

Regulation of Immune Tolerance

Developed and reviewed by the clinical, chiropractic, and naturopathic members of the Standard Process team

The Physiology and Significance of Immune Tolerance

Immune tolerance refers to the physiological process by which the immune system becomes unresponsive or “tolerant” to specific antigens. It is a critical aspect of immune regulation that helps prevent inappropriate immune responses to dietary proteins, beneficial gut microbiota, environmental antigens, and the body’s own cells, tissues, and organs. A breakdown or dysfunction in immune tolerance is associated with conditions like food allergies, celiac disease, inflammatory bowel disease, and rheumatoid arthritis.

Tolerance is maintained through both central and peripheral mechanisms. Central tolerance occurs in the thymus and bone marrow, where autoreactive T and B cells are eliminated during development. Peripheral tolerance involves several strategies to regulate immune activity after immune cells enter circulation. Key peripheral mechanisms include: 1) clonal deletion, where immune cells that could react strongly to dietary antigens become functionally inactive or are eliminated altogether, 2) induction of regulatory T-cells (Tregs), which play a pivotal role in maintaining immune balance by suppressing inflammation and promoting tolerance, 3) immune deviation, where the immune response shifts away from inflammatory pathways (Th1, Th2, Th17) toward regulatory, non-inflammatory responses, and 4) dendritic cells in gut-associated lymphoid tissue present antigens to immune cells, facilitating tolerance rather than inflammatory reactions.

Lifestyle and dietary interventions can support healthy immune tolerance by modulating key immunological mechanisms and promoting intestinal barrier integrity and gut microbiome health.

Supportive Lifestyle Practices

- Emphasize a healthy sleep-wake rhythm to support sleep quality and quantity. Sleep regulates cortisol and melatonin rhythms that are tightly linked to immune tolerance, Treg activity, and gut barrier function.¹ Chronic sleep disruption promotes gut permeability and inflammatory Th1/Th17 polarization.
- Support intestinal barrier function by reducing exposure to substances that act as epithelial stressors and promote immune activation. Non-steroidal anti-inflammatory drugs (NSAIDs), alcohol, ultra-processed foods, and antibiotics disrupt mucosal integrity, and increase permeability and dysbiosis.²

Whole Foods Nutritional Recommendations

- Encourage consumption of foods rich in pre-formed vitamin A, such as eggs, liver, and full-fat dairy. Vitamin A promotes Treg cell differentiation, modulates Th17 responses, supports dendritic cell tolerogenic function, and maintains gut mucosal integrity.^{2,3}
- Recommend foods high in Vitamin D, like fatty fish and egg yolks. Vitamin D enhances Treg induction, modulates Th1/Th17 inflammatory responses, and promotes tolerogenic antigen-presenting cell profiles.⁴
- Encourage patients to add mushrooms to soups, stews, and stir-fries. Mushrooms are rich in bioactive, immune-modulating compounds that influence the production of immune cells and the immune system response. For example, polysaccharides in shiitake and reishi mushrooms modulate immune cell function, natural killer cell activity, and cytokine production.^{5,6}
- Recommend that patients add turmeric to dishes like soups, curries, and smoothies. Turmeric’s bioactive components, including curcumin, modulate the activity of regulatory T cells, balance cytokines, and support mucosal immune homeostasis.⁷

Dietary Supplement Regimen



Immuplex®

Suggested Use: **Two capsules per meal**

- Supports a healthy immune system response function*
- Helps maintain normal white blood cell activity already within a normal range*
- Contains Protomorphogen™ & Cytosol™ extracts
- Supports the body's normal inflammatory response function*
- Provides ingredients with antioxidant activity
- Excellent source of zinc, iron, copper, chromium, folate and vitamins A, B₆, and B₁₂ and antioxidant vitamins C and E



Ganoderma Shiitake

Suggested Use: **One tablet 2-3 times daily**

The combination of these mushrooms can help to:

- Support healthy immune system function*
- Support vitality*
- Support the body's health as Reishi has been used traditionally as a tonic*
- Assist in the maintenance of general health and well-being*



Cod Liver Oil

Suggested Use: **Three softgels per day**

- Helps bridge the gap in dietary omega-3 intake*
- Supports epithelial tissue*
- Supports immune system response*
- Supports healthy inflammatory processes*
- Excellent source of antioxidant vitamin A
- Good source of vitamin D



Turmeric Forte

Suggested Use: **One tablet 1-2 times daily**

Turmeric Forte contains a bioavailable form of Turmeric rhizome and Fenugreek seed.* These herbs and their constituents:

- Support a healthy inflammatory response*
- Support healthy liver function and healthy digestion*
- Provide antioxidant activity*

Assessment of Immune Tolerance

In Office/Physical Exam

- Signs/Symptoms like rashes, food sensitivities, histamine intolerance, chronic fatigue, brain fog, post-exertional malaise
- Lab studies: hs-CRP, ANA, rheumatoid factor and other specific autoantibodies, food sensitivity panel, markers of gut barrier integrity like fecal calprotectin, zonulin, and secretory IgA
- Medical Hx: autoimmune conditions, asthma, allergies, eczema, IBS or IBD, frequent or recurring infections, history of frequent antibiotic usage, birth and breast-feeding history

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