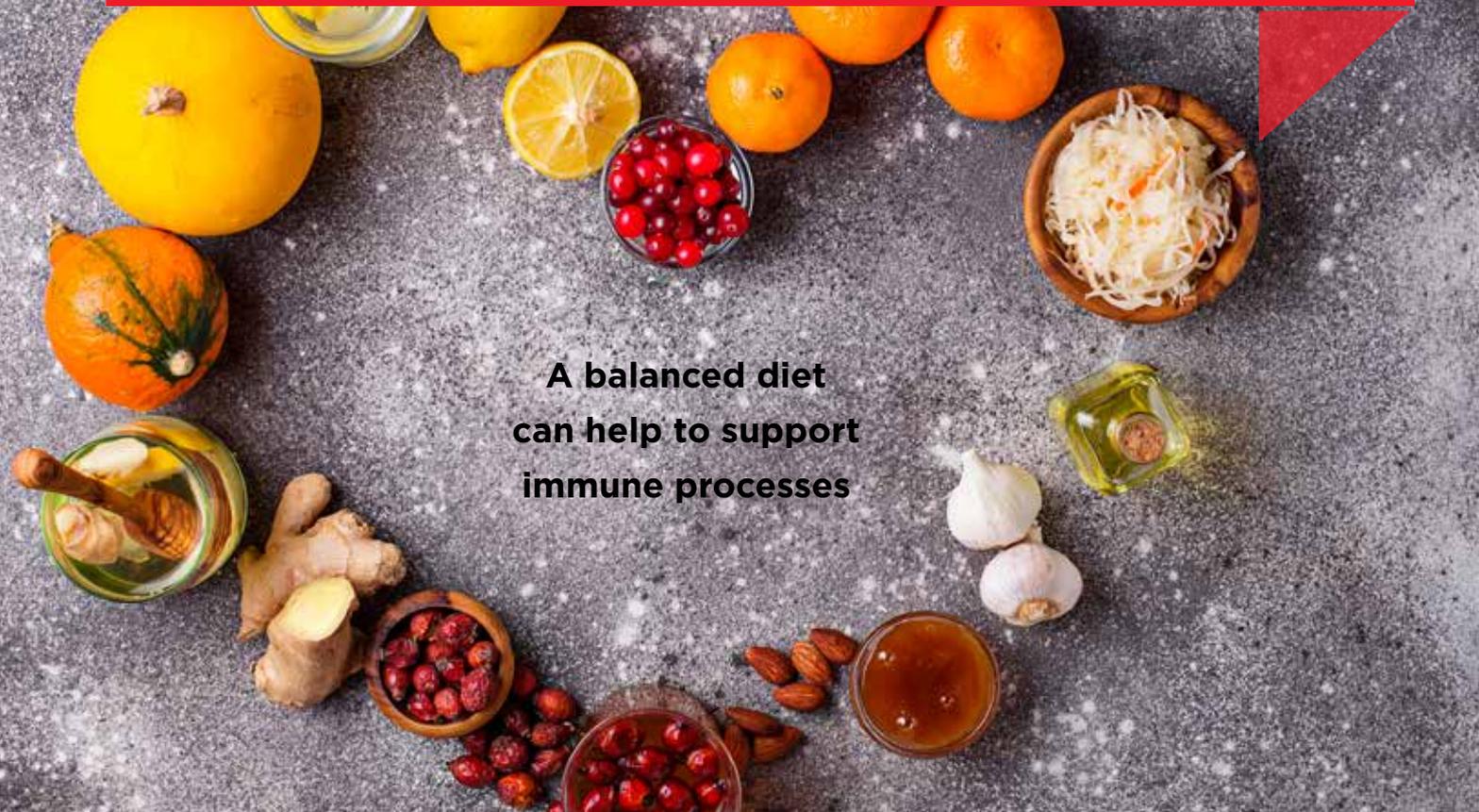


# Nutrition Strategies to Support Immune Health

NUTRITION CONNECTION



**A balanced diet can help to support immune processes**

With cold and flu season around the corner and the coronavirus pandemic still looming, many are taking a renewed interest in nutrition strategies to support immune health. While proper nutrition doesn't necessarily "boost" the immune system (and in fact, excess boosting could actually be detrimental), a balanced diet can help to support the immune processes that occur in the body. This helps put the immune system in a position where it's ready to work in the most optimal way possible.

