More than any population in history, we are increasingly exposed to environmental stress: With the decrease in the stratospheric ozone, more UV reaches the earth’s surface; we spend more time outdoors, often traveling to extreme environments where we experience excessive sun exposure. This is compounded with environmental pollutants from combustion of fossil fuels and cigarette smoking. Although there is increased attention on application of sunscreen, full UV protection is rarely achieved and exposure to UVA as well as to UVB is potentially hazardous. Although UVA alone is less erythrogenic and carcinogenic than UVB, increasing evidence has proven that the skin suffers synergistic damage from UVA in combination with ubiquitous chemical pollutants. Recent studies in our laboratory demonstrate that benzo[a]pyrene (often cited as a measure of environmental polycyclic aromatic hydrocarbons) is a photosensitizer which generates massive reactive oxygen species upon exposure to UVA. The evidence of this damage and the mechanisms of synergy will be reviewed. The role of topical antioxidants (vitamins C, E, selenium and genistein) in protecting the skin and in reversing photoaging and other environmental damage will be discussed. The requirements of formulations to keep these labile antioxidants stable and active after percutaneous absorption and the advantages of their use will be described.

Dr. Karen Burke is a dermatologist and research scientist. After her Ph.D. in biophysics from Cornell University, she completed postdoctoral fellowships at Cornell University Medical College and The Rockefeller University. She earned her M.D. at New York University Medical College with residency in dermatology. She is on the faculty of the Department of Dermatology at Mt. Sinai Medical Center. Her current research investigates the mechanism and efficacy of various topical and oral antioxidants in preventing and reversing sun damage (including photoaging and cancer) to the skin. She has two patents on topical selenoamino acids. She has also studied fat structure and metabolism, the effects of topical retinoic acid and retinol, and the science and techniques of collagen and other tissue implantation to treat dermal defects. Dr. Burke has written numerous research articles and medical book review chapters. She currently serves on the editorial boards of Cutis, Aesthetic Dermatology News, Cosmetics in Dermatology, and Journal of Drugs in Dermatology. She has written six books, including Thin Thighs for Life and Great Skin for Life.