

Immune Support 101



The slide features the title "Immune Support 101" in a serif font. Below the title is the logo for "The Natural Grocers" which includes a stylized leaf icon and the tagline "good4u". To the right of the text is a close-up photograph of a sliced citrus fruit, likely a grapefruit or orange, showing its segments and rind.

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Reminder



- This class is not intended to diagnose, treat, or mitigate any disease.
- Dietary supplements and foods can interact with prescription medications. If you are taking a prescription medication, become informed about the possible interactions.

The slide has a white background with the title "Reminder" in a serif font. On the right side, there is the "The Natural Grocers" logo with the tagline "good4u" and a photograph of a cluster of dark berries, possibly blackberries or raspberries, with green leaves.

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The Natural Grocers Difference



**THE 5 FOUNDING PRINCIPLES**  
of Natural Grocers

- 1 focus on **EDUCATION**
- 2 **HIGHEST** quality
- 3 **EVERY DAY**
- 4 supporting **COMMUNITIES**
- 5 **GREAT EMPLOYEES**

The slide features the title "The Natural Grocers Difference" in a serif font. On the right is the "The Natural Grocers" logo with the tagline "good4u" and a photograph of a piece of reishi mushroom. On the left is a large, detailed image of a reishi mushroom. In the center, there is a box containing the text "THE 5 FOUNDING PRINCIPLES of Natural Grocers" followed by a numbered list of five principles.

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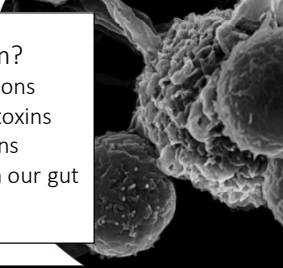
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Question 

What is the immune system?

- A. Cells that fight off infections
- B. Proteins that neutralize toxins
- C. Barriers against pathogens
- D. Healthy bacteria living in our gut
- E. All of the above



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Question 

What is the immune system?

- A. Cells that fight off infections
- B. Proteins that neutralize toxins
- C. Barriers against pathogens
- D. Healthy bacteria living in our gut
- E. **All of the above – The Immune System is all of these things... and more!**



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First Line of Defense 

**Immune Barriers**

- Skin
  - Antimicrobial lipids
- Mucus membranes
  - Nose, mouth, throat, gastrointestinal tract, urogenital tract
- Proteins in the bloodstream that kill pathogens and neutralize toxins
  - Antibodies
  - Other proteins



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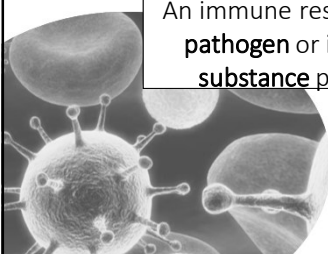
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The Basics of an Immune Response



An immune response is mounted if a **pathogen or immune provocative substance** penetrates a barrier



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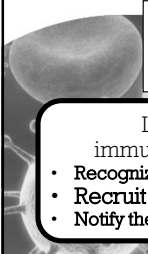
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The Basics of an Immune Response



An immune response is mounted if a **pathogen or immune provocative substance** penetrates a barrier

Local immune cells responsible for immunosurveillance are the first responders

- Recognize molecular patterns unique to bacteria and viruses
- Recruit more immune cells
- Notify the body with danger signals (inflammation)



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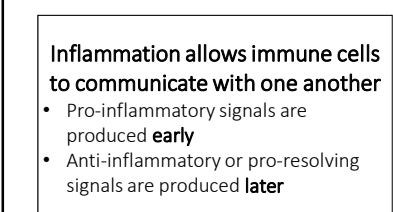
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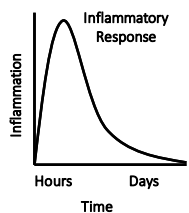
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Mediators of Inflammation




Inflammation allows immune cells to communicate with one another

- Pro-inflammatory signals are produced **early**
- Anti-inflammatory or pro-resolving signals are produced **later**



The graph shows a bell-shaped curve representing the inflammatory response. The vertical axis is labeled 'Inflammation' and the horizontal axis is labeled 'Time', with 'Hours' and 'Days' marked. The curve rises sharply during the 'Hours' phase and then gradually declines over the 'Days' phase.



