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**Glutathione and glutathione derivatives in immunotherapy.**

[Fraternale A](https://www.ncbi.nlm.nih.gov/pubmed/?term=Fraternale%20A%5BAuthor%5D&cauthor=true&cauthor_uid=27514076), [Brundu S](https://www.ncbi.nlm.nih.gov/pubmed/?term=Brundu%20S%5BAuthor%5D&cauthor=true&cauthor_uid=27514076), [Magnani M](https://www.ncbi.nlm.nih.gov/pubmed/?term=Magnani%20M%5BAuthor%5D&cauthor=true&cauthor_uid=27514076).

**Abstract**

Reduced glutathione (GSH) is the most prevalent non-protein thiol in animal cells. Its de novo and salvage synthesis serves to maintain a reduced cellular environment, which is important for several cellular functions. Altered intracellular GSH levels are observed in a wide range of pathologies, including several viral infections, as well as in aging, all of which are also characterized by an unbalanced Th1/Th2 immune response. A central role in influencing the immune response has been ascribed to GSH. Specifically, GSH depletion in antigen-presenting cells (APCs) correlates with altered antigen processing and reduced secretion of Th1 cytokines. Conversely, an increase in intracellular GSH content stimulates IL-12 and/or IL-27, which in turn induces differentiation of naive CD4+ T cells to Th1 cells. In addition, GSH has been shown to inhibit the replication/survival of several pathogens, i.e. viruses and bacteria. Hence, molecules able to increase GSH levels have been proposed as new tools to more effectively hinder different pathogens by acting as both immunomodulators and antimicrobials. Herein, the new role of GSH and its derivatives as immunotherapeutics will be discussed.

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