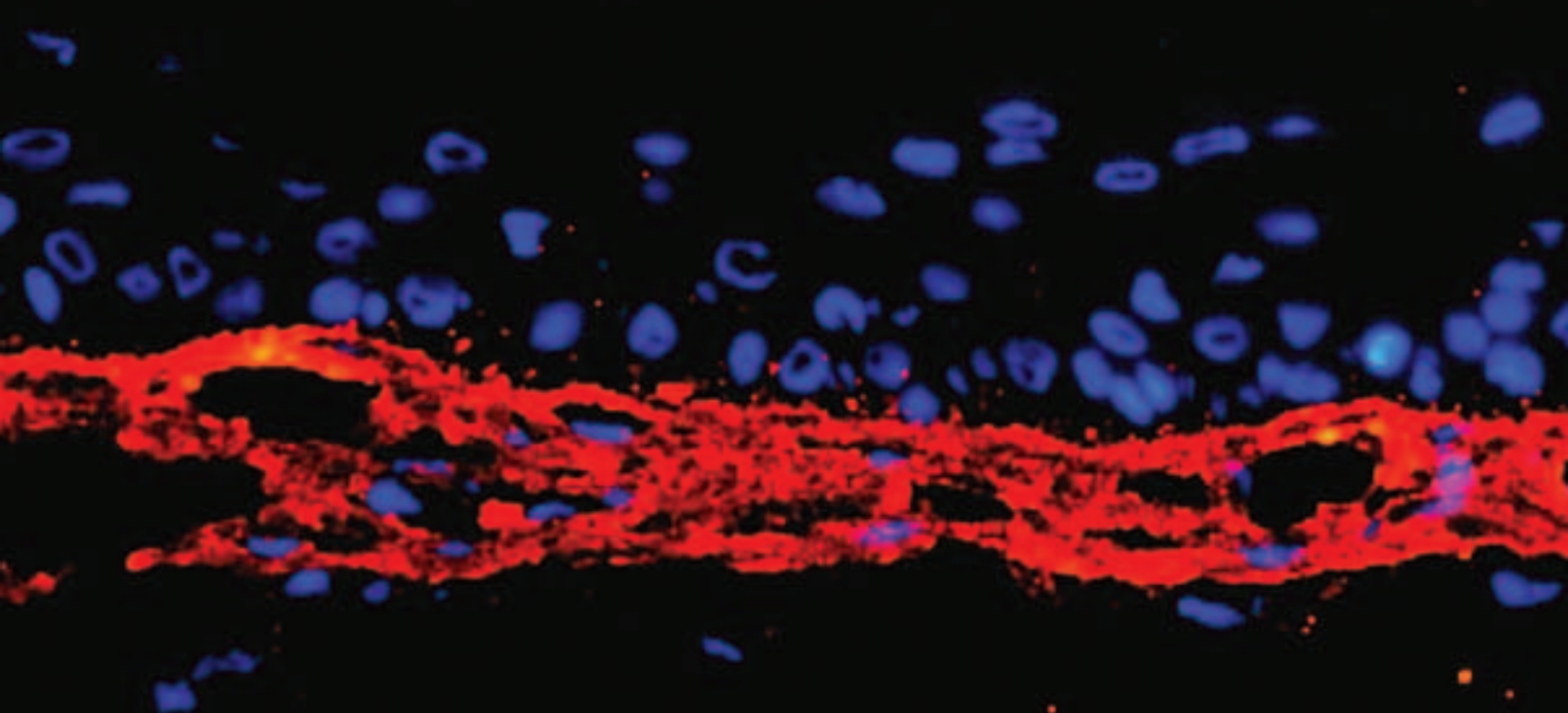
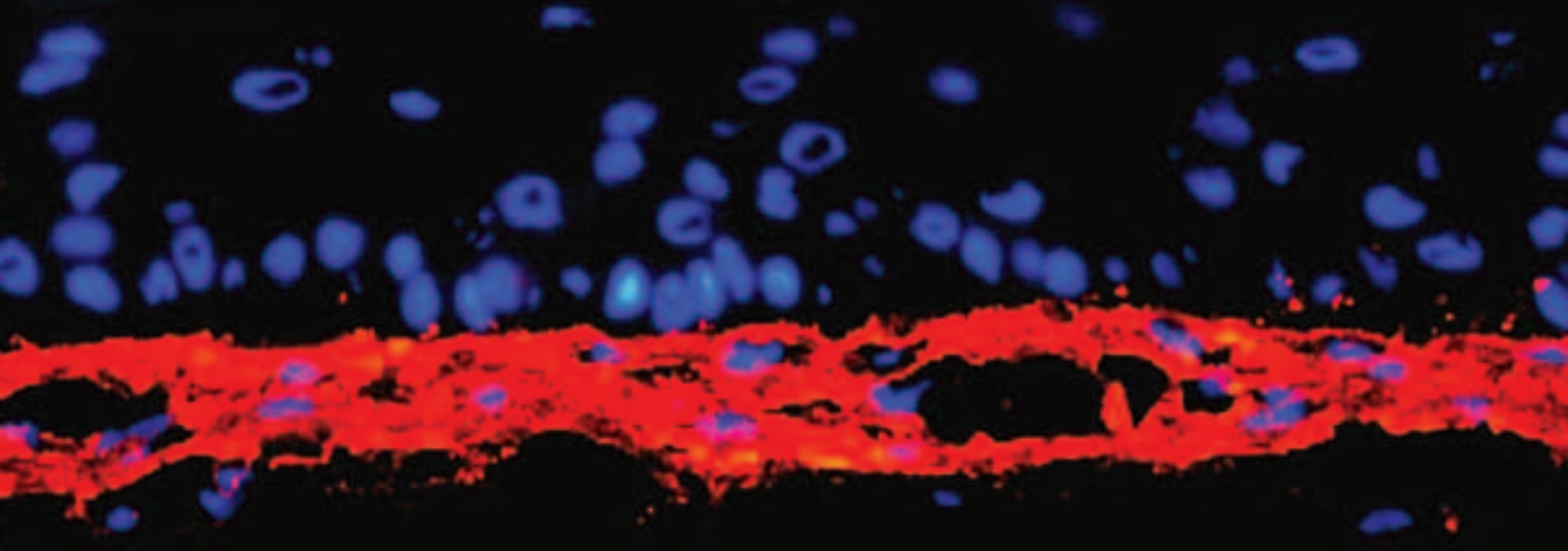


