Blue Light and Sunshine May be the Next Gen Weapons Against Antibiotic-Resistant Infections

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Skin and soft tissue infections are among the most common bacterial infections encountered in clinical practice.

Such infections can be caused by a number of bacteria that gain entrance into your body via cuts, scrapes, bites or open wounds. Even bacteria that normally live on your skin can cause an infection when introduced into your body this way.

Skin and soft tissue infections account for more than 14 million hospital visits each year, costing the health care system an estimated $24 billion.

Unfortunately, many infections are becoming increasingly difficult to treat. Antibiotic overuse has led to the emergence of antibiotic-resistant bacteria, such as methicillin-resistant Staphylococcus aureus, also known as MRSA.

Finding effective countermeasures to this growing public health threat has turned out few options, but the remedy may be as simple as colored light.
According to a new proof-of-principle study, blue light can selectively eliminate infections caused by *Pseudomonas aeruginosa*. According to lead researcher Michael R. Hamblin of the Massachusetts General Hospital:

"Microbes replicate very rapidly, and a mutation that helps a microbe survive in the presence of an antibiotic drug will quickly predominate throughout the microbial population. Recently, a dangerous new enzyme, NDM-1, that makes some bacteria resistant to almost all antibiotics available has been found in the United States. Many physicians are concerned that several infections soon may be untreatable.

Blue light is a potential non-toxic, non-antibiotic approach for treating skin and soft tissue infections, especially those caused by antibiotic resistant pathogens."

**Could Blue Light Replace Antibiotics?**

In the study, lab animals were infected with *P. aeruginosa*. Incredibly, ALL of the animals treated with blue light survived while 82 percent of the controls died. Could this possibly be the beginning of a whole new treatment paradigm for infections? Clearly, we’re nearing the end of the road of the antibiotic era, as antibiotic-resistance spreads.

Blue light therapy has also been shown effective against MRSA and other resistant bugs, offering new hope for effective treatments.

In a previous study published in 2009, over 90 percent of community acquired and hospital acquired strains of MRSA were successfully eradicated within mere minutes of exposure to blue light. According to the authors:
“These significant levels of photo-destruction at low dosages indicate that irradiation with 470nm LED light energy may be a practical, inexpensive alternative to treatment with pharmacological agents, particularly in cases involving cutaneous and subcutaneous MRSA infections that are susceptible to non-invasive types of radiation.”

Here, the word “radiation” does NOT refer to ionizing radiation but rather the emission of energy from an LED light source – here within the blue light spectrum, which has a range of 450-495 nanometers (nm). (The study in question used 470nm blue light).

Natural sunlight will expose you to the full light spectrum from 415-660nm light, which encompasses the entire spectrum of colors: violet, blue, green, yellow, orange and red.

**UV Light Not Necessary to Kill Pathogens**

A similar study from 2008[^1] had found 405nm blue light to be an effective treatment for MRSA. However, according to the researchers, the 390-420 nm spectral width could raise safety concerns in clinical practice as it also contains part of the ultraviolet (UV) light within the spectrum. Fortunately, the 2009 follow-up study demonstrated that UV is not necessary to successfully kill the pathogens.

Blue light therapy was actually FDA approved over a decade ago, for the treatment of severe acne. Many of the blue light treatments for acne use the same wavelengths needed to kill antibiotic-resistant bacteria like MRSA, which means the technology is already commercially available.
In 2006, researchers also tested a combination of 405-nm blue light and 880-nm infrared light on Staphylococcus aureus and Pseudomonas aeruginosa in vitro. According to the authors:

“Two common aerobes, Staphylococcus aureus and Pseudomonas aeruginosa were tested because of their frequent isolation from skin infections and wounds. Each organism was treated simultaneously with a combination of 405-nm and 880-nm light emitted by a cluster of Super Luminous Diodes (SLDs).

...The results revealed significant dose-dependent bactericidal effects of the combined blue and infrared light... With P. aeruginosa, the treatment reduced the number of bacteria colonies at all doses... and reducing bacterial colony by as much as 93.8 percent... Irradiation of S. aureus resulted in statistically significant decreases in bacterial colonies at all dose levels; the most decrease, 72 percent, was also achieved with 20 Jcm2.

...Appropriate doses of combined 405-nm and 880-nm phototherapy can kill Staphylococcus aureus and Pseudomonas aeruginosa in vitro, suggesting that a similar effect may be produced in clinical cases of bacterial infection.”

