Chapter 1

Introduction to Flavonoids and Human Health

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 ABSTRACT

Flavonoids comprise a wide-ranging group of polyphenolic compounds known for their strong ability to influence immune function, serving as a vital link between nutrition science and immunology. This section delves into how these molecules affect both innate and adaptive immune systems at the cellular and molecular levels, helping maintain immune balance.

Key flavonoids such as quercetin, luteolin, and epigallocatechin gallate (EGCG) play roles in steering macrophage behavior, enhancing the activity of natural killer (NK) cells, and curbing excessive inflammation by disrupting Toll-like receptor signaling and NF-κB activation. Within the adaptive immune framework, agents like apigenin and genistein impact the development of antigen-presenting cells, regulate antibody synthesis, and shape T-cell differentiation—particularly the balance among Th1, Th2, Th17, and Treg populations.

These compounds also reshape cytokine dynamics by suppressing pro-inflammatory signals like TNF-α, IL-1β, and IL-6, while promoting anti-inflammatory and antiviral mediators such as IL-10 and type I interferons. Mechanistically, their effects are mediated through pathways like MAPK