

The Science of Aging: Keys to the Future

I hope you enjoy this special issue of *Cosmetic Dermatology*[®], featuring articles authored by the faculty of Eastern Virginia Medical School in Norfolk, Virginia. The focus is on some of the science and theory behind one of the principal causes of premature or unhealthy aging, oxidative stress. At the heart of slowing aging and producing healthy longevity is the need to gain a better understanding of how oxidative stress, free radicals, and antioxidants impact living cells and the human body.

Oxidative stress may or may not produce lasting cellular damage depending upon the body's defensive and reparative capacity at the cellular level. Oxidative stress can be produced not only from environmental exposures from the outside, but also from the inside within organs, cells, or subcellular organelles themselves. So the inside/outside concept of possessing healthy skin and a healthy body is a very valid and important concept for us as physicians in treating patients as well as for our own health and well-being. The goal is to protect and defend the skin from injury due to oxidative stress by preventing or minimizing environmental exposure to damaging agents, but also by maximally protecting our cells and body from the exposures that we cannot prevent.

The 2 review articles in this issue present 2 facets of this problem. In the first article, the basic science aspects of oxidative stress and free-radical damage are presented. In the second article, there is a focus on active agents that may prevent, or at least mitigate, some of the injury to the skin. While the focus is primarily on the skin, it should be apparent that many of these natural products can be ingested systemically to protect and defend from the inside out. Much has yet to be learned about the penetration/accumulation in the skin. The optimal concentrations for either topical or oral use are unknown in many cases but the concept that "more is better" is not necessarily applicable to many antioxidants. There are issues concerning dose response with many of these compounds that are poorly understood. There are sometimes complex interactions

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between some antioxidants, and some antioxidants may also act as prooxidants, thereby causing cell injury. Increasing our knowledge in these areas is critical for future therapies.

The goal of antiaging therapies is really prevention and not repair. Much of what we as cosmetic surgeons perform on a daily basis is repair work because most of our patients are not using the protective and defensive measures that are available, either due to lack of knowledge or simply noncompliance. We have the opportunity to teach them but first we need to have a better understanding ourselves. This is a rapidly evolving field wherein science is advancing quickly, but there is also a great deal of "pseudoscience" and unsubstantiated or false marketing claims that we and our patients must sort through. Thus, we need to be not only teachers and advocates for our patients, but also guides to assist in finding therapies that are safe and effective and have value to their individual genetic environmental exposure and health needs. We also need to be lifelong students to keep abreast of new scientific and therapeutic developments.

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As I look to the future, I believe one of the keys lies in exploring new scientific frontiers in both mechanisms of action or oxidative stress and also discovering new therapeutic measures to intervene in these mechanisms. I believe the rapid advances in genomics, proteomics, and metabolomics will yield a rich harvest for both mechanisms and therapies. We also have much to learn

about the unique aspects of skin of color, an area of research that has in many ways been neglected. It is encouraging to see the broad interest now in exploring this research and to see centers like the new Hampton University Skin of Color Research Institute in Hampton, Virginia, join the search.

Another article in this issue looks at the novel mixture of plant-derived antioxidants with significant clinical effects and benefits. This is part of a growing trend to identify botanical products with druglike effects. The concept of plants as drug factories is one that I am very passionate about and has enormous potential for the future.

Another very exciting area of emerging science and greater interest is the use of low-level light therapy and light-emitting diode photomodulation to alter gene expression and energize cells with the concept of using light as a drug.

Research into life span extension and healthy longevity is also taking some dramatic strides forward as well as research into DNA repair. These are also areas to watch carefully. Some very exciting years lie ahead of us to explore these scientific advances for our patients and enjoy the benefits for ourselves as well.

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