

# PRESCRIPTION

Latest news and updates from the Faculty of Pharmacy



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## NATURE'S MEDICINE TO REDUCE INFLAMMATION AND PREVENT DISEASE

Inflammation is the body's natural response to protect itself from harmful stimuli, such as infections, injuries, or toxins. However, when inflammation becomes chronic, it can lead to various diseases, such as diabetes, cancer, arthritis, and Alzheimer's disease (Figure 1). Chronic inflammation is also associated with ageing, obesity, and stress.

Many conventional drugs, such as steroids and NSAIDs, are used to treat inflammation, but they often have serious side effects, such as ulcers, bleeding, liver damage, and cardiovascular problems [1]. Moreover, some of these drugs may lose effectiveness over time or worsen the condition by suppressing the immune system [2].

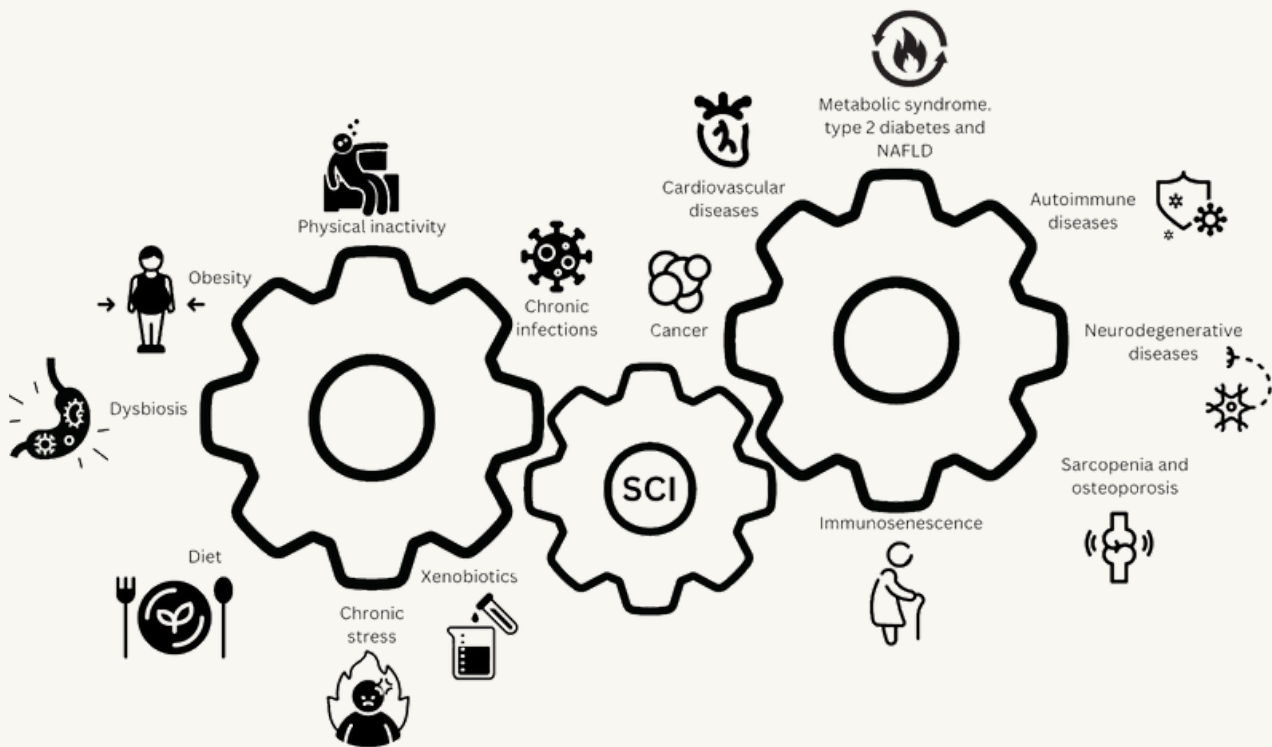


Figure 1: Many causes and effects of low-grade systemic chronic inflammation (SCI) have been found, which include chronic infections, physical inactivity, (visceral) obesity, intestinal dysbiosis, diet, psychological stress, and xenobiotics like air pollutants, hazardous waste products, industrial chemicals, and tobacco smoking are the most common SCI triggers. SCI causes metabolic syndrome, type 2 diabetes, non-alcoholic fatty liver disease (NAFLD), cardiovascular disease, cancer, autoimmune illnesses, neurodegenerative diseases, sarcopenia, osteoporosis, and immunosenescence.

Fortunately, nature offers a rich source of compounds and extracts that have anti-inflammatory properties without the adverse effects of synthetic drugs [3,4]. These natural products can modulate inflammatory pathways, reduce oxidative stress, and enhance the body's healing mechanisms [3]. They can also provide other benefits, such as antioxidant, anticancer, antidiabetic, and neuroprotective effects [4].

