

# Silicon Valley Health Institute

*Host of the Smart Life Forum*

**Next Meeting: Thursday, September 20, 2018**

**Main Presentation by Adiel Tel-Oren, MD, DC, CCN, LN**

*“Photo-Nutrient Supplements vs. Civilization's Sun-Deficiency Epidemic”*

**Secondary Presentation by Jillian Love**

*“How to Make Nut Cheese”*



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## Smart Life Forum

### Presentation Location

Cubberley Community Center  
Room H1  
4000 Middlefield Road  
Palo Alto, California  
Directions on our website:  
[www.SVHI.com](http://www.SVHI.com)

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# Announcements & Upcoming Events

## Upcoming Speakers:

### OCTOBER 2018

Steven Blake  
Elize St. Charles, PhD

### NOVEMBER 2018

Poison Spring: The Compromised EPA Mission  
by EG Valliantos, PhD

### DECEMBER 2018

Vaccines, Autoimmunity and Childhood Health  
by Thomas Cowan, MD

## Upcoming Foundation for Mind Being Research Meeting (FMBR)

Friday, September 28 @ 7:30pm

**Clare Hedin**

*“Music, Healing, & Consciousness”*

Unity Community Church  
Y.E.S. Hall

3391 Middlefield Rd, Palo Alto, CA

Please visit [www.FMBR.org](http://www.FMBR.org) for more info.

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Thank you.

## ***Main Presentation Speaker: Adiel Tel-Oren, MD, DC, CCN, LN!***



Dr. Adiel Tel-Oren (“Dr. T”) is a health pioneer and inventor focusing on Natural Principles, Health, and Sustainability. He is a physician, university professor and holistic scientist. He promotes “functional medicine,” a science-based, natural approach to diagnosis and therapy. Dr. Tel-Oren, born in Jerusalem, received his medical degree in 1996 at the prestigious Russian State Medical University, Moscow, and did his hospital rotations in Minneapolis, MN and in Moscow. He is also a US trained doctor of chiropractic (high honors, 1990) and a licensed, board-certified clinical nutritionist. He is President Emeritus, Dean of Medical Sciences, and Professor of Functional and Nutritional Medicine at the University of Natural Medicine in Santa Fe, New Mexico. Dr. Tel-Oren has founded and supported many projects including the Ecopolitan Health Network (headquartered in Minneapolis), which includes detoxification and healing clinics, non-profit 100% organic raw vegan restaurants, Foraging Retreats, Eco-Treks in Nepal, an Eco-Village in Wisconsin (in progress), and a Hypoallergenic Gluten-free bakery ([www.greenbakery.net](http://www.greenbakery.net)). You can find more information on [www.ecopolitan.com](http://www.ecopolitan.com).

Dr. T is an unusually knowledgeable person with the goal of empowering others. He has a sharp mind and an open heart, coming from a place of truth and integrity. He works tirelessly with people around the globe to make a difference. He is also the founder of several health and charity programs worldwide, including the Israeli Center for Functional Medicine, CCODER Nepal Community Health Program, and the Ecopolitan EcoHealth Community. Dr. T’s main humanitarian project is the creation of a network of schools, orphanages, and Day-Care centers, “The Everest Learning Academy” - to educate and nourish the poorest children in Nepal. They protect and nurture 800 children (and growing rapidly) who otherwise would end up on the streets or become victims of trafficking.

*(End of Meet Adiel Tel-Oren!)*

**Main Presentation by  
Adiel Tel-Oren, MD, DC, CCN, LN**

*“Photo-Nutrient Supplements vs. Civilization's  
Sun-Deficiency Epidemic”*

It was my privilege to serve as scientific editor of the book *Embrace The Sun* (2018, discounted at [clinic@ecopolitan.com](mailto:clinic@ecopolitan.com)) as well as to author the book's preface and an appendix. This book is a revolutionary game-changer: It scientifically demonstrates the critical importance of getting daily exposure to sunlight for health, above and beyond the benefit of obtaining vitamin D, and showing that the common assumption – “vitamin D supplementation can replace the sun” – is a grave error!

*Embrace The Sun* proves to any logical, discerning reader that the prevailing medical advice to “protect ourselves against the sun” only contributes to numerous chronic diseases that keep doctors busy. Sun exposure (without burning), according to the book's 1000-plus scientific citations, protects us against many cancers, mood disorders, cardiovascular diseases, diabetes, obesity, auto-immune disorders, skin inflammation, athletic and dancing injuries, dental problems, and a myriad of other ailments, in addition to significantly enhancing our strength, endurance, agility, and cognitive performance!

In an ideal and ancient world, it would be easier to follow that book's advice to go regularly under the sun without cover, in order to expose most of our skin to its glorious rays. Unfortunately, the current circumstances prohibit most people from enjoying sufficient year-round sun exposure. The magnificent sun — irradiating its full spectrum of rays — is our eternal life giver and most powerful energy source. The entire spectrum of sunlight has enabled the development of all life on Earth, and without it life would cease to exist. Everything we do revolves around the natural cycles of light and darkness. Our biological makeup has always been programmed to respond to the environmental cues of sunlight, which governs the flux of metabolic processes, behaviorism (mood) and internal clocks.