## HOW DOES THE IMMUNE SYSTEM WORK?

To understand how nutrition impacts immunity, let's brush up on how the immune system itself works. This system is a

complex set of organs, cells, and pathways with one common goal: prevent disease.

Everyone's body has bone marrow which contains stem cells. These can develop into different types of white blood cells, which are a major part of the two types of immune system responses:

1. **Innate immunity:** This is a general attack against perceived intruders. It includes first-line responder white blood cells like neutrophils, basophils, eosinophils, or monocytes.
2. **Adaptive (or acquired) immunity:** This attack is specific to the type of pathogen, and acts as the "memory" system. White blood cells known as lymphocytes—our T cells and B cells—recognize when the body is fighting off certain



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diseases it encountered in the past, and mount an attack accordingly. For example, B cells are involved in the production of antibodies. Antibodies mark infection cells for destruction by other immune cells, or sometimes neutralize them on their own.

Occasionally, the body gets mixed up, and creates antibodies for our own cells. These faulty B cells are supposed to be removed, but sometimes they are not. When this happens, someone can suffer from an autoimmune disorder. This is why we don't necessarily want to "boost" the immune system, because an overactive system is not ideal either.

Instead, the goal is a properly functioning immune system—and a balanced diet helps make that happen.

### THE ROLE OF NUTRITION IN IMMUNE HEALTH

A variety of individual nutrients and overall dietary patterns play a role in supporting the immune system. Here's an overview of some of the key players, and food choices that you can incorporate as a CDM, CFPP:

#### Protein and Calorie Intake

Protein energy malnutrition is a major concern among low-income families in developing countries, but it can also occur in elderly adults in the

United States (particularly those suffering from certain diseases, like cancer).

A lack of protein and calories affects both innate and adaptive immunity, causing decreased production of certain immune cells. It can also negatively affect how the body remembers certain pathogens and the antibodies that match up to them, which can make the immune response less effective.

A variety of foods can be used to increase calorie needs. Focusing on foods that are amenable to the client and are calorie-dense in small

- Tofu
- Eggs
- Lentils
- Beans
- Dairy products (especially Greek yogurt)

#### Vitamin A

This vitamin helps maintain the health of tissues throughout the digestive and respiratory systems. These tissues act as barriers to pathogens. Within the intestinal system, there is also much research going on as to Vitamin A's role in influencing various immune functions that occur there.



### PROTEIN ENERGY MALNUTRITION

can occur in the elderly, particularly those suffering from certain diseases, like cancer... Focusing on foods that are calorie-dense in small portions can be a useful strategy.

portions can be a useful strategy. For example, oils can be mixed into pasta dishes or nut butter can be spread on toast. Supplemental options, like shakes and high-calorie manufactured foods, can be utilized as needed.

There are also a wide range of foods to increase protein intake. Here are just a few options:

- Beef
- Chicken
- Fish

Studies have linked Vitamin A deficiency to increased risk of infectious diseases. In fact, one research article in the *European Journal of Immunology* stated that "Of the estimated 250 million preschool children who are vitamin A-deficient (VAD), 10 percent will die from their increased susceptibility to infectious disease."

