GASP

AIRWAY HEALTH

THE HIDDEN PATH TO WELLNESS

Dr Michael Gelb
Dr Howard Hindin

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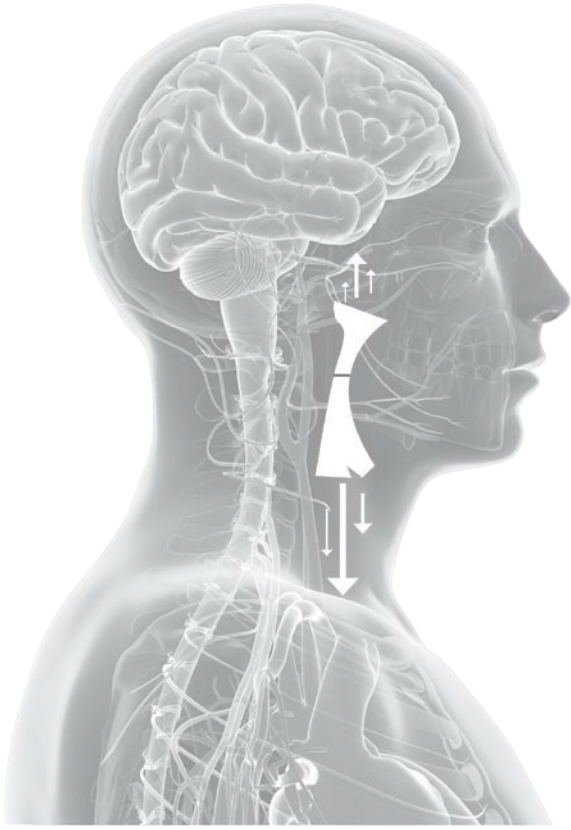

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Dr Gelb: *I would like to dedicate this book to my parents Sally and Harold Gelb as well as my children Marissa and Clifford.*

Dr Hindin: *I am thankful for the many people who influenced and supported my journey of curiosity and learning that has led to the creation of GASP. Michael Gelb and I started with an idea, which grew into the writing team we created along with Carol Richardson. We constantly motivated each other with research we discovered, patient experiences we shared and the excitement of bringing the message of GASP to all that we know will benefit.*

GASP is dedicated to the many teachers who opened my eyes and mind to new ideas, to questions that did not make sense and to an understanding of the important role oral conditions play in health and disease. I stand on the shoulders of pioneers such as Harold Gelb, Myron Lieb, Willie May, Aelred Fonder, and Brendan Stack in tmj; Daniel Garliner in myofunctional therapy, John Witzig and Bill Hang in functional expansion orthodontics; and Carlton Fredericks, Michael Schachter, Ron Hoffman and Jeffrey Bland in nutrition. I am also grateful for the endless discussions that my good friend Peter Madill and I have been enjoying for over 30 years.

I am thankful and honored to practice with my son, Jeffrey Hindin, and his wife Jill Meyer-Hindin, who are doing their own pioneering work in the structure and function of the airway in the dental arena. And to my daughter Tami, (acupuncturist and cranial-sacral therapist), who continues to astonish me with wonderful results she achieves with infants, toddlers and children. Daily, I benefit from all my friends and colleagues in the airway/sleep world that share the passionate pursuit of discovery and knowledge. I am particularly thankful to my wife Rose, who is always there to listen and give support to the sometimes frustrating creative process.

GASP is dedicated to all the patients over the years that shared stories, successes and failures, and continually enforced the vital importance of the airway oral systemic connection. Finally, GASP is for all those who will be able to find understanding and hope for their own hidden airway problem.

Preface

Improper breathing and sleep patterns adversely affect health, mood, energy, focus and function, and if untreated will ultimately lead to multiple systemic disorders. We refer to this constellation of disorders as "hidden airway" problems since they so often go unrecognized. These problems express themselves in many ways, and typically the symptoms are treated but not the underlying problem. As a result, new expressions appear and they are treated with medications, surgery and other interventions. But the continued struggle for adequate breath leads to persistent inflammation and an assortment of chronic diseases. Non-restorative sleep leads to poor focus and function, as well as interruptions in growth, develop- ment and learning. Recently, even Alzheimer's disease, dementia and cancer have been linked to airway / sleep problems.

Narrow and constricted airways are a primary cause of systemic inflammation, oxidative stress and endothelial dysfunction. They are also a major contributing and perpetuating factor in cardiovascular disease, diabetes and refractory depression and anxiety.

The writing of *Gasp* came from a series of conversations that we—Howie Hindin and Michael Gelb—had concerning the overwhelming number of children and adults presenting with chronic pain, headaches, attention deficit disorder, anxiety, depression and chronic fatigue. We shared our patient stories and successes—in particular, the miraculous changes we observed when patients' airway and sleep problems were recognized and properly diagnosed and treated. A large number of these patients came to our practices after seeing many, many other practitioners. One of us commented

that we should never have to see these patients; their problems were present for years—maybe even from childhood. These problems were there to be treated earlier, or even prevented. That's right. We believe that snoring, sleep apnea and TMJ disorders can be prevented.

