

~ Women Suffer More Than Men ~

# MAL-ILLUMINATION

*...the silent epidemic*

***CHI***

*Circadian Health Institute*

Kenneth Ceder, CEO, Research Director  
Robert Mathis M.D., Medical Director

*“Light is to mal-illumination . . .  
as food is to malnutrition”*

— Dr. John Ott  
Photobiology Pioneer  
Time-Lapse Photography Innovator

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All information in this book is intended to complement standard medical care. A medical doctor should always evaluate any unusual, sudden or severe symptoms. The recommendations made in this book while generally considered safe, could affect people differently. Therefore, it is recommended that people with serious symptoms be under the care of their physician.

Dr. Robert Mathis  
Medical Director  
Circadian Health Institute

# DEDICATION

This book is dedicated to the memory of time lapse photography innovator and pioneering photobiologist, Dr. John Nash Ott, who graphically demonstrated thru his fascinating time-lapse photography, the essential biological importance of light's full-spectrum on people, pets and plants. Dr. Ott's unique photography, often seen thru the lens of a dark-field microscope, allowed him to see what no man had ever seen before — time lapse film sequences of light's biological effect on living cells. His innovative research demonstrated that sunlight's full-spectrum of 'rhythmic' light energy which includes ultra violet light (UV), is essential for regulating brain chemistry that controls how we feel and function.

Years of research led Dr. Ott to conclude that in addition to all that man may be, he is also a 'solar being' that requires a daily vital light charge from the sun for body-mind wellness and optimum health. Without daily sunlight exposure we become deficient of vitamin D, our energy level progressively drops or vacillates, our brain chemistry becomes unnatural and we fall out of sync with nature's rhythm, which in turn compromises our immune system and opens the door to disease!

Unfortunately, much of humanity is now unwittingly starving for life-giving sunlight and vitamin D while receiving too much unnatural light, especially at night, or suffering from what Dr. Ott called, mal-illumination... *the silent epidemic!*

*“For the rest of my life I shall reflect on  
what light is.”*

— Albert Einstein

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# ABOUT US

**Circadian Health Institute (CHI)** is a nonprofit corporation dedicated to researching light and circadian rhythm disorders (CRD). CHI disseminates information about a new, contemporary disease, mal-illumination. Mal-illumination is a lack of enough daily natural sunlight and too much indoor artificial light, especially at night. Our mission is to educate people to recognize this silent epidemic and reduce their suffering naturally. Our vision is an *enlightened* world of natural wellness

**Ken Ceder, CEO** was formerly the co-director of Hippocrates Health Institute in Boston, Massachusetts. In 1987 after meeting and collaborating with pioneering photobiologist Dr. John Ott, Ott Light Systems, Inc. was formed. After Dr. Ott's death Mr. Ceder sold his rights to the "Ott" trademark and formed bioLight Group to advance Dr. Ott's pioneering work to state-of-the-art, light emitting diodes (LED)... *the next generation of biologically beneficial light.*

bioLight Group designs and markets innovative light therapy devices that reduce circadian rhythm disorders and vitamin D deficiency related diseases while increasing light-activated nutrition for optimum wellness. CHI was formed to continue Dr. Ott's pioneering light therapy research and to act as a catalyst for raising awareness about what Dr. Ott called mal-illumination...*the silent epidemic.*

**Robert Mathis, M.D., Medical Director** is Board Certified in Holistic Medicine, is a member of American Board of Holistic Medicine, and is an expert in the area of Heart Rate Variability, a non-invasive, non-destructive, predictive test of the overall balance of the autonomic nervous system. Dr. Mathis is highly regarded for his work with *bio-identical* hormone replacement therapy, especially with menopausal women. In addition to his credentials as a medical doctor, Dr. Mathis also holds a BS in Human Physiology with a minor in engineering.

# INTRODUCTION

## *The Future of Medicine is . . . Prevention!*

We are pleased to introduce you to cutting-edge medical research and information that will focus attention on an emerging new paradigm in medicine; Energy Medicine. The core of Energy Medicine is light. We will share with you a natural *cost-free* solution as well as an optional *cost-effective* solution for a host of chronic ailments. We trust the enlightening information contained in these pages will be of vital importance to you and your loved ones in the pursuit of optimum health and wellness.

For decades, consumers have been the target of a disinformation campaign from the media, conventional medicine and the pharmaceutical industry that created a fear of sunshine. *They have literally scared the daylight out of us!* Therefore, most people either intentionally or unintentionally avoid the sun — or smear on sunscreens that block the beneficial wavelengths that produce one's natural supply of vitamin D from direct exposure to bright midday sun. Now more than ever in this Age of Information, millions of people have unwittingly become “contemporary cave-dwellers” living and working indoors. This dramatic reduction of natural light exposure — that human DNA is programmed to assimilate — and its' associated disturbance to vital circadian rhythms, has contributed to many health related issues. The late Dr. John Ott, renowned photo biologist and father of full-spectrum light, had coined this adverse health phenomenon "Mal-illumination." Like malnutrition, mal-illumination deprives one of a level of nutrients and rhythmic stimulation that is essential for living as healthy humans. Everyone knows the sun rises and sets every day — this essential cycle sets the basic rhythm of life. Unknowingly, millions of people are ‘out of rhythm with nature’ and suffer from chronic mal-illumination...*a root cause of much disease.*

We are a pioneering Health Science Research & Development Corporation founded in 1987. For many years we have reviewed hundreds of research studies and books focusing on the use of ‘therapeutic light’ in the treatment of emotional eating disorders,

depression, cancer, osteoporosis, hormonal imbalance, insomnia, fatigue, autoimmune disorders and more.

Along with good nutrition, fresh air and clean water, we are convinced that daily sunlight exposure, especially morning sunlight is critical for optimum health and the prevention of disease in general. We strongly advocate at least a half hour of morning sunlight daily and a half hour of later afternoon (early evening) sunlight as a *cost-free* wellness therapy, preferably in conjunction with a brisk walk.

Common sense dictates that not all individuals have the same dermatological makeup, i.e. dark skin vs. light skin, and therefore individuals must adjust their exposure to sunlight accordingly. Go out in the sun regularly, starting with short periods. Build up your time in the sun progressively allowing for your skin to adjust by tanning a bit. Do it all year long and not an occasional or annual event like a two-week vacation on the beach.

Unfortunately, busy lifestyles and weather conditions don't always make this simple health practice possible. So if you're one of the millions of health minded people who may be suffering because you are missing your vital health link to the sun, then we are pleased to introduce you to an optional, *cost-effective* solution. A clinically proven solution that can help you think more clearly, sleep more soundly, cope more easily with stress, reduce anxiety & depression and lose unwanted pounds. Additionally, this alternative therapy may reduce the risk of a host of autoimmune disorders, as well as cancer, heart disease, stroke, diabetes and chronic pain.

# SECTION I - Light, Health and You: 101

*“Light is nothing short of miraculous. Light makes our world luminous, dazzles our senses and quietly controls the chemical tides in our bodies.”*

— George C. Brainard, Ph.D.  
*The Healing Light: Interface of Physics and Biology*

## *The Facts Of Light*

### *Mal-illumination: The Silent Epidemic*

In the beginning . . . *there was light*. All life forms evolved in the presence of sun's light, and without this light, life, as we know it would be much different... if any life actually survived.

Since the beginning of human history, people have lived and worked outdoors during the light of day, active and vibrant absorbing light energy from the sky. An average of 10 hours each day, 70 hours weekly, was common. With the advent of Edison's long-lasting light bulb, over the last 100 years people have moved indoors, away from the natural light that so faithfully regulated our circadian rhythms and energized our brain cells and bodies.

Today we spend an *average* of less than 30 minutes a day or a mere 3 hours per week in daylight and often much less according to a study by Daniel Kripke, M.D., Professor of Psychiatry, UC San Diego.

Do you think this meets our bodies' minimum daylight requirements?

Scientific research has proven that our circadian rhythms are dependent upon light entering our eyes to regulate our body's master clock. According to the quality and quantity of light received, key hormones and neurotransmitters like serotonin and melatonin are released in the brain to set our daily rhythms.

Today, most people suffer greatly from mal-illumination (a lack of enough daily natural sunlight and too much indoor artificial light, especially at night). Is it any wonder we experience many of the symptoms of being *out of rhythm*?

Weight gain, fatigue, depression, headaches, pain, hormonal imbalances, sleep disorders, PMS, lowered immune responses, vitamin D/calcium deficiencies, and lack of vitality are but a few of the many health problems associated with the lack of full-spectrum natural light which includes ultra violet light (UV).

Worse yet, most of us spend our days at the workplace being bombarded with light pollution from inferior indoor lights (flickering fluorescents and computer monitors) that spew painfully inadequate and distorted light frequencies instead of beneficial, full-spectrum daylight. Reduce your risk of mal-illumination...lighten up naturally!

## *Lights Out*

### *Artificial Light and Your Health*

Since low fat diets and exercise have gone to war against obesity, the average American has actually gained 8.5 pounds. Increasing numbers of people are getting Type 2 diabetes. Some people feel they exercise like a maniac, are always hungry, are overweight, and gain weight if they even *smell* a cookie.