Vitamin A deficiency is a major issue in developing

*Continued on page 14*

countries that lack access to many Vitamin-A rich foods. In the United States, though, deficiency is rare (<1 percent) thanks to the variety of food choices accessible to us. To follow are some examples:

- Sweet potatoes
- Carrots
- Pumpkin
- Spinach
- Eggs
- Liver
- Red peppers
- Apricots

### Vitamin C

When people think of immune health, this is usually the first vitamin that comes to mind. Vitamin C deficiency puts the

immune system at risk by affecting the immune cell responses as well as the body’s ability to fight excessive free radicals (components in the body which, in high amounts, can damage immune cells).

Research has suggested that Vitamin C may play a role in the prevention or alleviation of symptoms of numerous infections. However, the benefit likely varies based on the specific infection type and population.

For example, while additional Vitamin C does not prevent the common cold among the average population with adequate intake, there is some evidence it may be helpful in reducing the duration of symptoms among children with upper respiratory infections, according to a meta-analysis in the *European Journal of Clinical Pharmacology*.

The good news is that Vitamin C is quite abundant in foods, so it’s easy for a foodservice manager to provide many sources:

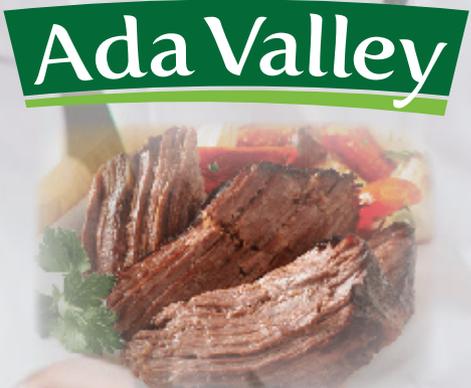
- Oranges
- Kiwi
- Mango
- Tomatoes
- Strawberries
- Bell peppers
- Leafy green vegetables
- Broccoli

### Vitamin D

Vitamin D has long been known for its role in bone health, but over the last several years there’s been growing research on its connection to immune health. Vitamin D has the ability to increase antimicrobial activity of certain cells, helping to fight off pathogens when they enter the body.

For example, a study in *Archives of Internal Medicine* found that Vitamin D deficiency was associated with increased risk of upper respiratory infections. A systematic review in *BMJ* found that supplementation with Vitamin D was linked to reduced infections among those who were initially deficient. Similarly, another study in the journal *Cytokine* found that Vitamin D supplementation was linked to reduced respiratory infections in asthma patients.

Most of the research on Vitamin D focuses on supplementation, because it is difficult to meet Vitamin D levels with food alone



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Cholesterol 50mg	17%
Sodium 80mg	3%
Total Carbohydrate 0g	0%
Dietary Fiber 0g	0%
Total Sugars 0g	
Includes 0g Added Sugars	0%
Protein 21g	
Vitamin A 0%	Vitamin C 0%
Calcium 0%	Iron 10%

The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

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due to limited dietary sources. While Vitamin D can also be produced via sunlight on the skin, this is not always feasible or practical (due to limited outdoor time and skin cancer concerns).

Researchers estimate around 9 percent of people have a clinical Vitamin D deficiency, but up to 40 percent may have sub-optimal levels. These adults may need their doctor or dietitian to prescribe supplements to help bring their levels up to normal.

However, as a foodservice manager, it's still beneficial to include Vitamin D-rich choices on your menu, even if options are limited:

- Fatty fish (salmon, tuna, sardines)
- Egg yolks
- Fortified orange juices
- Fortified cereals

### Vitamin E

Vitamin E has multiple roles in immune function, including increased activity and activation of certain cells. It's been most studied for its ability to prevent some of the age-related declines that occur within T-cells. Some studies have shown the Vitamin E supplementation led to reduced risk of pneumonia or colds in certain population subgroups like smokers or elderly adults.

