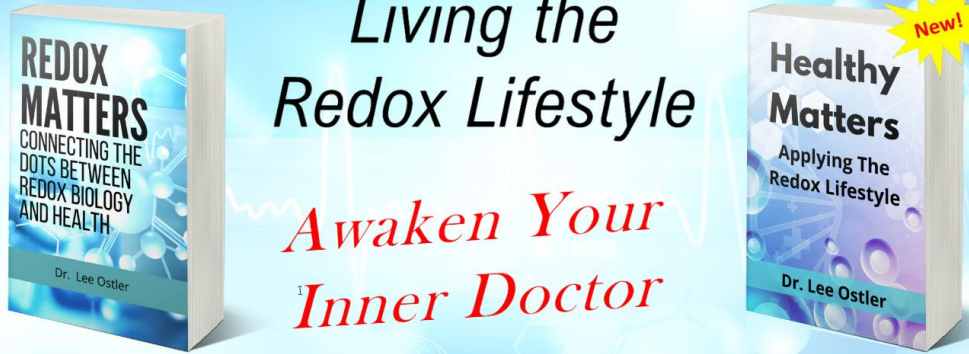


Redox Dentistry and Oral Health

*Elevating Oral-Systemic Healthcare to the
Next Level of Complete Redox Health*

Dr. Lee Ostler DDS



*Living the
Redox Lifestyle*

*Awaken Your
Inner Doctor*

Redox Matters
*Connecting the Dots Between
Redox Biology and Health*

Healthy Matters
*Applying the
Redox Lifestyle*

www.RedoxMatters.com

The image features two book covers against a blue, glowing background with molecular structures. The left book, 'Redox Matters', has a blue cover with white and yellow text. The right book, 'Healthy Matters', has a purple and blue cover with white and yellow text and a yellow starburst graphic with the word 'New!' in red. The central text is in a mix of black and red fonts, with the phrase 'Awaken Your Inner Doctor' in a large, red, italicized font.

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Redox Dentistry and Oral Health: Elevating Oral-Systemic Healthcare to the Next Level of Complete Redox Health

Introduction

Cellular breakdown and malfunction is a fact of life. It is caused by mitochondrial dysfunction, bacteria, radiation, toxicity, pollution, stress, poor nutrition, and age – to name a few. Cellular oxidation is the first of a series of actions in cells that results from these stressors, which if not managed well results in inflammation and disease. When these stresses are appropriately managed and countered, the body has an amazing ability to awaken its own “inner doctor” to initiate cellular defenses and healing capabilities not otherwise obtainable.

Because aging and disease are common conditions to the human experience, no person is exempt from the effects of these problems, nor from the ever present effects of aging. A healthy lifestyle helps, but mitochondria become less efficient over time, reducing cellular communication and function with age.

Current research shows that environmental factors can turn on and off genes, and affect gene expression related to aging, healing, and cellular regeneration and health. This is the new science of epigenetics – the cellular and genetic signaling which directs healthy cell functions and a healthy immune system. Also recently discovered is the body’s ability to use small amounts of intermittent cellular stress to activate cell defenses to restore cell function and cellular repair. This ‘pre-conditioning’ or hormesis effect happens through the effects of redox molecules (made within the mitochondria), along with a supportive array of redox-active nutritive phytochemicals which assist in stimulating the Redoxome to activate healthy pathway genes.

These redox signaling molecules are created natively within the cell, inside mitochondria. They are responsible for all cellular communication (this includes gene expression, transcription/translation, cellular antioxidant, immune system functioning, and more). In fact, nothing happens in the cell or beyond without signaling using redox-active and redox-sensitive molecules. But they must be well-managed and regulated in order to produce healthy results. This is where the newly coined “redox lifestyle” comes into play. These molecules are highly reactive and are short-lived. Previously, they could not be created or stored outside the body – until now! Combining replenishment with judicious applications inside healthcare, within home-based wellness strategies, and with sensible lifestyle measures, any person can now protect and enhance their health through the ability to “activate their own “Inner Doctor.”

This is because modern technology and bio research very recently discovered a method to create these specific signaling molecules. They function in the cell in the same manner as native redox molecules – in support of the immune system and in regulating cellular health. After decades of research, scientists and medical physicists developed stabilized Redox molecules which can now be supplemented to the cell – thus replenishing the cell’s ability to restore optimum cellular function and health.

