Dr. Mercola and Dr. Wunsch on the Dangers of LED Lights

Video: How LED Lighting May Compromise Your Health

https://www.youtube.com/watch?v=mOQ2SmaDLOY&spfreload=5

More information about this video, with comments from Dr. Mercola:

https://articles.mercola.com/sites/articles/archive/2016/10/23/near-infrared-led-lighting.aspx

Story at-a-glance

- Near-infrared is important as it primes the cells in your retina for repair and regeneration, which explains why LEDs — which is devoid of infrared — are so harmful for your eyes and health
- One-third of the energy your body consumes comes from the food you eat. The vast majority of the energy your body needs to maintain the systemic equilibrium comes from environmental infrared light exposure
- LEDs sabotage health and promote blindness. Limit your exposure to blue light during the daytime and at night. Swap out LEDs for incandescents or low-voltage incandescent halogen lights

This transcript (10 March 2018) is largely taken from https://mercola.fileburst.com/PDF/ExpertInterviewTranscripts/Interview-AlexanderWunsch-TheDangersofLEDLighting.pdf *, where the full interview can be found.*

Dr. M.: Dr. Joseph Mercola
Dr. W.: Dr. Alexander Wunsch

Dr. W.: I call these LEDs Trojan horses because they appear so practical to us. They appear to have so many advantages. They save energy, they are solid state, are very robust for example. We invited them into our homes but we are not aware that they have hidden properties which are harmful to our system, harmful to our mental health, harmful to our retinal heath and also harmful to our hormonal health or endocrinal health.

Dr. M.: This is one of the most important video interviews I believe you have ever seen. Hi, this is doctor Mercola helping you take control on your health. And today we are joined by doctor Alexander Wunsch from Germany and he is really a world-class expert, one of the best I know of in photobiology. We are going to talk about the dangers, the hidden stealth dangers of LED lighting that you most likely are not aware of. So, welcome and thank you for joining us today Dr. Wunsch.

Dr. W.: Hi, Dr. Mercola.

Dr. M.: Can you describe at a biological level what happens when we are exposed to these wavelengths from incandescent bulbs or solar radiation from you know from the near-infrared and how it helps to restructure at a molecular basis our mitochondria, what happens in the retina? The other light source I neglected to mention was infrared saunas. We can have a discussion on that too.

Dr. W.: The first question we have to ask is, what molecules are we addressing, or what other so-called – In photobiology, you call these molecules chromophores. These are molecules which are capable of absorbing exactly the wavelength you are emitting with the light source.

The first aspect is that we have to consider that there is a so-called optical tissue window, which ranges from 600 nanometers to 1,400 nanometers. So it's almost completely covered by the infrared-A part of the spectrum. This optical tissue window allows the radiation to penetrate deeply into the tissue. When I say deeply, I'm not talking about a millimeter or two. I'm talking about several centimeters or at least an inch or even more. The chromophores in the tissue, which absorb the light energy are – a part of these chromophores is found in the mitochondria and the other part of the water molecules, which are specifically activated. Not in terms of heat radiation, of chaotic molecular movement. The water molecules are specifically addressed.

For example, in the realm of membranes in the exclusion zone, which covers, like sheets, the microanatomical structures within the cells. Talking about the mitochondria first, here we have a specific molecule, which is called cytochrome c oxidase. This molecule is involved in the energy production within the mitochondria.

Energy for cells means adenosine triphosphate (ATP), which is the end product of the correlation of the energy production. This is the fuel that our cells need for almost anything, most for motility, for transporting of ions, for synthesizing products, for metabolism. The ATP production, if it would stop now at the moment, I could survive for another 12 to 15 seconds. My body produces about 85 kilograms of ATP in 24 hours.

Dr. M.: Okay, let's stop there because I've watched many of your videos in English and you have many more in German. I can tell you that you provide so much information in your videos I have to watch them three, four, five times because you just state things as facts which is fine. It's just your presentation style. But that is a phenomenally important statement. I'm not going to let that escape and just let people not appreciate what that is, but 85 kilograms, that's your body weight. We produce in whatever we weigh, in pounds or kilograms, we produce that amount in ATP.