Michael: I grew up listening to my father—Dr Harold Gelb, a brilliant clinician, teacher and author—talk to his patients and other practitioners about the harmful effects of removing permanent adult premolar teeth prior to orthodontics, as well as the harmful effect of headgear. I came to understand early on that making the mouth smaller—either by filing down or removing healthy teeth or by orthodontically retracting healthy jaws—was detrimental to one's health. Unfortunately, most of the dental community strongly disagreed with these thoughts going back to the 1920s up until today. Even though the treatment results were compelling, a scientific explanation was lacking.

My mother, Sally, was a myofunctional therapist who worked with my father and I back in the 1980s. My father advocated a multidisciplinary approach working with many practitioners offering other modalities. Today we know that by intervening early with adenotonsilectomy, palatal expansion and Myofunctional therapy most cases of mouthbreathing, snoring and apnea can be successfully treated with long-lasting results. Think of the incredible public health benefits derived by investing in our children before age 5 in areas of brain development, and prevention of epigenetic changes.

Howard: I have been in practice for 50 years. My first connection to Michael was being introduced to the world of TMJ disorders and treatment by Harold Gelb in 1968. Our dental practice evolved to focus on the medical / dental connection working with many of the leading integrative practitioners. We would sometimes encounter remarkable health improvements when dental conditions like tooth infections, gum disease, and TMJ were uncovered and properly treated. Sometimes we were disappointed when we did not get the results we expected; something was missing. But when we added treatment for sleep, and then airway, our results improved. I remember listening to the radio reporter Paul Harvey tell stories with surprised endings and the line: "Now you know the rest of the

story." In this case, the structure and function of the airway is the rest of the story.

The evidence we present in *Gasp* will change many of the paradigms in dentistry and medicine. We previously believed that by correcting TMJ pain and dysfunction, our patients were awakening better rested and more refreshed. We now know this: maintaining the jaws in a forward position at night maintains an open airway, which increases oxygenation and allows deeper stage 3 sleep and REM—restoring both body and mind. So it was serendipitously discovered, through overnight sleep studies and CBCT imaging, that keeping the lower jaw forward at night brings the tongue and soft palate forward and opens the airway.

Further evidence poured in from noted researchers like epidemiologist Karen Bonuck and physicians / researchers David Gozal and Christian Guilleminault. They found that mouthbreathing, snoring and sleep apnea can start at birth and lead to changes in the prefrontal cortex as early as the first year of life. The changes produced by snoring, apnea, flow limitation and resisted breathing in infants can therefore lead to executive function issues at age 4 and 7 with neurobehavioral and neurocognitive consequences. We knew that mouthbreathing could lead to altered growth patterns, which would exacerbate adult snoring and obstructive sleep apnea. This was a revelation because it helped Michael explain his own growth and development as well as some of his behavior patterns from childhood. It is now clear that the paradigm of diagnosis and treatment of these children needs to change. The crisis has reached epidemic proportions but these trends are reversible.

Integrative, functional and preventive medicine preaches health and wellness through diet, exercise, and a good mental attitude. Sometimes sleep is mentioned but not often or in the context of airway.

We have written *Gasp* to convey the stories of our patients and to share our experiences and what we have learned as dentists. We developed a new educational system called Airway Centric ® . *Gasp* was written so anyone with children or parents or siblings can have hope, can uncover their hidden airway problem, and can find the help they need to be the best they can be—at any age. Dentists should play a key role on a *team* of healthcare practitioners working

to establish a healthy airway at any age. Yes, it requires a team approach.

Gasp offers inspiration and hope. Current paradigms must change, and they are changing. We want to move the change along. We want this important information to reach those whose lives can be changed today. Early diagnosis and intervention is important. In at-risk children, treatment can start as early as 2.5 to 3 years of age. It is never too early or too late to intervene. We have seen patients, from 2 to 95 years old, benefit.

We also want to enlist each of you into our army for change. Read *Gasp*, and after you finish, you will begin to notice airway problems in the faces of family and friends—the mouth-breathers, the retracted jaws, the inattentive, sleepy child with slump shoulder and a forward head position—and more. Share this book and change a life; give it to your pediatrician and your pediatric dentist. There are pods of practitioners growing across the country trained in Airway Centric ® dentistry and medicine.

This is our passion, so we have been instrumental in forming two groups:

1. The Foundation for Airway Health – to educate the public and increase awareness. (www.foundationforairwayhealth.org)

2. The American Academy of Physiological Medicine and Dentistry (AAPMD) – a place for all healthcare practitioners to learn and grow their knowledge of airway and functioning as part of a collaborative team. (www.AAPMD.org)

Introduction

This book is about inspiration and hope. We are drowning in a "tsunami of chronic disease" according to Dr Jeffrey Bland. This is a crisis of epic proportions. There have been huge increases in diabetes, dementia and other chronic diseases. And it is not only chronic disease; the number of children with ADD has doubled, there is a 300% increase in obesity since 1980, and there are tremendous increases in those diagnosed with mental illness, anxiety, depression and more. These acquired diseases will cost our global economy more than $50 trillion over the next 20 years and will kill twice as many people as infectious diseases.