‘Redox oral health’ is one of many healthcare interests for this new (but old) science of redox biology – using bioactive molecules to enhance and protect oral health. The discovery of stabilized Redox

Signaling Molecules provides unique solutions that are useful in managing microbial life and promoting cell recovery through enhanced cellular function. Redox biochemistry provides simple, non-toxic and effective ways to address health in the oral environment and cellular breakdown - and to not just mask the symptoms. Not a treatment itself, it addresses the problems directly by attacking them at the source – the most basic root-cause (epi)genetic level.

This new development in redox biology represents interesting applications for oral-systemic healthcare. It creates new opportunities for dentists and dental hygienists to help their patients improve their own oral and systemic health.

This is because redox molecules are safe managers of microbial activity, and they provide optimum enhancement of cell signaling. This helps 1)- reduce the insult from bacteria on periodontal tissues (which is the source of oxidation and inflammation), and 2)- the increased ability to upregulate cellular defenses and cell regeneration. The added benefit is that what happens in the mouth also produces the same effects throughout the body. All this from the unique advantages that come from using Redox signaling molecules.

Overview – Redox Biology

Redox Dentistry & Oral Health is a new application of redox biology to the support of a healthy oral environment. The discovery of stabilized redox signaling molecules provides unique solutions never before available, which are useful in managing bacteria in the mouth, enhancing cellular defenses and regeneration following procedures, and in systemic maintenance of everyday oral health. Enhanced redox-sensitive activity through healthy cellular function and redox replenishment, provides simple and non-toxic and effective ways to address inflammation and cellular breakdown. It addresses the problems directly by attacking the problem at the source – the most basic root-cause levels.

Redox biology and biochemistry are the bedrock of life, health, and illness within the body. Disease is caused by too much oxidation and/or inflammation, and health is the managed state of cellular homeostasis along with intermittent mild (hormesis) stress adaptive stimulation.

Although cellular oxidation precedes the activation of inflammation (via the transcription factor Nuclear Factor – kappa Beta), for practical purposes cellular oxidation and inflammation are functionally synonymous.

Health is created and maintained with a proper balance between oxidation and reduction (Redox) reactions, along with the managed stimulation of cellular defenses and regeneration from periodic amounts of mild oxidation. Cellular communication is the mechanism and modality which regulates all cell functions and healthy gene expression. This is at the heart of the new field of epigenetics. It is all about how the cellular environment affects the redox-sensitive switches that activate pathway genes and genetic expression.

Redox signaling molecules are reactive oxygen molecules made in the mitochondria during energy creation (i.e. Krebs' cycle and the electron transport chain). They are used within the cell to

communicate, signal, and regulate a multitude of cellular metabolic activities related to energy metabolism and cellular defenses.

These redox signaling molecules are the cell's mechanism for directing gene expression, the actions of the immune system, cellular health, healing, and regeneration. Native molecules are also used by the cell to selectively kill bad bacteria (the 'oxidative burst' of phagocytosis in white blood cells), and to regulate all cellular and metabolic functions. Age, toxicity, and oxidative stress diminish and degrade mitochondria and signaling molecules over time – producing further illness, accelerated aging, and cell death.

Recently scientists succeeded in stabilizing Redox signaling molecules. This created a first-time ever cell supplement creating new opportunities in healthcare and anti-aging medicine to utilize - for the first time ever - redox replenishment to improve cellular health and restore cell function at the 'root-cause' or foundation level. It also creates intriguing considerations for management of both good and bad bacteria, leading to better management of the oral environment - coupled with enhanced cellular repair and regeneration abilities.

Redox Health in Patient Education and Professional Outreach

Promoting Redox Oral Health is a new development. It presents natural opportunities and discussion points to educate and inform those you care about; about how oral health really works. Nutrition as a subject matter has long been referenced in regards to its place in good oral health, but mostly from a (distant) 'back burner' position of importance compared to the discussion about bacteria's role in oral health and disease. However, this is changing with the emerging awareness of the role the Redoxome and redox-sensitive cellular-based oral health plays in the mouth. This is because cellular health is 'redox.' And – nutrition is 'redox.'

