

Nitric Oxide: Role in Immunity and Therapeutics

Authors : Anusha Bhardwaj, Shekhar Shinde

Abstract : Nitric oxide (NO•) has been documented in research papers as one of the most versatile player in the therapeutics. It is identified as a biological multifunctional messenger molecule which is synthesized by the action of nitric oxide synthase (NOS) enzyme from L-arginine. The protective and the toxic effect in conjunction form the complete picture of the biological function of nitric oxide in humans. The dual nature is because of various factors such as concentration of NO, the isoform of NOS involved, type of cells in which it is synthesized, reaction partners like proteins, reactive oxygen intermediates, prosthetic groups, thiols etc., availability of the substrate L-arginine, intracellular environment in which NO is produced and generation of guanosine 3, 5'-cyclic monophosphate (cGMP). Activation of NOS through infection or trauma leads to one or more systemic effects including enhanced immune activity against invading pathogens, vaso/bronchodilatation in the cardiovascular and respiratory systems and altered neurotransmission which can be protective or toxic. Hence, NO affects the balance between healthy signaling and neurodegeneration in the brain. In lungs, it has beneficial effects on the function of airways as a bronchodilator and acts as the neurotransmitter of bronchodilator nerves. Whereas, on the other hand, NO may have deleterious effects by amplifying the asthmatic inflammatory response and also act as a vasodilator in the airways by increasing plasma exudation. But NOS Inhibitors and NO donors hamper the signalling pathway and hence a therapeutic application of NO is compromised.

Keywords : nitric oxide, multifunctional, dual nature, therapeutic applications

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