

Septic shock: Nitric oxide beneficial after all

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Scientists at VIB and Ghent University in Flanders, Belgium have found an unexpected ally for the treatment of septic shock, the major cause of death in intensive care units. By inducing the release of nitric oxide (NO) gas in mice with septic shock, researchers Anje Cauwels and Peter Brouckaert discovered that the animal's organs showed much less damage, while their chances of survival increased significantly. That's contrary to all expectations, since it is generally assumed that nitric oxide is responsible for the potentially lethal drop in blood pressure in septic shock.

Septic shock, or sepsis, is a medical condition in which acute inflammation, low [blood pressure](#), and blood clotting cause a dangerous decrease in the delivery of blood to the organs. Because of the lack of oxygen, the patient's organs start to fail, one after the other. Currently, only supportive treatment is available.

It is generally assumed that [nitric oxide](#) (NO) gas is responsible for the hypotension and [cardiovascular collapse](#) in [septic shock](#). Therefore, a lot of medical research is focused on combating NO, which is also a messenger molecule in the body. Attempts to inhibit its production paradoxically led to a worsening of the organ damage and in an increased lethality, both in animal models and in a clinical trial in sepsis patients. This led to the assumption that NO also has positive effects in sepsis, but up to now NO remained a prime suspect for the pathogenesis of the cardiovascular shock.

The team in Ghent is turning this paradigm upside-down in an article

that will appear in The [Journal of Experimental Medicine](#) on Monday 21 December 2009. During their research, Cauwels and Brouckaert administered nitrite – a substance that releases NO – to mice with septic shock. The nitrite treatment, in sharp contrast with the worsening effect of inhibiting NO-synthesis, significantly attenuates hypothermia, mitochondrial damage, oxidative stress and dysfunction, tissue infarction, and mortality in mice. It is not yet known what mechanisms are at work behind this observation. That will be the subject of further research.

For now, not only is this discovery revolutionizing the way in which scientists view nitric oxide's role in septic shock – it also opens possibilities for treatment. Instead of trying to prevent the effects of NO, they should rather be imitated or reinforced to provide a solution for saving organs or particular parts of the body where there is a lack of oxygen due to septic shock.

Provided by VIB (the Flanders Institute for Biotechnology)

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