It's just an extraordinary statistic but most people are clueless about. It's a really important concept. The other thing you mentioned is that we can last about 15 seconds without ATP production. We can go four minutes, some people may go maybe 8 or 10 minutes without oxygen. We can go a few days without water, we can go months without food, but 15 seconds without ATP! That's an important thing, that's why we want to focus on this because the light is such an important misunderstood part of the equation for energy production, specifically at the mitochondrial ATP level. So, I'm sorry for interrupting you. I just wanted to emphasize that because it's really important.

Dr. W.: No, it is important to highlight this because the cytochrome c oxidase which is this [light] absorbing molecule, is the last step before the ATP is finally produced in the mitochondria. Here we have this tipping point where light in a wavelength range between 570 nm and 850 nm is able to boost energy production, especially in cells when energy production is depleted. So here we have one important mechanism where this long wavelength part of the spectrum, where the near-infrared light is bolstering the energy situation in our mitochondria.

We know today that many signs of aging, for example, are the consequence of hampered mitochondrial functioning, and so we have a very interesting and still soft tool to enhance the energy status in our cells, in the mitochondria in our cells, and not only on the surface but also in the depth regions and areas of the tissue. This is one important aspect and there are hundreds of papers published on these positive effects.

You can see it for example in wound healing, you can see it in anti-aging procedures. There are many applications developed in the meantime where we use this optical tissue window and we shine through this optical tissue window light in the range which cannot be found in standard general lighting appliances like LEDs or fluorescent lamps. So, the cytochrome c oxidase is responsible for an increased production of ATP. This means in turn that the cell which has a better energy supply is definitely able to perform better. The liver cell with more ATP will be able to detoxify the body much better. The fibroblasts in the skin will be able to synthesize more collagen fibers, and so on. This is one important brick in the wall.

Dr. M.: It's all about energy production. What I didn't appreciate until I heard it from you, is that maybe only one-third, a measly third, of our energy that we produce – and obviously one of those is ATP – comes from the food that we eat. The electrons that are transferred from the food, primarily the fats and the carbohydrates, are ultimately transferred to oxygen and generate that ATP. But only one-third of the energy comes from that. The rest, two-thirds or so, comes from this light exposure. And if you're exposed to LED lights, as you just mentioned – but again, people may [inaudible 20:36] – LEDs don't have that frequency from 500 to, I believe, 800 nanometers, which is the near-infrared primarily that hit the cytochrome c oxidase and generate the energy of the ATP. Can you expand on that? Because I think virtually no one has this appreciation

Dr. W.: Yeah. I think we have to differentiate between the metabolically used energy which definitely comes from food intake, but there is some thermodynamic aspect to it as well. And when you think about the body temperature, I don't know how much it is in Fahrenheit, in Celsius it is 37 degrees, or 310 Kelvin. To keep up this body temperature, it's not only the result of burning carbohydrates in the mitochondria, using the oxygen.

Dr. M.: Just for a moment, the 37 degrees Celsius that you've mentioned is basically a body temperature which is 98.6 Fahrenheit.

Dr. W.: To maintain this body temperature, it's not only the result of energy production in the mitochondria. The heat in our body comes in part from the mitochondria, but the major part comes from longer wavelengths in the infrared range and comes from near infrared for example, because the near infrared radiation in sunlight is very present in incandescent lamp light as well.

This radiation, this energy, this photonic energy is able to even pass through our clothing, because this is one important property of infrared radiation that it just goes deep and it goes through like the terahertz radiation at the airport scanner and so on. The radiation can enter your body and then will be transformed into longer wavelengths in the infrared part. They are very important for supporting the temperature level, the thermal energy level, of our body which is for all the mammals a very crucial aspect. A lot of energy comes in the form of radiation and this is supporting our thermal balance, more or less.

In order to clarify the dangers in principle, I think it's a good idea to express, again, that the light emitted from an LED has not the same quality you would expect from a natural light source. A natural light source normally is a blackbody radiator which gives off all kinds of wavelengths in a more or less continuous manner. The LEDs we have nowadays are fluorescent lamps. They consist of a blue LED, the driver LED, and fluorescent sheet which covers the blue LED and transforms a part of the blue light into longer wavelengths, yellowish light. The yellowish light from the fluorescent layer combines together with the residual blue light to a kind of whitish light which consists of a large portion of aggressive blue light. Blue light has the highest energy in the visible part of the spectrum and induces the production of reactive oxygen species (ROS), oxidative stress.