This isn't to say that nutrition or redox signaling is more important than bacteria. What it does do is place the topic of nutrition, host response, and cellular health on equal footing with the traditional focus almost exclusively given to "all-things-bacteria."

Because of new understandings of redox and cellular biology, the role of nutrition in the oral health landscape includes and moves beyond sugar, diet, saliva, and traditional risk factors, to now include a solid embracing of nutrition as the mechanism which activates cellular defenses which enhance cellular regeneration and regulate the host response. This applies to saliva, tissue health, mucosal health, disease resistance – in short – everything. Bacteria can't be discounted, but neither can the inherent ability of cells to weather the oxidative storm bacterial-induced inflammation creates. The intrinsic host-defense capabilities are as much a part of oral health as are the extrinsic factors which initiate dental and oral disease.

This makes oral health a two-factor equation: First – the management and physical control of oral bacteria and risk factors; and second, the proper role of nutrition to enhance cellular defenses and cellular repair. When nutrition is discussed within the oral health discussion, it should be more than a discussion about bad diets and sugar and sweetened beverages. It should now appropriately include aspects of host response, cellular health, and redox nutrition. This provides oral health professionals

(and their medical counterparts) with new ‘talking points’ and “buzz-words” with which to focus attention on a very misunderstood and infrequently addressed matter.

Ironically, within healthcare, dentists were among the early pioneers which brought “prevention” to the healthcare marketplace – frankly something which many allied health professionals could learn from! When bacteria was discovered to be the source of tooth decay and gum disease, the attention was directed toward preventing these conditions by managing their bacterial etiology better. Nutrition was included mostly in regards to avoiding foods with high propensity to feed the bacteria which caused tooth decay (refined carbohydrates).

While none of that has changed, what is new today is the emergence of a more robust nutritional concern – directly related to the host-response and to cellular health. Still, it is rarely mentioned in continuing education forums or in professional journals and barely deserves mention (if at all) in any list of plans for care by dentists and hygienists with their patients.

You may want to ponder how this new niche could provide new ways to not only help your current clientele, but also help to reach out into the broader marketplace with a ‘new’ message that differentiates a practice and its mission in the community with an attractive healthy message, now in vogue! This easily becomes part of a “new conversation” with patients and with other allied and referral-based health providers. It is a new mission for Complete Health which further connects you with multiple allied and like-minded health professionals from all walks.

The Science

Introduction

While the science of native Redox biochemistry has been well studied for decades, many health professionals have not heard of Redox signaling molecules due to the fact that the technology required to stabilize them with any shelf-life outside the body, was only recently discovered and commercialized. This breakthrough now allows Redox signaling molecules to be supplemented from external OTC sources and utilized for a number of health-related uses by individuals and health professionals.

Quoting Dr. Gary Samuelson, the medical physicist who created the technology to create and stabilize bioactive Redox signaling molecules

“Redox signaling is a fundamental process inside our body that reduces and oxidizes (redox’s) the salt water and biomolecules inside us. It plays a fundamental role in cellular communication, helping the cells to optimally do what they are already programmed to do. It helps the body locate the damaged cells inside us, kill them or replace them and to better regenerate healthy tissue. Balanced compositions of reactive oxygen species (ROS) have shown ... no negative side effects after 20 years of studies and can actually enhance the ability of the body’s antioxidants to protect healthy normal cells from damage and accelerate normal cellular regeneration.”

Emerging science is confirming the close connections which oral health has with general systemic health – the so called “Oral Systemic Connection.” Efforts to diminish the presence of high-risk pathogens in

the mouth are well founded. This includes the importance of reducing their effect on systemic inflammation, endothelial dysfunction, promotion of cancer, brain dementia and dysfunction, lung and kidney disease, pregnancy cancer, diabetes, and more.

The emergence of professional educational organizations, such as the American Academy for Oral Systemic Health (AAOSH.org), document the rising awareness and importance of the many newly discovered connections between the health of the mouth and the health of the body. Redox biology at the most basic level, is a principle part of these connections. This is because all disease occurs as a result of cells not behaving themselves, or not being able to function properly while dealing with provocative threats from their environment. This is not to say that the provocative stress to cells and tissues are not a factor (they are), but that the host-response is now increasingly recognized as a key component to if and how disease manifests from the earlier dysfunction of cells in the 'field of play.'