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Sunlight influences hormone secretion, libido, heart rate, alertness, sleep propensity, body temperature, and gene expression.<sup>1,2</sup> Therefore, it is not surprising that human physiology, well-being, immune response and productivity are all affected by the daily and seasonal changes in the solar spectrum. When you are with the rhythm of nature you sleep more soundly, cope more easily with stress, reduce anxiety and depression, and reduce the risk of autoimmune disorders.<sup>3,4</sup> Conversely, exposure to unnatural light sources at the wrong time of the day is highly detrimental to human health.<sup>5</sup> Just review the cancer sections of *Embrace The Sun* to fully realize the severe effect of sun deficiency.

In Nature, humans (like all other life forms) have resided outdoors (structures with doors did not exist...). Since time immemorial, our ancestors would experience significant daily doses of full-spectrum solar radiation even when seeking intermittent shelter within shallow caves and shadows cast by trees and rocks. They had to find and gather their food and create their tools during daylight and benefitted from the scattering of solar rays even in the shade.<sup>6</sup> The solar photons hitting and penetrating their skin and retina at varying intensities and frequencies throughout the day have acted as essential nutrients (similar to vitamins in food), by stimulating the body's production of hundreds of metabolites known as photoproducts. Therefore, it is accurate to call these varied sun-derived photons "photo-nutrients." A few examples: Vitamin D is a photoproduct of the photo-nutrient UVB rays, nitric oxide is a product of the UVA photo-nutrient, and early-morning serotonin production increases with blue-light photo-nutrients.

Today's obsessions with technology, light-deprived life, altered light rhythms, and imbalanced light spectra dramatically compromise our health by causing severe imbalance and deficiency of hormonal, neurological, behavioral, vascular, immunological, and dermatological photoproducts, many of which are discussed below or within the book *Embrace The Sun*. Modern people shun the sun, stay up well past dusk, spend much of their time indoors, cover most of their skin during the day, and bombard themselves with artificial light at night. They alternate between deficiency of sunlight and excess of "junk" light, severely disrupting their natural clocks. This creates confusion in the signaling within our bodies, hampering our physiological functions, resistance to illness, and sense of well-being.

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Furthermore, the fear of sunshine created by orthodox medicine and the pharmaceutical industry (both harnessing the commercial power of modern media, as documented in *Embrace The Sun*) has caused individuals to avoid the sun or apply sunscreen products, which block beneficial solar wavelengths. Certain populations hide their body from the sun because of religion or tradition, and others because of cold weather. Many societies today reside in “unnatural” geographical latitudes (far away from the tropical origins of humanity), thanks to technological advancements that allow humans to survive (but not thrive) in regions exhibiting harsh conditions (shorter days, cold climate) during several months of each year. Urban dwellers may suffer from blocked beneficial sunrays due to overcast skies, tall buildings, or persistent pollution particles. These disturbances to vital light rhythms and intensity have contributed to depression, cancer, hormone imbalances, anxiety, sleeping disorders, autoimmunity, allergies, cardiovascular disease, and other chronic illnesses.<sup>5</sup>

So how can we reset our clocks, regain our vitality, improve our performance, prevent disease, and avoid severe deficiency of solar photo-nutrients, if our lifestyle, location, work, climate, clothing choices, traditions, pollution, or season won't allow us to receive our daily dose of sunlight naturally? The answer proposed in this article is Sun Replacement Therapy (SRT)™.

SRT is a quick and practical home-based method to rebalance and resynchronize the body's essential biological clocks, while simultaneously providing the critical photoproducts manufactured during sun exposure. SRT uniquely incorporates the full solar spectrum (not just UV rays), mimicking closely the composition of naturally occurring sunlight. A session of 5 – 15 minutes every morning will provide a multitude of benefits, whenever it's impractical to perform the necessary dual activity of exposing most of the skin to warm sunrays during midday as well as exposing the face to bright morning sunlight.

The primary focus of this article is to convey a better understanding of light as a key influence on human health and performance, to explain the severe impact of light-cycle desynchronization, and to show how Sun Replacement Therapy provides an intelligent novel system for people who are not able to get enough of “the real thing.”

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Thus, SRT acts as a “solar supplement” of “photo-nutrients,” readjusting circadian rhythm and providing all the essential photoproducts discussed below and in Embrace The Sun, in addition to vitamin D.