Researchers T.S. Wiley and Bent Formby believe that overeating fat and a lack of exercise do not cause obesity, heart disease, diabetes, and cancer. They base their conclusions on more than a decade of research at the National Institute of Health and Washington D.C. Avoiding artificial fats help. Completely avoiding artificial toxins is impossible. They believe the problems of over-weight and cancer can be helped with a solution as simple as turning off a light bulb and paying more attention to nature's light of day and darkness of night.

Over 100 years ago, before the invention of the light bulb and the electric power grid, when the sun set the environment grew dark. If people stayed up late, their activity was lit by the dim red glow of fire or candles. When night fell, most people went to bed and slept. In the winter, people spent up to 14 hours a day in the dark.

In the past, the abdominal fat pad common in insulin-resistant high cholesterol and Type II diabetes patients would have kept internal organs warm and served as an energy store for famine season of winter. The liver dumps sugar into cholesterol production to lower the freezing temperature of cell membranes. Chronic high insulin leads to insulin resistance. Blood sugar cannot enter muscles cells; so all sugar goes to fat cells for storage or gets turned into cholesterol. This makes insulation and "antifreeze" to prepare the body for the winter famine that never comes for many in the modern world.

Cryptochromes in the blood pick up the blue spectrum of sunlight and carry it throughout the body. In the summer the body gets the message to produce hormones that say, "Eat all you can and build up a fat pad so you will survive the dark winter famine."

Today artificial lights trick the body into thinking every day, year-round, is the season to eat a lot and gain weight. We don't merely have fruits ripening in the summer; we have highly concentrated sugary foods year-round. Sugar consumption has increased 150% since 1900. Long hours of light cause insulin release to store extra carbohydrates as fat and cholesterol to have something to live on when summer is over.

The flickering light of the TV is addictive because it causes dopamine release; it also tells your body to eat and store fat.

Even if one slept eight hours a night, several hours were probably spent sleeping in a room with morning light leaking in. The evening's artificial light was an abnormal spectrum. A clock or TV dictated bedtime, hours after the sun actually set.

Staying up late means insulin stays higher in the night when it should be low. Cortisol falls so late that it will not come up normally in the morning. Prolactin does not come up until after 3.5 hours of melatonin, so after a short night it stays too high in the morning. If cortisol is not high enough to enhance dopamine, a person may feel rushed and have poor memory and trouble planning. In the afternoon the appetite comes roaring on. Melatonin would have suppressed appetite at night, but it will not form with the lights on. After sunset the light bulbs, computer monitor, and TV screen tell the body to eat carbohydrates and gain weight. Attempting to burn off the extra weight through exercise means cortisol level goes up. The insulin response system goes up to mobilize blood sugar and may eventually lead to insulin-resistance.

The length of hours of light and hours of dark each day regulates hormones like insulin, serotonin, and dopamine. Light shuts off melatonin production at the preoptic site connecting to the pineal gland. Research on rats showed that even the light of less than a candle in the dark phase (night) disrupts the production of the antioxidant melatonin and increases tumor growth. Long dark nights change the heart's metabolism from sugar burning to fat burning.

Artificially long hours of light – every day, all year long – eliminate seasons as far as the body can tell. Some people get depressed in the winter. They may also go for months with no exposure to natural sunlight. They are exposed to murky artificial light 24 hours a day. This can be partly countered by reducing the amount of artificial light in your environment at night and by getting adequate sunlight or artificial full-spectrum light with added ultra violet (UV) when indoors during the day.

[Much of the above information is adapted from T.S. Wiley & Bent Formby, *Lights Out: Sleep, Sugar, and Survival*, NY: Simon & Schuster, 2000]

*“Light therapy is one of the most successful and practical results of basic research in biological rhythms.”*

— Thomas Wehr, M.D.  
Chief of the Section on Biological Rhythms  
National Institute of Mental Health

## *Got Rhythm?*

### *Light, Rhythm, and You*

#### ***The Rhythms of Nature***

Much of nature is composed of rhythms or cycles. Common rhythms include the four seasons and the earth's 24-hour rotation. Our bodies also have rhythms, mostly tied to natural rhythms. Nature, through its 24-hour cycle of day and night, has provided us with a template or pattern that anticipates what we need to be healthy. When properly synchronized, our bodies will respond to nature's cues.

#### ***What are Circadian Rhythms?***

Have you ever wondered why your body needs sleep? Or what causes it to wake up? Or why it gets hungry? These patterns are all part of how your body responds to its cycle, its circadian rhythm.

Circadian rhythms are our body's natural cycles that control appetite, energy, mood, sleep and libido.

Circadian rhythms control the timing, quantity and quality of hormones and neurotransmitters the body produces and eventually secretes. Hormones and neurotransmitters are the elements determining how we feel, our sleep patterns, our appetite, our sex drive and other sleep and mood related issues.

#### ***What is Circadian Balance?***

As in nature, life follows rhythms and cycles. These cycles are well-defined rhythms and nature's way of maintaining balance.

When functioning properly, our circadian rhythms create circadian balance. This balance happens when we are in harmony with nature's cues. We can get up early, feel great during the day, and then sleep well at night. We are feeling our best because we are in our natural rhythm!

*Nature's most important cues come from the sun.* But because of work schedules or changes in seasons, we usually don't get all the natural light we need, and so we fall out of sync with nature.

Our bodies respond to nature's cues to create their ideal rhythms. When functioning properly, the human circadian rhythm will respond to the morning light of a new day. This light will cue the body to produce serotonin, cortisol, and other hormones and

neurotransmitters that fully awaken a person and cause the normal rise of blood pressure and body temperature.

At sunset the body receives another of nature's cues. As the sun goes down and light is reduced, the body secretes the hormone melatonin. Blood pressure then drops as the body prepares for sleep and eventually falls into a slumber.

### ***What is a Circadian Rhythm Disorder (CRD)?***

When we are out of balance, the quantity, quality and timing of hormone and neurotransmitter secretion are impaired and our bodies suffer a circadian rhythm disorder, or CRD

A CRD means your body is producing hormones, chemicals and neurotransmitters in the wrong amounts and/or at the wrong time of the day. Circadian rhythms stimulate the timing and production of countless hormones and chemicals that affect your sleep and mood. Circadian rhythms permeate practically every aspect of our lives because they so heavily influence the chemicals that determine our mood and sleep.

Given nature's day-night cycle and its tremendous effects on our psychological, behavioral, physiological, and hormonal rhythms, the implication is clear: *orderly rhythm is essential for optimal health*. The obverse is also terribly true: rhythmic disorder is a recipe for potential disaster to our health and wellness. Numerous scientific clinical studies have proven this. Clearly, many mood and sleep problems can be traced to a circadian rhythm disturbance.

Because the circadian rhythm influences so much of how a person feels or sleeps, if we desire optimum health, we need to properly care for our circadian rhythm. If it is out of balance, various aspects of our health will be impacted and we will be out of balance. Fortunately, after decades of research, science has found the way to create circadian balance.

### ***Light Therapy Resets/Stabilizes the Circadian Clock***

Light is the most effective way to synchronize the body-mind with the 24-hour day-night cycle. In the early 1980s two groundbreaking studies were made. One was conducted at the Albert Einstein College of Medicine in New York, the other, at the National Institute of Mental Health. Both studies concluded: specific wavelengths, intensities and color-spectrum of light (not available in ordinary room lighting) could reset the circadian clock and create circadian balance. Since that time, many studies have been conducted to understand how and why light therapy works.

***Lighten up! Come into Rhythm Naturally***

Since the dawn of history, humans have lived and worked outside in the light of day, active and vibrant, absorbing light from the sun. Sadly, we have unwittingly become contemporary cave dwellers who no longer get enough daylight to receive the cues that nature intended. The tragic result is that millions of people suffer from some form of CRD. Let there be light...come into rhythm naturally.

# SECTION II - Light, Health and You: 102

## *Sunshine is Powerful Medicine*

Chapter 4  
The UV Advantage  
Dr. Michael Holick

*“Can you imagine what would happen if one of the drug companies came out with a single pill that reduced the risk of cancer, heart attack, stroke, osteoporosis, PMS, depression, and various autoimmune disorders? There would be a media frenzy the likes of which has never been seen in response to a medical breakthrough! Well guess what? Such a drug exists, but it’s not in pill form. The “drug” I’m referring to, of course, is the sun.”*

— Dr. Michael Holick, PH.D., M.D.  
Boston University School of Medicine  
The nation’s leading expert on vitamin D

## *Light & Wellness*

### *The Path of Light in the Brain*

When we speak about health, balance and physiological regulation, we are referring to the functions of the body's major health keepers: the nervous system and the endocrine system. *These major control centers of the body are directly stimulated and regulated by light.* The central nervous system regulates rapidly changing activities such as skeletal movements, smooth muscle contractions and many glandular secretions. That portion of the central nervous system that controls and regulates internal functions of the body is called the autonomic (or automatic) nervous system (ANS). It stimulates all of the smooth muscle tissues, the heart and the glands. The ANS regulates the inner workings of the body in ways that tend to maintain or quickly restore balance. This is accomplished thru two subsystems called the sympathetic nervous system and the parasympathetic nervous system. The sympathetic nervous system supports the body during times of action and movement, while the parasympathetic nervous system aids in rebuilding and rejuvenating. Generally, more internal organs are affected by these dual subsystems. If sympathetic signals tend to stimulate an organ, parasympathetic signals tend to inhibit it and vice versa. Together these critical systems act like an overall check and balance for the entire body.