The Know

The new science of cell signaling is very exciting. New discoveries flowing from the 1998 Nobel Prize-winning research on Nitric Oxide cell signaling has given rise to new applications in healthcare called Redox Signaling. It is positioned at the lowest most basic root-cause level of health – the mitochondria, DNA and basic cell biochemistry. Molecular biologists have long awaited the day when redox signaling molecules could be stabilized outside the cell and be kept shelf-stable for any period of time. They opined that if this were ever possible, that they might be able to supplied to the body in ways to augment or optimize native cell signaling functions which are in charge of regulating the immune system and how it responds to threats and environmental stresses. If ever this could be done, they said, doing so would make up for the slow steady decline in mitochondrial and redox signaling activity which naturally diminishes at a rate of 10% per decade, following their peak activity at puberty.

In the past it was believed that redox functions were about handling cellular metabolism waste byproducts. Today it is understood that both reduction and oxidation processes are vital for proper cell functioning – protecting the cell from oxidative stress, increasing native glutathione and antioxidant activity inside the cell, and assuring proper gene transcription and expression. In nature, this protects cell membrane health and protein synthesis, turns on cellular antioxidant defenses, activates nightly cell regeneration and 'garbage cleanup' (autophagy), and better assure proper immune system functioning ... to name some of its primary functions. All of these play within what is now called the Redoxome – the redox landscape where redox-sensitive transcription factors (also called "redox switches") function to activate pathway genes and healthy gene expression.

The balance between reduction & oxidation ("redox" for short) is the basis for this cellular communication. This is how cells "communicate." They do it by passing electrons from one molecule to another – a process called cellular transduction. In fact, all processes of energy metabolism and even life itself, are regulated and affected by the movement of electrons. In doing so, this process of oxidation and reduction – back and forth – creates an oxidative state within the cell. These "redox" states are the essence and the trigger for what activates cellular response to the oxidation state.

These electrons and the molecules they move back and forth from and to, are the “signaling molecules” or messengers that have the duty of responding to various states within the cell. The electrical charges they pass back and forth are the *modus operandi* within the cell which effect the sensing of a condition, and the cell’s response to that condition, that comprise how the immune system functions, and how a myriad of metabolic pathways operate. They are complimented by and aided by vitamins, external antioxidants, minerals and micronutrients, as well as many phytochemicals and plant polyphenols – which also affect the redox landscape – to keep it primed and able to function properly.

These redox molecules are created within mitochondria during the process of metabolism, or in other words, the ‘burning’ of fuel to make energy. Glucose, proteins, and fats are metabolized or biologically ‘combusted’ in mitochondria to generate energy. In doing so they create “red-ox” molecules reflective of the reduction and oxidation reactions within Krebs cycle and the Electron Transport Chain. (This is all basic biology you may recall from days of high school and college level biology and physiology and biochemistry classes). These oxygen reactive molecules are derived from the components of saline – saltwater biochemistry. They include superoxide, nitric oxide, hydrogen peroxide, hypochlorous, and others). As the body creates these reactive molecules, they each play important roles within cellular biology and in activating genes that protect the cell and body from dangers within the environment.

“The discovery of the Redoxome is the most important discovery in health in our lifetime. Redox signaling molecules are the deepest cell-signaling molecules ever discovered. They are naturally produced in the mitochondria, and control all cellular functions. They live and work at the interface of energy and matter, where cellular communication activates biological programming and animates all cell processes – including the energy of life itself. The grand secret to health and anti-aging – the modus operandi and biological mechanismus for health – is based in the Redoxome. This is how the body detects and responds to stress, infection, and injury, and manages the inner workings of healthy cellular function. This includes energy metabolism, redox signaling, hormesis, ketosis, metabolic flexibility, and the magic of autophagy. Indeed everything in the cell (and the body) confirms to the influence of Redox! These are the ‘rules of the cell.’”

~ Dr. Lee Ostler DDS, author of “Redox Matters: Connecting the Dots Between Redox Biology and Health,” and “Healthy Matters: Applying the Redox Lifestyle.”

This is how the body knows to detect problems, and how it responds in stress-responsive ways, to these threats.

