

# Immune System 101

## 1. Introduction to Immune System 101

- The immune system protects the body through two branches: innate (immediate, non-specific) and adaptive (specific, memory-driven).
- Gut-Associated Lymphoid Tissue (GALT) represents ~70% of immune tissue, with secretory IgA playing a key role in tolerance and defense.
- Three universal steps: recognition (self vs. non-self), processing (signal integration), and response (elimination or regulation).

## 2. Beta Glucans as Immunomodulators

- Beta glucans are glucose polymers; structure and branching determine solubility and immune effects.
- Oral beta glucans can shift the Th1/Th2 balance, improving mucosal immunity and lowering allergic symptom burden.
- Sources and forms matter: yeast/fungal beta-1,3/1,6 are immunomodulatory, cereal beta-1,3/1,4 act primarily as dietary fibers.

## 3. Mechanisms of Action

- Engage receptors like Dectin-1, Complement Receptor 3 (CR3), and Toll-like receptors (TLRs).
- Trigger signaling cascades (NF- $\kappa$ B, MAPK) to regulate cytokines and enhance pathogen clearance.
- Support mucosal defenses by boosting salivary markers and regulating allergen-specific antibody patterns.

## 4. Role of Beta Glucans in Immune Health

- Allergy: oral forms reduce nasal, eye, and respiratory symptoms; subcutaneous use may raise IL-10 and improve outcomes in pediatric asthma.
- Cancer: beta glucans can prime immune cells to work with complement-activating monoclonal antibodies for targeted tumor cell destruction.
- Caution: inhaled particulate beta glucans (e.g., dust) may worsen airway inflammation in sensitized individuals.

## 5. Broader Health Benefits

- Oral supplementation has been linked to improvements in quality of life, mood, and energy during allergy seasons.
- May support resilience in polluted environments by boosting innate defense markers.

## 6. Practical Considerations

- Choose preparation carefully: document source and structure (yeast beta-1,3/1,6 vs. algae or cereal).
- Clinical oral ranges: adults 250–500 mg/day, pediatric courses ~100 mg/day for several weeks.
- Avoid use in transplant-related immunosuppression; monitor alongside standard allergy or cancer care.

## 7. Summary Takeaway

- The gut is central to immune health; beta glucans interact with this system to rebalance immunity and support tolerance.
- Source, particle size, and route dictate effects—oral forms show benefit for allergies and adjunct cancer care, while inhaled forms can provoke inflammation.
- Preparation-specific, evidence-based dosing is critical for safe and effective outcomes.