



The Role of Dietary Polyphenols in Reducing Systemic and Gastrointestinal Inflammation

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DESCRIPTION

Dietary polyphenols are naturally occurring compounds present in plant-based foods, widely recognized for their potential health benefits. These bioactive compounds, found in fruits, vegetables, tea, coffee and wine, are known for their antioxidant effects and their ability to modulate inflammation both systemically and within the Gastrointestinal (GI) tract. Recent studies have focused on the detailed intake of polyphenols and their specific connections to markers of systemic and GI inflammation in healthy individuals. This article examines the link between polyphenol consumption and inflammatory responses, highlighting recent discoveries and discussing their implications for overall health.

Polyphenols are divided into several categories, including flavonoids, phenolic acids, lignans and stilbenes, each with unique properties and effects on the body. Flavonoids, commonly found in berries, apples, onions and tea, are among the most studied due to their strong antioxidant capabilities. Phenolic acids, present in foods such as coffee, fruits and vegetables, are also recognized for their anti-inflammatory effects. Lignans, found in seeds, whole grains, legumes and stilbenes, abundant in red wine, also play a role in controlling inflammation. The variety of polyphenols consumed in a typical diet contributes to different effects on inflammation throughout the body.

Inflammation is a complex biological process that can be both protective and harmful, depending on its duration and intensity. Acute inflammation serves as a natural defense mechanism in response to injury or infection, promoting healing. However, chronic low-grade inflammation is linked to numerous diseases, including cardiovascular disease, cancer, diabetes and neurodegenerative disorders. Polyphenols, with their capacity to regulate inflammatory pathways, are of particular interest in preventing and managing these chronic conditions. Exploring how polyphenols influence systemic and GI inflammation in

healthy individuals can provide valuable insights into preventive strategies for inflammation-related diseases.

Recent research has demonstrated that consuming polyphenol-rich foods is associated with reduced levels of systemic inflammation in healthy adults. Polyphenols achieve their anti-inflammatory effects by inhibiting pro-inflammatory pathways, such as Nuclear Factor-Kappa B (NF- κ B) and Mitogen-Activated Protein Kinase (MAPK), which are critical in regulating inflammatory responses. These pathways are involved in producing inflammatory cytokines, including Interleukin-6 (IL-6), Tumor Necrosis Factor-alpha (TNF- α) and C-Reactive Protein (CRP). By reducing these inflammatory mediators, polyphenols help lower overall inflammation in the body.

A study published in the American Journal of Clinical Nutrition found that individuals with higher polyphenol intake had lower levels of systemic inflammatory markers, such as CRP, a known marker of inflammation associated with cardiovascular risk. The study revealed that the anti-inflammatory effects of polyphenols were dose-dependent, meaning individuals who consumed more polyphenols experienced greater reductions in inflammatory markers.

Polyphenols also play a significant role in maintaining gastrointestinal health. The GI tract serves as a major site of interaction between dietary components and the immune system and polyphenols can influence gut inflammation by modulating the gut microbiota and the intestinal barrier. The gut microbiota, a diverse community of microorganisms within the intestines, is critical in regulating immune responses and maintaining gut health. Polyphenols, particularly those not absorbed in the small intestine, can be fermented by gut bacteria, producing metabolites with anti-inflammatory properties.

CONCLUSION

Precise dietary intake of polyphenols is linked to lower levels of both systemic and gastrointestinal inflammation in healthy

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adults. By modulating inflammatory pathways and influencing the gut microbiota, polyphenols play a critical role in maintaining overall health and preventing chronic diseases related to inflammation. The dose-dependent effects of polyphenols on inflammatory markers suggest that increasing the consumption of polyphenol-rich foods, such as fruits, vegetables, tea and wine, can have significant health benefits.

Future research should continue to explore the specific mechanisms by which different classes of polyphenols exert their anti-inflammatory effects and how individual differences in gut microbiota may influence these outcomes. Encouraging the inclusion of diverse, polyphenol-rich foods in the diet is a practical and effective strategy for promoting long-term health and reducing the risk of inflammation-related diseases.