Although the body's state of balance is constantly regulated by the ANS, it is merely carrying out the orders of a part of the brain called the hypothalamus. *The hypothalamus receives light energy by way of our eyes and coordinates and regulates most of our life sustaining functions.* The hypothalamus also initiates and directs our reactions and adaptations to stress. As the body's major collecting center for information concerned with well-being, the hypothalamus may be the most important unit of the brain.

Information received by the hypothalamus is also used to control the secretions of the pituitary gland; thereby significantly affecting the body's other major regulatory system, the endocrine system, which regulates the physical and chemical processes (metabolism) involved in the overall maintenance of life, as well as the varying rates of chemical reactions within each of our cells. It does this by secreting chemical messengers called hormones directly into the blood stream. Once in the blood stream, these chemical messengers circulate to all parts of the body and affect certain specific target cells that are capable of decoding their messages.

The endocrine system consists of the following glands: pituitary, pineal, thyroid, parathyroid, thymus, adrenals, pancreas and gonads. The major gland is the pituitary,

referred to as the “master gland” because it controls most of the body’s hormone secretions, measuring their amounts as well as making constant readjustments in relation to the body’s needs. The pituitary is divided into two distinct portions: the anterior pituitary, which affects the thyroid, adrenal cortex, testes, ovaries, breasts, and the growth of the long bones, muscles and internal organs; and the posterior pituitary, which affects the mammary glands and kidneys.

Humanity is slowly recognizing the critical importance of light’s impact on both physical and mental health now that science has established definite anatomical connections between light, the eyes, the hypothalamus, the autonomic nervous system and the endocrine system.

[Much of the above information is adapted from Jacob Liberman, O.D., Ph.D., *Light Medicine of the Future*, Bear & Company Publishing]

## *Vitamin D*

### *Sunshine Vitamin*

#### **Sunlight Robbery:**

Vitamin D or more precisely, vitamin D3 cholecalciferol, is perhaps the single most underrated nutrient in the world. That's probably because it's *free*! Our bodies make it when the sun's *ultra violet* (UV) rays touch the skin. Drug companies can't sell you sunlight, so there's no promotion of its health benefits. On the contrary, since the early 1980s a huge anti-sun campaign by the pharmaceutical industry has been used to promote sunscreen agents by literally '*scaring the daylight out of us*'. This robs many people of the *vital* health benefits of sunlight and vitamin D. Needless to say; the number of vitamin D deficiency related diseases has gone through the roof over the last 25 years. Interestingly, most pharmaceutical sunscreens actually contain cancer-causing chemicals.

#### **The Miracle Vitamin:**

Vitamin D is a steroid hormone precursor that has recently been found to play a role in a wide variety of diseases. Current research indicates **vitamin D deficiency plays a role in causing seventeen varieties of cancer** (including breast, prostate & colon) as well as heart disease, stroke, hypertension, autoimmune diseases (MS, Chronic fatigue syndrome, etc.) diabetes, obesity, depression, chronic pain, osteoarthritis, osteoporosis, muscle weakness, muscle wasting, birth defects, and periodontal disease—and it doesn't stop there. Mind you, that this does not mean that vitamin D deficiency is the only cause of these diseases, or that you will not get them if you take vitamin D. What it does mean is that vitamin D, and the many ways in which it affects a person's health, can no longer be overlooked by the health care industry or by individuals striving to achieve and maintain a greater state of health.

#### **Light Activated Wellness:**

The high rate of naturally produced *light activated* vitamin D3 cholecalciferol in the skin is the single most important fact every person should know about vitamin D because it has such profound implications for human health and the risk of disease. Vitamin D has been produced by life forms for over 750 million years. Phytoplankton, zooplankton, and most plants and animals that are exposed to sunlight's UV rays have the capacity to make vitamin D. Because each human's optimum level of vitamin D varies, the safest and wisest way to maintain individual maximum vitamin D levels is by receiving approximately 30 minutes of daily sunlight or exposure to a light therapy system that

includes the appropriate balance of UV light. Most of us make approximately 20,000 units of vitamin D after about 20 minutes of summer sun. This is about '100' times more vitamin D than the government says you need every day. A potential problem with vitamin D supplementation is that medical science does not know how much D each individual truly needs to consume for optimum health maintenance. Interestingly, you cannot overdose on vitamin D when it is manufactured in the skin naturally. The body stops producing vitamin D when an individual's optimum level is produced from sunlight exposure. In humans, vitamin D is *critically* important for the development, growth, and maintenance of a healthy body, from birth until death.

### **Reduce the Risk:**

In his e-book, **The Healing Power of Sunlight & Vitamin D**, Mike Adams sums up the vitamin D deficiency *epidemic* thusly:

- 32% of doctors and med school students are vitamin D deficient.
- 40% of the U.S. population is vitamin D deficient.
- 42% of African American women of childbearing age are deficient in vitamin D.
- 48% of young girls (9-11 years old) are vitamin D deficient.
- Up to 60% of all hospital patients are vitamin D deficient.
- 76% of pregnant mothers are severely vitamin D deficient, causing widespread vitamin D deficiencies in their unborn children, which predispose them to type 1 diabetes, arthritis, multiple sclerosis and schizophrenia later in life. 81% of the children born to these mothers were deficient.
- Up to 80% of nursing home patients are vitamin D deficient.
- African Americans are deficient in vitamin D simply because of their dark skin. The darker the skin, the longer they must be in sunlight to produce adequate amounts of vitamin D. African Americans in the northern latitudes get even less UV light to create vitamin D, and prostate cancer among northern latitude African Americans is epidemic. If you are dark pigmented, you could require up to 20 to 30 times the amount of sun exposure of your light skinned neighbors. And ironically, our light skinned neighbors lather up in sunscreens before going outside, and even a weak sunscreen will block up to 95% of vitamin D generation. The more you have on, the longer you have to be out to get your daily requirement of vitamin D. Put on too much, and you'll have to spend all day in the sun, so, it is advised to sun smartly. Go into the sun for fifteen minutes, and then put your sunscreen on. The lighter the skin, the less sunlight you need. The higher the latitude the more sunlight you need.

### **Passive Fitness:**

Dr. Zane Kime, in his book **Sunlight**, states that a gradual, consistent exposure to sunlight, just like a gradual and consistent exercise program will produce:

#### DECREASED

- Resting heart rate
- Blood pressure
- Respiratory rate
- Blood sugar

#### INCREASED

- Tolerance to stress
- Energy, strength & endurance
- Ability of blood to absorb and carry oxygen

### **Vitamin D Research Areas:**

Vitamin D Deficiency is a world wide epidemic, with over one billion people at risk for its associated diseases. Sunlight has an enormous impact on health via the neuroendocrine of the skin. Since its discovery, the nuclear vitamin D receptor (VDR) has been found to be present in over thirty tissues and organs of man (intestinal, bone, liver, kidney, hematopoietic, skin, muscle, heart, pancreas, adrenal, brain, reproductive, lung, pituitary, thyroid, and cartilage tissues as well as on lymphocytes, monocytes, and macrophages), indicating a broad sphere of influence over health and vitality.

- **Autism:** Research has shown that low maternal vitamin D3 has important ramifications for the developing brain. Vitamin D is a steroid hormone with many important functions in the brain, mediated through the nuclear vitamin D receptor (VDR). Dysfunctional VDR demonstrate altered emotional behavior and specific motor deficits.
- **Autoimmune Illness:** Researchers are discovering an increasing number of links between the immune, nervous, and endocrine systems. Hormones of the endocrine system, such as vitamin D, help the immune and nervous systems defend the body, with defects in this intricate system leading to autoimmune disorders.
- **Cancer:** Vitamin D inhibits inappropriate cell division and metastasis, reduces blood vessel formation around tumors, and regulates proteins that affect tumor growth. It also enhances anti cancer actions of immune system chemicals and chemotherapy drugs.

