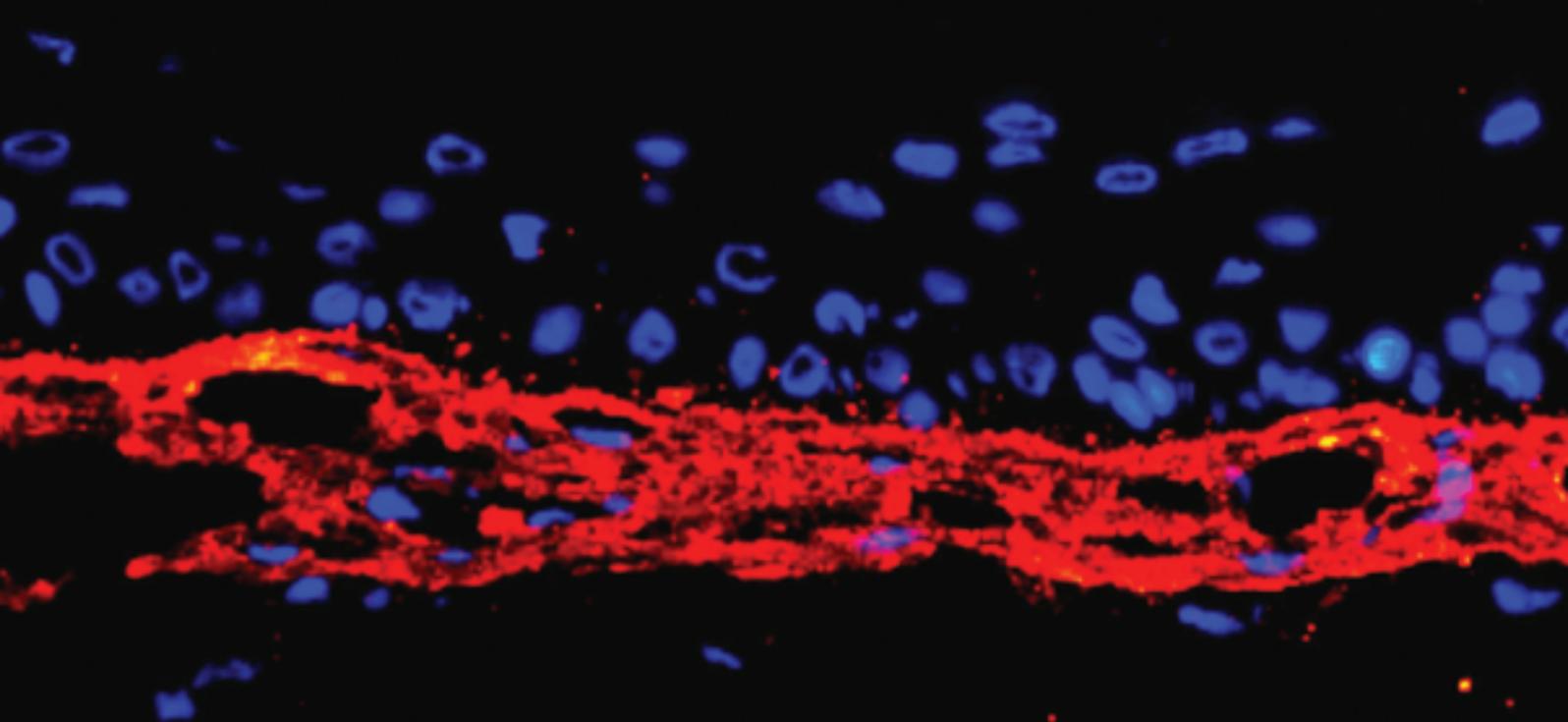
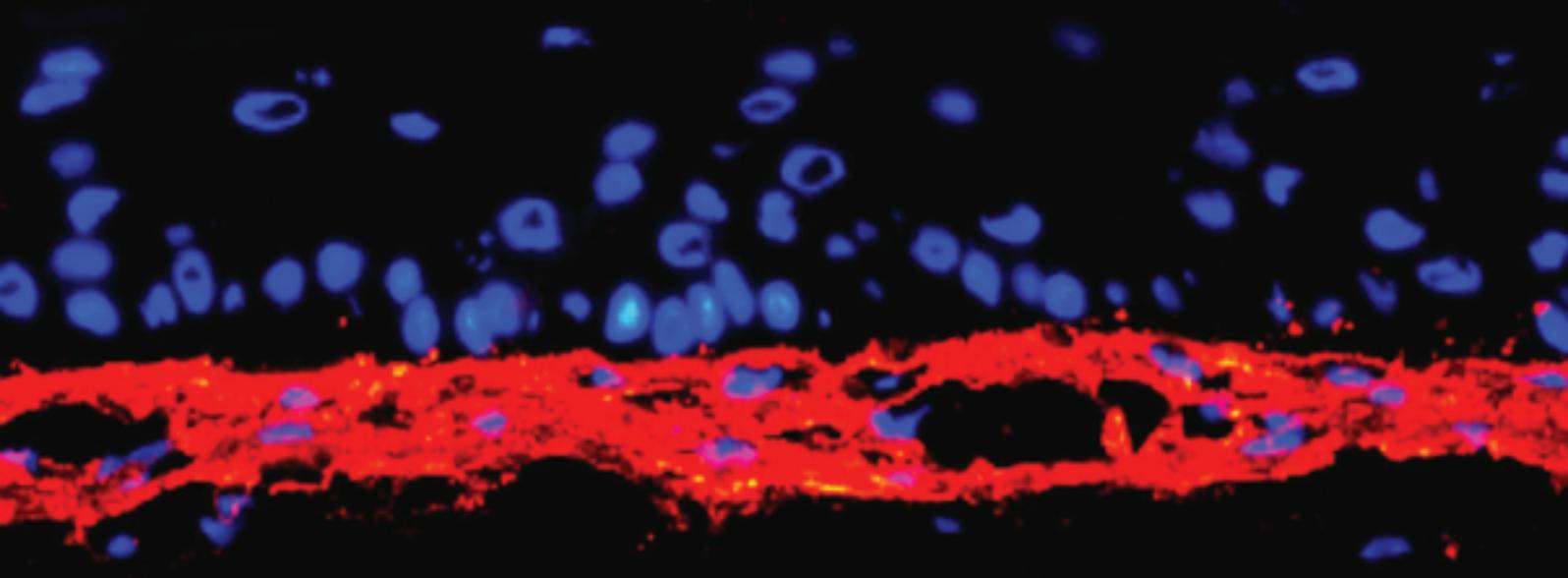