Are these staggering increases in ill health attributed to environmental factors? Are we paying the price, as Rachel Carson warned in *Silent Spring*, from the widespread use of pesticides following World War II? Is it diet and our sedentary lifestyle? Other causes might be microbes, allergens, toxins, and stress. The emerging field of Epigenetics helps explain how environmental changes can alter the expression of our genes in one lifetime and how much this expression has radically changed over the past 40 years.

Gasp looks at our healthcare crisis from a different angle. We are Homo sapiens, the most evolved species on earth. Evolution has blessed us by increasing the size of our brain, but this has led to small retracted faces and sinuses compared to our predecessors. As pollution has worsened and our diets have deteriorated, our jaws have narrowed and teeth are coming in crooked. There is rarely room for all 32 teeth these days. Our ability to speak was made possible by a flexible pharynx, but this created an "Achilles heel" of

a collapsible airway. We are the only mammals except bulldogs who snore and stop breathing during sleep.

Gasp is about inspiration and hope. The word “inspiration” is related to the concepts of guidance, encouragement and motivation. Here is another meaning: the act of breathing or drawing a breath. GASP is about all of this. It is about the “hidden airway” problem altering the lives of 50% of us. We call it “hidden” because it is often not looked for; it goes unrecognized and untreated. We offer the information in this book as a path to better airways and breathing, and to healthier and more energetic lives. We believe this book will be an inspiration for those who wrongly believe they were dealt a “bad hand” in life—that they must continue to suffer with an affliction that can be addressed.

This book is for the poor learners, those battling pain and fatigue and those who have been labeled “damaged, lacking will power and defective.” It is for those individuals—of all ages—who are NOT defective but are struggling to breathe.

Gasp is about our airway, breathing and sleep. Problems can start at birth. Many premature babies are mouth breathers. A poorly structured and functioning airway leads to mouthbreathing, snoring and sleep apnea; it can interfere with restorative sleep and ultimately damage the part of the brain called the prefrontal cortex, which controls executive function skills, attentiveness, anxiety and depression. The information in this book will describe how to restore an ideal airway with early intervention and where to go for help. As these hidden airway problems are exposed, the paradigm of Ear, Nose and Throat doctors, allergists, pediatricians, orthodon- tists and dentists will evolve to encourage better recognition and diagnosis of airway-centered disorders as early as the first year of life. The reader will learn how once the airway is established with breastfeeding, allergy treatment, adenotonsillectomy and palatal expansion, then neurocognitive and neurobehavioral problems are greatly improved—often without any medication. Anxiety and depression are alleviated, and the behavior and performance of our kids are remarkably transformed.

Gasp is not only about the airway of our children. 50% of us have a life limited by an airway or a sleep disorder.

Today there is a health movement toward "Wellness." Wellness is about diet and nutrition, exercise, and mental attitude. The new paradigm popularized by Mark Hyman, Jeffrey Bland and Drs Amen and Perlmutter is called "Functional Medicine." It addresses the causes of chronic disease with an individualized approach and emphasizes early intervention. It restores the balance amongst functional systems and the networks that connect them.

What is the missing link? It is *airway*, *breathing* and *sleep*. Breathing is life. If we don't breathe we die. If we don't breathe well when we sleep, 1/3 of our life is affected. If you work harder to breathe during the day, everything you do will be more difficult or even impossible. Gasp tells you why and how this works.

Gasp describes the impact of a narrowed airway from cradle to grave. Every day, we encounter fatigued patients with chronic headaches and neck pain. They have difficulty concentrating; they suffer with GI problems from acid reflux to irritable bowel syndrome. They range from thin women to men who have put on a few pounds. And you do not have to be obese to have an airway problem. Many of our younger patients with ADHD and airway issues have little body fat.

How important is an open airway? Time after time we see that once the airway is opened during the day and maintained during sleep, the transformation is quick and dramatic. You will read about how Valerie Deegan found her son Connor Deegan. He went from wishing he was dead, temper tantrums and D's and F's to his delightful former self getting A's and B's again.

Adults get their mojo back. They sleep through the night and awaken refreshed. Their lives are extended but more importantly they feel better and have less systemic inflammation. Eyes open up and brighten and skin tone glows. *Why?* Our patients suffer from intermittent hypoxia or oxygen desaturations as well as sleep fragmentation or disturbed sleep. This produces widespread systemic inflammation, oxidative stress and endothelial dysfunction, which affects the blood vessels and cardiovascular system. Cardiovascular and cerebrovascular diseases are highly correlated with obstructive sleep apnea as is refractory depression.

We are continually amazed to see how insomnia and anxiety improve once we open the airway and allow for easier breathing. It's as if we are removing hands that were strangling the neck. The threat is removed, breathing is easier and anxiety and insomnia improve.

Recent studies demonstrate that the seeds of dementia and Alzheimer's disease may be planted decades earlier with chronic airway and sleep disorders. It may take years to establish enough scientific proof. Do you want to consciously make the choice to wait? Managing the airway and obstructive sleep apnea with CPAP and oral appliance therapy or weight loss may possibly reduce the risk of—or even prevent entirely—these diseases, and these approaches will certainly lead to more optimal health, function and happiness. It is so important to begin treatment as early as possible, starting with snoring in adults and mouthbreathing in children.