- **Chronic Pain:** Vitamin D deficiency is a major contributor to chronic low back pain in areas where vitamin D deficiency is endemic.
- **Cognitive Function:** In a cross section of older adults, vitamin D deficiency was associated with low mood and with impairment on two of four measures of cognitive performance.
- **Diabetes:** Dietary vitamin D supplementation is associated with reduced risk of type 1 diabetes.
- **Heart Disease:** Studies have indicated reduced ultraviolet B exposure in Congestive Heart Failure patients during childhood, adolescence, and early adulthood. Activated vitamin D has been shown to increase survival in patients with cardiovascular disease.
- **Hyperparathyroidism:** Low plasma vitamin D<sub>3</sub> has been found to be a major risk factor for hyperparathyroidism.
- **Hypertension:** Clinical and experimental data support the view that vitamin D metabolism is involved in blood pressure regulation and other metabolic processes.
- **Melanoma:** An inability to tan is the number one risk factor for melanoma. Those who tan easily or who have darker skin are far less likely to develop the disease. A new theory is that melanoma is actually caused by a sunlight/vitamin D deficiency and that safe sun exposure actually helps prevent the deadly disease.
- **Mental Illness:** Vitamin D deficiency has been implicated in various psychiatric and neurological disorders.
- **Multiple Sclerosis:** Vitamin D supplementation may help prevent the development of MS as well as provide for additional treatment.
- **Muscular Weakness and Falls:** Specific receptors for vitamin D have been identified in human muscle tissue. Cross sectional studies show that elderly persons with higher vitamin D serum levels have increased muscle strength and a lower number of falls.
- **Obesity:** Serum vitamin D is significantly lower in obese individuals.
- **Osteoarthritis:** Low intake and low serum levels of vitamin D appear to be associated with an increased risk for progression of osteoarthritis.
- **Osteoporosis:** Vitamin D deficiency is extremely prevalent in the elderly. Most often the first symptoms are caused by myopathy with muscle pain, fatigue, muscular weakness, and gait disturbances. More severe deficiency causes osteomalacia with deep bone pain, reduced mineralization of bone matrix, and low energy fractures.
- **Pregnancy and Lactation:** Results of studies suggest that the vitamin D supply from human milk is inadequate, and that routine vitamin D supplementation is advisable for breast fed infants who are deprived of sunlight exposure.

- Miscellaneous: Vitamin D has also been implicated in the pathology of various other health disorders such as influenza, psoriasis, gout, otosclerosis, interstitial cystitis, decreased pulmonary function, thrombosis, chronic kidney disease, pancreatitis, rheumatology, hepatitis B infections, hemochromatosis, and gastrointestinal diseases...to mention a few more!

Research source: <http://www.vitamindcouncil.org>

### *Vitamin D and Seniors*

Older adults who don't get enough vitamin D - either from their diets or exposure to the sun - may be at increased risk for poor physical performance and disability, according to new research from Wake Forest University School of Medicine and colleagues. The results are reported in the April issue of the *Journal of Gerontology: Medical Sciences*.

"With a growing older population, we need to identify better ways to reduce the risk of disability," said lead author Denise Houston, Ph.D. "Our study showed a significant relationship between low vitamin D levels in older adults and poorer physical performance." About one-fourth of people over age 60 have low vitamin D levels. Previous research has shown that vitamin D not only plays a role in bone health, but possibly also in protecting against diabetes, cancer, colds and tuberculosis.

"Recent findings showing the importance of vitamin D status on multiple health outcomes underscore the need for more research on the effects of low vitamin D levels in elderly populations," said Houston, an instructor in internal medicine - gerontology.

Vitamin D is naturally produced when skin is exposed to the sun's ultraviolet rays. Foods such as fortified milk, juice and cereals also contain vitamin D, but it is difficult to get enough through diet alone, said Houston. Older adults are particularly prone to low vitamin D levels because they may get less exposure to sunlight and because their skin is less efficient in producing vitamin D from sun exposure compared to younger adults. Older adults also may not get enough vitamin D from dietary sources. "There is a growing awareness that the prevalence of low vitamin D levels is common among the elderly," said Houston.

For the current study, researchers analyzed data from the InCHIANTI study, which evaluated factors contributing to the decline of mobility in late life. The study involved 976 people who were 65 years and older from two towns in the Chianti area of Italy. The mean age of participants was 74.8 years. Data were collected from Sept. 1998 through March 2000. Participants completed a short physical performance test of their walking speed, ability to stand from a chair and ability to maintain their balance in progressively more challenging positions. In addition, handgrip strength, a predictor of future disability, was measured using a hand-held dynamometer. The researchers found that physical performance and grip strength were about five to 10 percent lower in those who had low levels of vitamin D. After looking at other variables that could influence the results, such as body mass index, physical activity, the season of the year, mental abilities, health conditions and anemia, the results held true.

The study wasn't designed to evaluate whether low vitamin D levels actually cause poor physical performance, but the results suggest the need for additional research in this area, said Houston. She said vitamin D plays an important role in muscle function, so it is plausible that low levels of the vitamin could result in lower muscle strength and physical performance. "But it's also possible that those with poor physical performance had less exposure to sunlight resulting in low vitamin D levels," she said.

Current recommendations call for people from age 50 to 69 to get 400 international units (IUs) of vitamin D per day and for those over age 70 to get 600 IUs. Many researchers, however, suggest that higher amounts may be needed. "Higher amounts of vitamin D may be needed for the preservation of muscle strength and physical function as well as other conditions such as cancer prevention," said Houston. "The current recommendations are based primarily on vitamin D's effects on bone health."

## *UV Light*

### *Miracle bioNutrient*

We live in a solar system. The earth revolves around the sun. It is the center of our universe. All life on earth is dependent on the sun's 'full-spectrum' of light radiation, which includes ultra violet light (UV). There are three different forms (wavelengths) of UV light; UVA, UVB and UVC. UVA and UVB have been coming to earth since the beginning of time and are essential for optimum health & wellness. UVC is filtered by the atmosphere and does not reach earth. Obviously, too much of most anything is not

good for you, which also includes UV light. However, not enough UV can also lead to very serious health problems according to The UV Advantage by Dr. Michael Holick, the nations' leading vitamin D researcher.

**Sunlight radiation is Life's energy.** *No sun...no life!* Fascinating examples of the miraculous power and 'longevity' potential of UV is suggested in the following research references.

- "Heliotherapy" was very popular in Europe from 1900 to c. 1940. One Dr. Rollier, head of a sun therapy clinic, wrote a volume titled *La Cure de Soleil*. He knew that the higher the UV doses, the greater the success of the treatment. Many patients were healed from tuberculosis (and it was noticed that the sun did not affect a cure if the patients wore glasses impenetrable to the healing UV rays). Other successful treatments concerned colitis, anemia, eczema, acne, lupus erythematoses, sciatica, asthma, and other ailments. Sun bathing and UV therapy were known as the most effective treatment modality for many infectious diseases. When penicillin was discovered in 1938, big business and science rushed into the new area of antibiotics. Sun therapy fell into disrepute.

- Prof. Smith-Sonneborn, University of Wyoming; Department: Biology, irradiated one-celled organisms with bactericidal UV-C rays which damaged their DNA and shortened their life span (accelerated their aging process). She then proceeded to re-irradiate the cells, this time using UV-A. The cells repaired themselves and the aging process was halted. This alone was sensational news. Prof. Smith-Sonneborn wanted to know next what would happen if she resubjected the cells to UV-A. This second radiation treatment extended the cells' lifespan by up to 50 % compared to the control group! These results showed without a doubt the ability of certain types of light to not only support cells in repairing their DNA, but also to support life-extending factors present within the DNA.

### *A Few Benefits of UV*

UV light exposure enables the body to build a strong skeletal structure, heart, and muscles as well as optimize the immune system and the body's utilization of sugar.

- UV light activates vitamin D synthesis.
- UV light reduces the risk of cancer.
- UV light helps in weight loss.
- UV light reduces the risk of depression.
- UV light increases heart performance.

- UV light lowers blood pressure.
- UV light lowers cholesterol counts.
- UV light activates an important skin hormone (Solitrole).
- UV light is effective against psoriasis.
- UV light is a nutrient just as vitamins and minerals.
- UV light promotes the production of sex hormones.
- UV light improves ECG and blood parameters in persons suffering from arteriosclerosis.
- UV light is effective with numerous other ailments (Krudsen in his book Light Therapy lists 165 diseases).

## SECTION III - The Enlightened Solution... when the sun doesn't shine or your indoors

### **Light is Life's Energy**

If your lifestyle, work or the weather does not allow you to receive your daily sunlight exposure *naturally*, then we would like to introduce you to a very convenient, cost-effective solution that is covered by most medical insurance when prescribed by a physician.

# Light Therapy

*...photo-dynamic nutrition*

“Light therapy is one of the most successful and practical results of basic research in biological rhythms.”

— Thomas Wehr M.D.  
Chief of the Section on Biological Rhythms  
National Institute of Mental Health

Today, we are living in a light-deprived world and are paying for it with our health. Problem is we've progressed faster than we've evolved. It's no wonder that so many people are suffering the effects of this new 'contemporary' epidemic. We evolved to spend most of our waking hours outside, in the bright sunshine – but today our indoor lifestyles are unwittingly contributing to increasing levels of insomnia, fatigue, anxiety, depression, obesity and other health issues.

The good news is that researchers in light therapy have made great strides in recent years in understanding the impact of light on our health and wellness. There is an increasing awareness among the medical and general populations about the critical importance of getting enough of the full-spectrum of light at the appropriate time of day and reducing our light exposure at night.

We are not likely able to change our lifestyle significantly to go outside and get the light we need on a daily basis... *especially early morning light* that programs vital circadian rhythms that control appetite, energy, mood, sleep, libido and other essential mind-body functions. So bringing the light we need to us in the form of light therapy is the next best solution.