### **The Sun – The Maestro in the Orchestra of Life**

Sunlight is the conductor in the symphony of living. It governs our biological clocks, behaviorism and daily metabolic processes. Existence has evolved around the dance between the cycles of light and darkness, also known as the circadian rhythm.<sup>7</sup> The term circadian rhythm is derived from the Latin root circa diem, “about a day.” These inner rhythms have a course of approximately 24 hours,<sup>8,9</sup> and provide a pattern that anticipates what we need to be healthy. They regulate our day-to-day biological routines, which are synchronized to our physical environment and are stimulated by various photic (visible) spectra and non-photoc (invisible) spectra of solar radiation.<sup>9,10, 11</sup> Circadian rhythms control the timing, quantity and quality of hormones and neurotransmitters the body produces, which regulate appetite, energy, mood, sleep and libido,<sup>3,4</sup> thus supporting health and maintaining disease resistance.

### **Responses to Light**

Research has proven that our circadian rhythms are dependent upon light entering our eyes to regulate our body’s master clock.<sup>10,12,13</sup> This master clock is in the brain, at the suprachiasmatic nuclei (SCN) within the anterior hypothalamus.<sup>10,14</sup> The SCN synchronizes “clock cells” in peripheral tissues within the skin, eyes, brain, heart, lungs, gastrointestinal tract, liver, and kidneys.<sup>15,16,17,18,19</sup> Based on signals of light and darkness, the SCN instructs the pituitary gland to secrete hormones, the chemical messengers of the body, in varying quantities depending on the time of day. These hormonal changes control and modify the sleep/wake cycle, blood pressure, digestion, metabolism, reproduction, and the immune response— regulating the physical and chemical processes involved in the overall maintenance of life.<sup>10</sup>

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Key hormones and neurotransmitters such as serotonin and melatonin are secreted by the nervous system to set our daily rhythms according to the quality and quantity of light received.<sup>13,20</sup> A new day's light will cue the body to increase serotonin (impulse control), cortisol (stress), GABA (calm), dopamine (alertness), follicular stimulating hormone (FSH, reproduction), gastrin releasing peptide (GRP, eating), neuropeptide Y (NPY, hunger), causing a needed rise in blood pressure and body temperature.<sup>1,21,22,23,24</sup> As the sun goes down at sunset and light diminishes, the body produces melatonin, lowering blood pressure and temperature and preparing the body for sleep. <sup>1,17,22,25,26</sup>

### Solar Rays – The Visible and Invisible Spectra

The spectrum of solar radiation that reaches the Earth's surface ranges from 290nm to more than 1,000,000nm, and consists of 6.8% UV, 38.9% visible light and 54.3% infrared radiation (Fig.1).<sup>27,28</sup>

UV photons fall between the wavelengths of visible light and gamma radiation. UV light is commonly divided into the following band-pass spectral regions; UV-A (315 nm – 400 nm), UV-B (280 nm – 315 nm) and UV-C (100 nm – 280 nm).<sup>29,30</sup> 95-97% of the UVR (UV-radiation) that reaches the Earth's surface is UV-A. UV-A rays are present throughout the day and can penetrate window glass. The remaining 3-5% is UV-B, also known as the “burn rays”. Most windows and automobile glass block these rays. UV-C rays do not reach the Earth's surface as they are filtered by the ozone layer.<sup>1,27,31,32</sup> Exposure to UV-B and UV-A radiation can alter human function by a skin-mediated response.<sup>5</sup>

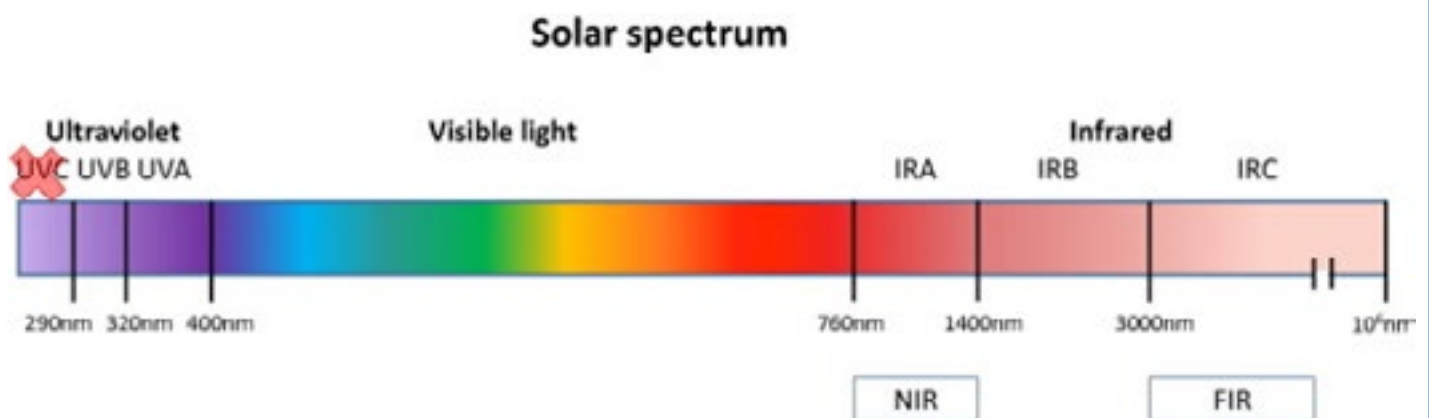


Fig 1. Solar spectrum composition. Red X over UVC means that they are blocked by the ozone layer (NIR: near infrared, FIR: far infrared)<sup>31</sup>

