# Mouth Breathing, Malocclusion & the Restoration of Nasal Breathing

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## Introduction

Most dentists and orthodontists are aware of the impact that mouth breathing has on the development of the maxilla. Most are also aware of the fact that even after successful realignment of teeth, unless a retainer is used, relapse usually occurs. The tongue is nature's retainer and at the lateral force exertion of 500 Gm provides the balance required against the inward force pull of the cheek muscles, at also around 500 Gm.

In an ideal world, these two forces would balance each other and normal maxillary development would take place. The primary teeth would erupt smoothly and evenly and even in the mixed dentition stage there should not be overcrowding or malalignment of teeth. So what causes mouth breathing to occur and what can be done about it? The answer to this lies in the basic physiology that we all studied during the early part of our careers. At the time we learned it we were not able to see its overall importance as we had yet to study the full gamut of anatomy and physiology to see how it all inter-related. By the time this happened we had forgotten most of it. So it should not come as any surprise that the information that follows will certainly strike a chord and probably elicit the usual comment "But I knew that!"

## Discussion

Before attempting to discuss what constitutes Functional as opposed to Dysfunctional Breathing it is necessary to understand the mechanism of breathing in all its complexity. Functional breathing is initiated when the $CO_2$ level in the arteries ($pACO_2$) reaches 40 mm Hg and stimulates the medullary response at the base of the brain. This in turn sends a signal to the diaphragm causing it to contract and relax and so the breathing cycle is maintained. So what goes wrong? Fig. 1

Fig. 1 - What makes us breathe

One of the prime roles of breathing is to maintain the pH of arterial blood at the optimal Chemical Axis, which ranges from 7.35 to 7.45.

This is a critical function as it controls the transport and release of oxygen throughout the body.

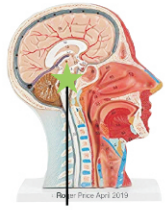
When the chemoreceptors in the brainstem sense an imbalance in the Chemical Axis, breathing is adjusted automatically to restore optimal function.

This can increase or decrease breathing rate, depth, volume, mechanics, dynamics and behavior patterns.

There is a norm for blood pressure, pulse, temperature, chemical content of the blood etc., but there is no such thing as Normal Breathing. Breathing has to be appropriate for the activity at the time, and what might be okay when running around the football field is certainly not okay when sitting on a couch watching a football game, beer in hand and loads of high fatty, salt-laden snack food at hand.

So in the absence of Normal Breathing the best we can hope for is the determination of Functional Breathing at Rest. Fig 2.

Fig. 2 - Functional breathing at rest



Optimal alveolar pressure of $CO_2$ should be 40mm Hg.

**THERE IS NO SUCH THING AS NORMAL BREATHING**

Breathing is directly linked to activity, nutrition, stress levels and other external factors. The Chemical Axis requires constant monitoring and reacts instantaneously to any pH imbalance.

There is however a definition for **Functional Breathing at Rest**, which is:

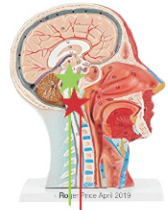
- Breathing in and out through the nose.
- Driven by the diaphragm, not the chest.
- 8-12 breaths per minute.
- Minute volume 5-6 liters.
- Silent.
- Under these conditions optimal alveolar pressure of $CO_2$ will be close to 40mm Hg.

In the 64 years since starting my studies as a pharmacist, and moving on to many other -ology and –opathy modalities, I have seldom come across a doctor o dentist who has looked at a patient, counted the number of breaths they take per minute and commented that they are breathing for two or three people. They surely enough comment about over-eating or drinking, but the breathing is never even noticed.

Anything that happens to the human body that the system wants to resist or reject sets up a stress response. This stress response, or mini-flight or fight, causes the release of adrenalin from the adrenal glands and our breathing rate rises. This applies to what we ingest, what stressors we encounter factually, as well as emotionally or perceived, and also what physical stresses are placed on the body through poor posture and other anatomical abnormalities.

The constant messages of increased breathing rate or hyperventilation cause the chemoreceptors in the brainstem to re-set themselves at what is now regarded as the "new normal" and the standard breathing rate rises from 8–10 breaths per minute to anything from 18– 30 bpm. Fig. 3.

Fig. 3 - Why breathing changes



Alveolar pressure of $CO_2$ drops below 40mm Hg.

The constant exposure to stressors of various natures initiate the Flight/Fight response which automatically triggers several responses.

Among these are:

Larger and faster breaths, which reduce the amount of $CO_2$ stored in the lungs.

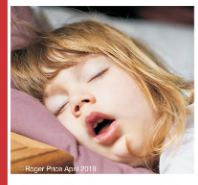
The tendency to mouth breathe in anticipation of threat or escape.

Changes in blood clotting levels, endorphin release, blood flow away from vital organs to the muscles of Flight or Fight, and the body prepares for action.

This action usually never occurs as the dangers are perceived rather than real - and the body then has to re-settle. If this is a regular occurrence then symptoms appear

Because the nose is not designed to cope with this volume of air, we become mouth breathers, and the constant lowering of $CO_2$ through breathing through the mouth perpetuates the problem. Fig. 4

Fig. 4 - The problem with mouth breathing

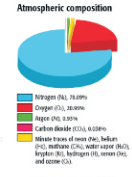


Residual alveolar pressure of $CO_2$ drops below 40mm Hg due to constant loss through open mouth.