Airway Centric ® dentistry places the airway above all else. The hierarchy for dentists should be airway first then TMJ and clenching or bruxism, and lastly the teeth, bite and occlusion. Sleep specialists like Christian Guilleminault from Stanford University agree that airway-centered disorders can be prevented by intervention in early childhood. We now know through the study of epigenetics that we need not suffer the fate of our parents' genes. We can change the expression of our genes through nutrigenomics and by incorporating supplements, diet, reading to our children, pollution free environment and Airway Centric ® medicine.

Facial structures can be optimized if they are constructed around an open, well-functioning airway. This requires collaboration between pediatrician, ENT, allergist, pediatric dentist, orthodontist, speech language pathologist and myofunctional therapist. Gasp will help find and build the "airway team" for you.

The time for *Gasp* is now! Doing nothing is not an option. An Airway Centric ® approach to wellness and lifestyle is simple and easy at any age, from birth through old age.

Breathe and be inspired!

Part I - It’s All About Airways

CHAPTER 1

Gasping for Life?

Are you constantly grappling with health problems such as fatigue, excess weight, headaches, chronic pain, sugar and junk food cravings, or with stress in general?

Do you have a child with learning disabilities, ADHD, behavioral issues, chronic ear and nose infections, allergies, or asthma?

Is your doctor treating you or your child for a chronic disease like high blood pressure, diabetes, obesity, insomnia, thyroid or autoimmune disorders, anxiety, or depression?

What if you discovered that there is one potential cause underlying all of these conditions?

Of course, many factors can lead to these problems, but one factor is rarely considered by today's medical practitioners, and the time has come for a change. This silent health saboteur should be top-of-mind for the millions of Americans—adults, parents, and young people alike—who suffer from these and other related chronic illnesses. The research and clinical stories in this book will shed light on this underlying cause of so many health and learning issues, and we hope it will ultimately become a primary consider-

ation of every healthcare practitioner, from pediatricians to cardiologists.

We're talking about airway-centered disorder, or ACD.

ACD is a physiological disorder of the mouth, jaw, nasal passages, tongue, or throat that involves an obstruction of the upper airways and in turn leads to breathing difficulties, including mouth breathing, snoring, sleep apnea, hypopneas, and upper airway resistance syndrome (UARS). These disorders can be precursors to a variety of more complex and pervasive health, developmental, and behavioral issues.

Sleep-Disordered Breathing (SDB) symptoms:

- Headaches
- Snoring
- Difficulty sleeping
- Neck, jaw, or ear pain
- Sugar cravings
- Junk food cravings
- Obesity
- Type 2 Diabetes
- Cardiovascular Disease
- Difficulty focusing mentally
- Excessive Daytime sleepiness
- Low energy
- Wake up feeling unrefreshed

ACD leads to either partial or complete blockages of the nasal passages or throat, which can affect breathing 24 hours a day. Research has extensively documented the negative effects of breathing difficulties during sleep, so we will focus primarily on these issues, collectively known as Sleep-Disordered Breathing, or SDB.

These terms may be unfamiliar to you (and perhaps even to your doctor), but you'll become acquainted with them in the coming chapters. For now, it's important to know that ACD—which can begin at birth—affects how we breathe because it increases the amount of effort we put into breathing just to survive. People with ACD find it difficult to thrive and often experience significant health issues, as illustrated by the many stories in this book.

Deep, restorative sleep is essential to survival, as well as to our ability to thrive at all ages and stages of life. ACD causes disrupted or fragmented sleep with profoundly disturbing effects on the brain. It causes systemic inflammation, oxidative stress, and a host of

severe health problems, like impaired functioning of the arteries (endothelial dysfunction).

ACD can lead to learning and behavior disorders such as attention deficit hyperactivity disorder (ADHD). It is also a causative factor in obesity, allergies, asthma, diabetes, heart disease, stroke, depression, anxiety, erectile dysfunction, and Alzheimer's disease. Because ACD prevents deeply restorative sleep, it can affect—or even destroy—relationships and work performance. In addition to physical impairment, ACD impairs your ability to function intelligently and stay focused. Moreover, the brain often reacts to ACD during sleep by inducing a physiological response, which may involve any or all of the following: a craving for sugary foods, hyperactivity, anxiety, or irritability. These tendencies exacerbate the health problems we've already mentioned.

If that sounds like a huge chunk to bite off, it is!

If you're saying to yourself, "I've never heard of this," you're not alone. Although your doctor may be aware of sleep disordered breathing, he or she likely has never considered its prevalence and all the ramifications.

In this book, you will learn about ACD; how to recognize it in yourself, your children, and other members of your family; and where to go for care. We've written this book to help you take charge of your own health and your family's health. You'll discover all the signs of ACD and SDBs, and since you will be equipped to recognize them, you'll also know how to find the medical allies you need to resolve the problem.

Ideal health, wellness, and brain development are dependent upon an open airway, nasal breathing, and deep, restorative sleep. Recent medical studies show us exactly why this is true. Yet somehow, this basic concept has all-too-frequently escaped the attention of today's medical professionals.

