PHOTOBIOLOGY/PHOTOMEDICINE

Introduction to Milestones in Photobiology

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Electromagnetic radiation, encompassing UV, visible, and infrared radiation, has a major impact on human health. Sunlight, the major environmental agent to which humans are exposed, is responsible for the energy required to sustain life and stimulates the generation of vitamin D3 from the precursor 7-dehydrocholesterol. Sun exposure has been used for millennia as a therapeutic agent to treat dermatological and nondermatological disease. In addition, the advent of artificial nonlaser and laser light sources has further expanded the scope of diseases amenable to phototherapy beyond what natural sunlight can do. This form of radiant energy can also have nefarious effects. Acutely, it can trigger an erythema response in the skin (sunburn), and chronic exposure can cause photoaging of the skin, non-melanoma skin cancer (squamous cell and basal cell carcinoma), and melanoma. Investigation into the biological effects of nonionizing electromagnetic radiation on the skin has identified hitherto unsuspected actions of this form of radiant energy. For example, UVR is now known to influence immunological process, which may help explain its role in skin cancer, the pathogenesis of photosensitivity diseases, and its actions as a therapeutic agent. Infrared radiation, the cutaneous health effects of which had largely been thought to be limited to causing the rare condition 'erythema ab igne', now is recognized as a contributor to photoaging of the skin and may have a role as a therapeutic agent.

Not surprisingly, because the skin bears the major burden of its impact, the consequences of UVR, visible light, and infrared radiation have been of particular interest to scientists who conduct research on the skin. Many of the ground-breaking observations with respect to cancer biology, the use of lasers, photoaging, and photoimmunology, to name a few, are derived from studies in the skin. The new knowledge generated from research in this area has led to a greater understanding of the biological effects of UVR on the skin and in disease pathogenesis and to improved therapeutic modalities. The Milestones in Photobiology presented here provide a brief overview of where we are and the prospects of photobiology for the future.

CONFLICT OF INTEREST

The author states no conflict of interest.

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