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Every day we witness the metamorphosis of the visible spectrum, between 400 nm and 780 nm.<sup>27</sup> At sunrise, a high intensity in the blue region (400-500 nm) is received. As the day goes by, this blue light is scattered and gradually diminishes. As a result, we perceive an orange-red hue (600-700 nm), a phenomenon called sunset.<sup>30</sup> During the night, very limited amount of visible light emanates from the stars. A full moon emits approximately five times that amount, radiating significant light in the blue visible range.<sup>20,33</sup> Visible light can penetrate the epidermal and dermal layers of the skin and can directly interact with lymphocytes (white blood cells) and other immune cells to regulate immune function.<sup>25</sup>

There are three infrared (IR) spectral bands; IR-A, IR-B and IR-C. IR radiation can penetrate the epidermis, dermis and subcutaneous tissue. The degree of penetration depends on wavelength range. Exposure to IR is perceived a heat. IR-A (780 to 1400 nm), also known as near infrared (NIR), deeply penetrates into biological tissues and is used in diagnostic and skin treatments. IR-B (1.4  $\mu\text{m}$  to 3.0  $\mu\text{m}$ ) penetrates only a few mm into the skin and ocular tissues. Lastly, IR-C (3.0  $\mu\text{m}$  to 1 mm), also known as far infrared (FIR), is absorbed very superficially (< 1 mm).<sup>29,30,31</sup>

### **Variations in Solar Exposure and Assimilation**

Timing, intensity, and wavelength of light, as well as skin type, season and location are important aspects that need to be taken into account when discussing effectiveness and maximization of solar exposure/assimilation.

Timing is crucial. The human physiology oscillates with the spectral changes in light throughout the day. The spectra of light at dawn, late afternoon and evening are distinct. Hormonal and metabolic responses in humans are cued with the natural changes in the visible light spectra. Naturally occurring blue light exposure in the early morning has positive effects on humans, regulating alertness, cognition and mood. However, blue light exposure in the evening (typical with TV/Computer/Cellular screens and LED displays like alarm-clocks) is disruptive and detrimental to human health. It inhibits the production of melatonin needed for sleep, for correct body mass index, and for good cognition.<sup>34</sup>

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Skin type determines the amount of solar exposure required for synthesis of vitamin D (UVB). Dark skin requires about five to six times more solar exposure than pale skin for equivalent vitamin D photosynthesis.<sup>35</sup> Thirty minutes in the summer sun with most of the skin exposed can produce 50,000 IU (1.25 mg) of vitamin D in a white person, 20,000-30,000 IU in a tanned individual, and 8,000-10,000 IU in a dark-skinned person.<sup>35</sup> Even when these numbers differ among studies, they consistently demonstrate the skin's superiority in providing vast amounts of vitamin D relative to any other source. As emphasized in *Embrace The Sun*, well-managed and properly-built tanning salons' sunbeds provide beneficial UV radiation that effectively produces vitamin D and other UV photoproducts like endorphins. Sun Replacement Therapy (SRT)<sup>TM</sup> provides similar benefits at the convenience, frequency, and privacy of home, while offering the other solar spectra of photo-nutrients at the same time.

The sunlight spectrum varies greatly with latitude, time of the day, and season of the year. Near the equator, midday and midsummer are the times where sunlight is most intense. UV doses are higher close to the equator, at higher altitudes and in conditions of minimal clouds. UV dosing (essential for vitamin D and other photoproducts) depends on time spent outdoors, amount of clothing, body fat, skin pigmentation (melanin), shade and sun blocks. People typically living in equatorial locations tend to be more outdoors and wearing less clothing (as it tends to be warmer), receiving higher ambient UV doses than people inhabiting temperate climates.<sup>35,36</sup> Such higher UV doses are associated with common, non-threatening skin cancer, but not with melanoma, as the scientific discussions in *Embrace The Sun* prove.

Lack of natural circadian light in the winter leads to the damaging emotional and physiological effects associated with seasonal depression (SAD).<sup>37</sup>

The risk of autoimmune diseases (multiple sclerosis, asthma, type 1 diabetes mellitus, and others), cardiovascular diseases (hypertension and myocardial infarction), many cancers (bladder, breast, cervical, colon, endometrial, esophageal, gastric, lung, ovarian, pancreatic, rectal, renal and vulvar) and other serious conditions increases with latitude (decreasing UV dose) of residence.<sup>38</sup> Generally, it is believed that this increased risk is at least partially due to insufficient UVB radiation, leading to vitamin D deficiency.<sup>1</sup>

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Embrace The Sun reveals many other photoproducts of UVR that support the health of the immune system, nervous system, and cardiovascular system, in addition to synthesis of vitamin D.