So, the blue light causes oxidative stress in the tissue and this stress has to be counteracted. We need even more regeneration from blue light but the regenerative part of the spectrum is not found in the blue, in the short wavelength part, it's found in the long wavelength part, in the red and the near infrared. So, tissue regeneration and tissue repair results from the wavelength which are not present in an LED spectrum. So we have increased stress on the short wavelength part and we have reduces regeneration and repair on the long wavelength part. This is the main problem. Diseases come apart in a way our organism is not accommodated to, because we don't have this kind of light quality in nature. This has consequences, the stress has consequences, in the retina. It has consequences in our endocrine system.

Dr. M.: I'm wondering – because there's a whole range of LED lights out there, we're going to step now a little bit into what you can do with this knowledge. Are there – and many people had this question – you can get cool white, which is the high blue light LEDs which are bright white versus the warm white LEDs. I'm wondering if you can – if there are types of LEDs that do have some of the red and the near-infrared in them or they just don't exist? And another version of this question, are there any healthy LEDs?

Dr. W.: Well, there is no easy answer to that.

Dr. M.: Like most good questions.

Dr. W.: Because when you bought an incandescent lamp, you exactly knew everything about the spectral distribution for example. You knew that after a thousand hours it would fail, break, stop functioning. In the LED world…

Dr. M.: Let me just interrupt you for a moment on this, because there's an interesting component. Everyone knows that the old incandescent bulbs fail at 1,000 hours, that, folks, is by design. There's a movie, a documentary about planned obsolescence [The Light Bulb Conspiracy, a film by Cosima Dannoritzer, 2010]. These bulbs could last a hundred years continuously if they designed it that way. It's designed to fail in a thousand hours. So, I'm sorry for interrupting. I just thought it was an interesting tangent.

Dr. W.: With the LEDs everything is different because there are LEDs where you have high portions of blue in a warm appearing light because the blue is masked by high amounts of yellow and orange. There are also LEDs available with lower portion in the blue which are very close to the spectral distribution of incandescent lamps with regard to the bluish part of the spectrum. It is impossible to tell without measurement. This is the problem. With an incandescent lamp you knew what you would get and with LED, the layman is not able to tell if it's a tailored spectrum where you have the blue part only masked by excessive parts of other spectral regions…

Dr. M.: But what we want to focus on now is that literally, the danger. There's no question there's danger in LED light exposure all the time of the day, but it's a relative one, so that if you're exposed to LED light and there's lots of biological full-spectrum sunlight through the windows – which is a whole other issue too, that we can talk about because sunlight outside and through the window are two different animals – but if you have that as a component, it's not as biologically dangerous because I believe that that compensates specially with the higher frequencies and the sunlight. But it becomes really dangerous at night.

From this perspective, I haven't changed all my lights back to incandescent because there's such energy hogs and really the only ones that I use at night because I have a big house and there's lots of lights and people, contractors and stuff, come over all the time. They leave lights on all the time. It would be crazy. That's just a magnificent and extraordinary waste of energy if they did that. But I never use these lights. I just leave them in there.

But the ones I use all the time, that you really realize… Take this message of this presentation: you got to switch back to incandescents. And not just any incandescent. There are incandescents that are clear, [have a] transparent outer bulb, not the ones that are coated with the white to keep a cool white light. You want the 2700 degree Kelvin, incandescent, thermal analog energy source of that light. It's the only light I use at night.

Now personally, it's the only light I use after sunset and even then, once the Sun goes down, I put on my blue blockers. I neglected to keep them on here now but it's because it's the middle of the day. I would put them on. I call them reverse sunglasses. I don't care what company you get them. You can get them under $10. Spend $100 for them to get whatever you like. But the moment the Sun goes down, these blue blocker go on, even if there's incandescent sources. So, that's my summary and I'm wondering if you could expand and really amplify those comments.

Dr. W.: It is definitely a good idea to keep away the short wavelengths in the evening, so after sunset as you said. And it's also a good idea not to intoxicate your environment with too much light. We know in the meantime that artificial light levels at night have reached insane intensity. The intensity of a candle, for example, is absolutely sufficient for orientation.

