Not all lights are created equal. Some are visible to the human eye as colors. Others, though not perceivable, produce long-lasting biological effects. For example, ultraviolet (UV) light (10-400 nm), which comes to us in the flavors of UVA, UVB, and UVC (though little of the latter reaches the earth), is well known to alter our skin cells at the genetic level, causing DNA damage. The result: aged, weathered skin; precancerous skin lesions known as actinic keratoses (AKs), and in the worst-case scenario, skin cancer.

Yet there are other types of light that can help fight these problems. An emerging field of light-based technologies, known by names such as phototherapy (light therapy) and photorejuvenation (light-based anti-aging), is having a major impact in turning back UV-induced skin damage.

WHAT IS PHOTOAGING?
“Photoaging” refers to skin damage and skin aging caused by intense and chronic exposure to sunlight, specifically UVA and UVB rays. Some visible effects of this damage include uneven pigmenary (color) changes, broken blood vessels, and roughness on the skin surface. Beneath the skin, UV damage can cause structural alterations in collagen and elastin (proteins that contribute to skin strength and elasticity), resulting in wrinkling, sagging, and a leathery texture. The quest to reduce, and perhaps reverse, the many signs of photoaging has led to a variety of dermatological inventions and discoveries. Ironically, many of the resulting treatments use light energy as their primary source! Today, dermatologists now have available a large array of light-based strategies to treat photoaging.

PHOTODYNAMIC THERAPY
Photodynamic therapy (PDT), sometimes referred to as phototherapy, is a relatively novel way of treating varied skin ailments. PDT has been shown to treat AKs, which often indicate long-standing solar damage. And recently, scientific studies investigating the use of PDT in skin rejuvenation have yielded promising results. The technique involves applying the face a “photosensitizing,” or light-sensitizing, medicine [most oftenaminolevulinic acid (ALA), and more recently, methyl aminolevulinate}
Some lasers are used to treat multiple problems, including wrinkles, sun spots, broken blood vessels, uneven texture and sometimes even stretch marks. This type of treatment is often called “laser resurfacing.”

**INTENSE PULSED LIGHT**

Intense pulsed light (IPL) is commonly used for a variety of dermatologic concerns. Like a laser device, it uses light energy to deliver its therapeutic effect to the skin. IPL technology uses a band, or range, of wavelengths, such as 555 through 950 nm. Research has shown IPL to be effective in treating uneven pigmentation and reducing the appearance of broken blood vessels. A 2003 study found that about 50 percent of participants perceived a moderate reduction in their pore size after one IPL treatment session. However, the improvement had diminished within six months, suggesting the need for repeated treatments over time.

**LASER RESURFACING**

The use of lasers involves recruiting a single specific wavelength of light to treat a plethora of skin conditions. Historically, most lasers for this purpose were ablative, meaning they surgically removed the skin’s top layer to reveal a softer, smoother skin surface. Currently, there is a growing interest in investigating the novel properties of existing lasers as well developing new ones.

Lasers are frequently referred to by their wavelengths. For example, the laser used to treat blood vessel-related conditions is called the 595 nm laser. The same laser may have many different brand names, depending on the company that produces it. The goal of a laser treatment is sometimes very specific; e.g., minimizing facial blood vessels, the removal of hair, or the treatment of dark “sun spots” (also known as brown spots, age spots, or solar lentigos). However, some lasers, such as the 2,940 nm Erbium:YAG laser, the 10,600 nm CO2 laser, and the 1,550 nm “fractionated” laser, are used to treat multiple problems, including wrinkles, sun spots, broken blood vessels, uneven texture and sometimes even stretch marks. This type of treatment is often called “laser resurfacing.”

Fractionated lasers are among the newest technologies in laser photorejuvenation. “Fractionated” means that the light energy is broken up into and delivered as neat columns instead of being transmitted in a large bolus (a single, large, concentrated dose) as is common with traditional lasers. This allows for deeper levels of penetration, quicker and better healing, and more evenly distributed results.

Fractionated lasers come in two flavors: ablative and non-ablative. The fractionated ablative laser (10,600 nm; one example is the Active FX™ laser) removes the top layers of the skin, allowing newer, healthier skin to grow. The results are often dramatic, with tightening of the skin and the removal of superficial wrinkles, sun spots, and some broken blood vessels. The disadvantage is the healing time needed after the procedure, which at times requires five days off work. In addition, sometimes the post-procedure redness can last a month!

Non-ablative lasers, such as the Fraxel re:store®, employ a much different wavelength (1,550 nm). While these lasers also divide the light energy into neat columns, the top layers of the skin are not removed when energy is delivered to the deeper layers. With a non-ablative laser treatment, patients can return to work within a couple of days and post-procedure downtime is minimal. However, the results in terms of wrinkle and sun spot removal are not as dramatic as with ablative lasers.

Clearly, the interest in treating skin aging through light-based technologies is growing. Dermatologists, scientists, and patients on all fronts are trying to make sense of and put to best use the rapidly growing body of knowledge about emerging treatment methods. The options for patients appear limitless. As always in medicine, patients seeking an optimum treatment plan should carefully consult with the physician — ideally a dermatologist well-versed in photorejuvenation — to design the most personalized, targeted approach.

**References available on p.96.**
References

THE TALE OF TANNING (P.18)

9. Ibid.
10. Ibid.
12. Ibid.
13. Ibid.
14. Ibid.
15. Ibid.
18. Ibid.
19. Ibid.
20. Ibid.

LIGHT FOR LIGHT (P.23)

5. Ibid.
6. Ibid.
7. Ibid.
8. Ibid.
9. Ibid.
10. Ibid.
11. Ibid.
12. Ibid.
13. Ibid.
14. Ibid.
15. Ibid.
18. Ibid.
19. Ibid.
20. Ibid.

SUN HAZARDS IN YOUR CAR (P.36)

1. Mougin L, Thomas L, Vigneau M, Fiere A. Un cas unilateral d’elastose avec kystes is-photoaging.html.
5. Ibid.
6. Ibid.
7. Ibid.
8. Ibid.
9. Ibid.
10. Ibid.
11. Ibid.
12. Ibid.
13. Ibid.
14. Ibid.
15. Ibid.
18. Ibid.
19. Ibid.
20. Ibid.

TREATMENT OF METASTATIC MELANOMA: A NEW WORLD OPENS (P.46)


38. Rogers H. “Your new study of nonmelanoma skin cancers.” Email to The Skin Cancer Foundation. April 1, 2010.


