

PLENARY PRESENTATIONS

NATURAL PRODUCTS AS SOURCES OF ANTI-INFLAMMATORY AGENTS: INSIGHTS FROM NITRIC OXIDE INHIBITION IN LPS-STIMULATED RAW 264.7 MACROPHAGES

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Inflammation is an essential biological response that protects the body against infection and tissue injury. However, persistent inflammation contributes to the development of numerous chronic diseases, including cancer, cardiovascular disease, diabetes, neurodegenerative disorders, and autoimmune diseases. Therefore, identifying safe and effective anti-inflammatory agents remains an important goal in drug discovery. Natural products have attracted considerable attention because of their remarkable chemical diversity and long history of medicinal use.

Based on our research on the anti-inflammatory potential of natural products, nitric oxide (NO) inhibition in lipopolysaccharide (LPS)-stimulated RAW264.7 macrophages has been employed as the primary screening platform for identifying promising lead compounds from medicinal plants, Thai traditional medicines, and marine-derived fungi. The results demonstrated that herbal formulations, including the mixtures of *Derris scandens* (DZSS), Benjakul, and Mo-Ha-Rak, significantly inhibited NO production. Bioassay-guided investigation identified several bioactive constituents from Thai traditional medicines, while labdane diterpenes isolated from marine-derived fungi exhibited promising anti-inflammatory activity. Structure–activity relationship (SAR) analysis revealed that structurally diverse natural compounds could produce the same biological outcome through suppression of NO production. Furthermore, network pharmacology and molecular docking analyses suggested that these natural products modulate multiple inflammatory targets, including TNF, IL6, IL1 β , PTGS2, STAT3, and NF κ B1, supporting a multi-target mechanism of action.

Collectively, these findings demonstrate that NO inhibition is an effective first-line screening approach for anti-inflammatory drug discovery. Future studies integrating artificial intelligence, multi-omics technologies, and translational pharmacology are expected to accelerate the development of evidence-based natural-product-derived therapeutics for chronic inflammatory diseases.

Keywords: Anti-inflammatory activity; Nitric oxide; RAW264.7 macrophages.