing deficiency of vitamins, minerals and accessory nutrients such as n-3 PUFAs and flavonoids that counter or prevent inflammation.\textsuperscript{13,14}

The frequency and severity of asthma attacks vary to a large degree. Some patients have only occasional episodes...
that are mild and brief, whereas others experience a chronic cough and mild bronchial congestion that is interrupted by severe episodes of bronchospasm, usually after exposure to some type of stimuli that enhances bronchial hypersensitivity.

An asthma attack typically has an acute onset, with sudden wheezing, coughing, and dyspnea, sometimes preceded by pruritis over the neck and chest. The cough of an asthma attack is distinctively tight, hard and sharp, generally unproductive, and accompanied by wheezing, a sensation of chest constriction and the subsequent distress this causes the patient. In less severe attacks a dry cough may be the only presenting symptom. After the attack subsides many patients will produce a thick, tenacious mucus.

Asthma is classified into four categories according to the severity of symptoms. In many cases a patient will move back and forth between these categories, depending upon treatment and the presence of stimuli that promotes hypersensitivity:

<table>
<thead>
<tr>
<th>Stage I</th>
<th>Stage II</th>
<th>Stage III</th>
<th>Stage IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild and intermittent dyspnea. Lung capacity 50-80% of normal. Pulmonary (Pa) CO(_2) levels normal or decreasing, pH normal or increasing; PaO(_2) normal or decreasing.</td>
<td>Moderate, with obvious dyspnea and wheezing. Lung capacity 50% of normal. Usage of accessory muscles. PaCO(_2) decreasing, pH increasing; PaO(_2) decreasing.</td>
<td>Severe, with obvious distress, visible cyanosis. Lung capacity 25% of normal. Marked use of accessory muscles. PaCO(_2) normal or rising, pH normal or decreasing; PaO(_2) decreasing dramatically.</td>
<td>Severe distress, lethargy, confusion, ‘pulsus paradoxus’ (decrease in systolic pressure and pulse amplitude). Lung capacity 10% of normal. Marked use of accessory muscles. PaCO(_2) rapidly increasing, pH rapidly decreasing; PaO(_2) dramatically diminished (Berkow 1992, 648).</td>
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**Medical treatment**

The medical treatment of asthma consists of a consideration for environmental triggers (including animal dander, dust mites, cockroaches, airborne molds, and pollens) and symptomatic drug interventions. Potential allergens are typically identified by the RAST method (see *The Fire Within: Digestive Function and Botanical Medicine*).

Typical interventions include furniture and flooring changes, emphasizing dust covers and hardwood floors. Patients may be counseled to give up a pet, or limit
exposure. Pollen allergies however are difficult to control by such methods, and thus desensitization immunotherapy may be recommended, apart from drug therapy.

Drug therapy for asthma consists of bronchodilators, used to control acute symptoms, and corticosteroids, used to inhibit chronic inflammation. Among the bronchodilators used in acute inflammation are β-adrenergic agonists, often administered in metered doses by inhalation, including epinephrine, albuterol, terbutaline, pirbuterol, metaproterenol, bitolterol, isoetharine and the long-acting (12h) salmeterol. Anticholinergic drugs such as atropine may also be administered in emergency situations to control symptoms. Theophylline is a methylxanthine found in black tea that is administered orally as fast acting bronchodilator, but has a number of severe side-effects including ventricular arrhythmia and even death. Theophylline should be discontinued immediately if there are any symptoms of nausea and vomiting.

Chronic inflammation in asthma is typically treated with corticosteroids, given orally or as an aerosol, the latter of which is also used to treat late responses to inhaled allergens, blocking the subsequent bronchial hyperactivity. Adverse effects of inhaled corticosteroids include hoarseness and mucocutaneous candidiasis. Systemic effects include suppression of the adrenal-pituitary axis, growth suppression in children, osteoporosis in women, thinning of the skin, and easy bruising. Care must be taken when withdrawing corticosteroids as too rapid of a withdrawal can precipitate secondary adrenocortical insufficiency. Other prophylactic drugs used to control inflammation include cromolyn and nedocromil, but are not used in acute scenarios.

**Holistic treatment**

In **Traditional Chinese** medicine asthma is an affliction of the Lungs by one of three etiological agents, including Cold, Heat and Qi deficiency. Dyspnea, wheezing and coughing are clinical features of all three types. Cold-type asthma is more frequent in winter and exposure to cold, identified by a white, moist and glossy coating on the tongue, and taut and tight pulse. Heat-type asthma is identified by its occurrence in hot weather, a yellowish
mucoid sputum, thirst, a red tongue with yellow greasy coating, and a slippery and rapid pulse. Deficiency-type asthma is caused by a deficiency of Lung and Spleen Qi and manifests as the chronic form of asthma, with a weak, fragile cough, aversion to wind, debility, a pale tongue with dry coating, and a deep fine, weak pulse.

