Mechanism and function of sleep following ultraviolet radiation induced injury

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ABSTRACT

Exposure to ultraviolet radiation raises the risk of skin cancer. The response to genotoxic injury caused by UV radiation is mediated locally, in the injured skin cells, as well as globally, in systemic effects of the whole animal. The global response is poorly-understood yet may be adaptive to the animal. This proposal focuses on the study of the systemic behavioral response to UV-induced injury using the nematode *Caenorhabditis elegans*. In preliminary studies, we observed that following UV radiation induced injury, *C. elegans* animals engage in a sleep response, which is neurally-mediated. This UV-induced somnolence requires the transcription factor CEP-1, which is the *C. elegans* homologue of the mammalian DNA damage control pathway effector p53. In our first aim, we propose experiments to test the hypothesis that CEP-1 is acting in specific myoepithelial somatic cells to effect a local transcriptional response that then promotes neurally-mediated sleep. In our second aim, we propose experiments to test whether sleep in response to UV exposure is beneficial to the DNA repair program. This pilot proposal thus aims to bridge previously disparate areas of research: The cellular response to DNA damage and behavioral state regulation. In addition to its relevance to understanding the mechanisms of recovery from genotoxic stress, this proposal is relevant to one of the greatest mysteries of biology, the function of sleep.