These negative and positive charged molecules perish quickly once they have performed their signaling mission. Their job is to 'signal' or direct cell communication including gene transcription, manage antioxidants, protection of cell membranes, and generally conduct all the affairs that a given cell is created to perform.

With age and environmental toxicity, radiation, poor diets and lack of exercise – cells become less efficient. Over time, mitochondrial dysfunction causes a decrease in signaling efficiency. With increased oxidation, instead of a robust antioxidant and cellular defense platform, there is an increase in chronic oxidation and inflammation throughout every cell and the body. When cells do not function properly, disease results. The reverse way of thinking of it is that whenever there is disease present, there were first dysfunctional cells. When this happens, it gives rise to slower healing, accelerated aging, more wrinkles and skin problems, increased systemic inflammation – affecting all body parts, tissues and organs.

Redox signaling molecules are short-lived; they are active inside the cell for milliseconds and are not stable outside the cell. Due to their highly reactive nature, science had declared it was impossible to stabilize these molecules outside of the body! However, as mentioned earlier a bio research science team including a medical atomic physicist, recently succeeded in not only creating charged redox molecules, but in stabilizing them with a shelf life now up to 18+ months. That means it is now possible to increase Redox signaling molecules in the body and to restore the cell's ability to function optimally – the way it was designed. In fact, research finds that enhanced Redox activity increases antioxidant activity by ten-fold, and glutathione efficacy (the 'master antioxidant') and SOD (Superoxide Dismutase), 800% and 800% respectively – thus providing protection against oxidative stress inside the cell. [Source available upon request.]

Having good plant-based vitamins and antioxidants in the body is important. But it is not enough. A good metaphor is that if you have a great fire department nearby and your building is on fire, but you can't 'signal' them to come put the fire out – your building still burns. Redox molecules activate the available resources (vitamins, antioxidants, etc.) so the cells can do the job they were designed to do. Simply adding more antioxidants and good nutrition, while desirable, still requires Redox signaling to activate them and make them effective inside the cell. And while there is minor and indirect activity upon select sulfur-sensitive transcription factors from select phytochemicals, they are not classed as reactive redox signaling molecules themselves, but rather secondary messengers.

This is worth repeating for emphasis ... stabilized redox signaling molecules are 'bio-reactive', meaning they are reactive molecular oxygen species, made from the Krebs-mediated reactions with the only dissolved fluids available within a cell - saline. They consist of charged molecules of sodium, chlorine, oxygen, and hydrogen. This is a major breakthrough in molecular biology and medical science! This creates the opportunity for supplementing nature's Redox signaling molecules and restoring cells to optimum levels of functioning. This is the basis for real anti-aging medicine, for enhanced healing and

restoring cells to do what they were designed to do – even long after they have declined in their natural ability to do so on their own.

Summary

Redox biology is fundamental to the growing understanding of epigenetics – that part of cellular physiological variations (phenotype-expression) that are caused by external or environmental factors. This is where genes become switched on and off, and it affects how cells read genes. Epigenetics implies features that sit “on top of” or “in addition to” the traditional basis for inheritance – meaning it is what “activates” genes to express themselves and cause cells to function normally – or not. Improper and diminished redox signaling functioning is what gives rise to ALL disease and is core to the inflammation processes – both innate and acquired immune system functioning. Having proper redox signaling activity restores and allows normal activity to the cell; whatever the particular cell is designed or differentiated to do, it does better when signaling and communication paths are working optimally.

Many today have a working understanding of DNA and most people believe that “*we are our DNA*” – that whatever our DNA has in store for us is what we are destined to experience. The surging field of epigenetics and redox biochemistry is beginning to tell a different story.

In truth, you are not your DNA; you are your Redox! It is what you do *to* your genes – that comes from nutrition, diet, lifestyle, environment, oral health, sleep, and stress management – which determines your health and future! Genes do contain the blueprint of your life, but it requires a proper activation and gene expression to interpret and translate them into actionable responses to the cell’s environment. While a small percent of them are ‘fixed’ (eye color, ethnicity, gender, etc.), many are turned on and off based on epigenetic and environmental factors related to lifestyle, nutrition, medications, and other factors – all a function of the redox lifestyle potential. As an operational understanding, this gives the basis for the powerful effect that healthy lifestyles have on activating redox-sensitive switches which powerfully turn on healthy genes and suppress unhealthy genes. Now, the ability to manipulate this landscape, operating on the basis of the science principle of hormesis, is truly a breakthrough. (Hormesis is where a mild intermittent oxidative stress or stimulus activates healthy gene expression, and a high oxidative stress activates inflammation and disease cellular responses).