- Mouth breathers universally have low tongue posture leaving the maxilla without support during the growth stage.
- Lack of counterbalancing the inward forces of the buccinators - maxilla narrows, forms high arch, causes nasal incursion and contributes to crowding.
- Chemoreceptors set at dysfunctional level promoting over-breathing.
- Smooth muscle spasm - gastric reflux - excess mouth acid.
- Disrupted biochemistry - compromised growth and development.
- URT infections - adenoids, tonsils and inflammation and congestion of the oro-pharyngeal mucosa - UARS contributor.
- Alkalinity of blood - less oxygen released to cells, cells die, eczema etc.
-

The air contains very little $CO_2$ as will be seen from the chart below (Fig. 5). We have to

Fig. 5 - The Carbon Dioxide confusion




The body requires a constant pressure of $CO_2$ of 40mm Hg or 6.5%

- It is a total myth that Carbon Dioxide is a toxic waste gas and should be 'breathed out' in big breaths to expel it from the body.
- Hemoglobin saturation of blood require 5% to be present in the lungs. The air contains 21% - more than 4 times the body's requirements.
- Under normal circumstances the body is never short of oxygen - what is missing is the $CO_2$ that releases the bonded oxygen to the brain and other cells.

produce our own, within the body, to make up the required amounts. This is done primarily as the by-product of the chemical reactions which take place during exercise and digestion. Numerous health problems arise as a result of this, mainly due to the uncontrolled spasm of

smooth muscle systems throughout the body which are dependent on the presence of 40 mm Hg $PaCO_2$ and approximately 6.5% pulmonary content of $CO_2$ to maintain integrity.

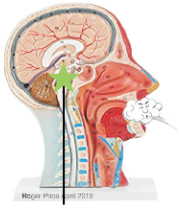
So, apart from the dental and orthodontic problems caused, myriad other problems arise due to this dysfunctional breathing. The two with most impact on the dental and orthodontic professions are:

**Snoring:**

Snoring is essentially the movement of too much air over the loose tissue at the back of the throat, causing it to rattle. Usually accompanied by open mouth breathing it perpetuates the loss of $CO_2$ and maintains the dysfunctional breathing pattern. In many cases, teaching the patient to reduce the breathing rate and to sleep with closed mouth virtually eliminates the problem.

**Sleep Apnea:** Fig. 6.

Fig. 6 - Central Sleep Apnea



**Traditional medical thinking** says that Central Sleep Apnea *'is the failure of the brain generated message to breathe, to reach the diaphragm'.*

Multiple clinical trials at major hospitals refute this notion and have proved that it is the drop in alveolar $CO_2$ that causes the diaphragm to halt for as long as it takes for the $CO_2$ to rise to the point where oxygen is again released from the blood to the brain.

This is primarily related to the drop in $CO_2$ as a result of snoring and mouth breathing during sleep.

Once breathing recommences the dysfunctional behavior pattern will repeat the process and a cycle will be created.

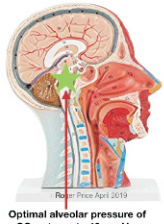
**Alveolar pressure of $CO_2$ drops below 30mm Hg.**

Sleep apnea is a little different in that it is in many cases caused by a disruption of the pH of the blood due to the decrease in $CO_2$. This causes the blood to become too alkaline leading the brain to think that the body cells are in danger of dying (which they are). The brain's response to this is to suppress breathing for sufficient time for the $CO_2$ level to rise, for more carbonic acid to be produced to buffer the blood and remove the danger to the cells. Once this has been achieved the signal to breathe is again given. However, in the case of sleep apnea the ensuing breath is a large gasp and this lowers the $CO_2$ levels again to danger point. This is why sleep apnea is characterised by a pause-gasp cycle which can occur up to 20–50 times an hour. In most cases this can be controlled by restoring $CO_2$ levels to normal, ensuring that the pH integrity is maintained and the need to stop breathing is then removed.

**Restoring nasal breathing as the norm.**

The good news is that it is possible to reverse this situation and re-create functional breathing. This requires several steps which begin with identifying the cause of the original problem. Unless this is done, and the habit modified, relapse is a real fact of life. It is also necessary to address the breathing mechanics and dynamics so that the optimal levels of retained $CO_2$ can be restored. The moment this happens the medullary response recognizes that retained $CO_2$ levels have risen and starts to re-set the response to the appropriate level. Fig 7.

Fig. 7 - Restoring functional breathing



**Optimal alveolar pressure of $CO_2$ returns to 40mm Hg.**

As always, there are choices.

Surgical
Orthodontic
Orthopedic

All of these require four steps.

Identification of underlying causes of the dysfunctional breathing habit.

Addressing and eliminating these obstacles to optimal function.

Ensuring that any physical impediment is removed in order to prevent relapse.

Rehabilitation to restore optimal function.

Once the system normalizes, the $CO_2$ returns to balanced function and the organism recovers.