As human beings, we will do anything and everything to breathe, because breathing is our most important life-giving function. To breathe, we must have an open airway. Healthcare providers can either *improve* our ability to breathe or *worsen* it. In fact, those of us who specialize in airway health and dentistry have come to

understand ourselves primarily as health care practitioners—and also as primary care givers who can help save your life.

We have over 70 years of combined experience in dentistry and preventive health care. We understand that opening your airway (not surgically, of course, but using nighttime appliances, orthodon- tia and other treatment modalities) can have a dramatic impact on your ability to function in everyday life, on your physical appearance, and on your general health. Our number one responsibility as dentists—and healthcare practitioners—is to help you breathe by providing an open airway. Dentists can suggest various treatments to open airways in people of all ages, and we will explain these treatment options in this book.

> "You know we have an epidemic of Obstructive Sleep Apnea when you see a 'travel CPAP' machine for sale in the Sky Mall magazine" (while flying across the United States)." – Kaitlyn Tarbert, RDH, a Pediatric Oral Myofunctional Therapist

This new, interdisciplinary approach to dentistry as healthcare—called the Airway Centric ® Model—aims at preventing airway-centered disorders, Sleep-Disordered Breathing, and all the associated challenges to mental and physical health. The Airway Centric ® Model of diagnosis and treatment enables people of all ages to sleep and breathe more effectively so they can function better in all areas of life. The Airway Centric ® Model trumps anything in dentistry and perhaps even in all of healthcare, because breathing is essential to life.

We've all been told that diet, exercise, and a good night's sleep are the keys to handling life's stressors. But being able to take a deep breath is equally important. There are many reasons why breathing effectively has become more challenging for many people, especially during sleep. Most of these challenges relate to airway dysfunction. Airway dysfunction is one of many precursors to diseases that cause lifelong suffering, and it is too often overlooked. We point to it not only to raise awareness among medical practitioners across a variety of specialties, but more importantly to raise awareness among parents who can help prevent life-long suffering in their children, as well as among all adults suffering from chronic

health problems that may be influenced by sleep-disordered breathing.

We believe airway-centered disorders, in their various forms, are a missing link in medicine today. In fact, we know that in most cases, our Airway Centric ® approach provides relief from symptoms and prompts a return to health.

In simple terms, this program is a way of life. It is a paradigm shift that puts proper breathing, open airways, and restful sleep at the center of prevention and treatment plans—rather than at the far edge of a doctor's radar screen, where it has remained for too long. ACD and sleep-disordered breathing are preventable and treatable at any age.

We offer this book as a beacon of hope for those who are frustrated by any of a number of health challenges that have confounded modern medicine for too long. We believe you'll find the answers to your problems here.

2

CHAPTER

What Happened to Our Airways?

Face Forward

Fifty years ago, Marilyn Monroe's iconic beauty graced the big screen. Even now, more than 50 years after her death, she is still an icon of beauty and sensuality. Her prominent cheekbones, straight nose, and full lips represent the ideal of femininity. Notice her wide jawline with its strong chin and that beautifully broad smile. Monroe's beauty features also happen to be signs of a healthy airway.

A generation later, the Oscar-winning actor Robert Redford epitomized the rugged blond handsomeness and all-American athleticism that made him the heartthrob of millions of women. His strong jaw line and broad face evoke masculine strength. They are also a sign of a healthy airway.

Instinctively, we see a healthy face as a beautiful one. In other words, "gorgeous" faces are nature's way of leading us to healthy

mates, who offer the best chances of creating healthy and beautiful offspring. Human beings are hard-wired to respond sexually to healthy partners. Call it natural selection, but after all, the goal of sexuality is procreation and the preservation of our own individual gene pool and the human race. Furthermore, throughout life in many societies, attractive people tend to have advantages, as though our instinct is to pay attention to and to trust people who are healthy.

Although beauty is definitely in the eye of the beholder, and the personification of it comes in many different shapes and sizes, most people tend to agree on a starting point for defining beauty: prominent cheeks, full lips, straight teeth, a wide strong jawline, and a mouth without an overbite or receded jaw.

You can probably guess where we are going here: It is no coincidence that these standards of beauty are also indications that the airway is open and clear. But in the generations between Monroe and Redford's heyday and today's Hollywood stars, faces have changed.

Consider Angelina Jolie. Certainly she's gorgeous. But her face is much narrower than Monroe's and there are rumors that she has had plastic surgery: rhinoplasty to straighten and thin her nose, implants to strengthen her chin, and silicone injections to enhance her pouty lips.

Why would anyone do that? Because the effect calls to mind the bloom of youth and good health, and healthy is beautiful. But does it change what is underneath—the airway? It is possible to change the structures underneath, but this is not what plastic surgeons are trained to do.

Now let's consider Justin Bieber, the current young generation's heartthrob. Though Bieber makes the preteen crowd swoon, his long narrow face, pug nose, tiny mouth and open lips are a far cry from the rugged masculinity of Robert Redford.

Bieber represents a generation of children who were less often breastfed and who were weaned to soft diets—baby cereals and pureed foods, and then sugary cereals designed to appeal to

children, hot dogs, luncheon meats, and other soft foods which have become prominent in the "standard American diet."[1] (We'll get into more about why and how a soft diet affects face structure in a bit.) They also come from the first generation raised in a highly toxic environment.