## Mal-illumination Solutions

To escape the ravages of Mal-illumination all we need is moderate, daily, sunlight exposure. However, too often natural sunlight may be inconvenient or unavailable. The solution... **Bring Sunshine Indoors with SOLshine Biobulbs™**

## *In Conclusion*

### *Light is Life's Energy*

*All corporal energy comes from the sun.* Sunlight energy is stored in your food as carbohydrates, fats, and proteins and stored directly in the human body as vitality (photo-current). If you suffer from reduced vitality or illness, returning to a natural cycle of darkness at night and brightness of day — sunlight — can literally save your life.

In addition to all that man may be, he is also a photobiotic being, *completely dependent* on the absorption of solar energy. The body is an electro-chemical bio-system, collecting energy from the atmosphere. The nerve ganglia all over the body may be reasonably likened to electric wires for conducting photons of light energy collected by the skin and eyes and distributed to the internal organs and cells. We are electronically plugged into the sun's rays and when this connection is severed, disorder is soon to follow. Every muscular movement, metabolic process, every enzyme reaction, the very thoughts of your brain, your movements, the digestion of food, and the burning of fat is an electrical process augmented by sunlight energy. Contradistinctively, a slowdown in these electrical processes leads to decreased metabolism, reduced burning of fat, reduced vitality and immunity. This reduced electrical activity is the harbinger of *circadian rhythm disorders and the silent epidemic of mal-illumination*.

Even in sunny California and Florida if our skin and eyes are not sufficiently exposed to solar radiation for periods of time, disturbances will occur in the physiological equilibrium of the human system. The result will be functional disorders of the nervous system, a weakening of the body's defenses, aggravation of chronic disease and a vitamin D deficiency.

For the past number of years clinicians, physicians, national media, and the National Institute of Health have been warning Americans to stay out of the sun. The purpose of this warning is intended to prevent melanoma, a serious form of skin cancer. In spite of the ever-increasing use of sunscreens and intentional reduction of sun exposure, incidence of this cancer is on the rise. The risk of skin cancer from sun exposure is much smaller than the public has been led to believe while the risks of vitamin D deficiency from lack of sun exposure are now known to be very serious. In addition to osteoporosis,

insufficient vitamin D actually increases the risk of several cancers, including breast, prostate and colon as well as a host of autoimmune disorders.

The cornerstones of good health are proper nutrition, fresh air, clean water, moderate exercise and natural light. Our bodies are self-healing organisms that receive "biological cues" and "nerve-brain voltage" from the sun, much like a solar battery that is charged by sunlight energy. A key to good health is to treat the cause, not just the effect, which interferes with proper function and balance. Our 'inner' circadian rhythms must be in sync with Nature's 'outer' rhythm in order to establish ease in the body and reduce the risk of many *dis-eases*. With balance and vitality restored we can create an internal environment that truly supports lasting health . . . just the way Nature intended!

Sunlight is critical for optimum health and productivity. Reduce the risk of the silent epidemic of mal-illumination. Come into rhythm naturally with a morning walk in the light of each new day.

## SECTION IV - Connecting the Research Dots of Many Diseases to the Preventive and Healing Power of Light

*"We are human photocells whose ultimate biological nutrient is sunlight. Unknowingly, millions suffer daily from chronic — 'mal-illumination.' Like malnutrition, mal-illumination deprives us of bio-nutrients and rhythmic stimulation that is essential for living as whole, healthy humans."*

— Ken Ceder  
Chief Enlightenment Officer  
**bio**Light Group

## ***UV radiation, vitamin D and three autoimmune diseases-- multiple sclerosis, type 1 diabetes, rheumatoid arthritis.***

Photochem Photobiol. 2005 Nov-Dec;81(6):1267-75. Review.

PMID: 15971932 [PubMed - indexed for MEDLINE]

We review the evidence indicating a possible beneficial role for ultraviolet radiation (UVR) on three Th1-mediated autoimmune diseases: multiple sclerosis, type 1 diabetes and rheumatoid arthritis in relation to recent developments in photoimmunology. Recent work suggests that UVR exposure may be one factor that can attenuate the autoimmune activity leading to these three diseases through several pathways involving UVB and UVA irradiation, UVR-derived vitamin D synthesis and other routes such as alpha-melanocyte-stimulating hormone, calcitonin gene related peptide and melatonin. Ecological features, particularly a gradient of increasing prevalence of multiple sclerosis and type 1 diabetes with higher latitude, provide some support for a beneficial role of UVR. Analytical studies provide additional support, particularly as low vitamin D has been prospectively associated with disease onset for all three diseases, but are not definitive. Randomized controlled trial data are required. Further, we discuss how associated genetic studies may assist the accumulation of evidence with regard to the possible causal role of low UVR exposure and/or low vitamin D status in the development of these diseases.

## ***Considering the potential benefits as well as adverse effects of sun exposure: can all the potential benefits be provided by oral vitamin D supplementation?***

Prog Biophys Mol Biol. 2006 Sep;92(1):140-9. Epub 2006 Feb 28. Review.

PMID: 16616326 [PubMed - indexed for MEDLINE]

Exposure to ultraviolet radiation (UVR) is associated with both adverse and beneficial health effects. While many of the adverse effects of excessive exposure are well known, the adverse effects of insufficient UVR exposure are less clear-cut, but may include a heightened risk of several cancers and autoimmune disorders as well as of bone diseases such as rickets, osteomalacia and osteoporosis. Although some of the postulated beneficial effects of UVR exposure may occur through the maintenance of adequate levels of vitamin D, it is not clear that this can account for all of these effects. We briefly review the epidemiological literature with respect to vitamin D, UVR exposure and autoimmune diseases. We further outline alternative pathways, whereby UVR could alter

the risk of development of some cancers and autoimmune disorders, independent of effects on vitamin D synthesis. Recognition of the beneficial effects of UVR exposure has led to a reconsideration of sun avoidance policies. It is important to recognize that all of the beneficial effects of UVR exposure may not occur only through UVR-induced vitamin D synthesis. Thus maintaining current sun avoidance policies while supplementing food with vitamin D may not be sufficient to avoid the risks of insufficient exposure to UVR.

### *Sunlight Actually Prevents Cancer*

*Cancer March 2002*

Insufficient exposure to ultraviolet radiation may be an important risk factor for cancer in Western Europe and North America, according to the published study in *Cancer*, directly contradicting official advice about sunlight.

The research examined cancer mortality in the United States. Deaths from a range of cancers of the reproductive and digestive systems were approximately twice as high in New England as in the southwest, despite a diet that varies little between regions.

An examination of 506 regions found a close inverse correlation between cancer mortality and levels of ultraviolet B light. The likeliest mechanism for a protective effect of sunlight is vitamin D, which is synthesized by the body in the presence of ultraviolet B.

The study's author, Dr William Grant (wbgrant@infi.net), says northern parts of the United States may be dark enough in winter that vitamin D synthesis shuts down completely.

While the study focused on white Americans, the same geographical trend affects black Americans, whose overall cancer rates are significantly higher. Darker skinned people require more sunlight to synthesize vitamin D.

There are 13 malignancies that show this inverse correlation, mostly reproductive and digestive cancers. The strongest inverse correlation is with breast, colon, and ovarian cancer.

Other cancers apparently affected by sunlight include tumors of the bladder, uterus, esophagus, rectum, and stomach.

## *American Cancer Society Journal: Cancer and Light*

*Cancer: Interdisciplinary International Journal of the American Cancer Society*, 94/6, March 15, 2002

### **An Estimate of Premature Cancer Mortality in the U.S. Due to Inadequate Doses of Solar Ultraviolet-B Radiation**, by William B. Grant, Ph.D.

**BACKGROUND:** There are large geographic gradients in mortality rates for a number of cancers in the U.S. (e.g., rates are approximately twice as high in the northeast compared with the southwest). Risk factors such as diet fail to explain this variation. Previous studies have demonstrated that the geographic distributions for five types of cancer are related inversely to solar radiation. The purpose of the current study was to determine how many types of cancer are affected by solar radiation and how many premature deaths from cancer occur due to insufficient ultraviolet (UV)-B radiation.

**METHODS:** UV-B data for July 1992 and cancer mortality rates in the U.S. for between 1970-1994 were analyzed in an ecologic study.

**RESULTS:** The findings of the current study confirm previous results that *solar UV-B radiation is associated with reduced risk of cancer of the breast, colon, ovary, and prostate as well as non-Hodgkin lymphoma. Eight additional malignancies were found to exhibit an inverse correlation between mortality rates and UV-B radiation: bladder, esophageal, kidney, lung, pancreatic, rectal, stomach, and corpus uteri.* [Emphasis added.] The annual number of premature deaths from cancer due to lower UV-B exposures was 21,700 (95% confidence interval [95% CI], 20,400-23,400) for white Americans, 1400 (95% CI, 1100-1600) for black Americans, and 500 (95% CI, 400-600) for Asian Americans and other minorities.

## *Obesity treated with phototherapy: four case studies*

By Bylesjo EI, Boman K, Wetterberg L.

International Journal of Eating Disorders:  
December 1996, Volume 20 Issue 4, pages: 443-46.