LED Science and System Design



Matures Quickly

Light emitting diode (LED) technology for skin rejuvenation and acne treatment is now available in a variety of competing products. And according to several experienced users, the future is bright for this new modality.



Mark Rubin, M.D., a cosmetic dermatologist in private practice in Beverly Hills, Calif., uses the OmniLux LED system from Alderm (Irvine, Calif.) as the light source for photodynamic therapy (PDT).

Dr. Rubin, who is also an assistant clinical professor of dermatology at the University of California, San Diego, uses the red wavelength (633 nm OmniLux

Revive) in the treatment of non-melanoma skin cancers, primarily actinic keratoses (AK's). "For AK's, we usually try to incubate the ALA (Levulan) for 30 minutes. First, though, we normally perform an acetone scrub or micro-dermabrasion. Then the OmniLux light is applied for 20 minutes. Because OmniLux has a large panel of light, you can cover large areas, so it is easy to treat an entire face or the forearms in one sitting."

By Michael Moretti, Editor

With very different LED systems in the marketplace, “what you learn from one device doesn’t necessarily carry over to another,” Dr. Rubin conveyed. “For instance, the wavelength and the intensity of the OmniLux is significantly different than with GentleWaves (Light BioScience) or other LED devices.”

OmniLux, which was the first LED to obtain FDA approval, was originally developed and optimized for PDT in the treatment of non-melanoma skin cancers by scientists in European cancer research hospitals. It was designed to deliver the correct wavelength, intensity and dose so that it specifically targets the activation spectra of the target chromophores. It is now widely accepted that the correct wavelength intensity and dose are essential for effective photodynamic therapy.

According to Glen Calderhead, Ph.D., president of SG Biomedical in Japan, and research coordinator at the Japan Phototherapy Laboratory in Tokyo, “For skin rejuvenation, the continuous wave 633 nm light from the OmniLux Revive head penetrates far enough into the target dermis to involve not only the superficial and fine reticular dermis, cell population, blood vessels and lymphatics, but also right down into the mid and even deep reticular dermis.”

Bruce A. Russell, M.D., is a dermatologist in a private research based practice in Portland, Ore., “Although the mechanism of action for LED is different from high-powered modalities, LED sources can be



Mark Rubin, M.D.

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extremely effective if they are properly used and well made,” he said. “I’m excited primarily about rejuvenation and acne.”

