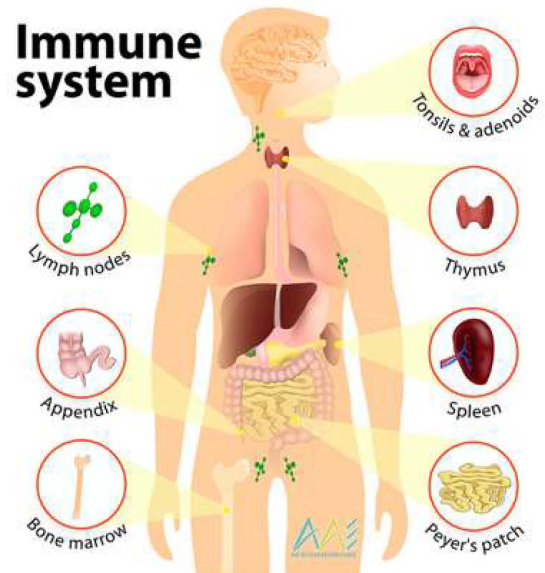


The Immune System

The immune system is made up of a network of cells, tissues and organs that work together to protect the body. When foreign objects are identified by the immune system, white blood cells (leukocytes) are signaled to secrete antibodies that protect the body against infectious disease. The immune system also plays an important role in the inflammatory response resulting from injury to tissue. When injury occurs, cytokines are released to trigger several inflammatory mechanisms involved in the recovery and healing process. When the immune system is compromised or is less active than normal, there is a higher vulnerability for infective illnesses. This is called immunosuppression.

Signs and Symptoms of Immunosuppression

- ▶ Reoccurring or prolonged common infections, including upper respiratory tract infections, ear infections, and gastrointestinal distress due to infection
- ▶ Abnormal routine blood panels (white blood cells and other immune system blood markers)
- ▶ Inability to recover between training sessions
- ▶ Fatigue



When Are Athletes at Risk?

- ▶ Exposure to frequent or extended travel
- ▶ During a period of high training volume and intensity without adequate recovery time
- ▶ Under extreme environmental stress (i.e. climate, altitude)
- ▶ Heightened exposure to pathogens (airborne or blood-borne transmission, contaminated food or fluids)
- ▶ Insufficient blood cell counts (i.e. low platelet counts, anemia, vitamin D)
- ▶ Insufficient intake of food or fluid
- ▶ Inadequate sleep and poor recovery
- ▶ Anxiety or alterations in mood

Note: If you are experiencing any of the above signs and symptoms, or are concerned about your recovery response time, please contact your sports medicine physician or sport dietitian.

IMMUNE FUNCTION



Immune Boosting Foods

Food Source	Benefit	Daily Recommendation
Citrus Fruits	Rich in vitamin C and aid in white blood cell production to help fight infections	1/2 - 2 cups
Garlic	Contains calcium, potassium and sulfuric compounds which protect against bacteria and infection	1-2 cloves (1-2 tsp. minced)
Ginger	Provides antioxidant, antimicrobial and anti-inflammatory properties	1.5-3 tsp. fresh ginger, 1/4-1/2 tsp. ground ginger
Spinach, Kale, Swiss Chard, Arugula, Beets	Rich in antioxidants and nitrates which help protect cells and guard against inflammation	1-3 cups raw veggies, 1/2 - 1 cup cooked veggies
Green Tea	Rich in flavanoids and contains L-theanine which protects against bacteria	2-3 cups
Greek Yogurt, Kefir	Helps protect against travelers' diarrhea and upper respiratory tract infection	1 cup Greek yogurt 1 cup Kefir

Meal and Snack Ideas

- ▶ Add spinach and chopped garlic to scrambled eggs
- ▶ Top Greek yogurt with orange slices, strawberries, kiwis
- ▶ Swap out one cup of coffee with one cup of green tea
- ▶ Top a favorite salad with beets or citrus fruit
- ▶ Add sliced lemon to a water bottle and sip throughout the day
- ▶ Sprinkle fresh or powdered ginger on a rice dish
- ▶ Add dark greens or beets to a recovery smoothie

ImmunoBoost Shot *Servings: 1 shot*

- 1/2 cup orange juice
- 1/4 tsp. minced garlic
- 1 Tbsp. fresh ginger or 1 tsp. powdered ginger
- 1/2 tsp. curcumin
- 1/2 tsp. cinnamon
- 2 tsp. honey

Shake in a blender bottle or blend and pour.

*Avoid taking on an empty stomach for improved tolerance.

Immune Boosting Protocol for Travel

1-2 Weeks Prior to Leaving

- ▶ Increase consumption of immune boosting foods
- ▶ Start supplementing with probiotics to prevent traveler's diarrhea and boost gut integrity particularly when traveling to higher risk destinations (e.g. where drinking bottled water is recommended). Look for a combination of lactobacillus and bifidus strains, containing at least 10^{10} live bacteria per dose.

2 Days Prior to Leaving

- ▶ Consider taking a home made ImmunoBoost Shot (see recipe) or 500-1000mg vitamin C daily

During Travel

- ▶ Continue supplementing with probiotics and vitamin C throughout duration of travel
- ▶ Be diligent about hand washing and sanitizing, particularly in athlete dining halls, and avoid touching your eyes, nose and mouth
- ▶ Try to avoid sick people

If you feel like you have the start of a cough or cold...

- ▶ Suck on zinc lozenges with the goal of achieving >75mg zinc per day for the first 5 days to reduce duration and severity of symptoms.

**Avoid chronic use of high dose antioxidant dietary supplements to prevent immunosuppression, as it can negatively affect training adaptations.