

Photobiology: The Therapeutic Use of Light to Improve Health

A Special Interview With Dr. Alexander Wunsch

By Dr. Joseph Mercola

JM: Dr. Joseph Mercola

AW: Dr. Alexander Wunsch

JM: Photobiology: the therapeutic use of light to improve health. Hi, this is Dr. Mercola helping you take control of your health. Today we are privileged to be joined by Dr. Alexander Wunsch from Germany, who is one of the leading experts in the entire world in photobiology. I'm absolutely thrilled to engage in dialogue with him. Many people aren't aware of the historical significance of this topic with respect to how it's been used over the past few centuries. That's what we're going to explore today so that you can develop a framework and a perspective.

The last time I interviewed Dr. Wunsch was on the dangers of artificial LED (light emitting diode) lighting. That interview has almost a million views at this point. If you haven't seen it already, please look at that because that's going to go into some practical real world aspects of photobiology. This time, we're going to focus on the historical components to help you get a better appreciation of its potential. Welcome and thank you for joining us today from Germany, Dr. Wunsch.

AW: Hi, Dr. Mercola.

JM: Alright. Why don't you start off by sort of setting the frame for how light has been used therapeutically, probably not just centuries, but for thousands of years? We can go back to ancient Egypt, maybe even start there and it can progress into the more recent therapeutic use of light.

AW: Yeah. I think I could even go back a few hundred thousand years because what particularly makes us into the human beings we are is the use of fire. Since up to 2 million years ago, our ancestors were using fire. I'm pretty sure that they realized very soon that fire, that the heat, which is emitted by the bonfire, has also a kind of therapeutic value.

Then we can make the step into the Egyptian times. I think it's important to highlight that we had hundreds of thousands of years' time in human evolution to fully adapt not only to sunlight, but also to the influence of fire, of near-infrared and mid-infrared radiation, which is emitted by all incandescent light sources. We have it in the case of fire.

When we think about Egypt, there was already a kind of lighting industry because the Egyptians wouldn't have been able to build their pyramids and their large building structures without using artificial light inside these buildings. It's very often quoted that you have pictures of pharaohs which show the ankh cross, which represents health in the Egyptian religion or in the Egyptian culture. In fact when you go into the details, we cannot really prove that there is light therapy existing in ancient Egypt. What we can say is that sunlight was used for hygienic purposes. This is for sure.

In just a few sources, they mention a kind of photodynamic therapy. It was a small part of light therapy, which can be proven in a scientific manner, and a very large part, a large portion of hygienic use of sunlight. But I think from the moment on when humans were able to manufacture glassworks, it was also possible to produce colored light using the colored glass as a kind of filter technology.

JM: Terrific. It's interesting to realize that our ancient ancestors, perhaps for as long as millions of years, have been exposed to light at night, but it's been only from fire essentially. The wavelengths of that are really very, very low in blue, virtually almost non-existent - yet still enough to represent the full visible spectrum and to provide optimal color rendition. But the fire spectrum doesn't end here, it extends its range over the near infrared and mid infrared up to almost 8000 thousand nanometers.

I guess the point here is that our physiology, our retina, was never designed to be exposed to the blue wavelengths at night. You're just not going to see those. That is exactly what our culture is not experiencing at this point, in which we're going back to the old presentation. But it's just so important to understand this historical perspective. That's one of the reasons why it's so crucial to block that blue light at night, then also in the daytime if it's from artificial sources that are not incandescent bulbs, like halogen or incandescents.

Let's progress now to the – I think you ought to start about the 18th century and how some of the recent pioneers have started to use light therapeutically for illness.

AW: Yeah. I call the time before the 1800s century the “mystical phase” of light use, because humans already had clear indications that light does them good. But they didn't explore it in a scientific manner. In the 18th century, we call it also “the age of enlightenment”, people became much more interested in the reasons why the occurrences happen around them. This fostered science massively.

There was a very important guy in Germany, his name was Ehrenfried Walter von Tschirnhaus. He lived in the area of Dresden. He was experimenting with large huge lenses and with huge mirrors. He focused - he concentrated - sunlight with really huge devices. He was, for example, able to ignite wood underwater, more or less immediately, by focusing solar energy through his optical apparatuses. He was able to melt metal. He was able to melt glass. This really boosted the scientific progress, for example, the famous Dresden Glassworks. They were able to build very precise lenses. The optical world was explored using the inventions of Tschirnhaus.