Traveling across multiple time zones also interferes with the normal circadian cycle, leading to the symptoms of jet lag. Constant change in the circadian cycle due to shift work has the most devastating health effects, increasing risk for cancer, obesity and type 2 diabetes.<sup>39</sup> When the natural circadian cycle is disrupted, there is an increase in the risk of autoimmune and infectious diseases.<sup>5,35,36</sup>

### **Sun Replacement Therapy – How to Get Your Daily Dose of Photo-Nutrients!**

Using the sun as a therapy has been practiced over centuries in ancient Egypt, Greece, China and India,<sup>40</sup> and more recently in Europe and the USA (see chapter 13 in Embrace The Sun). It is most effective with the proper combination of light intensity, duration and timing. Sun Replacement Therapy (SRT) is a system consisting of the full spectrum of UV and visible solar rays, with an enhancement of wavelengths that were scientifically proven to benefit human health, mood and circadian cycle, for use whenever sun exposure is insufficient in quantity, quality, and timing. SRT includes a full-spectrum lamp, a blue light (440-480 nm), and UV radiation lamp with an appropriate UVA/UVB ratio – all working together in a manner that allows most of the benefits of real solar radiation to be obtained within a practical 5-15 minutes morning session. Nothing can truly replace the complexity of Nature perfectly, but this approach is as close as it gets to mimicking the magnificent spectrum of rays generated by our friend, the life-giving sun.

### **Healing Ultraviolet Rays**

UV radiation (UVR) has been used for many years to treat skin diseases. UV exposure is an important environmental interface with immune function as it plays an essential part in the prevention of several diseases. As shown in Embrace The Sun, it has been used as a popular medical treatment for TB, rheumatic disorders, diabetes, gout, chronic ulcers, and wounds.<sup>27,35</sup> As stated above, a low exposure to UVR increases the risk of autoimmune diseases, cardiovascular diseases, and many cancers.<sup>38</sup>

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The levels of UV radiation from the sun vary with latitude, altitude, weather, time of day and season of year. For example, winter provides mostly UVA radiation and hardly any UVB,<sup>38</sup> contributing to Seasonal Affective Disorder (SAD).

A beneficial aspect of UV exposure is decreased risk of melanoma, as detailed in *Embrace The Sun*. Studies have shown that melanoma is more frequently found among people with indoor occupations than those getting large amounts of UV exposure (e.g. farmers). Children who have more outdoor activities and thus more sun exposure have a lower risk of melanoma as well.<sup>38</sup>

Exposure to both UVA and UVB radiation can have direct immunosuppressive effects through upregulation of cytokines (TNF- $\alpha$  and IL-10) and increased activity of T regulatory cells that remove self-reactive T cells. These mechanisms may help prevent autoimmune diseases.<sup>35</sup>

Furthermore, UV exposure was shown to improve mood through the release of endorphins. UV radiation leads to production of an opioid,  $\beta$ -endorphin, which is released into the bloodstream, and in sufficient concentrations it induces mood enhancement and relaxation.<sup>1</sup> In addition to SRT, traditional sunbeds may be a good source of UVR. UVR therapy, also known as phototherapy, is divided into different types: Broadband UVB (290–320 nm), narrow band UVB (310–315 nm), monochromatic UVB (308 nm from an excimer laser), broadband UVA (320–400 nm), and UVA-1 (340–400 nm).<sup>1</sup>

## UVA

An appropriate UVA dose provides great health benefits. UVA radiation penetrates more deeply into the skin than UVB, and reaches both the epidermis and the deeper dermis, where it affects blood vessels, dermal dendritic cells (the skin's antigen-presenting cells), dermal fibroblasts, endothelial cells, mast cells, and granulocytes.<sup>38</sup> Thus, it has a direct impact on the immune system.

As detailed in *Embrace The Sun*, UVA generates nitric oxide (NO) in our skin. NO reduces blood pressure by relaxing blood vessels, thus improving cardiovascular health. Moreover, it has antimicrobial effects, by disinfecting tissues and regulating inflammatory processes in acute and chronic wounds. It also acts as a neurotransmitter by stimulating the brain.

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When occurring in excess, nitric oxide acts as a potent free radical, so too much UVA exposure can be counterproductive and may lead to skin damage.<sup>38</sup>

UVA exposure increases the production of cytokines and enzymes that protect cells and tissues against oxidative stress and tissue injury, by facilitating antioxidant, anti-inflammatory, anti-proliferative, and anti-apoptotic activities. A UVA exposure of 20-30 minutes protects the skin against damage induced by solar radiation and is thus an adequate exposure time.<sup>38</sup>

