

# A comparison of organic and inorganic nitrates/nitrites.

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## Source

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## Abstract

Although both organic and inorganic nitrates/nitrites mediate their principal effects via nitric oxide, there are many important differences. Inorganic nitrate and nitrite have simple ionic structures and are produced endogenously and are present in the diet, whereas their organic counterparts are far more complex, and, with the exception of ethyl nitrite, are all medicinally synthesised products. These chemical differences underlie the differences in pharmacokinetic properties allowing for different modalities of administration, particularly of organic nitrates, due to the differences in their bioavailability and metabolic profiles. Whilst the enterosalivary circulation is a key pathway for orally ingested inorganic nitrate, preventing an abrupt effect or toxic levels of nitrite and prolonging the effects, this is not used by organic nitrates. The pharmacodynamic differences are even greater; while organic nitrates have potent acute effects causing vasodilation, inorganic nitrite's effects are more subtle and dependent on certain conditions. However, in chronic use, organic nitrates are considerably limited by the development of tolerance and endothelial dysfunction, whereas inorganic nitrate/nitrite may compensate for diminished endothelial function, and tolerance has not been reported. Also, while inorganic nitrate/nitrite has important cytoprotective effects against ischaemia-reperfusion injury, continuous use of organic nitrates may increase injury. While there are concerns that inorganic nitrate/nitrite may induce carcinogenesis, direct evidence of this in humans is lacking. While organic nitrates may continue to dominate the therapeutic arena, this may well change with the increasing recognition of their limitations, and ongoing discovery of beneficial effects and specific advantages of inorganic nitrate/nitrite.

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