In this realm, there was a guy named Andreas Gärtner. He was known as the “Saxonian Archimedes.” He, I think, in my awareness, he was the one who built the first phototherapeutical device. It was a foldable mirror made from wood and plaster. It was a hollow mirror covered with gold leaf. Using this, he could concentrate sunlight onto aching joints of patients. People suffering from arthritis, from rheumatism, from gout, they found pain relief from this phototherapeutical unit.

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Later on, nowadays, we can explain clearly how this really worked. Because the gold leaf absorbed all the ultraviolet (UV) radiation from sunlight, he could treat patients for several hours. Otherwise, he would have induced a phototoxic reaction, a kind of sunburn. If you focus the sunlight without filtering out the UV, you can imagine that this is not really a beneficial activity. But using this combination of materials, he was able to produce these so-called luminous heat rays, the near-infrared and the red, which is so beneficial because it can penetrate deeply into the tissue. In a museum in Dresden (the Mathematics and Physics Salon), you still can watch this amazing device. You can look at the first phototherapeutical appliance from the beginning of the 18th century.

JM: I have a question on that. You had mentioned that – I didn't realize that gold leaf would actually absorb the UV, but I know that it's really useful for reflecting all the infrared. In fact, they use it in some of the space telescopes for that very purpose. They collect all that and focus it. I don't think there's any element in the universe that reflects infrared more effectively than that. Would that be another potential reason? The lack of UV plus the focused infrared into the tissue?

AW: Yeah. It's interesting that UV behaves quite peculiar in combination with certain metals. For example, silver only reflects about 4 percent of the incident UV radiation. Gold almost absorbs all the parts. The best reflector for UV is the aluminum, if we talk about metals.

When we talk about phototherapy, besides the heliotherapeutic application, we always have to look at the light source, and we have to look at the beam shaping media, such as the reflector or lenses, because they all contribute to the final blend of wavelengths, which then come into action in the phototherapeutical intervention.

JM: Interesting. Why don't you walk us through the progression after the ones you just mentioned?

AW: Yeah. In the late 19th century, a lot of things happened in the realm of understanding how light acts upon the human body. It started with the experiments of A. Downes and T.P. Blunt. They found out that ultraviolet radiation would kill bacteria.

The researchers were also interested in other parts in the optical spectrum. For example, General Augustus Pleasanton. He published a book in 1877 where he described experiments he performed between 1861 and 1876. Starting with his grapery, he grew wine in his grapery. He was using not only transparent colorless glass, he also used blue window glass, and found out that he got significant increase in the growth behavior in plants. Later on, he also applied this to humans.

From our today's viewpoint, it was kind of weird because people in the late 19th century, especially in the United States, would walk around with blue glasses. In a way, they did exactly the opposite of what we do today in order to protect our eyesight. They even enhanced the blue part of the spectrum because they used it as a kind of booster, a kind of doping, and didn't care about the long-term effects, which are pretty negative as we know.

JM: If you're wearing blue glasses then, you would increase the blue exposure and you would limit the red and the infrared, is that correct?

AW: Yeah. Exactly. The problem with the blue is that – the problem always is that if you overdose things. For short-term use, increased blue enriched light can activate ourselves, but we adapt pretty swiftly to this effect. The stimulating effect is wearing out after a short while. Walking around with blue-colored glasses definitely is not a good idea. You can use them for a few minutes. This can be a good idea. From today's scientific viewpoint, we need at least one hour, especially our kids, need at least one hour of unfiltered daylight during adolescence in order to prevent them from suffering from myopia. It's always not *pure blue*, and not *pure blocking*. Somewhere in between is the golden pathway to health.

Of course, if we look around, we have problematic light sources. We talked about this in our last interview. The problem is that in the course of evolution, it did not happen that it gets dark and that your body produces melatonin and all of a sudden, it can become bright as daylight with very high portions of blue. The blue, especially during nighttime when the melatonin is up, has an even more detrimental effect on our retina.

Coming back to General Augustus Pleasanton, in the late 19th century, he published his book in the same year when Dr. Seth Pancoast also published a book, but not only on blue light, but also on red light. In a way, he already covered both ends of the spectrum and understood or used the antagonistic effects of red and blue light in order to stimulate sympathetic activity using the red, and parasympathetic activity using the blue.