Protocols vary for photorejuvenation with the OmniLux. “Treating patients twice weekly for around four to six weeks, depending upon progress and overall sun damage burden, seems to be giving the majority of patients a nice result,” Dr. Russell said. “For inflam-



Before Tx



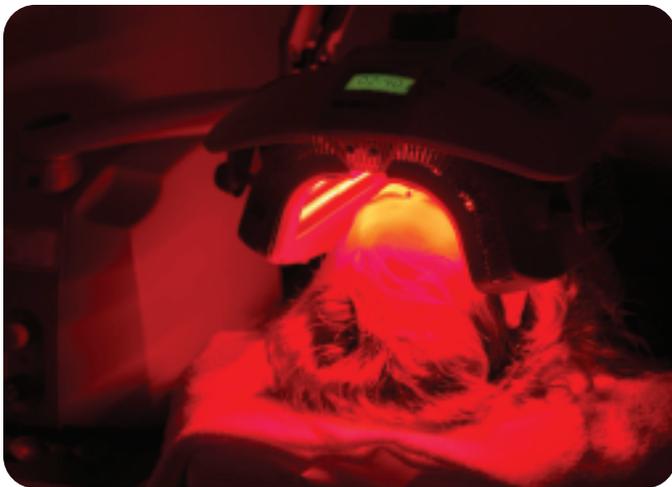
After OmniLux Tx

Photos courtesy of Bruce A. Russell, M.D.

matory acne, most patients can get by with eight sessions, two sessions per week for four weeks. In these cases, we like to alternate blue and red wavelengths. Fortunately, OmniLux provides us other wavelengths besides just blue. The first session is blue, the second session red, the third session blue, etc.”

Dr. Russell is helping to develop a third wavelength for the OmniLux, which should be available later this year. “We’re in the middle of clinical trials. This new wavelength is showing real promise for deeper cystic acne and more complicated cases of rejuvenation.”

Some competing LED systems “have blue light, along with about 500 other wavelengths, but the blue output is not pure,” Dr. Russell noted. “Some of the blue lights out there also have a fair amount of ultraviolet light in them. This is not necessarily beneficial. In contrast, the spectral output of the OmniLux is exactly the wavelengths that are advertised. The device also has much greater intensity than many of the other LED systems.”



LumiPhase-R procedure

In addition, the OmniLux features four or five panels (each with several hundred individual lights) that are moldable. “You can flex the panels to resemble the shape of the face or the back or the limb,” Dr. Russell related. “However, for those of us accustomed to using high-powered lasers, it takes awhile for us to acclimate ourselves to the fact that lower level light sources like LED systems can be effective. The reason the future seems so bright for LED is that its mechanism of action appears to be quite different from high-powered lasers. Many of the effects we are seeing with LED lie outside the traditional selective thermalphotolysis mechanism of action.”

The LumiPhase-R from OPUSMED (Montreal, Canada) targets fibroblast in the dermis. “By using an *in vitro* model called human reconstructive skin, we were able to prove that treatment with the



Bruce Russell, M.D.

“After a series of treatments, patients can expect close to 60% improvement in their skin appearance.”

LumiPhase-R reduces not only collagenase (MMP-1), as stated in early reports, but also gelatinase (MMP-2),” said Daniel Barolet, M.D., dermatologist and chief scientific officer at OPUSMED. “You have an effect on collagen, as well as on elastin and other components of the dermis.”

Two sessions a week for six weeks are recommended with the LumiPhase-R. “After a series of treatments, patients can expect close to 60% improvement in their

skin appearance,” Dr. Barolet noted. “However, this improvement is not only in fine lines. There is also a reduction in pore size and sometimes an improvement in erythema.”

Dr. Barolet, also a clinical instructor of dermatology at the University of Montreal, stated that “the LumiPhase-R is the most powerful LED platform on the market. In fact, we’re using our platform to photoactivate a porphyrin derivative like aminolevulinic acid (ALA) to remodel the dermis. Eventually, we’ll have infrared for other applications. We call this new concept photoregulation. Our platform is also versatile. You can easily change the treatment head from red light to blue light.”



Daniel Barolet, M.D.

The Revitalight Skincare System from Skincare Systems, Inc. (Chicago) “appears to be more powerful than other LED systems and we see results faster,” said Mark Lees, Ph.D., a skincare specialist and product developer from Pensacola, Fla., who has been performing LED treatments for about four years now. Patients schedule six treatments at two week intervals.

“I typically use the red light setting for aging skin,” Dr. Lees said. “The main thing I’ve observed with LED in general is a big difference in diffuse redness. Rosacea patients, for example, do very well with LED because it really helps with the redness. I’ve seen a difference with the Revitalight after only one treatment.”

