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Role of Heme Oxygenase-1 in Host Defense

Innate host cell response is central to the function of host defense against pathogens. However, it is often insufficient to efficiently respond against infections, especially in conditions where the immune system is compromised. Activation of host response or direct targeting of the invading pathogens then becomes inevitable to reduce the severity of the disease progression. Heme oxygenase-1 (HO-1), a cytoprotective enzyme, has recently been recognized as a regulator of both physiological as well as pathophysiological processes, such as apoptosis, inflammation, and host defense. Induction of HO-1 by a natural substrate hemin effectively enhanced the ability of macrophage to resist infections by several pathogens, including HIV-1, dengue virus, West Nile virus, poxvirus, and *Leishmania donovani*. HO-1 activation in a prostate cancer cell line susceptible to XMRV infection profoundly reduced the virus production by infected cells. Suppression of intracellular pathogens in HO-1-activated cells was attenuated by SnPP IX, a specific inhibitor of HO-1 activity, indicating a pivotal role of this endogenous enzyme in the host defense mechanism. In view of effective treatment of these infections as an invariable challenge due to the emergence of drug-resistant mutants, unraveling of HO-1-dependent regulatory genes may provide novel biomarkers and therapeutic targets for treating infections and disease conditions.

Biography

Dr. Subhash Dhawan is Chief of Viral Immunology section in the Laboratory of Molecular Virology at the Center for Biologics Evaluation and Research, US Food and Drug Administration. Dr. Dhawan's research focuses on the regulation of viral and host factors in the pathogenesis of HIV infection. As a regulatory scientist, Dr. Dhawan performs review of product applications and conducts inspections of firms manufacturing blood screening and diagnostic tests for the detection of HIV infection.