

Red blood cell hormone modulates the immune system

January 20 2011

New research reveals that a hormone best known for stimulating the production of red blood cells can modulate the immune response. The study, published by Cell Press in the January 27th issue of the journal *Immunity*, finds that erythropoietin (EPO) has contrasting influences on infectious and inflammatory diseases and may be useful in the design of new therapeutic strategies.

EPO is a cytokine hormone that stimulates the production of [red blood cells](#) by acting at EPO receptors (EPORs) on red blood cell precursors. Interestingly, other cell types also express EPORs. "It is clear that EPORs are present on immune cells, but the function of these receptors was completely unknown," says senior study author Dr. Guenter Weiss from Innsbruck Medical University in Austria. "We hypothesized that EPO might be able to modulate the immune system and could be of clinical relevance in certain diseases."

After showing that EPO inhibited induction of key pro-inflammatory genes, Dr. Weiss and colleagues examined the role of EPO-modulated [immune cells](#) in two mouse models of disease: systemic infection with [Salmonella bacteria](#) and chemically induced inflammation of the colon (colitis).

In mice infected with Salmonella, EPO treatment was associated with reduced survival and impaired ability to clear the pathogen, neutralization of EPO production in the body promoted Salmonella elimination. This suggests that EPO reduces the ability of the immune

system to fight off a systemic infection with intracellular bacteria such as Salmonella.

The researchers went on to show that in contrast to [bacterial infection](#), EPO had a beneficial effect on the severity of colitis. EPO decreased the production of nuclear factor (NF)- κ B, a protein that is critical for inflammation and thereby reduced the formation of cytokines such as tumor necrosis factor alpha which are centrally involved in the pathogenesis of autoimmune colitis. This suggests that EPO may exert beneficial effects in non-infectious [inflammatory diseases](#).

"Our results provide novel evidence that EPO acts as a potent anti-inflammatory immune modulator by specifically targeting (NF)- κ B-driven inflammatory pathways," concludes Manfred Nairz, first author of the paper. "Although high dose EPO treatment in humans may lead to a dangerous excess of red blood cells, EPO derivatives that do not influence red blood cell production have been developed and these could possibly serve as valuable therapeutic tools in treatment of pathologic inflammation."

Provided by Cell Press

Citation: Red blood cell hormone modulates the immune system (2011, January 20) retrieved 25 April 2024 from <https://medicalxpress.com/news/2011-01-red-blood-cell-hormone-modulates.html>

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