If you have to read in the evening or probably even at nighttime, my personal favorite light source for reading tasks is a low voltage incandescent halogen lamp which is operating on a DC transformer. So direct current will eliminate all the dirty electricity and it will eliminate all the flicker. There are for example transformers available where you can adjust the output between 6 and 12 volts. As long as it is direct current, there is no flicker, there is no dirty electricity and you are able to dim the halogen lamp into a color temperature which is comparable to candle light even. So this is the softest, the healthiest electric light you can get at the moment. No LED will ever be so energy efficient, because you were talking several times about the energy efficiency. If we extend the spectral range to the non-visible part of the near-infrared radiation – let's say if you would calculate the energy efficiency from 400 nanometers to a 1,400 nanometers, then the light source with the highest energy efficiency, would you like to make an educated guess?

Dr. M.: Probably the shorter wavelengths, I would think.

Dr. W.: The light source with the highest efficiency in the range from 400 nanometers to 1,400 nanometers would be

Dr. M.: Would be incandescent.

Dr. W.: Halogen incandescent lamp

Dr. M.: Many people didn't know this either until you explained it to me that halogen is an incandescent lamp. It's an analog thermal light source. It's not digital.

Dr. W.: Yes, and it is up to 100 percent more energy efficient, compared to the standard incandescent lamp. So, you have better energy use, you have less energy waste, and if you take into account the near infrared radiation and if you decide for your eyes for example for light hygiene of your retina, for your retina, that you want to have these long wavelengths in addition to the visible part, then the low voltage halogen lamp is the best and it reaches four thousand, five thousand and in a dim state, even ten thousand hours of lamp life.

Dr. M.: Is this the AC halogen or is this only with DC?

Dr. W.: We can only talk about high voltage and low voltage. Because the incandescent lamp can be operated on AC as well as on DC. But if you operate the low voltage incandescent lamp on DC, you have zero dirty electricity. If you operate on AC, you have 20 times more dirty electricity compared to the AC high voltage one. It's a little bit complicated. It's physicists' stuff, but AC, alternating current always produces dirty electricity. In the low voltage ones, you need much more amperage. So, it's the current and the other factor: the volt and the ampere. The ampere raises at a factor of 10 if you are working with AC on low voltage. So, the best are low voltage halogen lamps with DC, because those are the ones which reach up to 5000 and even more hours of lamp life.

Dr. M.: Okay. That gives us a pretty broad picture of some practical information we can now use to light ourselves at night. I mean, ideally. This is why our ancestors were so much healthier. Not only did they have more access to better food typically, they weren't processed or commercialized, they had better biological healthy analog light sources that were thermally based, not digitally based. That would be the best. Now, the other danger that most of us are exposed to pretty much every waking hour is our devices. Our computer screens, our tablets, our phones. They're almost all LED based and there's a lot of components here – and our e-readers too.

I use an e-book reader on the beach. It's called Kindle, the e-ink reader. Although it has an LED backlight that you can use at night, you can turn it all the way off and just look at the sunlight, which is reflected. I think that's really the ideal type of computer monitor that you could use. They are made -- I'm in the process of trying to find one. But in the meantime, I just recently purchased a notebook that has an organic light-emitting diode (OLED) screen and not an LED monitor.

It's really interesting because I'm a firm believer that you should use f.lux on your monitor not just at night. The default setting for that is to just come on at sunset, and yes that's helpful. It's probably the time that it's most important. But I keep it on all the time. There's no way I'm going to expose myself to that type of bright intensity light. But even though I can change a color temperature, it still has this digital pulse faking out my biology.

I want you to talk about the difference between OLED, LED, e-ink, f.lux, and also if we are outside and we have this LED or OLED screen and we've got the f.lux on, what I find personally is that I don't need to keep it all down at 2,700 degrees. I can essentially deactivate f.lux and put it up to 6,500 degrees if I need more light because you got all this light coming in. It sort of drowns out that monitor. I'm wondering if that's biologically healthy. A lot of stuff at you but these are really important questions.

Dr. W.: Talking about our digital screens, I prefer personally to reduce the correlated color temperature also during the daytime for my notebook. And as you already said, the e-ink would be a perfect solution because in this case you can exactly control the quality of the incident light and by that you can control the quality of the light which will be reflected by the e-ink display The problem is that for motion pictures it's just too slow. It's good for reading tasks but it's not good for watching videos or so.

The f.lux is one option you have. It depends a bit on the quality of your screen and the settings you are using if it really comparable to effective extinction of the blue light component, and what you could achieve with screen blue light protection glasses. Because they allow to eliminate the short wavelengths even better. The OLEDs technology, I'm not sure if the color is really stable in every angle you can look at the display.