This discovery in its magnitude and reach is on par with the discovery of DNA, the mapping the genome, and other significant health and medical breakthroughs. Why? Because for the first time mankind has the ability to effectively manipulate a mild oxidative hormetic stimulus which has shown to produce positive genetic expression to support multitudes of gene pathways. This means that when redox states are properly managed through lifestyle modification and/or redox replenishment, there is enhanced regulation over healthy gene expression, the cell cycle, cell communication, anti-aging and regeneration - and so much more.

To summarize: Redox stands for “Reduction-Oxidation” and is part of the normal cellular operations inside the cell. Science has duplicated this process by creating and stabilizing reactive redox biochemistry consisting of an electrolyzed saline solution containing charged reactive molecules – just

like the mitochondria make in the saline solution inside the cell. Because of this chemistry and its effects on cellular biology, redox supplements chlorine and salt-water based and have an odor or flavor similar to “pool-water.” This is reflective of its saline biochemistry.

The impact on wellness and well-being happens because Redox molecules impact cells foundationally. Working and supplementing at this core level – at the basement “root-cause” level of our physiology – healthy plentiful redox signaling affects everything downstream. Simply stated, this is the Redoxome – it affects everything! When cells are restored to optimum levels with redox signaling activity, the cell is able to function as it is designed to do. It senses and responds appropriately and timely to stress and dysfunction. In short, healthy cells equals a healthy body! An unhealthy body means there is either unhealthy levels of, and/or inadequate amount of redox signaling!

This is why this discovery and its associated science is so ground-breaking for everyone – and why it promises new opportunities in healthcare and wellness.

Applications

As to the applications relevant to addressing conditions of disease, it must be acknowledged that redox signaling molecules, and redox-active phytochemicals are not approved for diagnosis, treatment, or direct use in addressing disease. FDA and FTC regulations are defined in such a way that agents which are regulated under “supplement” laws cannot be utilized in the treatment of disease conditions - without first complying with rigorous testing and clinical trials. This would result in the establishment of a “drug classification” and the agent would then be regulated and controlled under FDA drug laws. This leads to and allows the establishment of legal medical claims and the creation of “indications.” All other possible benefits are considered “off-label” and discussion is limited regarding the usefulness of these agents.

As such, at this point in time, the utilization of redox-active agents, be they actual signaling molecules or redox-active phytochemicals or the vitamin cofactors which facilitate energy metabolism and metabolic pathway activity, are used as a ‘prevention’ modality – notwithstanding that common experience and an abundance of anecdotal and case-studies have shown that it is not uncommon to find betterment of both common and grievous conditions occurring when cellular function and health is restored.

This leaves the thinking health professional space to ponder and to “connect of dots” between basic principles of cellular redox biology and the presence of conditions they are wont to address. If a safe, over-the-counter non-prescription agent is able to replenish and restore cellular function and better manage the microbial environment, is there a place for it in the life of those suffering from problems of cellular dysfunction? Furthermore, by understanding how such agents can be utilized in additional and adjunctive ways to present procedures, can they be added to or recommended for home support? And if so, how?

More Learning:

“Connecting the dots” more than implies that a basic understanding of cellular and redox biology can help explain why disease happens in the first place – AND that by correcting the conditions and

impairments and dysfunctions that brought on the condition in the first place, the condition itself can be impacted in a positive way. This does not preclude or set aside appropriate and necessary medical intervention with acute happenings or when chronic conditions acutely worsen. What it does say is that correcting the “upstream” or the grounding and foundational processes very often allows the body to heal itself – as nature designed – by following the “rules of the cell.”

Specifics of what this looks like are beyond the scope of this paper and are best discussed in personal conversations. However, pointing your mind further, consider the following questions:

If the NF- κ B transcription factor is upregulated from the assault of pathogenic oral bacteria containing endotoxins / LPS on toll-like receptors on host cells (also applies to any other body region), is it reasonable in addition to clearing oral pathogens, to downregulate the NF- κ B inflammatory and cytokine cascade through enhanced cellular defenses?