Dept. of Neurology, Umea Univ. Hospital, Sweden.

We studied the effect of phototherapy on body weight in four overweight women. Melatonin was measured in the serum and urine before and after 1 hr of bright light (350 cd/m<sup>2</sup>). Psychiatric self-ratings with the Comprehensive Psycho-pathological Rating Scale (CPRS) and Visual Analog Scale (VAS) were performed. Phototherapy (1,500 lux)

was given daily at 7-9 a.m. for 10 days and thereafter twice weekly for another 4 1/2 weeks.

Three of the 4 women reduced their net weight (1.5-2.4 kg) and improved in mood. All were sensitive to light. The findings indicate that phototherapy affects the melatonin-serotonin system and carbohydrate regulation and may reduce body weight.

### ***Letter to the Editor: Light Therapy, Obesity, and Night-Eating Syndrome***

Serge Friedman, M.D., Christian Even, M.D., Roland Dardennes, M.D., & Julien Daniel Guelfil, M.D., *Paris, France*

American Journal of Psychiatry

159:875-876, May 2002 © 2002 American Psychiatric Assn

To the Editor: The prevalence of night-eating syndrome (morning anorexia, evening hyperphagia, and insomnia) among obese patients ranges from 9% to 27% (1). A concurrent attenuation of the nocturnal elevation in melatonin and leptin blood levels with nighttime awakening and eating has been characterized in obese subjects with night-eating syndrome (2). An open study (3) has suggested that bright-light therapy may reduce body weight in obese subjects, especially those with carbohydrate craving, with or without seasonal affective disorder. We report the first case of which we are aware regarding an overweight patient suffering from night-eating syndrome and nonseasonal depression, both treated with light therapy.

Ms. A, a 51-year-old overweight woman (body mass index=31.2) was seen as an outpatient for the worsening of depressive symptoms over 1 month, despite 2 years of maintenance treatment with paroxetine at a constant dose (40 mg/day). A thorough psychiatric examination by a senior psychiatrist and a record of food consumption (energy and macronutrient content) revealed the following:

1. Nonseasonal major depressive disorder, recurrent episode, moderate, with partial remission between episodes (DSM-IV criteria). Severity was assessed with the Structured Interview Guide for the Hamilton Depression Rating Scale, Seasonal Affective Disorders Version (4) (the usual 21 items of the Hamilton Depression Rating Scale plus eight items assessing atypical symptoms) and with the Beck Depression Inventory (13-item version). Initial scores on the Hamilton scale were 18 on the depression scale and 12 on the scale for atypical symptoms. Ms. A's Beck Depression Inventory score was 12.
2. Night-eating syndrome, according to the provisional criteria for night-eating syndrome (2): morning anorexia and evening hyperphagia, in which at least 50% of daily energy

intake is consumed after the last evening meal (62% after 8:00 p.m.); awakenings at least once a night (at midnight and 3:00 a.m. nightly); and consumption of snacks during awakenings (these snacks were 67.8% carbohydrate and had a carbohydrate-to-protein ratio of 6:1) in order to restore disrupted sleep. These criteria persisted for at least 3 months and were not considered to be side effects of paroxetine treatment.

Bright-light therapy was added to ongoing treatment (paroxetine, 40 mg/day). After 14 daily morning sessions of 10,000-lux white light for 30 minutes, Ms. A no longer fulfilled the DSM-IV criteria for depression, and her scores were significantly lower on the Hamilton scale (depression score=7, atypical symptom score=5) and Beck Depression Inventory (score=5). She no longer met the criteria for night-eating syndrome.

One month later, all of Ms. A's previous night-eating symptoms had returned. She was not depressed (DSM-IV criteria), and her severity scores remained low: depression score=6, atypical symptom score=4, Beck Depression Inventory score=5. Another 12 morning sessions with light therapy completely suppressed her night-eating symptoms.

Exposure to light improved the symptoms of night-eating syndrome in an obese subject, irrespective of comorbid depressive symptoms. These findings should be further tested in controlled studies to establish the possible role of light therapy for obese subjects who suffer from night-eating syndrome, with or without affective disorder.

### *Light Therapy Can Improve Libido in Men*

A study conducted at the University of California at San Diego shows that an hour of bright light therapy per day can boost the levels of a pituitary hormone that increases testosterone in men. One of the study's authors, Daniel Kripke, M.D. UCSD professor of psychiatry, added "the study also supports data that bright light can trigger ovulation in women, which is also controlled by luteinizing hormone (LH), the pituitary hormone we studied." Earlier research by the university showed that bright light therapy was also successful in regularizing the menstrual cycles of women who had long and irregular cycles.

Published in the current issue of the journal *Neuroscience Letters* (341, 2003, 25-28), the study looked at LH excretion following bright light exposure (1,000 lux) from 5-6 a.m. each morning for five days in 11 healthy men ages 19-30. The same group of men had their LH measured again after exposure to a placebo light (less than 10 lux) from 5-6 a.m. for five days. The researchers found that after just five days of bright light exposure, men showed a 69% increase in LH levels!

Previous studies by the Kripke group and others have shown that bright light exposure helps alleviate the symptoms of depression. According to the study's authors, sexual dysfunction such as loss of libido and decreased sexual activity, which are known depressive symptoms as well as side effects of newly developed antidepressants, may be helped by bright light exposure.

Source: Reuters Health

### *Menopause and Light*

Menopause can cause sleep problems, fatigue, irritability and mood disorders. Light therapy treats all these symptoms. Menopause technically means the end of menstruation, but this change occurs years before as the body begins to slow down the release of eggs and hormones. Perimenopause is generally viewed as the few years before and the year after your last period. Women are more vulnerable to menstrual related disorders during this time and their cycles are more inconsistent. PMS and PMDD (Premenstrual dysphoric disorder) symptoms can be more severe. As many as 10 years before menopause, a woman's period may begin to be irregular, skipping a month, then having two periods within a short time. Periods may also alternate between heavy and light. The issue of strengthening circadian rhythms for women is particularly critical during menopause. Bright light plays an important role in regulating menstrual cycles and minimizing the effects of PMS and PMDD. Using morning light therapy to regulate circadian rhythms can be very beneficial.

Hot flashes are the primary cause of sleep problems in women over 50, and may also be the result of disturbed circadian rhythms. Falling estrogen levels during menopause send confusing messages to the hypothalamus, which regulates body temperature. The circadian rhythm in turn spikes causing awakenings because the increase in temperature disrupts the melatonin release during the sleep cycle. However, even after menopause when hot flashes are no longer a problem, the rhythmic awakening continues, since the circadian rhythm is now miss-entrained. Light therapy is used to restore a normal circadian rhythm.

Several recent studies show that current menopause treatments increase the risk of cancer. Short and long-term hormone replacement therapy, once the mainstay of menopause treatment is now discouraged because of its negative consequences. Light therapy is becoming the more attractive alternative, since it helps regulate the same brain centers that menopause hormones affect.

## *PMS*

Prominent PMS researcher, Barbara Parry, MD, of the University of California, San Diego, recently established that PMS is related to light and that phototherapy (light therapy) can alleviate PMS symptoms. Why did the phototherapy work?

When people are exposed to bright light, they produce serotonin, a neuropeptide (a chemical that carries messages between nerves) that helps us feel calm, alert and happy during the day. At night, when it is dark, the brain produces less serotonin and more melatonin, a neuropeptide that helps us sleep deeply.

Researchers at UCLA (Rapkin et al., 1998) have shown that serotonin levels drop just before ovulation in all women. Rapkin shows that this drop correlates with the onset of PMS symptoms, and that serotonin levels rebound with the onset of menstruation when PMS symptoms decrease. This and other recent research suggests that PMS occurs in women with low base levels of serotonin, when serotonin levels drop further at ovulation, these levels fall low enough in PMS sufferers for symptoms to appear.

Using phototherapy, women with PMS can keep their serotonin and melatonin levels balanced, preventing their PMS symptoms from appearing.

Using phototherapy, women who suffer with PMS frequently report less depression, less moodiness, better sleep, better concentration, etc. Researchers used to believe that PMS, which is obviously linked to the menstrual cycle, must be caused by a hormonal imbalance. We are now learning that PMS seems to be caused by cyclical irregularities in brain neurotransmitters, particularly serotonin, rather than by hormones.

A study reported in the New England Journal of Medicine (Schmidt et al., 1991) suggest that although PMS is usually synchronized with a woman's menstrual cycle, it does not seem to be caused by the hormonal fluctuations that trigger the cycle.

## *Alzheimer's and Light*

Researchers at The Oregon Health & Science University are exploring the use of light on dementia patients. There is evidence to suggest that light therapy is an effective intervention. They believe bright light therapy may actually have a positive impact on the mood, behavior and sleep of adults with dementia. These symptoms actually can cause a great deal of difficulty in providing care for adults with dementia, in addition to the fact that it negatively impacts their quality of life.