It's interesting to note that both Bieber and Jolie have their mouths partly open. Perhaps they think this is sexy. We have to ask, though: are they simply mouth-breathers? And is this the new "normal"?

It's clear: In today's Western world, jaws are narrower and pushed back, noses are pushed in, and faces are longer and narrower—all typical results from a lack of breastfeeding, soft diets, and mouth breathing that have become commonplace. If you find this argument hard to swallow, read on; we will connect the scientific dots for you.

These facial characteristics coincide with a rounded, forward shoulder posture as well as a forward head posture. A jaw that does not develop forward during childhood will often continue to recede throughout life, leading to that characteristic "hump" or bump in the middle of the nose as the recession pulls the tip of the nose downward. All of these less-than-ideal features are telltale signs of blocked airways.

Interestingly, an attractive face and an open airway go hand in hand. A healthy face grows proportionally, as well as balanced in both the forward direction and horizontally. In fact, a healthy face is not only gorgeous when viewed straight on, but the profile is attractive as well, with the forehead and chin in the same plumb line. For that type of face to develop, a person's airway must be open and functioning from birth through adulthood.

A Little Bit of History

Let's go back over 12,000 years to a time before the development of agriculture, when our ancestors lived in nature, hunting and gathering their food. Our skulls and faces were much more ape-like,

1 It is not by coincidence that this term was coined as the acronym "SAD," because the standard American diet is sadly lacking in nutritional quality.

with wide jaws and rounded facial structures. About 12,000 years ago, humanity developed agriculture, and along with a settled agrarian lifestyle, human beings began to eat a “softer” diet.

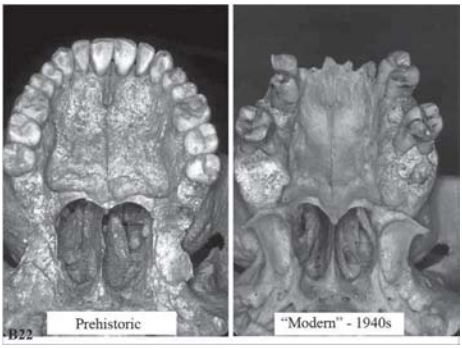

Figure 1. Source: http://www.brianpalmerdds.com/pdf/adsm_section_b.pdf
used with permission of Dr Kevin Boyd, DDS, MS

As you can see in Figure 1, ancient skulls had a wide, rounded arch on the upper jaw, along with large, wide nasal openings to the sinuses, creating nicely open airways through the sinuses. Because the lower jaw was also wide and rounded, there was plenty of room for the tongue, and the jaw could comfortably rest in a forward position, creating open airways in the throat as well. By contrast, the 1940s skull has a narrow, V-shaped arch, small nasal passages, and not much room for the tongue (along with a lot of evident tooth decay).

The staples of a hunter-gatherer lifestyle, up until that era, were meat, fruit, and nuts (effectively, the Paleo diet) along with wild grains and vegetables. Most of this diet was uncooked and difficult to chew. The softer diet introduced with agriculture 10,000 years ago contained more vegetables and grains, which were typically cooked, along with fruits and cooked meats (cooking makes meat softer).

According to researchers such as Boyd and Harvard evolutionary biologist Daniel Lieberman, this soft diet eliminated the natural need for chewing, and this began to change the shapes of our faces: narrowing our jaws and creating restrictions in our airways. Lieberman performed a study on pigs, feeding one group a soft

diet and one group foods that were tough to chew. The group that ate tough food developed not only stronger muscles but also larger jaws, while the group with soft foods developed weaker, smaller jaws. It took only one generation to create these smaller jaws. The theory is that this is what happened to human beings; rather than a *genetic* change in the short span of 10,000 years, an *epigenetic effect* has occurred because of soft diets, resulting in smaller faces and narrower jaws.[2]

In fact, the research of Dr Robert Corruccini of Southern Illinois University shows just this result. Dr Corruccini studied populations that had not yet been affected by Western cultures as they became westernized and began to eat the soft, sugary foods of Western industrialized cultures.

Corruccini found that there was virtually no malocclusion (bad bite due to poor development of the jaws) in these cultures *before* Western diets were introduced. Within one generation of the introduction of the Western diet, 50% of the population developed malocclusion. Within two generations, 70% of the population had malocclusion. The third generation eating an industrialized diet had 85% malocclusion. This poor formation of the jaws is an epidemic of industrialized cultures today.[3]

Smaller jaws leave less room for teeth, causing crowding. They also leave less room for the tongue, forcing it to move backwards, especially during sleep, where it tends to block the airway. With

2 See Kevin Boyd, M.Sc., DDS, "Darwinian Dentistry, Part 1: An Evolutionary Perspective on the Etiology of Malocclusion," *JAOS* November/December 2011, pp. 34-40, available on: www.orthodontics.com, and Jonathan Shaw, "Head to Toe: Daniel Lieberman tracks the evolution of the human head," *Harvard Magazine*, January/February 2011, pp. 25-29.

