Topical antioxidants for protection and reversal of environmental damage

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More than any population in history, we are increasingly exposed to environmental insult: With the decrease in the stratospheric ozone, more UV reaches the earth’s surface; and 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 to application of sunscreen, full UV protection is rarely achieved and exposure to UVA as well as to UVB is potentially hazardous. Although UVA is less erythrogenic and carcinogenic than UVB, increasing evidence has proven that the skin suffers synergic 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, and selenium) in protecting the skin and in reversing photo aging 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.

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