Just one year later, in 1878, a year before Edison invented the incandescent lamp, Dr. Edwin Dwight Babbitt published a book, the *Principles of Light and Color*. He was using the full set of rainbow colors, which had been discovered by Newton, and later on used the color set of Goethe. This is really a remarkable book, I think 800 pages or so. It was first published in 1878, and the second edition in 1896. If one has the time, it's really worthwhile taking a look into this epic work.

Edwin Dwight Babbitt, he was a chromotherapist, as well as Seth Pancoast and General Augustus Pleasanton. Today in medicine, we start to reinvent what they already knew or what they already have found out in the late 19th century, that the colors have specific effects on our health state, on our organism. Using the correct colors means you can communicate with all your different organs in your system.

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Chromotherapy is a kind of esoteric discipline, many people may think. But in the meantime, we can prove scientifically for many of the colors in the rainbow spectrum, that they really have effects, which can be objectively demonstrated.

JM: Can you highlight some of the primary observations that Dr. Babbitt had come up with in the late 19th century that have been forgotten or just being rediscovered at this point? Some of the primary ones.

AW: The Babbitt book covers all and everything. From that perspective, it's not so easy to highlight a single aspect. What comes into my mind is the model of the atom. It is a sketch or a kind of graphical representation of how he thought that the atom is consisted of.

The structure is like a kind of vortex system, very complicated. It resembles the outer shape of a human heart in a way. It is based on a vortex system, which leads to the fact that for a certain time, the particles are visible to the outside or detectable to the outside. In the other phase, it's kind of turned inside and invisible.

This reminds me, too, some findings in quantum physics and some findings in the 20th century physics, that we come in a way to this kind of concept. That we talk about oscillation, we talk about vacuum. The matter is made up of almost 100 percent space and frequency and oscillation. This is what Babbitt already presented in his very specific ways. Maybe I should send you a picture of this atom model of Babbitt then you might understand what I was trying to explain. It's not so easy to describe it with words.

JM: Especially if English is not your primary language. We can insert that into the video so that people will have a better understanding of what you're referencing. Good.

AW: Coming back to the use of colored light. He had a kind of bottle, which was shaped as a lens. He could put in some salt solution in order to produce colors in a reproducible way, because the best way to produce a colored filter, which gives you always the same color, is to use solutions of colored salt. It's much more precise than using gel filters or glass filters.

He had this kind of lens-shaped bottle. He was able to focus colored light onto certain parts of the body. He also designed a very beautiful glass window, which had different sections in many different colors. You would just lay down behind this window. If the sun would shine in, the colors were automatically projected to different parts of your organism.

JM: But was he able to achieve any remarkable clinical therapeutic benefits for the use of these applications that were surprising at that time and maybe still likely be today?

AW: They all had. Be it Pleasanton, Pancoast or Babbitt, they all had therapeutical results with using these colors. The problem was that it's very difficult to reproduce these effects, starting with the problem that the sun doesn't always shine. They were pioneers in chromotherapy in a time where electrical lighting was not available. People, in a way, had better circadian rhythmicity without electrical lighting. But in terms of scientific precision with regard to producing colored light, they had worse conditions than we have it to date. Today, we can exactly produce the same colors anytime, during the day and throughout the year.

But there was one guy, his name was Dinshah Ghadiali. He came from India and lived the second half of his life in the United States. In 1897, he rescued the life of a patient using the instructions of Babbitt. It was colitis. It was an inflammatory disease in the intestines. Dinshah used the Babbitt principle. He knew from reading the *Principles of Light and Color* that indigo colored light would be able to stop vomiting and break this process of disease in this patient, a young female. This started a new chapter in chromotherapy that Dinshah had to experiment and

investigate for more than 23 years after that before he was able to present his system to the public.

In the meantime, a lot of other important things happened, because the late 19th century was the century where Niels Ryberg Finsen from Denmark started his research on the effects of colors. He was the first to make a discrimination between the *negative phototherapy* and a *positive phototherapy*. Sometimes in some textbooks, you would read that Finsen kind of coined the scientific chromotherapy because he was using red light in order to treat patients suffering from small pox. In fact, this was not really the red light he was using. He shielded out - or he removed - the short wavelength part of the spectrum, especially the ultraviolet and the violet, indigo and blue. The colors that remained are located in the longer wavelength part in the spectrum.

You can be 100 percent sure that if you paint a room completely in red and you're using red curtains and red tissue or cloth, that you would have 100 percent elimination of blue. The short wavelength part, the blue and the indigo, was the reason for the inflammatory reaction in patients with small pox.