Dr. Lees prices a series of LED treatments at a much lesser patient cost than a number of single sessions. “The surface of the skin looks a lot better after a series of treatments in terms of smoothness and clarity,” he said. A typical session with the Revitalight lasts only 20 minutes compared to 30 to 40 minutes with many other LED systems. “I also appreciate the massage option, which allows the patient to receive a slight vibratory massage at the same time. Clients really like this feature,” Dr. Lees said. “There is also a blue light option for acne. We are currently doing a photography history on a few case studies. So far, we are seeing some nice improvement in acne.”

Overall, LED “is just one more great modality to put in the arsenal,” Dr. Lees commented. “However, I don’t believe it is going to replace what we currently use. I don’t like jumping from one modality to another. We shouldn’t forget about glycolic peels or extraction or good products for home use. I think home care is incredibly important with LED and other therapies. What that client does to her face 24/7 greatly influences results.”

The Revitalight has shown impressive results for scars and wound healing. “We’ve seen dramatic improvement, even in very old scars,” observed Kenneth Mark, M.D., a dermatologist in private practice in New York City and Southampton, N.Y. “The redness fades and the skin looks like normal tissue.” Dr. Mark has also had success using the Revitalight to firm and tighten skin, as well as helping with fine lines. “One patient described their skin as having more elasticity and firmness.”



Kenneth Mark, M.D.

“The Revitalight is very user-friendly,” continued Dr. Mark. “There is no irritation to the skin and no downtime. The patient enters and leaves. No one knows they have had anything done.” Dr. Mark’s aesthetician operates the handheld device. “She simply applies the treatment head to the skin. A treatment session lasts 20 to 30 minutes. Unlike other devices, in which a patient sits in front of a panel of lights, the Revitalight is more of a pampering experience. Patients can lie on their back and let the operator apply the device to their skin.”

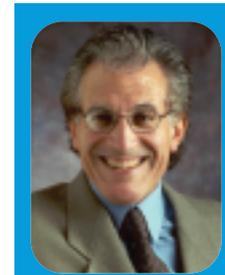
Most patients schedule a series of six treatments with the Revitalight, spaced two weeks apart. “After three months, most patients return for monthly treatments, but they are probably better off coming in every two weeks,” said Dr. Mark, also a clinical

“There is really good science behind LED. Studies have shown that LED technology inhibits enzymes that breakdown collagen.”

instructor of dermatologic surgery at New York University. “There is really good science behind LED. Studies have shown that LED technology inhibits enzymes that breakdown collagen; therefore, you have less collagen degradation. You also have all kinds of stimulation of certain biochemical pathways that appear to have a clinical effect. Patients are definitely coming back. We’ve had the Revitalight for almost one year now. Not one patient has asked for a refund.”

The GentleWaves LED Photomodulation system from Light BioScience (Virginia Beach, Va.) “allows for intervention of mild to lesser-severe aspects of sun-

aging, including lesser changes of color, pigmentation and texture,” said Douglas Key, M.D., an associate clinical professor of dermatology and science at the University of Oregon Health Sciences Center in Portland, Ore. In the majority of patients, Dr. Key first performs light DiamondTome microdermabrasion. “For the newly entering patient with less severe sun damage, the initial number of sessions would be four to six at one to two week intervals.” Maintenance therapy is scheduled every one to two months.



Douglas Key, M.D.

“Once we define patient expectations, our patients have been extremely pleased,” said Dr. Key, who also has a private practice devoted exclusively to aesthetic medicine in Portland. “LED is very much a growing trend in aesthetics. All modalities before GentleWaves have done very little to accelerate or amplify the actual healing process. They have been destructive of pigmentation and vascularity, while promoting collagen remodeling from a micro-injury. On the other hand, GentleWaves may well be the first accessible technology that actually can amplify the very process of wound healing. I think GentleWaves not only maintains the effects achieved from other modalities, but improves the results.”

Gordon Sasaki, M.D., a plastic surgeon in private practice in Pasadena, Calif., added that the GentleWaves “represents one of the new, fully integrated LED systems, which is unusual.” The device primarily dwells on the 590 nm dominant yellow light to non-thermally photomodulate up or down the mitochondrial and genetic activity of living cells to reverse many of the common patterns of photoaged skin. “What attracted me to GentleWaves is



Gordon Sasaki, M.D.

that it is a lock-and-key device, where the science has preceded the marketing.” Dr. Sasaki said. “There are a good number of *in vitro* studies involving human fibroblast that demonstrate that GentleWaves technology causes an increase in the cell’s ability to produce more collagen and elastin. At the same time, there is a reduction in the production of collagenase. This degrades many of the structural proteins such as collagen I and elastin.” ■