3 See: R.S. Corruccini. 1984. An Epidemiologic Transition in Dental Occlusion in World Populations. *American Journal of Orthodontics* 86 (5): 419-426, also *How Anthropology Informs the Orthodontic Diagnosis of Malocclusion's Causes*, Lewiston: Edwin Mellen Press, 1999, and http://wholehealthsource.blogspot.com/2009/09/malocclusion-disease-of-civilization.html. This information was obtained during a lecture by Dr Ben Miraglia, DDS, Airway Centric ® Orthodontist during a lecture on March 27, 2014 in Hartsdale NY, hosted by the AAPMD.

smaller faces and narrower jaws have also come smaller nasal openings in the back of the mouth (above the palate). (See figure 1)

In the last 200 years, since the beginning of the Industrial Revolution, and particularly in the last 35 years, our faces generally have flattened and narrowed even more. We're slowly developing "bulldog-like" faces as our noses and sinuses are increasingly pushed in, making nasal breathing difficult and causing ACD.

Several factors have contributed to this narrowing of our airways. Dentist and researcher Kevin Boyd coined the term "Darwinian Dentistry" to refer to the perspective of normative and healthy aspects in the human jaw and mouth, based on studies of human skulls from different time periods and cultures. This field of study is also called Evolutionary Oral Medicine, and it's an important development in our efforts to understand why so many people have developed narrow airways.[4]

Here's how breastfeeding—or not—relates to airway problems. As women left home to work during the Industrial Revolution, there was less and less breastfeeding. Breastfeeding of infants is a primary factor in normal facial development because the newborn's sucking action (which is not replicated in bottle-feeding) develops muscles critical to proper airway development. In addition, as Boyd points out, it was during the development of the Industrial Revolution that infant formulas and "convenience foods" such as soft baby cereals were commercially developed.[5]

As more and more women worked outside the home, particularly from the 1980s on, breastfeeding continued to fall out of favor, and also the demand for fast foods and convenience foods rapidly expanded. Diets therefore changed radically; in particular they included more soft foods. Our food also became more processed and chemically laden.

The result of these dietary changes has been smaller jaws, just as Harvard evolutionary biologist Daniel Lieberman found in his

4 Boyd, "Darwinian Dentistry, Part 1"

5 Boyd, Kevin, "Darwinian Dentistry, Part 2: Early Childhood Nutrition, Dentofacial Development and Chronic Disease," *JAOS* March/April 2012, pp. 28-32.

study with pigs.[6] These post-Industrial Revolution dietary changes translate directly to humans who "never have to actually chew anything all day long," says Lieberman,[7] resulting in narrower faces and small jaws with insufficient room for teeth. Not only that, noses, sinuses and breathing passages are markedly smaller today than they were just a generation ago.

How can we understand the impact of these external factors on our internal facial structures? It all goes to a new science called epigenetics that links environmental factors to phenotypic expression of our genes.[8] One link, as shown in some studies of the jaw, is through the development of the musculature, which actually shapes bone formation during development. As a baby breastfeeds, the nipple repeatedly presses against the palate as the milk is expressed. This pressure widens and expands the palate as it develops. In addition, a baby's muscles have to work hard to pump the milk; this action pulls on the jaw and bony sutures of the mouth in such a way that more bone is deposited and the jaws are widened.[9] By contrast, bottle-feeding and sucking on pacifiers does not contribute to the widening of the jaws, but instead causes higher palates and narrower jaws.[10]

Humans are the only mammal in which the epiglottis descends between six months and one year of age, leaving the airway susceptible behind the tongue and soft palate. During breastfeeding the epiglottis is locked with the soft palate, allowing the channeling of milk into the stomach.

Humans are the only mammal with a free floating hyoid bone, which also makes the airway vulnerable. All other mammals have a strutted hyoid, which protects airway integrity.

Because of our upright posture, the airway in humans has a 90 degree turn, which creates turbulence while breathing, compared to four-legged mammals which have a much straighter and therefore

6 Jonathan Shaw, "Head to Toe: Daniel Lieberman tracks the evolution of the human head," *Harvard Magazine*, January/February 2011, p. 27.

7 Ibid.

8 See, for instance, http://www.sciencemag.org/content/330/6004/611

9 See Boyd, "Darwinian Dentistry, Part 2," p. 30.

10 Ibid.

more open airway. As the brain of *Homo sapiens* enlarged, the jaws and sinuses were pushed back as our faces flattened and shrunk.

All this is to say that our human physiology sets us up to be vulnerable to airway blockages. With changes in our diets and a lack of breastfeeding, the natural mechanisms for creating healthy jaws and airways have been inhibited. On top of that, we have added thousands of industrial chemicals into our environment in the last five decades. These chemicals have infiltrated our air and our water, our homes, our food, and our personal care products.

We became painfully aware of the ravages of pesticides on our inner and outer environments after Rachel Carson published her iconic book, *Silent Spring* in 1962. Since then, the picture worsened. A 2009 Environmental Working Group report showed 232 toxic chemicals in the cord blood of babies born in 2004, including mercury, fire retardants, pesticides, and Teflon chemicals.[11] This means that even unborn babies cannot escape exposure to chemical pollution.

We are now exposed to these pesticides and other toxic substances on a daily basis. This may be a primary factor in the profound changes in human physiology that have occurred in a startlingly short period of time. Scientists are just beginning to discover the variety of epigenetic changes that have resulted from these substances.

