Let There Be (UV) Light!: How Sunlight Can Protect Us From Immune Mediated Diseases

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Abstract

The ultraviolet (UV) radiation contained in sunlight is a powerful immune suppressant. While exposure to UV is associated with protection from the development of autoimmune diseases, particularly multiple sclerosis, the precise mechanism by which UV achieves this protection is not currently well understood. A major way in which UV suppresses adaptive immune responses is via the induction of regulatory cells. In particular, regulatory B cells play an important role in preventing autoimmunity and activation of B cells is a major way in which UV suppresses adaptive immune responses. When C57BL/6 mice were exposed to low, physiologically relevant doses of UV, a unique population of B cells was activated in the skin draining lymph nodes. Experimental autoimmune encephalomyelitis (EAE) in mice immunized with MOG/CFA was reduced by exposure to UV. Importantly, these two events were linked because protection from EAE could be adoptively transferred using B cells isolated from UV-exposed, but not unirradiated hosts. Indeed, UV-protection from EAE was dependent on UV activation of lymph node B cells because UV could not protect mice from EAE who were pharmacologically depleted of B cells using antibodies. Thus, UV maintenance of a pool of unique regulatory B cells in peripheral lymph nodes appears to be essential to prevent an autoimmune attack on the central nervous system.

About the speaker

Associate Professor Scott Byrne is a teaching and research academic at the University of Sydney who leads a group devoted to studying the biological effects of sunlight exposure. He is an immunologist who has established an international reputation in the field of photomedicine. He has made numerous seminal contributions in this area, particularly his discovery that UV activates a unique type of regulatory B cell. Recently he demonstrated that UV-activated BRegs mediate sunlight protection from CNS-targeted autoimmune diseases. His group have now discovered that UV also protects from diet-induced obesity and related conditions. Phototherapy is used widely to treat inflammatory skin diseases. What these studies reveal is that UV light also has the potential to be used as an adjunct therapy to protect and treat chronic non-cutaneous immune mediated diseases.