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The Purpose of Inflammation 

**Inflammation recruits more immune cells to the site of infection**

- Phagocytes – “eat” and destroy pathogens – mostly bacteria
- Antiviral cells destroy infected cells
- Helper cells then notify **specialized immune cells** that there is a problem
- Other physiological changes occur that make the body less conducive to pathogen replication



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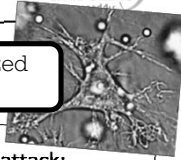
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Activated Immune Cells 

It can take 7-10 days for these specialized cells to be ready to fight an infection



**Specialized cells orchestrate the attack:**  
Stimulate other immune cells to clear the infection  
**OR**  
Stimulate other cells to make antibodies to clear infection

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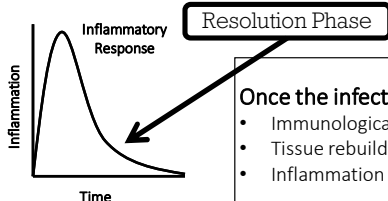
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Resolution Phase 



**Once the infection is cleared:**

- Immunological memory develops
- Tissue rebuilding begins
- Inflammation subsides

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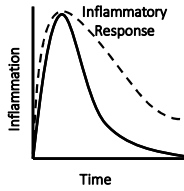

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### Immune Dysfunction



Immune response does not resolve properly

**Chronic inflammation**

- Inflammation does not taper off after immune response has finished
- Excessive production of free radicals can also result from chronic inflammation
- Chronic inflammation destroys tissues and suppresses the immune system

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### Chronic Inflammation & Autoimmune Reactions



The inability to separate **self proteins** from **non-self proteins** leads to autoimmune disease

- The immune system has complex mechanisms to designate between self and foreign proteins
- Inflammation, especially chronic inflammation can cause the disruption of this complex system

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### Summary of Immune Response



- 1 Physical barriers represent the **first layer** of immune defense
  - Gut, skin, mucus membranes, urogenital tract
- 2 If a barrier is penetrated, immune cells must respond
  - Inflammation signals that a barrier has been compromised
  - Acute inflammation is a key part of a healthy immune response
  - Chronic inflammation leads to immune dysfunction

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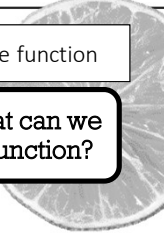
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Immune System Support 

These are the very basics of immune function

Given these basic concepts, what can we do to support healthy immune function?



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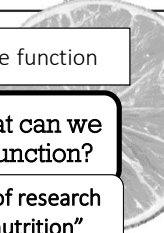

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Immune System Support 

These are the very basics of immune function

Given these basic concepts, what can we do to support healthy immune function?

First off, there is a lot of research regarding "immunonutrition"



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Immunonutrition 

= nutrition that supports immune function

- Malnutrition is the most common cause of immunodeficiency worldwide
- It would be impossible to cover all of the research regarding nutrition and immune support
- BUT we will cover some of the best science and established paradigms



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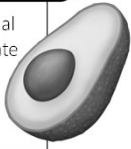
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Supporting Healthy Immune Function 

**Optimal immune function requires having healthy physical barriers to protect us**

Skin health – Keeping this first barrier intact is essential

- Support skin barrier function by having adequate intake of essential fatty acids
- Also “**conditionally essential**” nutrients support skin health



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Supporting Healthy Immune Function 

**Optimal immune function requires having healthy physical barriers to protect us**

**Conditionally essential - nutrients that become depleted under conditions of severe physiological stress and need to be replaced**

“**conditionally essential**” nutrients support skin health

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Supporting Healthy Immune Function 

**Support the health of your physical barriers**  
**Conditionally essential nutrients for skin health:**

- **Arginine** – precursor to proline which is used for collagen synthesis and supports nitric oxide production
- **Vitamin C** – studies show supplements increased collagen deposition. Vitamin C is crucial for the formation of a “triple-helix” collagen structure, which gives collagen its strength
  - A randomized, double blind, placebo controlled trial found an antioxidant blend (**vitamin C, E, + zinc**) reduced oxidative stress resulting in a stronger healthier barrier

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Supporting Healthy Immune Function

**Support the health of your physical barriers**

The gastrointestinal tract is a major barrier against pathogens

- **Probiotics** – Healthy bacteria that limit growth of undesirable bacteria and support the health of cells
- **Prebiotics** – Food for healthy bacteria
- **Glutamine** – Used as a fuel source by intestinal cells and promotes replacement of damaged cells with healthy cells

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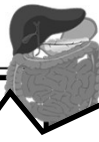
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Supporting Healthy Immune Function

**Support the health of your physical barriers**

The gastrointestinal tract is a major barrier against pathogens

Certain foods and alcohol damage this barrier, allowing bacteria and food particles to cross the barrier and enhancing inflammation

- **Probiotics** – Healthy bacteria that limit growth of undesirable bacteria and support the health of cells
- **Prebiotics** – Food for healthy bacteria
- **Glutamine** – Used as a fuel source by intestinal cells and promotes replacement of damaged cells with healthy cells

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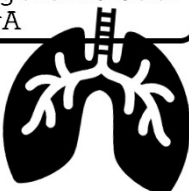
Supporting Healthy Immune Function