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Finsen not invented, but he reinvented the negative phototherapy, which means you eliminate certain parts of the spectrum, which would exaggerate the development of a disease. This happened in the early 1890s. This observation that the short wavelength in the spectrum would amplify the inflammatory reaction in small pox, this observation led him to the idea that light acts as an *incitement*. It is able to produce the inflammatory reaction. In small pox, this would be a problem. But he was thinking about the treatment of tuberculosis.

Treating tuberculosis: His idea was if he could produce the inflammation in the tissue, then the body would be able to cure itself. This is what he finally developed: the positive phototherapy, which means he produced exactly this part in the spectrum he formerly wanted to exclude. Using the short wavelength part enabled him to very successfully treat tuberculosis, especially in the skin. He was able to establish a Light Institute in Copenhagen, because the problem was that the sunlight, which was the most potent UV light source, was only available for less than 30 days in a year in Copenhagen. His idea was to use electrical light.

In the late years of the 1890s, he established the Finsen Institute in Copenhagen and successfully treated patients with tuberculosis from all over the world. Finally, he was awarded with the Nobel Prize for Physiology in 1903. He was one of the most important persons in the end of the 19th and the beginning of the 20th century. Finsen's work fueled the progress of phototherapy for the next 30, 40 or 50 years. From 1900s to 1950, phototherapy was kind of a state of the art therapeutical intervention in medicine. People would not say "It's only light." They said "Oh. It's light therapy. We can cure you with just using the light rays."

JM: I have a question. Let me just diverge in a bit of a tangential but important question with Finsen's work. Let me reemphasize that he was able to effectively treat tuberculosis, which really had no treatment prior to that. This was 40, 50 years before the advent of pharmacological medication, which is currently used today. Tuberculosis is a very slow-growing organism and very hard to treat. It's usually given multiple drugs to treat it.

But 50 years before that, he was getting results. This is because UV light is germicidal. This is one of the reasons why it's useful to hang your clothes on a light outside, exposing it to sunshine, because it kills not only the bacteria, but all of those other microbes and viruses that might contaminate your bed materials and your clothing.

But I'm wondering, in tropical or sub-tropical environments, tuberculosis is still a problem. But probably my guess is the nutrition isn't up to speed, so their immune system is suppressed. But obviously in those environments, they have access to massive amounts of ultraviolet exposure year round in the equatorial regions. What is your speculation as a physician why with exposure to light, where Finsen was able to treat patients with tuberculosis, people still come down with tuberculosis in those areas if they were exposed to the light?

AW: I think what the Western missionaries – is that a word that exists? From the church, those who travel the world.

JM: Missionaries. Right.

AW: Missionaries. First, what they told the indigenous population is that it's a sin to walk around naked. You're laughing, but this is kind of a major influence if you ask people to dress themselves in the manner like we do and they are used to really be exposed to the sun in their culture. I don't think that nowadays in the third world or developing part of the world that we have this kind of social behavior these cultures had before the Western world was intruding these parts of the globe. The poverty, the overpopulation, the use of clothes, all these habits they changed [people] in a way that they don't really benefit from the ultraviolet radiation anymore.

JM: Okay. That's perfect. I never would have guessed. It was not in my consciousness to realize that the introduction of these missionaries that taught them to put clothes on was essentially abolishing the beneficial exposure to the ultraviolet radiation, but it makes perfect sense. It really is a powerful illustration of what we do in our own culture. Even in the sun time when we have similar access to beneficial radiation, very few of us are outside with minimal clothing.

When we go outside, we typically are clothed from the bottom of our neck to our feet. You're not going to get a lot of useful ultraviolet radiation through the exposure on your face. In fact, that's probably the last place you want to have it because the skin on your face is so thin. It's going to accelerate photo aging, and the surface area is so small. The major benefit's on your chest, back, legs and arms. If you're hiding them under clothes, it's not going to penetrate that. UV, those short wavelengths, has very limited penetration capability. The longer the wavelengths, the deeper it penetrates. They only go a few millimeters on bare skin. Certainly, they're not going to go through clothes.

AW: Yeah. This is the problem we have today. It's not that the sun wouldn't shine, but we stay out of the sunlight when it's mostly efficient. On one hand, we cover our skin with clothes. We don't have the time to go out for 30 minutes during noon time. Many of us have to stay at workplaces and are not allowed to take a break for, let's say, half an hour or 20 minutes. Yeah.

