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Review Article

# How the redox state regulates immunity

Lisa Mullen [a], Manuela Mengozzi [a], Eva-Maria Hanschmann [b], Ben Alberts [a], Pietro Ghezzi [a]



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## Highlights

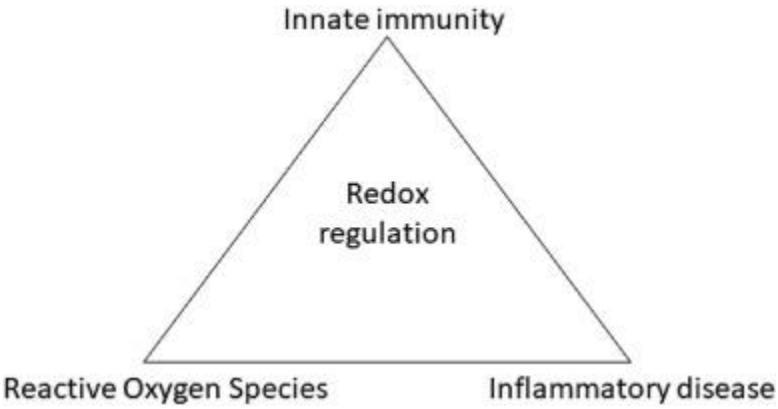
- Increased production of reactive oxygen species (ROS) and, in some cases, oxidative stress, are often associated with inflammatory disease.
- However, the idea that ROS contribute to inflammatory disease is simplistic and it could well be that both increased ROS and inflammatory disease are caused by activation of innate immunity.

## Abstract

Oxidative stress is defined as an imbalance between the levels of reactive oxygen species (ROS) and antioxidant defences. The view of oxidative stress as a cause of cell damage has evolved over the past few decades to a much more nuanced view of the role of oxidative changes in cell physiology. This is no more evident than in the field of immunity, where oxidative changes are now known to regulate many aspects of the immune response, and inflammatory pathways in particular. Our understanding of redox regulation of immunity now encompasses not only increases in reactive oxygen and nitrogen species, but also changes in the activities of oxidoreductase enzymes. These enzymes are important regulators of immune pathways both via changes in their redox activity, but also via other more recently identified cytokine-like functions. The emerging picture of redox regulation of immune pathways is one of increasing complexity and while

therapeutic targeting of the redox environment to treat inflammatory disease is a possibility, any such strategy is likely to be more nuanced than simply inhibiting ROS production.

## Graphical abstract

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