That said, a varied diet can easily meet Vitamin E needs among most clients by including these common sources:

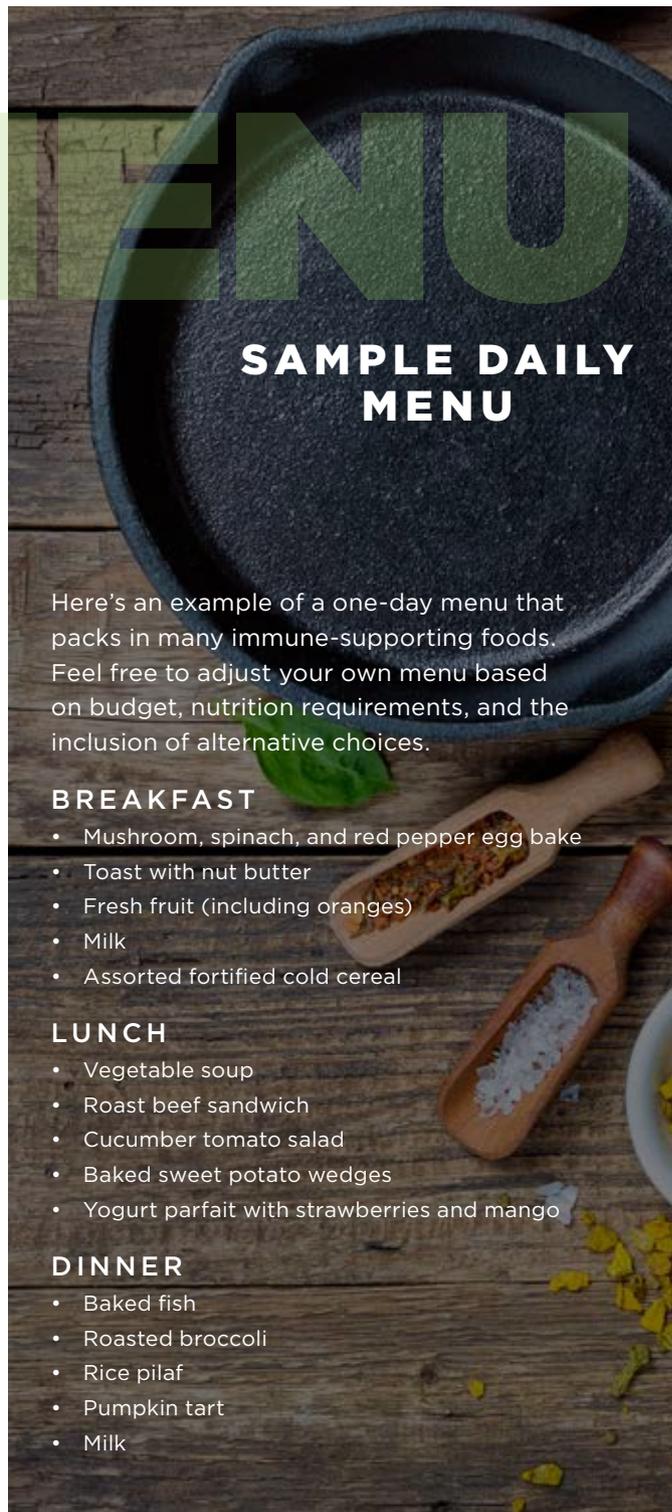
- Nuts
- Seeds
- Vegetable oils
- Broccoli
- Spinach
- Fortified cereals

### Zinc

This mineral is involved in signaling pathways that take place for both innate and adaptive immunity. Zinc deficiency can cause decreased levels and activity of certain immune cells.

Zinc may also be involved in the clearance of both acute and chronic viral infections, possibly helping to shorten symptoms. For example, a meta-analysis in the *Journal of the Royal Society*

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## SAMPLE DAILY MENU

Here's an example of a one-day menu that packs in many immune-supporting foods. Feel free to adjust your own menu based on budget, nutrition requirements, and the inclusion of alternative choices.