If cellular defenses and responses to provocation from bacteria and cellular oxidation are improved with the activation of the Nrf2 transcription factor (a cysteine/thiol/sulfur-sensitive redox switch), is there a way to enhance this antioxidant gene expression which increases glutathione, superoxide dismutase, and catalase antioxidant level in the cell – to improve cellular response to the bacteria-induced threat?

If wounds heal based on the redox signaling activity at the wound/surgical edge, is there a way to increase this signaling activity in such a manner to accelerate the rate of wound repair and regeneration and tissue recovery – and with improved comfort?

If redox-based molecules are utilized by the cells themselves to identify and destroy dangerous microbes of all types (utilizing superoxide, hypochlorous, ozone, hydrogen peroxide within the white blood cell’s phagocytosis and lysosome activity), can these same molecules potentially be useful in managing these similar microbes in other settings – artificially?

Can the principles of biological hormesis be applied to both oral and general health – where slight modifications in the redox landscape through mild states of controlled oxidation can increase tissue response and health?

Is there an emerging modality that works beyond a drug and receptor site model which can prevent the need for medical intervention?

Is there a tie-in between the principles of redox biology and sleep disorders? Why do sleep disorders increase oxygen saturations and cellular hypoxia, and then activate inflammation? Would support of cellular health be supportive of other mainstream treatments to stabilize and restore a constricted airway? If improved cellular function affects circadian rhythm, sleep cycles, and neurotransmitters, is it sensible to recommend parallel strategies which enhance improved sleep and better cellular clearing (autophagy) during sleep?

Understanding better the connections of refined carbohydrates (which are an existential threat to dental caries) with energy metabolism and metabolic flexibility, is it sensible to encourage others to

consider moderating their refined carbohydrates and processed foods, to help both oral health and systemic metabolic health matters?

If acid reflux has a redox basis with cells within the stomach and the effect of acid on esophagus tissues, would it make sense to address this before dysplastic cells appear in the upper GI tract, or acid-mediated dental caries risk threatens dental structures?

If unmanaged inflammatory responses can manifest in the mouth due to over-active and unbalanced redox pathways, can the inflammatory response be better managed utilizing a redox approach to cellular function stability?

A thousand other questions can be asked! The purpose of this exercise is to open the mind to begin thinking of how this newly discovered and grounding redox science can apply to such a broad array of situations and condition. “Between the lines” of these questions are more questions and answers which will lead forward until the proverbial ‘light’ turns on and the ‘dots connect’ which will then explain why there is merit in not brushing this aside.

To the curious- if not serious-minded, there is a way to investigate this and embrace what is now here.

- Read science articles: The article [“Redox Scientific Literature Research”](#) available at the Redox Matters site, describes how to do simple and quick primary research with PubMed and other databases. This will show you that “redox” is much more established than you ever thought. (This article is in the “Learn” section in the “Articles” section at RedoxMatters.com)
- Read books: [“Redox Matters”](#) and [“Healthy Matters”](#) discuss the foundation science of redox signaling and how they apply to our lives (the ‘redox lifestyle’). There are over 800 literature citations combined, which reference the peer-reviewed literature substantiating the role of redox signaling in health, wellness, and antiaging. For the serious PhD-level students who must know all the details, you may want to read this fabulous [biochemistry textbook!](#)
- Watch Videos: There are many webinars and webcasts of health professionals in panel discussion about the science of redox signaling and how they view it and utilize it in their respective practices. Put some earbuds in your ears and take in these informative panel discussions with health professionals describing their views on redox and how they use it in their professional and personal life. These are located at the [RedoxMatters](#) website. Other videos are located [here](#). For those wondering why this is not a pharmaceutical – even though it started out on that track – watch [this video](#) about the Genesis of the modern redox science breakthrough.

Redox-based wellness, antiaging, and healthcare considerations are at the very early stages of entering the healthcare arena. Sophisticated pharmacological applications are now being ardently researched and pursued which will give science and medicine the ability to selectively turn on and off genes using redox sensitive switches. That is further down the road – but is coming. In the meantime, the availability of redox solutions which broadly and deeply affect every cell in the body, is now here!

To learn more about the science and application of Redox Molecules, visit the Learn page at www.RedoxMatters.com.