We took our behavioral pattern and brought it to other societies, to other cultures, who in a way had an inborn instinct or their own way of living in order to deal with the sun in a beneficial way.

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JM: Yeah. One of the craziest mistakes that most of us make is to repeat the errors of our ancestors or to have to make the same mistakes twice. To me, one of the most important points that we're making here in this whole dialogue is the appreciation that lack of exposure to the sunlight can have some really serious adverse consequences on your health. As illustrated by the fact that these third world countries, because they're putting clothes, don't have access to the ultraviolet radiation, and they're coming down with tuberculosis. Why make the same mistake? We need to learn from that and incorporate that.

We're going to have many more discussions on this, not just this interview. I plan to interview you many more times because my passion is photobiology and you're one of the leading experts in the world on this. I'm looking to learn so much more from you as you just shared with me now. I didn't understand this principle.

But to teach people this and to apply that so that we can just access these essentially free resources and optimize our own biology that was designed to heal with this exposure. This lack of exposure to this vital, therapeutic biological, radiation, which has profound molecular biological consequences – which we can go into detail in future presentations – minute pathways that get optimized when you have this exposure. It's just profound.

To obtain those benefits, it's so simple. Just get access to the sun as much as you can in the right time zone. In the winter it's the solar noon. In the middle of summer in the sub-tropical area, it's probably 7, 8, 9 o'clock in the morning. You want to stay out of it in the noon because it's too much. It's like Goldilocks. You just want to get enough, not too much. Thank you for sharing that.

AW: Yeah. Do we still have some time?

JM: Yes. Absolutely. Yes, we do.

AW: Because I don't want to leave the 19th century.

JM: No, no. Continue on. I'm sorry for the interruption.

AW: No. It fits perfectly together because there was a very, very important man from the United States who invented a phototherapeutic method in the late 19th century. This was John Harvey Kellogg. You might have heard of him.

JM: Sure. Sanitarium in Battle Creek, Michigan.

AW: Battle Creek Sanitarium. He was starting to perform the heliotherapy. He treated his patients first in 1876. This was about the time when John Harvey Kellogg started using sunlight

as a therapeutic measure. Shortly after the invention of the incandescent lamp, he filed a patent for an incandescent light bath. This was in 1891. In the following two years, he treated thousands of patients with this incandescent light bath. He exhibited this system at the world exhibition in Chicago in 1893.

There was a visitor from Germany, from Berlin, the chemist Dr. Willibald Gebhardt. He was so fascinated by this incandescent light bath. It didn't use the UV. It exactly used the opposite, the red and the near-infrared heat rays, the *luminous heat rays*. Gebhardt visited Kellogg at the Battle Creek Sanitarium and learned all about the use of this incandescent light bath. Then he took this technology and knowledge back to Berlin where he started to produce these light baths extensively.

During the next few years, he was able to establish hundreds of light institutes throughout Germany. In all major cities, they had several of these light institutes where people were using incandescent light in order to treat themselves when they suffered from pain, from gout, from rheumatism, from psoriasis. This was even a threat for the physicians, because they couldn't help their patients better than they could help themselves when they visited and treated themselves in these light institutes.

It took a few years in the beginning of the 20th century. Someone from the United States discovered this incandescent light bath technology in Germany and brought it back to the United States where it initially came from. Kellogg wrote a text book, which has the title *Light Therapeutics*. The first edition was published in 1910, and the second edition I think in 1926 or so. You can get this as a portable document format (PDF).

I really would recommend this to everyone who is interested in phototherapy, because this is the basic knowledge. Everything you have to know about sunlight, about ultraviolet light, about visible light, about the near infrared, about the use of cold, the use of heat, it's all contained in this book from John Harvey Kellogg.

JM: Wow.

AW: It's still, in my understanding, the first book to read if you want to understand better how light in the different parts of the spectrum interact with the organism. It's very systematically structured. In my understanding, it's still up to date, because you can really learn a lot.

For example, everyone warns you about sunburn, but in the pre-antibiotic era, the medical doctors sometimes had to completely change the direction in a patient. If the health was constantly going down, down, down, down, down, they had to make a mark, to change the direction of this downward development. Here, sunlight was one of the therapeutical options.