How to Naturally Decrease Your Risk of Bacterial Infections

Two years ago, I reported the finding that low vitamin D levels increase your risk of being a nasal carrier of MRSA. The relationship held even after adjusting for age, race, recent antibiotic usage, recent hospitalization, and poverty. This means that vitamin D status could be a modifiable risk factor for MRSA carriage and potentially MRSA infection, and is yet
another reason for making sure your vitamin D levels are optimized year-round.

The study built upon the already established findings that vitamin D helps regulate your immune system and offers potent protection against infections. It does this by acting on specific genes that in turn produce over 200 anti-microbial peptides that help fight all sorts of bacterial and viral infections.

For example, research has shown that vitamin D can counter the effects of Crohn’s disease (inflammatory bowel disease) by acting directly on two genes – the beta defensin 2 gene, which encodes an antimicrobial peptide, and the NOD2 gene that alerts cells to the presence of invading microbes. Here, they looked specifically at vitamin D’s impact on methicillin-resistant Staphylococcus aureus (MRSA). According to the authors:

“...individuals with vitamin D deficiency had a statistically significant increased risk of MRSA carriage... Further trials may be warranted to determine whether vitamin D supplementation decreases the risk of MRSA colonization.”

How I Used Sunlight to Treat a Chronic Toenail Fungus Infection

In college, I developed a common nail infection called onychomycosis. These infections are notoriously difficult to treat even with powerful oral antifungal drugs. I acquired the infection largely as a result of not understanding what an optimal diet was and many thousands of miles of running. I tried many different therapies to eliminate it for nearly 20 years, but it only finally resolved when I wasn’t even trying to get rid of it.

Several years ago, I switched my life around so I could work in the subtropics during the winter and get regular doses of
sunshine to naturally maximize my vitamin D levels. So after five months of going out in the sun nearly every day for an hour or more, I noticed that my infection had disappeared. I then remembered that UVB is a very potent germicidal and was clearly responsible for removing the infection that the dozens of previous approaches had failed miserably at. I do believe that regular, ideally daily, exposures for many months are required for this to work. Going out a few days a month will not be enough to treat this resistant infection. One could likely use a tanning bed or UVB lamp to get the same results.

Even conventional physicians acknowledge that the treatment of choice for psoriasis is UVB, ideally through sun exposure. Interestingly, I also tried to get a symmetrical tan so was tanning my armpits and I also noticed that it eliminated armpit odor, probably by the same mechanism – by the UVB killing odor-causing bacteria in the armpit.

**UV Radiation has Long History of Use as Treatment of Disease**

An article written by Richard J. Wurtman, while over 40 years old, still contains loads of interesting information about the health benefits of sunlight, and is well worth a read-through. If you have any interest, I strongly recommend you download this classic, superbly written 11-page PDF from the Massachusetts Institute of Technology More recent evidence presented in the journal *Dermato-Endocrinology* just last year confirms that exposure to the sun in appropriate and measured timeframes has a number of health benefits unrelated to vitamin D production, such as:

- Enhancing mood and energy through the
- Protecting against and suppressing
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<th><strong>release of endorphins</strong></th>
<th><strong>symptoms of multiple sclerosis (MS)</strong></th>
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<td>Treating skin diseases, such as psoriasis, vitiligo, atopic dermatitis, and scleroderma. UV radiation also enhances skin barrier functions</td>
<td>Inducing nitric oxide (NO), which helps protect your skin against UV damage and offers cardiovascular protection, promotes wound healing through its antimicrobial effect, and has some anti-cancer activity</td>
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<td>Melatonin regulation through the “third eye” of the pineal gland photoreceptors</td>
<td>Relieving fibromyalgia pain</td>
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<td>Standard treatment for tuberculosis 100 years ago, long before the advent of antibiotics</td>
<td>Treating neonatal jaundice</td>
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<td>Can be used to sterilize your armpits and eliminate the cause of most body odor.</td>
<td>Treating Seasonal Affective Disorder (SAD)</td>
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<td>Synchronizing important biorhythms through sunlight entering your eye and striking your retina</td>
<td>Regulating body temperature</td>
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<td>Protecting against melanoma and decreasing mortality from it</td>
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According to the featured *Dermato-Endocrinology* article:

“Solar ultraviolet (UV) radiation has been used since ancient times to treat various diseases. This has a scientific background in the fact that a large number of molecules (chromophores) in different layers of the skin interacts with and absorbs UV... Phototherapy is a valuable option in the treatment of many psoriatic and nonpsoriatic conditions, including atopic dermatitis, sclerosing skin conditions such as morphea, scleroderma, vitiligo, and mycosis...”
fungoides. Phototherapy is the treatment of certain skin disorders with UV radiation which can be produced by the sun, fluorescent lamps, short arc lamps with UV filters and lasers.”

