The impact of environmental stressors on the vitamin D3 pathway within the skin of the Atlantic bottlenose dolphin (*Tursiops truncatus*)

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The Atlantic bottlenose dolphin has attracted attention as a potential sentinel for human health. Greater knowledge of how the dolphin responds to environmental stress is needed, but such studies are limited by its status as a protected species. We previously established cell strains and cell lines from dolphin skin as an *in vitro* tool for measuring the molecular-level impact of the environment on this marine mammal. These cell models are being used to investigate the role of the vitamin D3 pathway within dolphin skin. Vitamin D is of interest because of its acknowledged chemopreventative, antimicrobial, and immunomodulatory properties within terrestrial animals. Within the skin, UVB radiation stimulates the conversion of 7-dehydrocholesterol into the active, hormonal form of vitamin D3: 1,25-dihydroxyvitamin D3 (1,25D3). The primary route through which this hormone exerts a biological function is via interaction with the nuclear vitamin D receptor (VDR), a potent ligand-activated regulator of gene transcription widely expressed in many organs. Whether aquatic mammals also possess this pathway and gain the same immune benefits from vitamin D3 as terrestrial mammals is unknown. We have detected expression of VDR in dolphin skin cells and found the cells to be sensitive to exogenous 1,25D3 administration, similar to humans and other animals. We are interested in whether environmental stressors interfere with the vitamin D3 pathway in dolphin skin, proposing a possible mechanism for the detrimental impact of environmental fluctuations on marine mammal health. Very few studies have investigated the impacts of environmental factors on the vitamin D3 pathway within any animal model. We have found that certain stressors including hypoxia, increased ambient temperature, and fuel oil alter levels of VDR and the expression of various VDR gene targets in dolphin skin cells. Such findings may help elucidate the role of vitamin D on innate immunity in dolphin skin.

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