I would not recommend to use this today. But Kellogg describes in detail the four different stages of a sunburn. The first thing that he says is "Sunburn is not a burn injury. A burn injury appears immediately. And a sunburn appears with delayed time of several hours." He didn't know anything about *reactive oxygen species* these days, but he exactly explained that there is definitely a huge difference between an immediate heat-induced burn and a kind of phototoxic

reaction that you find in a sunburn. He discriminated or described four different stages of a sunburn from one to four. Four is with blisters. One is just the mild erythema.

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In these days, without antibiotics, sometimes some patients deliberately chose to induce a second degree or third degree erythema in order to change the direction of the development of the health of a certain patient.

JM: Perfect.

AW: You can learn a lot from these explanations. Even if you would not reproduce anything he is describing. But it gives you the best insights in phototherapy for laymen. You can understand it as laymen, you can understand it as a physician. It's written in a way that you really reach all the different people with their different horizons.

JM: Sure.

AW: Yeah. *Light Therapeutics*.

JM: Thank you for that pearl. I can't tell you how much I appreciate it. My guess is, since it was written in 1926 and previously, that it predates the copyright law so it's available free.

AW: It's freely available, yeah.

JM: Look up *Light Therapeutics* by John Harvey Kellogg online, PDF, and then you got to download. I am going to read that book before our next interview, I assure you. One specific question, though. I'm assuming that the heliotherapy that he instituted, because it was from an incandescent bulb, was very low in blue and primarily red and near-infrared that provided the most of the benefit. Would that be a fair assumption?

AW: He was using the phototherapy with sunlight.

JM: Yeah. That's right. Helio.

AW: He used the arc light, the carbon arc light. He used the incandescent light bath, and he was using the quartz light as well. In the early 20th century, Richard Küch, he was a physicist from Germany, invented the quartz lamp. It's a gas-mercury discharge lamp with a quartz tube. Quartz glass is transparent for ultraviolet radiation. Before this invention of the quartz lamp, the artificial light with the highest output in UV was the carbon arc lamp.

Depending on the composition of the carbon, physicists tried to increase the UV output, but you had the problem that you have massive heat in the carbon arc lamp, and that you have smoke, dirty air and consumption of oxygen. For the actinic therapy, which is the use of ultraviolet radiation, the quartz light was really a quantum leap. It was a step into a new kind of

therapeutical option. He used everything that was available. Kellogg just covers in his book all the different light sources and how to use them.

JM: Okay.

AW: By the way, not only is this book available as a PDF without copyright, you can get all the books I was talking about – Pleasanton's book, Pancoast's book, and even Babbitt's book – in perfect quality. It's high-quality, digitized and available as PDF.

JM: Perfect. We'll seek to provide links to those for anyone who's interested. Do you think there's benefit – so your recommendation would be to read Kellogg's book first and there would be additional value if you read the other books, too?

AW: The other books are very special – if you're interested in the history of spirituality and esoteric, then you can read also the other books. If you have a lot of time and if you have an open mind to look into a lot of different facets of the emanation of light, I would say that Babbitt is highly recommended as well. But in order to learn about phototherapy and in terms of having an introduction that is concise and comprehensive, it's *Light Therapeutics* from Kellogg.

JM: Okay.

AW: If you refer to a contemporary textbook in phototherapy, you will not learn what you can learn from *Light Therapeutics*.

JM: That's great news. Thank you for those pearls of wisdom and free resources. Who doesn't like free resources? That's great. You don't even have to buy a book. You get it for free. Ideally – I think we're both in agreement on this – I'm going to read this on my Kindle. The Kindle is probably the best device to use. It has an LED backlight, but you can turn it off. If you're in the sunlight, you're reading essentially with reflected sunlight. It's almost as good as reading a paperback book, or a hardcover book – a printed book is what I meant to say. A printed book.

AW: It could even be better because if you read a paperback book, you have these whiteners, which transform a lot of UV light into visible short wavelength light. The whiter a paper is, the worse it's for your eyes, for your retina.

JM: Wow. Interesting. So the Kindle with the backlight off is better than a printed book. Interesting.

AW: Yeah.

JM: It's certainly more convenient. For those who don't know, these PDFs – I'll see to it to include some instructions here that you can download – you can go to your Kindle account and go to your Kindle devices and identify the email address of that device and then send that address a copy of the PDF and it will appear magically on your Kindle. There's no charge for it. You can get these free on your Kindle. That's the simple trick. A lot of people don't know that that's the way that you do that.

AW: Yeah. But I have to warn you. Pancoast is a file of 250 MB (megabyte).