**UV Exposure – An Effective Prevention against Tuberculosis**

Nearly one third of the word’s population carries the tuberculosis bacteria, but only about 0.2 percent of those infected with tuberculosis (TB) actually develop a clinically significant infection. This fact indicates that something other than the bacteria itself is responsible for developing the disease. Several studies have appeared in the last decade, indicating that vitamin D is one of the major keys that dictate whether you will actually develop the disease. These studies have all come to the conclusion that **vitamin D deficiency sets off the disease if you are a carrier of the bacteria.**

One previous study was able to show an astonishing **100 percent resolution rate** by treating TB patients with 10,000 units of vitamin D daily (compared with the 400 units usually advocated by conventional medicine). This treatment was so effective that it was the treatment of choice prior to the introduction of antibiotics.

How does vitamin D treat TB so effectively? Your white blood cells convert vitamin D that your skin produces from proper sun exposure into an active form, which helps form a protein that kills the tuberculosis bacteria. Therefore **the more severe your vitamin D deficiency is, the higher your risk of developing the active form of TB.**

Although there are vitamin D supplements on the market, I am convinced that supplementing with oral vitamin D is a poor
substitute for proper UVB exposure on your skin. The primary reason is that it’s just too darn easy to overdose on vitamin D since it is an oil-soluble supplement, which easily stores in fat tissue. It is so easy that I’ve actually done it a few times, so I speak from personal experience on this one. Instead, your safest bet is to get your vitamin D from natural sunlight exposure.

Why? Because unlike other vitamins, vitamin D is created by your body after exposure to ultraviolet rays from the sun. This is the active vitamin D – vitamin D3. Nearly all the prescription-based supplements are synthetic vitamin D2 (ergocalciferol), which is FAR LESS effective.

How Vitamin D Performance Testing Can Help You Optimize Your Health

Additionally, a robust and growing body of research clearly shows that vitamin D is absolutely critical for good health and disease prevention. Vitamin D affects your DNA through vitamin D receptors (VDRs), which bind to specific locations of the human genome. Scientists have identified nearly 3,000 genes that are influenced by vitamin D levels, and vitamin D receptors have been found I throughout the human body.

Is it any wonder then that no matter what disease or condition is investigated, vitamin D appears to play a crucial role? This is why I am so excited about the D*Action Project by GrassrootsHealth." It is showing how you can take action today on known science with a consensus of experts without waiting for institutional lethargy. It has shown how by combining the science of measurement (of vitamin D levels) with the personal choice of taking action and, the value of education about
individual measures that one can truly be in charge of their own health.

In order to spread this health movement to more communities, the project needs your involvement. This is an ongoing campaign during the month of February, and will become an annual event.

As a participant, you agree to test your vitamin D levels twice a year during a five year program, and share your health status to demonstrate the public health impact of this nutrient. There is a $65 fee each 6 months for your sponsorship of the project, which includes a test kit to be used at home, and electronic reports on your ongoing progress. You will get a follow up email every six months reminding you "it's time for your next test and health survey."

Let There Be Light!

With antibiotic-resistant infections on the rise, it’s nice to know there may be some very effective new strategies to address this problem. Best of all, these strategies are not dependent on pharmaceuticals.

Optimizing your vitamin D levels appears to be an important first-line of defense, which may protect you against becoming an unwitting carrier of dangerous pathogens that are extremely difficult to treat. And the use of blue light therapy could very turn into a much-needed lifesaving treatment against serious skin and tissue infections.

While it may be awhile before blue light is routinely used in clinical practice, I urge you to do what you can personally do to decrease your risk of a potentially lethal infection – keep your
vitamin D levels optimized year-round! The D*Action Project is a win-win for both you and vitamin D science, so I invite you to participate in this important research project.

[-] Sources and References

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11. Grassrootshealth.net