Alzheimer's is the most common form of dementia. Alzheimer's disease is a brain disorder that gradually destroys an individual's memory and ability to learn, reason, make

judgments, and communicate. Nearly 4.5 million Americans suffer from the disease. According to experts, that number has more than doubled since 1980. There is no cure for this debilitating mental disease, but researchers continue to work on treatments that will improve the quality of living for patients. Researchers hope non-invasive treatments, like light therapy can improve the quality of life for patients by minimizing some of the troubling symptoms such as depression.

Depression is a very common symptom in Alzheimer's and other kinds of dementia. Depression research suggests that light will indeed have a beneficial impact on most patients' moods. Researchers say nearly every medication that is used in older adults will have some negative side effect, such as sedation. Some medications actually contribute to falls and can lead to delirium in older adults. Many medications used in the elderly aren't actually tested in those populations, and there is not sufficient data to support the use of things like anti-psychotics to help with agitation. Light therapy has an advantage over medication in that it has very few side effects.

### *Chronic Fatigue Syndrome*

CFS is a disabling long-term condition with distinct physical as well as psychological components. Symptoms persist on and off year round, yet a recent study showed that more than 1/3 of CFS patients experience distinct seasonal variation, with winters worse. Among that group, oversleeping, daytime fatigue, carbohydrate craving and eating were indistinguishable from patients with SAD. Furthermore, seasonal CFS patients were significantly more likely to have experienced a depressive episode in the past year, usually in winter.

An implication is that they might respond to light therapy. Indeed, case studies at Columbia University Medical Center (New York) and University of British Columbia (Vancouver) have shown marked improvement. Patients improved mainly in the symptoms that typify SAD, but some also showed improvement in physical symptoms of CFS (such as joint pain) that are rarely seen in SAD. Clinical trials are a high priority, especially considering that there are few specific treatment interventions for CFS, and patients often receive multiple medications (including sleeping pills and antidepressants) with unclear effect. Since light therapy for CFS is still at a preliminary investigational phase, we encourage that you consult with your doctor before initiating self-treatment: if light is administered inappropriately, there is even a risk that symptoms could worsen. However, in our opinion, it is an option for doctors to consider, following similar treatment guidelines as for SAD.

## *Insomnia*

Sleeping poorly not only leaves you cranky and lethargic; it can increase your risk of heart disease, diabetes and even weight gain by decreasing body levels of a hunger-controlling hormone called leptin.

Some people have difficulty initiating sleep before the early morning hours, and, not surprisingly, have difficulty awakening when most people start their day. This problem, known as "delayed sleep phase syndrome," or DSPS, has been corrected in many cases through the use of bright light therapy. By using a bright light at the end of someone's "subjective night" (which might end at midday, given late awakening), the sleep phase can be gradually shifted earlier such that one is able to achieve a normal sleep schedule. The treatment acts by its effects on the internal biological clock, bringing the clock into sync with local time. In contrast, DSPS patients often fail to respond to sleeping pills, which don't reset the brain's clock, but put people at a risk for becoming dependent on the medication.

Conversely, some people can't resist falling asleep far too early and waking well before sunrise. Light therapy at the start of their subjective night, in the evening, can coax the biological clock later, thus normalizing - or at least improving - the sleep pattern. This technique may be especially valuable for older people, who are prone to developing advanced sleep phase syndrome, or ASPS. It has even been suggested that sitting all evening in a dimly illuminated living room predisposes people to ASPS, and even turning up normal room lights can alleviate the problem in many cases.

DSPS and ASPS are extremes on the dimension of insomnia. Many more people experience such problems at milder severity, for example, they want to go to sleep at 11:30 p.m. but just can't fall asleep till 1 a.m. As a result, it's very hard to wake up alert for a normal work day. In just a day or two, bright light therapy at the breakfast table can often do the trick.

## *The Effect of Sunlight on Postoperative Analgesic Medication Use*

University of Pittsburgh; and Carnegie Mellon University, Pittsburgh, Pennsylvania:  
Jeffrey M. Walch, BSA, Bruce S. Rabin, MD, PhD, Richard Day, PhD, Jessica N. Williams, BS, Krissy Choi, BS and James D. Kang, MD

**Objective:** Exposure to natural sunlight has been associated with improvement in mood, reduced mortality among patients with cancer, and reduced length of hospitalization for patients who have experienced myocardial infarction. Our aim was to evaluate whether

the amount of sunlight in a hospital room modifies a patient's psychosocial health, the quantity of analgesic medication used, and the pain medication cost.

**Methods:** A prospective study of pain medication use was conducted in 89 patients undergoing elective cervical and lumbar spinal surgery where they were housed on either the "bright" or "dim" side of the same hospital unit. Analgesic medication was converted to standard morphine equivalents for interpatient comparison. The intensity of sunlight in each hospital room was measured daily and psychologic questionnaires were administered on the day after surgery and at discharge.

**Results:** Patients staying on the bright side of the hospital unit were exposed to 46% higher-intensity sunlight on average ( $p = .005$ ). Patients exposed to an increased intensity of sunlight experienced less perceived stress ( $p = .035$ ), marginally less pain ( $p = .058$ ), took 22% less analgesic medication per hour ( $p = .047$ ), and had 21% less pain medication costs ( $p = .047$ ). Patients housed on the bright side of the hospital consistently used less analgesic medications in all age quartiles.

**Conclusion:** The exposure postoperatively of patients who have undergone spinal surgery to increased amounts of natural sunlight during their hospital recovery period may result in decreased stress, pain, analgesic medication use, and pain medication costs.

## *Vitamin D Supplementation and Total Mortality*

### **A Meta-analysis of Randomized Controlled Trials**

Philippe Autier, MD; Sara Gandini, PhD

*Arch Intern Med.* 2007;167:1730-1737.

**Background** Ecological and observational studies suggest that low vitamin D status could be associated with higher mortality from life-threatening conditions including cancer, cardiovascular disease, and diabetes mellitus that account for 60% to 70% of total mortality in high-income countries. We examined the risk of dying from any cause in subjects who participated in randomized trials testing the impact of vitamin D supplementation (ergocalciferol [vitamin D<sub>2</sub>] or cholecalciferol [vitamin D<sub>3</sub>]) on any health condition.

**Methods** The literature up to November 2006 was searched without language restriction using the following databases: PubMed, ISI Web of Science (Science Citation Index Expanded), EMBASE, and the Cochrane Library.

**Results** We identified 18 independent randomized controlled trials, including 57 311 participants. A total of 4777 deaths from any cause occurred during a trial size-adjusted mean of 5.7 years. Daily doses of vitamin D supplements varied from 300 to 2000 IU. The trial size-adjusted mean daily vitamin D dose was 528 IU. In 9 trials, there was a 1.4- to 5.2-fold difference in serum 25-hydroxyvitamin D between the intervention and control groups. The summary relative risk for mortality from any cause was 0.93 (95% confidence interval, 0.87-0.99). There was neither indication for heterogeneity nor indication for publication biases. The summary relative risk did not change according to the addition of calcium supplements in the intervention.

**Conclusions** Intake of ordinary doses of vitamin D supplements seems to be associated with decreases in total mortality rates. The relationship between baseline vitamin D status, dose of vitamin D supplements, and total mortality rates remains to be investigated. Population-based, placebo-controlled randomized trials with total mortality as the main end point should be organized for confirming these findings.

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### *CYP2R1 (vitamin D 25-hydroxylase) gene is associated with susceptibility to type 1 diabetes and vitamin D levels*

Ramos-Lopez E, Brück P, Jansen T, Herwig J, Badenhop K  
s [JOURNAL ARTICLE]  
Diabetes Metab Res Rev 2007 Jul 2.

**BACKGROUND:** The vitamin D system has been implicated in type 1 diabetes by epidemiological and immune intervention studies as well as by polymorphisms of the vitamin D binding protein (DBP) and CYP27B1 genes. CYP2R1, a cytochrome P450 enzyme, catalyzes the formation of vitamin D(3) to 25-hydroxyvitamin D(3) (25(OH)D(3)), the main circulating vitamin D metabolite.

**METHODS:** Two hundred and three simplex type 1 German diabetes families (609 subjects) were genotyped for the rs10741657 and for the rs12794714 polymorphisms. 25(OH)D(3) levels were measured and correlated with CYP2R1 polymorphisms in 133 type 1 diabetes patients as well as its mRNA expression from peripheral blood mononuclear cells (PBMCs) in 58 type 1 diabetes patients. Frequencies and genotypes of the CYP2R1 polymorphisms were analyzed using Haploview software version 3.2. The

correlation between 25(OH)D(3) and CYP2R1mRNA with the genotypes of the rs10741657 and rs12794714 polymorphism was evaluated by Wilcoxon-Mann-Whitney and ANOVA test using Bias Statistical package 7.01.

**RESULTS:** Whereas the rs12794714 polymorphism was not associated with type 1 diabetes the variant 'G' of the rs10741657 polymorphism was more often transmitted to affected offspring (61% vs 39%  $P = 0.004$ ) and was also more frequent in cases than in controls (46.1% vs 35.7%,  $P = 0.03$ ). Patients carrying the genotype 'GG' or 'GA' of the rs10741657 polymorphism possessed, on average, lower levels of 25(OH)D(3) compared to those with the genotype 'AA' ( $P = 0.003$ ,  $P_c = 0.01$  and  $P = 0.01$ ,  $P_c = 0.04$ , respectively).