JM: Then it won't work, unless you convert it. There's a limit. You have to be able to email. It has to be under 10 megabytes or more. Then you wouldn't be able to convert it to your Kindle.

AW: Maybe it's possible to convert it to a downsized version.

JM: What you want to do is copy it physically into a word document and then take the word document and send that file to your Kindle. That might work. Or get rid of the pictures. Alright. I'm sorry to interrupt the flow, but let's go on to the next person, which I believe is Dr. Oscar Bernhard. Dr. Bernhard is a Swiss surgeon.

AW: This was all happening in the realm of Finsen's work. In the late 19th century, light really was prevalent. If people would move from the country to the cities, they would have a higher prevalence for rickets and tuberculosis. It became clearer and clearer in the 19th century that sunlight has to do something with it. In the Swiss mountains near Davos, a surgeon, Dr. Oscar Bernhard, he was using sunlight even before Finsen was inaugurating his method. As a surgeon, he had to operate on patients with pulmonary tuberculosis, for example, with tuberculosis in the joints.

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Oscar Bernhard found out that if he used the sunlight during the surgery before the wound closure, he would put out the patient for 10 or 15 minutes into direct sunlight. What he found was this improved the healing significantly. Even in surgical cases, sunlight was applied by Oscar Bernhard. In the Swiss mountains, we know that we have increased elevated concentrations of ultraviolet radiation in the heights of the mountains.

There was another, the sun doctor. He entered the stage a bit later than Oscar Bernhard. Oscar Bernhard was the pioneer in the 1880s and 1890s. Even before Finsen was developing his method, Bernhard already used the sunlight in his medical practice, in his surgical practice.

Another Swiss guy, the sun doctor, August Rollier, he started in 1905, treating patients in Leysin in Switzerland, again in the mountains. He ran, I think, up to 40 different hospitals in this area in the 1930s, 1940s. He was the one with more than 50 years of experience with the heliotherapy. Rollier only used heliotherapy. He was convinced that artificial light cannot do the job, and that sunlight is superior. Rollier was the master of heliotherapy in these days up to the 1950s. In the middle of the 1950s, he passed away. He was treating his patients more than 50 years from the beginning to the mid of the 20th century.

JM: Did he compile any of his findings into a book like Kellogg did?

AW: I don't know if there is an English version of his paramount book, but of course he wrote a lot, he published a lot of books on his method. But I have some, I think, even freely available reviews on the work of Rollier. I will check and I will provide the PDF.

JM: Okay. Perfect.

AW: If it's no problem with the copyright.

JM: We would love it. Yes.

AW: Because Rollier, he was really the master of heliotherapy. He not only used the sunlight, he had a kind of coherent healing system, which integrated the psychological aspect. He was a holistic physician, holistic healer, who not only used sunlight in a very skillful manner, but also all the other options using music and a kind of physiotherapy, the work therapy. He invented a lot of different appliances, which enabled the patient to lie in their beds and do some work and be productive, not only a lazy piece of flesh who is taking the space in the hospital room.

This was very important for people suffering from tuberculosis being treated in Switzerland, because it was quite expensive to stay there as a patient. The relatives had problems to send their patients to the Swiss mountains and to pay a lot of money. Rollier even gave them a chance to earn some or make some money during their stay in the hospital.

It was really a holistic system which is well described, of course, in his books. I have at least one article, one paper, which describes it in a very understandable manner. How he treated all the different aspects of his patients very successfully. Yet, he had very, very good results, much better compared to what we expect from tuberculosis treatment using the five-phase antibiotics treatment we have nowadays.

JM: Sure. We know that ultraviolet radiation is directly germicidal to many microbes, but in addition, ultraviolet B exposure specifically it helps the body produce vitamin D. I didn't realize this until recently. I guess that was discovered by a German, vitamin D synthesis, Adolf Windaus.

AW: Adolf Windaus. Yes. He discovered the molecule. He also discovered how to synthesize it, how to produce it. He received a Nobel Prize as well.

JM: Excellent.

AW: From that moment on, it became industrialized. For example, in Germany we had where they produce milk, they had irradiation systems for the milk. They had yeast irradiation with ultraviolet light in order to increase the content of vitamin D also in the nutritional basics in dairy products and so.