**The upper respiratory tract is defended by a mucus membrane containing antimicrobial proteins and IgA**

Airborne pathogens commonly attack this part of the body

- Influenza
- Common Cold



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### Supporting Healthy Immune Function



**Studies show zinc (lozenges or syrup) supports immune function in the mouth, nasal passage, throat, and upper respiratory tract**

- The lozenges may leave an astringent taste in your mouth
  - This is a sign that it is working and the zinc has created an electrical gradient in the respiratory tract, maintaining cellular defenses
- Zinc also can support the production of immune proteins such as IgA and other peptides



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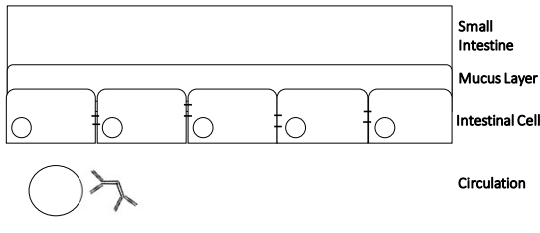

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### Protecting Mucus Membranes Secretory IgA



Small Intestine

Mucus Layer

Intestinal Cell

Circulation

The diagram shows a cross-section of the small intestine. At the top is the lumen. Below it is the mucus layer. Underneath the mucus layer is a layer of intestinal cells. Each cell has a nucleus and a small circle representing a pore. A Y-shaped antibody molecule is shown attached to the surface of one of the cells. Below the cells is the circulation area, which contains a single circle representing a blood vessel.

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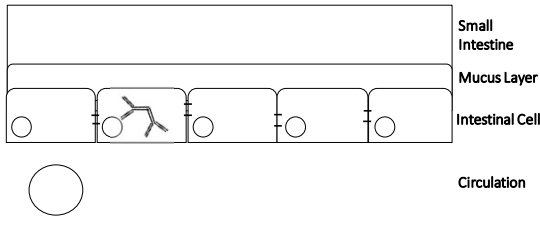

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### Protecting Mucus Membranes Secretory IgA



Small Intestine

Mucus Layer

Intestinal Cell

Circulation

The diagram shows a cross-section of the small intestine. At the top is the lumen. Below it is the mucus layer. Underneath the mucus layer is a layer of intestinal cells. Each cell has a nucleus and a small circle representing a pore. A Y-shaped antibody molecule is shown attached to the surface of one of the cells. Below the cells is the circulation area, which contains a single circle representing a blood vessel.

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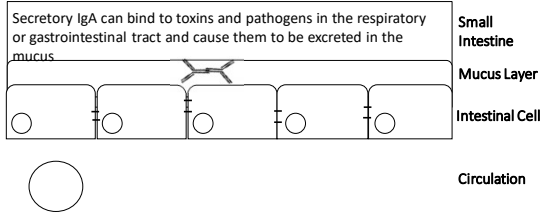
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27

### Protecting Mucus Membranes Secretory IgA



Secretory IgA can bind to toxins and pathogens in the respiratory or gastrointestinal tract and cause them to be excreted in the mucus



Small Intestine  
Mucus Layer  
Intestinal Cell  
Circulation

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### Protecting Mucus Membranes Secretory IgA



- Low secretory IgA levels are associated with increased risk of infection in the gastrointestinal tract and respiratory tract
- **Prebiotics** and **probiotics** have been shown to support healthy IgA levels
- **Vitamin A** deficiency significantly impairs secretory IgA synthesis
- Supplementation with **cocoa flavonoids** has been shown to enhance IgA synthesis in the gastrointestinal tract



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### Immune Cells



**When barriers are penetrated immune cells must respond**

In this regard, immune function is determined by two outcomes:

- Having healthy numbers of immune cells available to respond
- Immune cells being able to function properly



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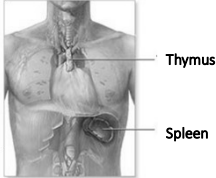
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Supporting Healthy Immune Function

**Stress hormones such as cortisol cause immune cells in the spleen and thymus to die**

- Cortisol is produced in response to **micronutrient deficiencies** or **protein energy malnutrition**
- Multiple vitamins protect against micronutrient deficiency



Thymus  
Spleen

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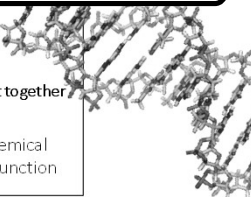
Supporting Healthy Immune Function

**Most immune cells are relatively short-lived (<28 days)**

Cell turnover requires **B vitamins**:

- **Vitamin B6, Folate, and Vitamin B12**
- Required for amino acid and DNA synthesis
- Studies shown B vitamins need to be **present together** to support optimal immune function

They have other essential roles in biochemical processes required for optimal immune function