## **UVB**

UVB radiation is the only portion of the solar spectrum able to photosynthesize vitamin D in the skin,<sup>35</sup> modulating cell proliferation, differentiation, apoptosis, angiogenesis, immune and inflammatory responses.<sup>38</sup> A metabolite of vitamin D influences bones, intestines, immune and cardiovascular systems, pancreas, muscles, brain, and control of cell cycles.<sup>36</sup> Its primary physiological function is to maintain serum calcium and phosphorus levels in an adequate range to ensure metabolic functions, neuromuscular transmission and bone mineralization.<sup>1</sup> The major form of vitamin D circulating through the bloodstream is 25-hydroxyvitamin D (25[OH]D). This is the “stored form,” utilized in determining a person’s vitamin D status. Conversion of skin-derived (or food/supplement-derived) vitamin D into 25(OH)D is primarily done in the liver although various cell types in the skin also carry out this transformation. 25(OH)D is transformed in the kidneys as well as in other tissues into the steroid-like hormone 1,25-dihydroxyvitamin D (1,25[OH]2D), the active form of the vitamin, which regulates over 1,000 different genes in every tissue in the body. It is known to accumulate in intestinal cell nuclei, where it enhances calcium and phosphorus absorption, controlling calcium blood levels and regulating bone-calcium metabolism.<sup>1</sup> It has a wide range of biological actions, such as inhibiting angiogenesis, cellular proliferation, and spread of cancer, inducing differentiation (anti-cancer effect), stimulating insulin production (diabetes), inhibiting renin production (hypertension), and stimulating the production of macrophage cathelicidin,<sup>36</sup> which is a polypeptide that effectively combats both bacterial and viral infections.<sup>35</sup>

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People living at high latitudes throughout the world are often found to be deficient in vitamin D. Sunscreen products dramatically reduce vitamin D synthesis in the skin, increasing the likelihood of deficiency.<sup>28</sup> Deficiency is related to many downfalls in human health—hypertension, cardiovascular diseases, influenza, obesity, cancer, type 2 diabetes, and autoimmune diseases.<sup>35,36</sup> Research has shown that vitamin D supplementation is less efficient than UV radiation when observing the suppression of multiple sclerosis,<sup>8</sup> and Embrace The Sun has described other instances whereby UVR/Sun exposure exhibited greater benefit than D-supplements. Therefore, it's wise to enjoy those healing rays every day, either through natural sunlight (if available in sufficient quantity and quality), or through Sun Replacement Therapy™.

UVB therapy owes its effectiveness to its anti-proliferative properties, obtained by inducing local and systemic immunosuppressive effects.<sup>38</sup> Many skin diseases (e.g. psoriasis, vitiligo, atopic dermatitis, localized scleroderma) can be treated with solar radiation (heliotherapy) or artificial UV radiation (phototherapy).<sup>1</sup> Many experts recommend daily exposure to the midday sun for a period of 15-30 minutes,<sup>35</sup> but this recommendation is not practical for most people, as discussed above, and tanning beds, which provide UVR (but not the healing visible solar spectrum), are usually not available on a daily basis. SRT can easily provide all the needed UVR by exposing the full body daily, in the privacy of home!

### **The Healing Visible Light Spectrum**

Visible light has a powerful effect on human health, because light entering the eyes affects circadian rhythms.<sup>17,41</sup> Visible light (400-780nm) can also penetrate epidermal and dermal layers of the skin and may directly interact with circulating lymphocytes to modulate immune function.<sup>25</sup> Full spectrum white light has been found to increase blood flow, increase antibody production, and decrease inflammation by reducing the pro-inflammatory cytokines TNF- $\alpha$ , IL-6, interferon-gamma, and interleukin-12, while increasing the anti-inflammatory cytokines interleukin-10 and TGF-beta.<sup>42</sup> Sufficient light intensity is necessary to provide all the crucial circadian effects described earlier and the immune benefits obtained through the skin. During high-latitude winters, daylight time is often too short, and overcast skies contribute to light deficiency, especially in dark mornings.

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This is compounded by the tendency of humans to cover most of their skin, as well as by insufficient indoor lighting at workplaces, schools, hospitals, factories, garages, banks, etc. SRT, applied to the entire body every day at the privacy of home (especially in early morning), can partially compensate for this deficiency.

### **Blue Light**

Blue light is an essential environmental cue which sets the circadian rhythm. It stimulates cognitive brain activity. It enhances wakefulness, brain performance and mood. It takes less than a minute of blue light exposure to trigger the brain regions involved in regulating alertness and cognition.<sup>34</sup> This is better than a cup of coffee in the morning! Research has shown that blue light consistently outperformed caffeine in visual reaction, decision making, alertness and cognition.<sup>43</sup>

Light regulates multiple non-image-forming (nonvisual) circadian, neuroendocrine, and neurobehavioral functions, by stimulating intrinsically photosensitive retinal ganglion cells (ipRGCs).<sup>34</sup> ipRGCs mediate the entrainment of circadian rhythms, regulation of pineal melatonin synthesis, pupillary light constriction, and the regulation of sleep.<sup>44</sup> These retinal cells relay photic information to non-image-forming centers of the brain, one being the hypothalamic suprachiasmatic nucleus (SCN), which is the master biological clock of the human body as previously discussed. Even blind individuals detect light through these non-image-forming centers, hence their ability to be influenced by variations in solar radiation spectra.<sup>34</sup>