Some of the most promising natural products for inflammation are turmeric, ginger, garlic, grapes, pineapple, green tea and others [5-7]. Examples of the bioactive compounds include:

- Curcumin, the main component of turmeric, is commonly used in Asian food and traditional medicine. It reduces pro-inflammatory cytokines such as TNF- $\alpha$ , IL-6, and IL-1 $\beta$  and suppresses NF- $\kappa$ B activation. Curcumin improves mood, metabolism, and cognitive function with antioxidant, anticancer, and neuroprotective properties.
- Gingerol and shogaol are phenolic compounds found in ginger that have anti-inflammatory and analgesic effects. They can inhibit the enzymes that produce inflammatory mediators and modulate the immune system.
- Allicin is a sulfur compound found in garlic with anti-inflammatory and antioxidant properties. It can block the activation of inflammatory pathways and reduce the production of pro-inflammatory substances.

- Resveratrol is a polyphenol in grapes, red wine, berries, and peanuts. It modulates COX-2, iNOS, and Nrf2 inflammatory genes. Resveratrol promotes metabolism and ageing protein SIRT1. Resveratrol prevents cardiovascular disease, diabetes, cancer, and neurodegeneration.
- Bromelain is an enzyme in pineapple that can modulate the immune system and decrease inflammation in conditions such as arthritis, sinusitis, and colitis.
- Catechin is a natural substance found in green tea extracts and plants like cocoa and berries with antioxidant and anti-inflammatory effects. It has a ring-shaped structure with two mirror forms. It can help protect the cells from damage and prevent diseases.
- Omega-3 fatty acids are essential fats in fish, flaxseeds, walnuts, and algae. Omega-3 fatty acids decrease inflammation by lowering prostaglandins and leukotrienes and raising resolvins and protectins. They can prevent heart disease, diabetes, depression, and cognitive loss.

However, natural and synthetic inflammatory treatments have advantages and disadvantages [8]. Synthetic drugs have a stronger, faster anti-inflammatory effect than natural products, which may have various targets and mechanisms [8]. Nevertheless, natural products are a major source of oral drugs 'beyond Lipinski's rule of five' (bRo5), where higher doses and formulations may improve oral bioavailability [9]. Some studies have indicated that curcumin and resveratrol are as effective as synthetic drugs [10].

Natural products from plants or other sources are presumed to be safer than synthetic medicines. However, depending on the dose, formulation, and individual characteristics, natural products can have adverse effects, interactions, or toxicity [11]. Ginger can cause bleeding, heartburn, or allergic reactions in some people [12]. Synthetic medicines are tested and regulated before approval, and their safety profiles are well-established. Yet, as mentioned earlier, synthetic drugs like steroids and NSAIDs can produce major side effects such as gastrointestinal ulcers, liver damage, and cardiovascular difficulties, especially with long-term use or high doses [1].

The biggest benefit of natural products—food, supplements, and herbal remedies—is their accessibility and affordability compared to manufactured pharmaceuticals [13]. Natural product quality and purity vary by source, extraction, and processing [4]. Pesticides, heavy metals, and other contaminants may contaminate these products [13]. However, synthetic drugs are more standardised and controlled in dosage and composition but may be too expensive or limited in developing countries and remote areas [8].

In a nutshell, natural products and synthetic drugs have different pros and cons when treating inflammation. The best option for each person may depend on their needs, preferences, and medical conditions.

## Questions

Let's dive deeper into the article and evaluate your comprehension. We have 5 questions for you [here](#).

## About the Author

Dr. Mizaton Hazizul Hasan, an Associate Professor of Pharmacology at Universiti Teknologi MARA, Malaysia, joined UiTM in 2007 after completing her PhD. She was a National Science Fellowship awardee. Her over forty pharmacology and toxicology articles demonstrate her dedication to scientific progress. As the main supervisor, Dr. Mizaton has graduated six PhD candidates and many Master's students, developing the next generation of scientific professionals. Her primary research area is comprehensive pharmacological and safety assessments of natural and synthesised substances.

Her study involves developing natural compounds to treat inflammation-related disorders like cancer, diabetes, and hypercholesterolemia. Dr. Mizaton's research also predicts synergistic drug combinations using computational methods, which could lead to new treatments. Her research has earned Dr. Mizaton national funding of RM 1 million, demonstrating her academic excellence.



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## CONTACT US

 @pharmacyuitm



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 Faculty of Pharmacy UiTM



 <https://pharmacy.uitm.edu.my/>



 +603-3258 4645

 korporatff@uitm.edu.my

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## PRESCRIPTION

Faculty of Pharmacy,  
Universiti Teknologi MARA,  
Kampus Puncak Alam,  
42300 Bandar Puncak Alam, Selangor.