LED Science and System Design



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

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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-



Mark Rubin, M.D.



Before Tx



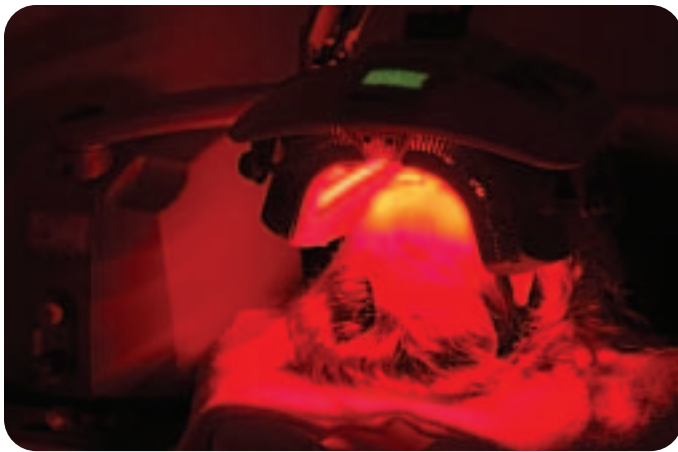
After OmniLux Tx

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.”



Bruce Russell, M.D.

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 LumiPhase-R reduces not only collagenase (MMP-1),

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

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 Max7 LED system from Flip4 (Sainte-Julie, Quebec, Canada) features seven preprogrammed polychromatic treatments, ranging in wavelengths from 400 to 700 nm. “We have added the Max7 to our array of therapies and are pleased with the results we are seeing,” said Alex Martin, M.D., Ph.D., chief medical director for Clinique Ergonique, a franchise of full-service medical spas headquartered in Newport Beach, Calif. “Max7 is very non-labor intensive. There is also

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no recovery time, unlike the downtime with laser treatments. However, it takes many more sessions of LED to achieve the effect of a laser in one or two sessions.”