In *Ayurvedic* medicine asthma, or *svasa*, is the result of a worsening cough (*kasa*), or from similar etiological factors that include the upward movement of *apana vayu*, which invades the chest and throat, causing a vitiation of *Kapha*, which causes dyspnea, wheezing, catarrh and distress.

Other etiological factors include poor digestion, exposure to poisons, noxious fumes and dust, anemia, chronic fever, wind, injury or from drinking very cold water.

The clinical features of *svasa* are differentiated into five types with different causative factors: *Kshudrasvasa* (dyspnea), *Tamakasvasa* (bronchial asthma), *Chinnasvasa* (anaphylaxis), *Mahansvasa* and *Urdhvasvasa*: the latter three are incurable and are premonitory symptoms of death.

*Kshudrasvasa* is a mild form of asthma caused by excessive exertion. *Tamakasvasa* or bronchial asthma is caused by *apana vayu* invading the chest and throat, causing a vitiation of *Kapha*. *Tamakasvasa* can be further classified on the basis of secondary *doshic* manifestations, i.e. *Pittaja*, *Vataja*, but the condition remains primarily an affliction of *Vata* and *Kapha*.

From the *Western herbal* perspective asthma is caused by the same etiological factors as the medical perspective. In addition, a more complete analysis of environmental triggers, the role of food allergens, digestive weakness (including hypochlorhydria (deficiency of stomach acid)), nutritional deficiencies (e.g. omega 3 fatty acids), intestinal permeability and dysbiosis must be undertaken. Important considerations are also made for stress and anxiety.

1. **Open the airways.** This is the most obvious treatment for asthma, and can consist of both short and long term strategies. Botanicals to use as an alternative to β-adrenergic inhalers are: *Datura* (oral, inhaled smoke), *Atropa* (oral), *Lobelia* (oral, inhaled smoke), *Ammi* (oral), Ma Huang (*Ephedra sinica*), *Ganoderma*, *Cordyceps*. IgE-
mediated attacks may respond to freeze-dried *Urtica*, two capsules every five minutes. In a pinch very strong black coffee or black tea given in small sips may be life-saving.

2. **Eliminate bronchial congestion and inflammation.** A variety of methods are used, including those which ease muscular spasm, promote vasoconstriction of the mucosa, assist in the expectoration mucus, and soothe irritation and inflammation.

- **Respiratory antispasmodics,** specifically used in cold and dry (*Vata*) conditions, e.g. *Lobelia, Ganoderma, Cordyceps, Drosera, Sympl-carpus, Grindelia, Cimicifuga, Dioscorea, Thymus, Prunus, Verbascum, Tussilago, Inula, Populus candidans, Draconitum, Lysichiton, Drosera, Lactua, Sanguinaria Hingu (Ferula foetida), Vasaka (Adhatodha vasica), Tai Zi Shen (Pseudostellaria heterophylla), Xing Ren (Prunus armeniaca)

- **Stimulating expectorants,** used in highly congestive conditions with a thick profuse catarrh (*Kapha*), e.g. *Viola, Urginea, Stillingia, Primula, Bellis, Polygala*, and *Euphorbia, Commiphora, Populus candidans, Grindelia, Vibhitaki (Terminalia chebula), Tulasi (Ocimum sanctum), Ban Xia (Pinellia ternate), Jie Geng (Platycodon grandiflorum)

- **Mucolytics, digestive stimulants** to enhance digestion and decrease viscosity of mucus, e.g. *Zingiber, Cinna-monum, Pimpinella, Capsicum, Zanthoxylum, Allium, Angelica, Ela (Elettaria cardamomum)*

- **Astringing expectorants,** to dry up excessive mucus secretions and constrict mucosal capillaries, e.g. *Myrica, Euphrasia, Abies, Solidago, Verbascum, Hydrastis, Vibhitaki (Terminalia chebula)*

- **Antiinflammatory expectorants,** for symptoms of of heat (*Pitta*), *Vasaka (Adhatodha vasica), Vamsarochana (Bambusa spp.), Bhumyamalaki (Phyllanthus amarus), Chuan Bei Mu (Fritillaria cirrhosa), Zhe Bei Mu (Fritillaria thunbergii), Gua Lou (Gua Lou Ren, Tian Hua Fen) (Trichosanthes kirilowii)*