One of the most researched issues of exposure to pesticides and dioxins is the increased prevalence of cleft palates in children.[12] Exposure to toxic substances in the environment has been linked to lower IQs and learning disabilities in children.[13] Finally among these epigenetic effects, we also know that pollution causes increases in asthma and allergies. Allergies in turn lead to sleep-disordered breathing in both children and adults.[14] In other words, pollution

11 http://www.ewg.org/research/minority-cord-blood-report/bpa-and-other-cord-blood-pollutants

12 See, for instance: http://www.ncbi.nlm.nih.gov/pubmed/17608552 and http://hmg.oxfordjournals.org/content/8/10/1853.full

13 http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(06)69665-7/fulltext

14 See, for instance, this study of 20,000 school-aged children in China: http://respiratory-research.com/content/11/1/144/abstract "Habitual

contributes to the epidemic of airway obstruction and sleep-disordered breathing.

The Perfect Storm

The result of all these epigenetic effects of our modern lifestyles is a perfect storm for our children's health involving: allergies, sinusitis, mouth breathing, snoring, sleep apnea and other forms of sleep-disordered breathing. Dr William M. Hang, DDS, MSD calls to our attention the crisis of airway development:

> "Few children in industrialized societies eating the Western diet and breathing pollutants have adequate immune systems allowing them to combat the allergens well enough to maintain nasal breathing, maintain proper oral posture and, therefore, ideal facial growth."[15]

It can hardly be coincidental that since the early 1980s— when our epigenetic exposures increased exponentially—obesity, diabetes, and cardiovascular disease rates have increased alarmingly, as have behavioral and learning disorders like ADHD. If you think that sounds like the consequences of ACD, as we mentioned in chapter one, you are absolutely right. We believe that all of these challenges to human health are intertwined, and that the one primary factor we can address is our airways.

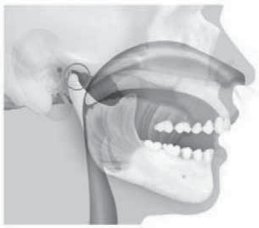

Figure 1: Blocked Airway

According to Lieberman, even long ago, as our brains became bigger, our faces flattened, and our jaws were pushed back (retruded). Unknowingly, and with good intentions, conventional dentistry and orthodontics have contributed to a worsening of this trend, because when teeth are pulled, the jaw becomes smaller. Even removing wisdom teeth can contribute to a smaller jaw. A smaller jaw means a smaller airway. The placing of headgear to

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Snoring in school-aged children: environmental and biological predictors" Shenghui Li, Xinming Jin, Chonghuai Yan, Shenghu Wu, Fan Jiang and Xiaoming Shen. Also see: http://www.sleepreviewmag.com/2010/09/pollution-temperature-related-to-sleep-disordered-breathing/

15 https://www.facefocused.com/obstructive-sleep-apnea.html

pull the lower jaw back to correct malocclusion also compromises the airway. (See Figure 1)

As a result, airway-centered disorders are now very common in all ages across the United States. According to the National Institutes of Health, "obstructive sleep apnea (OSA) affects approximately 20% of US adults, of whom about 90% are undiagnosed."[16] Data from the US Public Health Service's National Health and Nutrition Examination Survey, 2005-2006, show that 53.7% of men snore three or more nights per week; 14.5% of men snort, gasp, or stop breathing three or more nights per week; and 6.1% of men have been diagnosed with sleep apnea.[17] Assuming that the 6.1% who have been diagnosed with sleep apnea may be included in the other two numbers, that's approximately 70% of men who report having some form of sleep-disordered breathing!

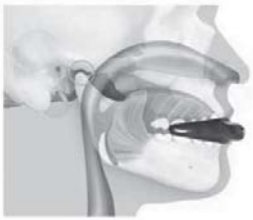

Figure 2: Open Airway

For women, the total is approximately 40%, but that does not include the potential presence of UARS, a milder form of upper airway resistance during sleep that tends to happen in women and that is not yet broadly recognized (even among sleep study centers), and which therefore remains mostly undiagnosed. In fact, some studies show that up to 93% of women and 82% of men with signs and symptoms of moderate to severe forms of SDB are undiagnosed.[18]

Dr John Remmers, the Harvard-trained physician who coined the term Obstructive Sleep Apnea, states that OSA is becoming the most common chronic disease in industrialized countries.[19]

16 Finkel, KJ, et al, "Prevalence of Undiagnosed Obstructive Sleep Apnea among Adult Surgical Patients in an Academic Medical Center," *Sleep*, 2009, Aug; 10(7):753-8. http://www.ncbi.nlm.nih.gov/pubmed/19186102

17 http://www.thoracic.org/education/breathing-in-america/resources/chapter-23-sleep-disordered-breathing.pdf

18 http://www.thoracic.org/education/breathing-in-america/resources/chapter-23-sleep-disordered-breathing.pdf

19 https://www.facefocused.com/obstructive-sleep-apnea.html

The time has come for an Airway Centric ® approach to dentistry and orthodontics, so that we widen jaws and open airways. (See Figure 2.) Our ability to breathe, sleep, stay healthy, and functon at our best in life depends on an open airway