**CONCLUSION:** Thus, our findings reveal a novel association of CYP2R1 polymorphisms in patients with type 1 diabetes and with their circulating levels of 25(OH)D(3). Copyright (c) 2007 John Wiley & Sons, Ltd.

### *Correlation between vitamin D(3) deficiency and insulin resistance in pregnancy*

Maghbooli Z, Hossein-Nezhad A, Karimi F, Shafaei AR, Larijani B

[JOURNAL ARTICLE]

*Diabetes Metab Res Rev* 2007 Jul 2.

**BACKGROUND:** The serum level of 25-hydroxyvitamin D deficiency has long been suspected as a risk factor for glucose intolerance and perhaps 1,25-dihydroxyvitamin D has a role in the regulation of insulin secretion. This study investigates the relation between 25-hydroxyvitamin D concentrations and insulin resistance in pregnant women.

**METHODS:** A cross-sectional study was conducted on 741 pregnant women referred to five educating hospital clinics. Universal screening was performed with a GCT-50 g, and those with plasma glucose levels  $\geq 7.2$  mmol/L were diagnosed as GDM if they had an impaired GTT-100 g based on Carpenter and Coustan criteria. The levels of insulin and C-peptide were measured during OGTT-100 g test. The homeostasis model assessment index (HOMA) equation was used as the insulin resistance index. The concentrations of 25-hydroxyvitamin D, and PTH were also measured.

**RESULTS:** Total prevalence of vitamin D deficiency ( $<25$  nmol/L) was found in 70.6% of pregnant women. Prevalence of severe vitamin D deficiency ( $<12.5$ ) in GDM patients was higher than in normoglycaemic pregnancies. The regression model revealed a strong correlation between the HOMA index and serum levels of vitamin D.

**CONCLUSIONS:** These results show that a positive correlation of 25(OH) vitamin D concentrations with insulin sensitivity and vitamin D deficiency could be a confirmative sign of insulin resistance. Copyright (c) 2007 John Wiley & Sons, Ltd.

### *Antepartum Depression*

An average of 1 in 10 women suffer from a depressive episode during pregnancy, which is a time when medications need to be strictly controlled in order to protect the fetus. Furthermore, being depressed during pregnancy increases the likelihood of a postpartum depression, so every effort should be made to avoid a depressive episode. Might light therapy work here? Investigators at Yale, Columbia and Case Western Reserve have said yes. They found major improvement in antepartum depression over 5-week treatment trials, and several of their patients continued treatment through the postpartum period.

### *Postpartum Depression*

One out of every 10 women will suffer from clinical depression during pregnancy, which puts them at increased risk for postpartum depression. Many expectant mothers resist taking antidepressant medications, fearing (the potential and often unknown) dangers that drugs may pose to fetal development and to the long-term health of the child.

Researchers from the NY State Psychiatric Institute at Columbia-Presbyterian Medical Center, in conjunction with Yale and the Univ. of Louisville, are conducting clinical trials to develop light therapy as a safe, effective alternative to traditional medication-based treatments for postpartum depression. Bright light therapy, which has been used successfully in individuals with winter depression and major clinical depression, has already shown promise with depressed pregnant women in preliminary trials. Principal Investigator Michael Terman, director of the Clinical Chronobiology Program at the New York State Psychiatric Institute and professor of clinical psychology at Columbia's College of Physicians & Surgeons, says: "Treating depression is an enormous challenge, and this research offers a constructive new option for pregnant women and their families." Terman's previous studies have shown that light therapy often delivers a rapid antidepressant response-often within days-and with negligible side effects.

Pregnant women face unique challenges and can become overwhelmed by the physiological, career and family changes that accompany pregnancy. This makes them susceptible to depression and reluctant to seek treatment. "I felt really, really hopeless," said a recent participant who had experienced antepartum depression. "All the fun stuff

you're supposed to do when you're pregnant, I couldn't do and I didn't want to do. A natural childbirth was important to me and if I wasn't going to use an epidural, I certainly didn't want to use Prozac for my depression. Light therapy made a huge difference."

## *Children & SAD*

*Eighty percent of the children reported feeling better while on light therapy. One teenage girl said, "It was like I was my old self again—like I am in the summer." —Susan Swedo, M.D.*

Treatment with bright light can help children with the wintertime depression known as seasonal affective disorder (SAD), reports a study in the June 1997 issue of the *Journal of the American Academy of Child & Adolescent Psychiatry*. (Vol. 36, No. 6)

In a study of thirteen children and teens with SAD, depression scores dropped significantly during light therapy, compared to no change during inactive placebo treatment. The research was led by Dr. Susan E. Swedo, and a team of child and adolescent psychiatrists with the National Institute of Mental Health.

In people with SAD, depression occurs only during the winter months, disappearing completely during the spring and summer. Most previous studies of SAD have focused on adults. However, recent research suggests that SAD may affect three to four percent of school-age children.

Light therapy consisted of two parts. During "dawn simulation" the children were exposed to low-intensity light for two hours each morning, starting at 6:30 a.m. They also received bright light therapy, in which they were exposed to high-intensity light for one hour per day in the afternoon or early evening.

Light was generated by a piece of equipment called a light box. The children sat about eighteen inches from the light box for the specified time while playing, reading, or watching TV. After one week of light therapy the children switched over to placebo treatment for a week, and vice versa.

Scores on standard tests of depression were significantly lower when children were on light therapy, compared to no change with placebo treatment. Light therapy reduced scores for both typical and atypical depression. The parents' assessments agreed, and all of the children continued using light therapy after the end of the study.

Bright light therapy has been shown to relieve SAD in adults. The new study is one of the first to evaluate the use of light therapy in children with SAD.

## *New Survey: Impact of Depression on Women in the Workplace*

CHICAGO, IL -- MARKET WIRE -- 10/21/2003

Depression, a condition that affects approximately 5 million employed American women, is considered a greater hindrance in achieving professional success than other barriers including child and elder-care responsibilities, pregnancy, and sexual harassment, according to 83% of surveyed working women with depression.

Although the benefits of therapy are significant, 40% of these women remain undiagnosed, reports a new survey sponsored by the American Medical Women's Association (AMWA) and the National Mental Health Association (NMHA). Fortunately, depression is a common and treatable condition and those who suffer from depression should not have to compromise their work potential.

-- 19 million American adults struggle with depression which in turn impacts absenteeism, turnover, and productivity in the workplace.

-- 21%, roughly 1 out of 5 working women, suffer from depression.

-- Absenteeism among surveyed depressed women averages 10.6 days per year, compared to 5 days per year among working women in general.

-- 30% of employed female respondents suffering from depression either quit or lose a job; 90% of these women attribute the loss to their symptoms.

-- Only 47% of women diagnosed with depression seek help right away.

## *Depression Most Costly Illness for Employers*

*Psychiatric News* July 18, 2003, Vol. 38 No. 14, p. 19

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### **Clinical & Research News by Jim Rosack**

Employers across the country are losing an estimated \$44 billion a year in lost productivity directly related to depression. And the vast majority of that loss is due to "presenteeism."

A new, nationally representative survey estimates that depression costs U.S. employers more than any other illness in terms of the lost productivity of their employees. According to results of the Depressive Disorders Study, (DDS) completed one year ago,

workers with depression cost employers more than three times the amount associated with lost productivity from all other illness.

“You cannot manage costs to employers without first measuring the impact of various illnesses,” said Walter Stewart, Ph.D., M.P.H., a researcher with Advance PCS Center for Work & Health in Hunt Valley, MD, at the time the survey was conducted. Stewart added, “We know that employers won’t act on what they cannot measure.” Unfortunately, he continued, “employers focus much more on how much they are paying for employee health care rather than on steps to make the health care plan more cost-effective.”

Twenty percent of the \$44 billion cost of depression was accounted for by absenteeism, while 80% of the costs associated with depression, or \$35.7 billion, was linked to “presenteeism”—that is, present on the job but with significantly reduced productivity.

This, Stewart noted, is a major finding that should be reinforced over and over with employers. They believe the employees are generally fine because the employees are on the job, Stewart noted; however, they do not realize the “hidden costs” of lost productivity due to lack of energy, of insight, of creativity or of motivation—all items difficult to quantify. Those interviewed estimated that with depression, they lost an average of 5.6 hours a week of productivity, versus only 1.5 hours persons without depression.

In terms of treatment, the DDS found that about 25 percent of individuals with depression had received treatment and of those, the patients said that on a scale of treatment effectiveness self-reported by the subjects, from zero (doesn’t work at all) to 10 (complete relief), the average rating was midline, at 5.6.

“Major depression may not be the most common illness, but it is probably the most costly,” Stewart concluded. “And these numbers do not include short- and long-term disability. Most of these costs are invisible, but the average loss of 14% in productivity time is concentrated in a minority of workers who are depressed.”

Major depression is an important target for employers and their health care plans, Stewart noted, because “it accounts for 50% of work-related costs, but may not be effectively and appropriately identified and treated. We need to improve that.

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