### BREAKFAST

- Mushroom, spinach, and red pepper egg bake
- Toast with nut butter
- Fresh fruit (including oranges)
- Milk
- Assorted fortified cold cereal

### LUNCH

- Vegetable soup
- Roast beef sandwich
- Cucumber tomato salad
- Baked sweet potato wedges
- Yogurt parfait with strawberries and mango

### DINNER

- Baked fish
- Roasted broccoli
- Rice pilaf
- Pumpkin tart
- Milk

*of Medicine Open* found that zinc lozenges reduced the common cold duration by an average of 33 percent.

The prevalence of zinc deficiency is up to 20 percent worldwide, though it's lower in the United States. Significant deficiency is more likely in patients with chronic diarrhea or digestive disorders, due to absorption problems.

Marginal deficiency—when zinc intake is slightly below ideal—is common in the elderly, though, and can still be detrimental. You can help combat this by including a variety of zinc-rich foods on the menu such as these:

- Red meat
- Poultry
- Nuts
- Seeds
- Shellfish
- Legumes

## OVERALL DIETARY PATTERNS AND GUT HEALTH

In addition to individual nutrients, we know that overall dietary patterns can influence the immune system, presumably by affecting gut health. Those good bacteria in your gut play an intricate role in immunity—one that scientists are still discovering.

An overall balanced diet with lots of nutrient-dense, plant-based foods has been shown to improve the overall balance of gut bacteria. It's wise to minimize excessive added sugars, unhealthy fats, and overly processed convenience foods.

In addition, prebiotic and probiotic foods may also help support gut health. Prebiotic foods are those which feed the bacteria already in your intestinal system. Common sources are garlic, onions, asparagus, greener bananas, and seaweed. Probiotic foods are those which actually contain live bacteria cultures, and include options like yogurt, kefir, and traditionally fermented vegetables.

While it might seem like a lot to remember, you'll likely touch on all of the nutrients above by simply incorporating a variety of foods each week.

## FINAL THOUGHTS

This is by no means an exhaustive list of foods that impact immune health. Other vitamins and minerals like Vitamin

B6, folate, selenium, and iron are important too. By working to include many nutrient-rich foods on your menu each day, you can help ensure your patients, clients, and students are supporting their immune system. **E**

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*This Level II article assumes that the reader has a foundation of basic concepts of the topic. The desired outcome is to enhance knowledge and facilitate application of knowledge to practice.*

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Reading *Nutrition Strategies to Support Immune Health* and successfully completing these questions online has been approved for 1 hour of continuing education for CDM, CFPPs. CE credit is available ONLINE ONLY. To earn 1 CE hour, access the online CE quiz in the ANFP Marketplace. Visit [www.ANFPonline.org/market](http://www.ANFPonline.org/market) and select “CE Articles.” If you don’t see your article title on the first page, then search the title, “*Nutrition Strategies to Support Immune Health*.” Once on the article title page, purchase the article and complete the CE quiz.

- What is the term for the type of immunity that mounts an attack specific to a certain pathogen, and acts as the “memory” system for recognizing past pathogens?
  - Innate immunity
  - Eosinophil immunity
  - Adaptive immunity
- Which nutrient helps maintain tissues that act as barriers to pathogens throughout the digestive and respiratory systems?
  - Vitamin A
  - Vitamin C
  - Vitamin D
- Which food would be the best choice to increase Vitamin C at a meal?
  - Chicken
  - Nuts
  - Strawberries
- While most nutrients that support immunity can easily be met through dietary planning, which nutrient has limited dietary sources (and as such, may require an MD or RD to provide a supplement)?
  - Vitamin C
  - Vitamin D
  - Zinc
- Which nutrient has been linked to reducing some of the age-related declines that occur in T-cells?
  - Vitamin A
  - Vitamin C
  - Vitamin E
- Which food would be the best choice to increase zinc at a meal?
  - Beef
  - Olive oil
  - Peaches
- Which option is an example of a probiotic, a food that contains live bacteria cultures which may improve gut health and support immunity?
  - Yogurt
  - Chicken
  - Strawberries

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