Melanopsin, a photo sensitive retinal pigment, is associated with mediation of non-image-forming retinal functions and has a crucial effect on sleep.<sup>44</sup> Melanopsin projects into the SCN and synchronizes it with the solar day. It is highly sensitive to blue light. Melanopsin reactivity is based on a biochemical feedback loop: It gets activated by blue light in the early morning and starts producing an electrical signal, which regulates genes that affect the biological clock.<sup>44</sup> Then, as the evening approaches, orange-red light switches it back into a less active biochemical state that will render it sensitive to blue light again, in the following morning. Excess blue light in the wrong time of the day (especially during dark hours) desynchronizes the innate clocks and disturbs the reactivity of melanopsin.

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This disrupts the cascade of events initiated by morning light. Individuals with low level of melatonin (especially in winter, but also resulting from the disruption related to blue light exposure during the evening and at night) are found to suffer from mood and sleep disorders, and possess a higher risk of seasonal affective disorder (SAD).<sup>37,57</sup> A great way to reset the body's internal clock, restoring sleep-wake cycle and addressing mood issues caused by SAD (and many other related health problems) is to utilize Sun Replacement Therapy every morning: It contains abundant emissions in the blue region, triggering the non-visual photoreception needed for realignment of circadian rhythm, starting the morning correctly, with alertness and improved performance, as intended by Nature!

Other functions of blue light as a therapeutic agent include the skin's production of singlet oxygen and the photo-inactivation of bacteria.<sup>38</sup> A study has demonstrated successful eradication of MRSA (methicillin-resistant *Staphylococcus aureus*, a bacterium that has developed resistance to multiple antibiotics and usually leads to serious skin and soft tissue infections, which may be fatal if treatment is delayed), within a few minutes of exposure to blue light (470 nm).<sup>45</sup> Blue light therapy was also shown effective against severe acne, premenstrual depression, bulimia and anxiety.<sup>2</sup>

As mentioned earlier, continuous blue light, especially when darkness is necessary (light pollution from phones, TV, computer screens, LED lights, etc.), is quite detrimental to our health as it interferes greatly with melatonin production, which is essential for good sleep quality, keeping a desirable waist line and a healthy heart:

Melatonin is a small indole-amine that is produced and secreted in a 24 hour rhythm that peaks at night. It also aids in the entrainment of biological clocks, including influences on clock genes.<sup>20</sup> Furthermore, melatonin suppresses UVR-induced skin damage.<sup>46</sup> Melatonin concentration rises during the evening, promoting the onset of sleep. Importantly, it suppresses appetite, decreases blood pressure and lowers body temperature.<sup>1,17,22</sup> Melatonin concentrations are closely linked with obesity. Studies have shown that melatonin stimulates brown fat, which burns calories instead of storing them, thereby helping regulate body weight and metabolism.<sup>47</sup> Exposure to light at night strongly suppresses melatonin secretion and thus interferes with sleep duration and quality.

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Also, a recent study demonstrates that exposure to blue light at night increases the risk of breast cancer and prostate cancer!<sup>48</sup>

Another recent study has shown conclusively that those who remain active, alert, and sleepless at night (and wake up late as a result) have a shorter life span.<sup>49</sup> Chapter 9 of *Embrace The Sun* discusses further the beneficial effect of longer sleep on general health and longevity.

### **Health-Giving Visible Red and Near Infra-Red Rays**

There are numerous benefits obtained from appropriate red and Near Infra-Red (NIR) exposure. Infra-red saunas and domes have become trendy tools in homes and clinics for detoxification via sweating, for treating skin diseases, and to reduce inflammation. <sup>50,51,52</sup> Solar infrared radiation in excess (which can only occur with sunscreen use) can generate free radicals deep in the skin.<sup>31</sup> But modest solar infrared exposure is beneficial, as are therapeutic infrared applications such as moist heat (hot bottles/heating pads) and hot baths.

One aspect of red light and infra-red solar rays that is not frequently discussed is the fact that they transfer energy to cells in the skin and the tissues below it. Studies have shown that respiratory enzymes are inhibited by blue light and activated by red light.<sup>53</sup> Red light enhances mitochondrial function by activating the mitochondrial enzyme cytochrome c oxidase, which consequently enhances the production of ATP (chemical energy needed for cell functions).<sup>53,54</sup> It is used to speed up healing of wounds and stimulate hair growth.<sup>55</sup> Infrared rays are not a part of SRT, since infrared devices, various heating sources, and saunas are found everywhere. Warm-blooded humans have always endeavored to surround themselves with comfortable warmth, finding ways to avoid long-term exposure to the cold weather (the absence of sufficient infrared rays) by recreating their original tropical warm (infrared rich) environment.<sup>6</sup>

### **At Night, “Come to the Dark Side” to Find Health**

Our home and work environments are continuously bombarded with artificial light, even at night. We no longer live or sleep in natural darkness! This negates the natural cues given by nature, putting our health at risk on many levels: Circadian Rhythm Disruption (CRD) occurs when your body produces hormones, chemicals and neurotransmitters in the wrong amounts and at the wrong time of the day.