The OLED technology? I'm not sure if the color is really stable in every angle you can look at the display but definitely if you have a screen technology where black is really black, then you have less radiation coming to your eyes. The OLED technology is able to provide this. So the high contrast between black and white, all the black areas in a TFT screen (thin-film-transistor) or the standard screen are not really black. They are also emitting shortwave radiation. The OLED screen only emits where you see light, where there is black on the screen, there is no light. This might be preferable as long as you have no problems with the [viewing] angle.

Dr. M.: It’s magnificent. I really love my new notebook. What I’ve noticed – I’ve compared the notebook side by side in the same settings outside and I put f.lux on both at 2,700 degrees Kelvin, which is an advanced setting that you have to go. It’s in the upper right hand corner. It only goes down to 3,500 normally, which is the color temperature of halogen. You have to go to 2,700 and do it in advanced setting. But when you do that, Dr. Wunsch, it’s amazing. The OLED is actually the same color you would see when you put on the blue blockers. And then the LED conventional notebook is like, you can tell it’s like a blue light. You can see it night as day when you compare it. It looks orange when you have it by itself, but when you compare it with an OLED, there’s a dramatic difference. I’m also wondering, do you minimize the digital impact on the cell biology that you were referring to earlier with the OLED versions and LED?

Dr. W.: This depends again on the technology of dimming. I bet that you can get OLEDs displays with the pulse-width modulation dimming technology and you can also get OLED screens with the improved dimming technology, where you have reduced flicker or even eliminated flicker activity. These are the factors you would have to look at, and this is not so easy. Normally, you would need a flicker meter when you purchase or when you buy your notebook, and you should check – this is a recommendation – you should check every electrical lighting appliance before you buy it and bring it into your home.

Dr. M.: As I mentioned in the beginning, if it’s not obvious by now, you are just a wealth of information in this area. We’re definitely going to have you on multiple times to expand on this because there’s so much information that people need to know to absolutely have a better understanding.

What I really love about some of your videos – we’re going to have links to those videos, the English ones – is that you put this in a historical framework, which is just so magnificent because once you understand the historical framework, you can start to begin to develop a deeper appreciation of how we veered on this path toward literally sabotaging ourselves with what we think is useful technology. But it has these enormous downstream biological side effects that we’re exposing ourselves to.

With knowledge, we can proactively prevent most of this. But I think, to summarize this, because we’re just kind of wrapping up, we really need to limit our exposure to this blue light. And it’s not, not, not just at night, it’s all day long. That’s why you want to avoid these exposures. It’s really important that you do that. Get the incandescent lights at night, blue blockers. Remember, it’s so simple. As soon as the sun sets, I don’t think you disagree with this, you put on those blue blockers. Nothing beats it. Don’t take them off unless there’s an emergency or you have to read something really carefully. It’s just that you’re sabotaging yourself when you don’t.

You’re increasing your reactive oxygen species and your retina pigment epithelium. You’re producing your production melatonin not only in your penial gland, but also in your retina and other tissues. It’s just so critical, and we never even touched on the other hormonal components. That’s a whole other interview. I think that’s about all we have time for. But I want you to summarize things from your perspective and emphasize any points you’d like to.

I am sure this is going to help so many people because, again, age-related macular degeneration is a serious, serious issue. I’m telling you, I just hope and pray to God that we can spread this message far and wide. Share this video with every one of your friends and family because they need to know. Otherwise, we are going to have – We already have an epidemic of obesity. We have an epidemic of heart disease. Cancer. Alzheimer's. We're going to have an epidemic of blindness unless we can get ourselves away from these chronic unopposed blue digital light sources, especially at night.

You've got to spread this message far and wide if we want to prevent this blindness epidemic. Just like cigarettes, it's not going to happen tomorrow, next week, next month, or next year. It's this chronic exposure. We need decades of this exposure before we're going to see it. For most of us, it's less than 10 years that we've had this exposure. We're not going to see it for a while. But it doesn't diminish the danger and the damage any less. So please spread this message far and wide. We are definitely having you back on again, Dr. Wunsch, because you've got so much incredible information to share and there's going to be a lot of questions on this too. Thank you so much.

Dr. W.: Thank you very much, Dr. Mercola.