

NO Biosynthesis

Nitric oxide biosynthesis is carried out primarily by the enzyme Nitric Oxide Synthase (NOS). The enzyme catalyzes the oxidation of L-arginine to form nitric oxide and L-citrulline. NOS incorporates a number of prosthetic groups such as a heme group, two flavenoids, and tetrahydrobiopterin to carry out this catalysis.

Three main isoforms of mammalian NOS are known. eNOS, nNOS, and iNOS all are expressed in many different tissues and each has certain unique biochemical and genetic aspects.

- eNOS, originally discovered in vascular endothelial tissue, is associated with the caveolae of the plasma membrane. Multiple post-translational acylations are responsible for this localization.
- nNOS, originally found in neural tissue, is associated with the cytoskeleton. nNOS is unique in that its gene has multiple exon combinations leading to tissue-specific translation regulation.
- iNOS, originally found in activated macrophages, is transcriptionally induced by cytokine signaling. iNOS plays roles in a variety of immune responses, many of which can be determined in iNOS “knock out” mice.

Nitric oxide can also be synthesized in the body independently of an enzyme. Low tissue pH can directly cause the conversion of nitrite to NO. Under extreme conditions this mechanism of biosynthesis of NO predominates.