Six to eight sessions, one week apart, are usually recommended with the Max7. A typical session lasts 30 minutes. “The two primary indications that we treat are small vascularities and fine lines around the eyes, which give a tired look to people,” Dr. Martin explained. “We’ve noticed a 75% to 80% success rate. This is pretty high for a piece of medical equipment that is non-invasive.”

Clinique Ergonique tends to schedule the Max7 prior to using other modalities. “It seems to increase blood flow to the skin surface,” Dr. Martin said. “We can then perform a facial coupled with a non-acidic enzyme peel. We also combine LED in treating individual lesions on the face with the 1064 nm Nd:YAG laser.” Furthermore, the Max7 operates with a unique robotic arm, which gently sweeps across the patient’s face and décolleté region. “This allows the patient to truly relax



Max 7 LED Tx

in privacy before being subjected to a more invasive procedure and also frees the technician to do other tasks in between therapies,” Dr. Martin said.

The Dermajoule LED system from Bella Products, Inc. (Foothill Ranch, Calif.) is a non-ablative treatment that causes no tissue damage. “There is no appreciable heat generation,” said Richard Skolnik, M.D., a plastic surgeon in private practice in New York City and chief of residency training in aesthetic surgery at Mount Sinai Medical Center. “The procedure appears to stimulate the cells at a microscopic level.”

“Everything has been microsized, so the whole unit can be handheld,” said Dr. Skolnik. “The Dermajoule is easy to operate and can be used by an aesthetician or nurse. The device is also very reliable and performs consistently,” Dr. Skolnik likes to refer to the procedure as photobiostimulation. “The assumption is that we are stimulating at a cellular level the mitochondria to increase the output of adenosine triphosphate (ATP).

“LED is the wave of the future in both non-medical and medical technologies because of its efficiency and controllability.”

Patients love the treatment. The more sun damage they have, the more impressive the results.”

Six sessions are recommended, spaced seven to ten days apart. Each session lasts about 15 to 20 minutes. “If we combine it with microdermabrasion, we seem to achieve results more quickly,” Dr. Skolnik said. “Peels or topicals also seem to work far better when combined with the Dermajoule. There is a glow to the skin and a decrease in fine lines.”

Dr. Skolnik predicts that “LED is the wave of the future in both non-medical and medical technologies because of its efficiency and controllability. I also believe that LED is going to have medical applications outside plastic surgery and dermatology.”

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

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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.”

“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 instructor of dermatology 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



Kenneth Mark, M.D.

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

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.

“Once we define patient expectations, our patients have been extremely pleased,” said Dr. Key, who also

“I think GentleWaves not only maintains the effects achieved from other modalities, but improves the results.”

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.”



Douglas Key, M.D.

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 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



Gordon Sasaki, M.D.

“What attracted me to GentleWaves is that it is a lock-and-key device, where the science has preceded the marketing.”

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.”

“Recently published clinical studies about GentleWaves continue to support these *in vitro* cellular models that maximize the net increase in dermal

collagen and reverse many of the signs of photoaged skin in young and mature patients alike,” said Dr. Sasaki, also a clinical professor of plastic surgery at Loma Linda University. “When GentleWaves was introduced into my practice, I thought my patients and staff would be underwhelmed by the technology, and not notice any significant beneficial results. To my surprise, though, unsolicited comments from my staff and patients revealed that there was an appreciated improvement in skin fitness, usually within one to three treatments, once or twice a week. Positive word of mouth has spread very quickly in our community.”

LED is non-invasive and can be used on all skin types (regardless of ethnicity). “It is also a procedure that compliments other, more irritating techniques like

“We use LED on almost every patient as an adjunctive procedure to compliment both ablative and non-ablative techniques, including hair removal.”

surgery and peels,” Dr. Sasaki said. “We use LED on almost every patient as an adjunctive procedure to compliment both ablative and non-ablative techniques, including hair removal.” Dr. Sasaki also believes GentleWaves is “an ideal modality for the younger patient because it is so quick. It only takes about 35 seconds. Rapid turnaround time is an important consideration in a busy practice. Treatment is both safe and effective.” ■

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