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It is linked to increasing cancer risks, metabolic dysfunction, and mood disorders.<sup>20</sup> The body can no longer discriminate between day and night. No wonder so many of us feel “out of balance,” lacking energy, feeling blue, and constantly seeking “healing” experiences. We can learn from animals in their original, natural, nourishing environments: Energized, balanced, adaptable, nourished bodies can take “health” for granted, without the need for contemplating the concepts of “health and disease”—because their bodies have no reasons to ever get sick! Indeed, our imbalanced modern life requires many corrections and adjustments in order to regain our health. Resetting our circadian rhythm is paramount among them, and a short SRT session every morning will bring us closer to our natural beginnings.

As previously discussed, melatonin is produced solely at night and any exposure to light stops its production. It is a key element in countering infection, inflammation, cancer and auto-immunity.<sup>35,56,57,58</sup>

When people are correctly exposed to sunlight or bright artificial light in the early morning as occurs in Nature (and as in SRT), their beneficial nocturnal melatonin production will occur sooner with the arrival of darkness, helping them enter the restorative sleep phase more easily at night. Also, Serotonin production will be stimulated by the bright morning light of the sun (or SRT), providing a positive mood and a calm, focused mind. Serotonin is the precursor to melatonin: The pineal gland makes Melatonin by acetylating and methylating serotonin.<sup>59</sup> Normally produced during the day, serotonin is only converted to melatonin in darkness. This conversion naturally stops with morning light, increasing serotonin levels.

### **Final Thoughts About Getting Your Full Spectrum of Photo-Nutrients**

Humans have been programmed to reside in warm outdoors, exposed to the sun during the day, and to sleep during the night hours. Important pathways react to light and darkness cues. Many photo-products are made during exposure to various parts of the solar spectrum at different times of the day. Humans, like plants, have soaked up the sun’s energy and  
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converted it into biological reactions since primordial times. Hence, the solar spectra must be considered “essential photo-nutrients.” These solar-derived nutrients made life possible and are no less important than food-derived ones. We can’t fool with Nature’s rules while expecting a life of marvelous metabolic balance.

If you are fortunate enough to dwell all year in a warm sunny latitude with open unpolluted skies, get your unclad body exposed to the midday sun for long enough time (which will depend on your skin type, tan, latitude, altitude etc.) every day without burning, as well as expose yourself to early morning sunlight, to receive all the scientifically proven benefits described in Embrace The Sun and in this article. If you are not so fortunate, because of higher latitude, less sunlight, cold weather, clothing, pollution, work schedule, and indoor or urban living, then treat yourself every morning to only 5-15 minutes (based on skin type and tan) of SRT—delivering all the essential photo-nutrients (UVR, full spectrum light, and additional blue light) that are critical to your body and mind, and are analogous to those bestowed upon us by the healing sun.

To obtain a highly-discounted copy of Embrace The Sun, and for additional information on SRT plus a list of practical recommendations and activities that are designed to enhance your circadian health, visit [www.Ecopolitan.com](http://www.Ecopolitan.com) or email [clinic@ecopolitan.com](mailto:clinic@ecopolitan.com) .

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*(End of Main Presentation)*

## *Secondary Presentation Speaker: Jillian Love!*



Combine equal parts imagination and training. Add a heaping dash of talent and an overflowing cup of passion. Top it off with the ability to create engaging sensory experiences with the fusion of food, entertainment and fun and you have the recipe for Jillian Love.... Talented raw vegan chef, international raw educator, community organizer and event planner, inspiring presenter. She provides raw and vegan menu consultation, menu development and staff trainings and she is available for classes, workshops, speaking engagements, boutique catering and chef services, personal health and life optimization coaching. She has extensive background and training in assisting individuals as well as organizations in personal transformation and change.

### **Social Change and Community Activism**

Jillian is a change agent & pioneer in the conscious cuisine and sustainable health movement! She is founder of Bay Area Raw, an organization providing events, services and social networking opportunities to bring together local businesses, entrepreneurs, visionaries, activists, community leaders and the community members to share information, celebrate healthy lifestyle and support the growth of the Conscious Cuisine and Sustainable Living Movement.

Jillian also runs the several Bay Area MeetUp Groups focused on Conscious Cuisine, Holistic Health and Sustainable Living. These local groups serve as community hubs for individuals interested in exploring conscious eating and optimal nourishment and engaging in lifestyle choices that sustain the planet. Jillian Love is committed to global transformation through conscious cuisine and is an advocate for food justice.

*(End of Meet Jillian Love!)*

## **Secondary Presentation by Jillian Love** *“How to Make Nut Cheese”*

Learn how to make nut cheeses, a healthy alternative.

*(End of Secondary Presentation)*

### **About Smart Life Forum**

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