JM: Yeah. I think today the most common form of vitamin D, D3 specifically, because when you irradiate animal material, you make vitamin D3. When you irradiate plant material like mushrooms, you make vitamin D2. But the most common form of synthetic vitamin D3 is the irradiation of sheep lanolin. That's where most of the vitamin D comes from. It's very inexpensive. It's one of the most inexpensive supplements out there.

But the key here is that, and I think you and I are in complete agreement on this fact, is that vitamin D has many therapeutic benefits, no question. If you can't have exposure to the sun, you probably should take it. But it is actually a marker, a biological marker, for ultraviolet B radiation exposure. When your body has enough, your vitamin D levels go up. It's more than just vitamin D.

It's naïve to believe that you're going to get the same benefits as you would from artificially raising your vitamin D exposure, to getting to raise it normally it's designed to over hundreds of generations. The only way you can get it essentially was by exposure to the sun. Yes, there are these minute ways that you can, like eating polar bear liver, things like that. But for the most part, you're not designed to get vitamin D by swallowing it from animal material. You were designed to get it from exposure to sun. Maybe you can just comment on that, because I think it's another practical take-home from this.

I'm not saying you should not swallow vitamin D. You should if you have to. But that's not the goal. The goal's not to get your vitamin D level up to this level by swallowing a pill. It's to get it up by exposing either to sun or some effective alternative that produces ultraviolet B exposure. Ideally, similar to the sun so you get it balanced with the infrared because we know just UV exposure by itself is not necessarily healthy. It can be problematic. Maybe you can comment on that.

AW: Yeah. The problem is if you have different input channels and you only serve one of these channels, then you get a kind of disorder and a kind of incoherency. This is exactly what can happen if you administer vitamin D orally. It signals your system that you have lots of UV around you. This might even start processes that are not adequate because your skin didn't have the exposure. I think the best idea, if you have the skin type so that you can stand the sun exposure, is that you use this natural pathway. Because then you have coordinated, coherent action pathways, which are not granted if you only serve one of the channels.

[----1:10:00----]

JM: Okay.

AW: Another aspect, of course, that is still unclear is if the vitamin D, the orally administered vitamin D, really reaches the skin layers where you normally need it as well, in the keratinocyte layer. Cathelicidin is a substance that is produced under the influence of vitamin D in the skin, which helps the organism to fight germs. This might be one of the reasons why the heliotherapy and the UV therapy were so efficient with regard to tuberculosis treatment.

JM: Okay. I think we've sort of reached the amount of time that we've committed to doing this specific interview. I think I'd just like to stop here and then have you on again to continue with this and other. Really, you are, as I've mentioned earlier, the main expert in this area in the world. I'm absolutely convinced of that. I'm really excited that you're willing to meet with us on a regular basis to help us understand and apply this phenomenally valuable, essentially free input into practical applications.

You've done the homework. You've been studying this for decades. You understand it better than almost anyone on the planet. I greatly appreciate you sharing your wisdom with us, because it has so many benefits. Having this historical grounding that you gave us and providing this pearls, free resources that we can read and get the grounding so that we can apply some other benefits. Because I'm absolutely – I've been convinced for decades myself, although I've never had the opportunity to study it like you have, that this is key to health. There's no question in my mind. It's almost as important as eating and exercise. If you want to be optimally healthy, it is vital, in the truest sense of the word, vital to your optimal health.

Virtually no one is teaching this. They did teach it in the past. Now we're seeking to rediscover what they were teaching a hundred years ago. It's just because of this manipulated bias that we have from this pharmacological corporate structure, which essentially directs all of the research. If it was authentically and sincerely motivated on specific healing principles, we would have expanded on the research you just described. We haven't because it's been artificially suppressed. It's the sad reality.

But the good news is that this is the 21st century. We only got to the beginning of the 20th, so we've got a lot more to talk about. But this is the 21st century, we've got access to these powerful methods of communication where we can share this information, create a ground so our people can start to understand this and catalyze research and therapeutic interventions based on this solid information, which could improve their health and the health of the people that they love, and avoiding these toxic, expensive, and dangerous interventions that are commonly recommended for diseases that just don't need them. They respond perfectly well and ideally to normal interventions.

It's just simple. As you've mentioned, myopia. I mean even yourself. You are wearing glasses. If we have been optimally exposed and our parents had understood the information that we're trying to share, we would not have this problem. We would not have it.

AW: I totally agree.

JM: Again, much thanks and gratitude for sharing your wisdom. I look forward to our future interview.

AW: Thanks for having me, Dr. Mercola.

JM: Okay.

[END]