- **Demulcents and vulneraries,** used in acute inflammation, heat and dryness (*Vata, Pitta*), and not in profound catarrh, e.g. *Glycyrrhiza,*
3. Correct dysfunctional breathing patterns. Assess for the breathing patterns mentioned under **Part IV: A Guide To Breathing**. Emphasize meditation, relaxation and stress-reduction techniques. Nerve relaxants and trophorestoratives may be indicated, including *Avena, Passiflora, Valeriana, Stachys, Anenome, Lycopus, Leonorus, Chamomila, Hypericum, Scutellaria, Ashvagandha (Withania somnifera), Brahmi (Bacopa monniera), Ling zhi (Ganoderma spp.)*

4. Support immune function.
   - **Lymphagogues** as supportive, and specifically with lymphadenopathy, e.g. *Echinacea, Ceanothus, Phytolacca, Thuja, Galium, Trifolium*
   - **Immunomodulants** in chronic or recurring conditions, e.g. *Echinacea, Tabebiua, Amalaki (Emblica officinalis), Ling zhi (Ganoderma spp.), Huang qi (Astragalus membranaceus), Wu Wei Zi (Schizandra chinense), Dong Chong Xia Cao (Cordyceps chinensis)*
   - **Immunosupportive nutrients**, including vitamins A (25,000 IU daily), B complex (50 mg daily), C (to bowel tolerance) and E (800 IU daily), as well as zinc (50 mg daily) and selenium (100 mcg daily)

5. Correct inflammatory tendency by addressing nutrient deficiencies.
   - Decrease consumption of feed-lot, grain-fed meat and animal products, including beef, pork, chicken and eggs.
   - Increase consumption of omega-3 fatty acids, equivalent of 1000 mg of EPA/DHA daily
   - Flavonoids and anthocyanidins-rich compounds and foods, e.g. quercitin, grape seed extract, turmeric, berries (e.g. blueberries, strawberries), *Rubus, Rosa (hips), Hibiscus, Gingko, Amalaki (Emblica officinalis)*
   - Magnesium and calcium, 800-1000 mg each daily
6. Detoxification.
   - Cholagogues and hepatotrophorestoratives to enhance liver detoxification with cholagogues and supportive nutrients (see *The Inner Alchemist: Hepatobiliary Function and Botanical Medicine*), e.g. *Berberis, Peumus, Silybum, Haritaki* (*Terminalia chebula*), *Haridra* (*Curcuma longa*), *Guduchi* (*Tinospora cordifolia*). *Bhumyamalaki* (*Phyllanthus amarus*), *Katuka* (*Picrorrhiza kurroa*), *Huang Qin* (*Scutellaria baicalensis*).
   - Diuretics and lymphagogues, e.g. *Apium, Galium, Urtica, Solidago, Equisetum Phytolacca, Thuja, Galium, Ceanothus*
   - Hydration and heat: showers, baths, steam baths, sweating under blankets; drinking 2 liters of water daily

7. Eliminate environmental triggers. Patients should be assessed for possible allergens (e.g. dust mites, pollen, animal dander), and then placed on an elimination-challenge diet to determine food allergens. Attention must be directed to the removal of noxious agents including volatile organic compounds (VOCs) and other chemical irritants and toxins found in building materials including paints, flooring, carpets, and pressed wood (e.g. fiberboard, plywood). Cessation of smoking (tobacco, cannabis) is highly recommended. Workplace hazards include recycled air and dust.

8. Specific formulae:
   - Respaherb (see above)
   - Reishi/Cordyceps blend
   - Compound Tincture of Lobelia (King’s American Dispensatory, 1898), 5 – 10 mL, up to five times daily.
   - Nayopayam kvatha, 48 mL bid-tid
   - Balajirakadi kvatha, 48 mL bid-tid
   - Shiva gutika, 3-6 g bid-tid
   - Chaturdasangha churna, 3-6 g bid-tid
   - Ma Xing Shi gan Tang (Ephedra Apricot, Gypsum and Licorice decoction), 1 cup thrice daily
   - Ren Shen Ge Jie San (Ginseng and Gecko powder), 3-6 g bid-tid
   - Ding Chuan Tang (Arrest Wheezing decoction), 1 cup bid-tid
   - Chuan Ke Ling, 4 pills bid-tid

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**Reishi/Cordyceps**

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Dosage</th>
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<tbody>
<tr>
<td>Reishi extract 15:1</td>
<td>50 mg</td>
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<tr>
<td>Reishi mushroom</td>
<td>200 mg</td>
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<tr>
<td>powder</td>
<td></td>
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<tr>
<td>Cordyceps Cs-4</td>
<td>250 mg</td>
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</tbody>
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Dosage: 2 – 3 capsule; 2 – 3 x daily

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• Ping Chuan Wan, 10 pills bid-tid

References

