

Effects of nitrite and nitrate on the cardiovascular system in health and disease

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An alternative pathway for endogenous NO generation in the form of the reductive nitrate-to nitrite-to-NO pathway in humans, also referred to as the enterosalivary circuit of inorganic nitrate, has been identified. In 2004 we demonstrated that the reduction of nitrite to NO in the rat ischaemic heart provided a source of NO that limited the damage caused by reperfusion¹. This research has recently translated at a clinical level with the demonstration that intracoronary nitrite during reperfusion following balloon angioplasty in patients presenting with ST-elevated myocardial infarction lowers infarct size². This is in contrast to a lack of efficacy when nitrite is administered intravenously in the same setting³. Our most recent analyses suggest that the beneficial effects relate to local suppression of the pro-inflammatory pathways that play a critical role in the process resulting in myocardial cell death following a myocardial infarction.

Dietary nitrate administration, in the form of beetroot juice, as a method of raising circulating nitrite levels reduces blood pressure, improves platelet reactivity and protects against endothelial dysfunction in healthy volunteers. Importantly, the enterosalivary circuit, which is critical in regulating the bioactivity of nitrate, has been shown to play an important role in setting healthy blood pressure⁴ and more recently the therapeutic potential of a once daily inorganic nitrate load has been demonstrated in hypertensive⁵ and hypercholesterolemic patients. These studies show that dietary nitrate lowers blood pressure, improves platelet function and reduces the systemic inflammatory load that characterizes cardiovascular disease. Together these studies highlight the potential of the nitrate-nitrite-NO pathway in the therapeutics of cardiovascular disease.

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