

The Inflammatory Response in Geriatric Patients

Yaşlı Hastalarda İnflamatuar Yanıt

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ABSTRACT

The inflammatory response plays a pivotal role in the pathophysiology of age-related diseases and health outcomes in geriatric patients. Understanding the mechanisms underlying inflammation in older adults and developing targeted interventions to modulate the inflammatory response may offer promising avenues for improving the health and quality of life of geriatric populations.

Keywords: Geriatric, inflammatory response, quality of life

ÖZ

İnflamatuar yanıt, yaşa bağlı hastalıkların patofizyolojisinde ve geriatrik hastalarda sağlık sonuçlarında önemli bir rol oynamaktadır. Yaşlı yetişkinlerde inflamasyonun altında yatan mekanizmaları anlamak ve inflamatuar yanıtı modüle etmek için hedefe yönelik müdahaleler geliştirmek, geriatrik popülasyonların sağlığını ve yaşam kalitesini iyileştirmek için umut verici yollar sunabilir.

Anahtar Kelimeler: İnflamatuar yanıt, yaşlı, yaşam kalitesi

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Dear Editor,

I read the article named "Evaluation of Inflammation Markers in Elderly Patients Undergoing Hip Fracture Surgery", published in the first issue of the ninth volume of your journal.¹ I would like to thank the authors for the article that evaluated the 30-day mortality and intensive care unit admission after a hip fracture surgery and found no correlation between inflammatory parameters and mortality or intensive care unit admission. To contribute to the discussion of the article, I would like to touch upon a few points about the inflammatory response in geriatric patients.

Geriatric patients, defined as individuals aged 65 and older (the classification based on age is as follows: youngest-old, ages 65 to 74 years; middle-old, 75 to 84 years; and oldest-old, 85 years and older), often present with a variety of health conditions that can trigger an inflammatory response. The inflammatory response is a complex biological process involving the activation of immune cells and the release of inflammatory mediators in response to tissue injury, infection, or other stimuli. While inflammation is a normal and necessary part of the

body's immune defence mechanism, dysregulated or chronic inflammation can contribute to the pathogenesis of various age-related diseases and adversely affect the health outcomes of geriatric patients.²

In geriatric patients, the inflammatory response may be heightened or dysregulated due to age-related changes in the immune system, a phenomenon commonly referred to as "inflammaging." This term encompasses a chronic low-grade inflammatory state that develops with aging and is characterized by elevated levels of pro-inflammatory cytokines, such as interleukin-6, tumor necrosis factor-alpha, and C-reactive protein. Inflammaging has been implicated in the pathogenesis of many age-related diseases, including cardiovascular disease, neurodegenerative disorders, metabolic syndrome, and frailty.^{2,3}

Moreover, geriatric patients often have multiple comorbidities and are more susceptible to infections, which can further exacerbate the inflammatory response. Infections, particularly bacterial and viral infections, stimulate the release of pro-inflammatory cytokines and activate immune cells, leading to systemic inflammation. The presence of chronic diseases, such as diabetes, chronic obstructive pulmonary

disease, and renal insufficiency, can also contribute to a state of chronic inflammation in geriatric patients.⁴

The consequences of heightened or dysregulated inflammation in geriatric patients are manifold. Chronic inflammation has been associated with accelerated aging, increased functional decline, and poor health outcomes in older adults. It can exacerbate existing health conditions, impair wound healing, and increase the risk of complications following surgery or traumatic injury.⁵ Additionally, chronic inflammation has been implicated in the pathogenesis of age-related cognitive decline and neurodegenerative diseases, such as Alzheimer's disease and Parkinson's disease.

Given the significant impact of inflammation on the health and well-being of geriatric patients, strategies aimed at modulating the inflammatory response have garnered increasing interest in geriatric medicine. Lifestyle interventions, such as regular exercise, healthy diet, and smoking cessation, have been shown to have anti-inflammatory effects and may help mitigate inflammation in older adults. Pharmacological interventions, including nonsteroidal anti-inflammatory drugs and anti-cytokine therapies, are also being investigated for their potential to modulate inflammation and improve health outcomes in geriatric patients.²⁻⁵

When evaluating this phenomenon at the cellular level, PANoptosis is a novel regulated cell death mechanism that integrates components of pyroptosis, apoptosis, and necroptosis. This process is triggered by various pathogens and immune stimuli, highlighting significant interactions between these cell death pathways. Understanding PANoptosis is essential for clarifying the link between inflammatory responses and chronic infections, as factors such as infections, injuries, and cellular defects can promote its activation through the assembly of the PANoptosome. In elderly individuals, PANoptosis may further aggravate inadequate inflammatory responses and complicate age-related health issues, emphasizing the need to recognize these mechanisms for potential therapeutic approaches targeting chronic inflammation.⁶

Aging is driven by the progressive dysregulation of various molecular pathways, particularly the mTOR and AMPK signaling pathways, which are involved in cellular senescence. Immunosenescence, characterized by the gradual deterioration of the immune system due to aging or pathological conditions, can be countered through various pharmacological and nutraceutical interventions. On the other hand, it is not surprising that several reviews highlight the anti-inflammatory effects of chronic disease medications in elderly adults, such as metformin. Research has particularly noted the efficacy of natural and syn-

thetic compounds like resveratrol, rapamycin, and metformin in addressing conditions related to immunosenescence and aging, showcasing their similarities in mechanisms of action, which are crucial for maintaining immune responses throughout life.⁷

In conclusion, the inflammatory response plays a pivotal role in the pathophysiology of age-related diseases and health outcomes in geriatric patients. Understanding the mechanisms underlying inflammation in older adults and developing targeted interventions to modulate the inflammatory response may offer promising avenues for improving the health and quality of life of geriatric populations.

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