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Review

Menopause and aging: Changes in the immune system—A review

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ABSTRACT

Background: The higher risk of women developing autoimmune diseases suggests that immune system is mediated by sex steroids.
Objective: To review the effects of aging and menopause in immune system.
Methods: A systematic review of *in vitro*, animal and human studies involving aging and menopause and immune system was carried out. An electronic search based on Internet search engines, MEDLINE (1966–June 2010) and the Cochrane Controlled Clinical Trials Register was done.
Results: After crossing-cleaning the reference lists, a total of 688 studies dealing with immune system and menopause were identified. Of them, 30 were considered selectable. The concept of immunosenescence reflects changes in both cellular and serological immune responses throughout the process of generating specific response to foreign antigens. This may be related with a higher incidence of infectious and chronic diseases. After menopause, there is an increase in pro-inflammatory serum markers (IL1, IL6, TNF-alpha), an increase in response of the immune blood cells to these cytokines, a decrease in CD4 T and B lymphocytes and a decrease in the cytotoxic activity of NK cells. Additionally, IL-6 is a key factor in bone resorption and also seems to be associated with other diseases more common after menopause such as diabetes, atherosclerosis and cardiovascular disease.
Conclusions: Most of the studies suggested that in addition to age, in postmenopausal women, changes of the immune system have been attributed to estrogen deprivation. Furthermore, recent studies point out changes in immune response related to use or cessation of hormone replacement at menopause.

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