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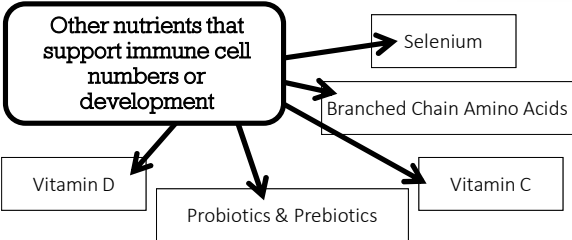
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Supporting Healthy Immune Function

**Other nutrients that support immune cell numbers or development**



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graph TD; A[Other nutrients that support immune cell numbers or development] --> B[Vitamin D]; A --> C[Probiotics & Prebiotics]; A --> D[Vitamin C]; A --> E[Branched Chain Amino Acids]; A --> F[Selenium];
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33

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Supporting Healthy Immune Function



**Probiotics & Prebiotics**

Stimulate the development of immune cells, production of antibodies, and produce immunoregulatory metabolites



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Supporting Healthy Immune Function



**Vitamin D**

Almost all immune cells express vitamin D receptors.

Taking 1200IU of vitamin D3 daily was shown to support immune function in the upper respiratory tract in school-age children.



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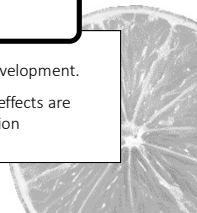

Supporting Healthy Immune Function



**Vitamin C**

Free radicals suppress healthy immune development.

Many of vitamin C's immune supportive effects are attributed to its antioxidant function



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Supporting Healthy Immune Function

**Branched Chain Amino Acids**

BCAAs activate developmental pathways in immune cells and support healthy immune cell numbers and function, especially in cases of physiological stress



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Supporting Healthy Immune Function

**Selenium**

Selenium deficiency severely decreases the ability of immune cells to function.

Other studies show that selenium deficiencies actually allow the virus to become stronger.



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Mushrooms & Immune Function

Mushrooms contain *hundreds* of different bioactive compounds that exhibit free radical scavenging, inflammation modulating, and immune supporting activity.

Cell wall made of glucans

- Alpha glucans (α-glucans)
- Beta glucans (β-glucans)

Produce fungal immunomodulatory proteins



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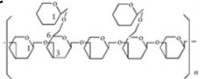
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**Glucans**



**Glucans interact with receptors on immune cells**

- Supports or modulates immune function
- Most studies show glucans support early stages of immune function that are active during the first 1-5 days of an immune response



**Because of the mechanism by which glucans support immune function there is also evidence that suggests they balance immune reactivity towards food born irritants**

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**Nutrition to Support:**  
The Resolution Phase of the Immune System

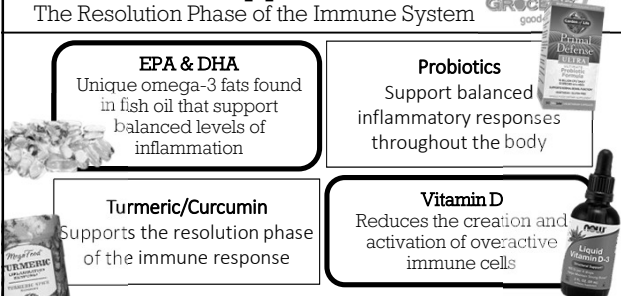


**EPA & DHA**  
Unique omega-3 fats found in fish oil that support balanced levels of inflammation

**Probiotics**  
Support balanced inflammatory responses throughout the body

**Turmeric/Curcumin**  
Supports the resolution phase of the immune response

**Vitamin D**  
Reduces the creation and activation of overactive immune cells




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**Long-Term Immune Support**

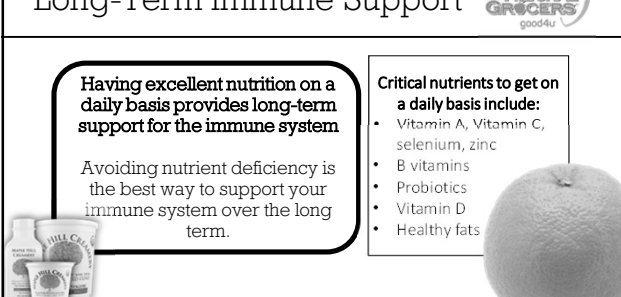


**Having excellent nutrition on a daily basis provides long-term support for the immune system**

Avoiding nutrient deficiency is the best way to support your immune system over the long term.

**Critical nutrients to get on a daily basis include:**

- Vitamin A, Vitamin C, selenium, zinc
- B vitamins
- Probiotics
- Vitamin D
- Healthy fats




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42

**Timely Immune Support**

**Certain nutrients can provide *timely immune support***

- Mushrooms extracts can provide acute immune support
- Vitamin D status often decreases during winter months
- Prebiotics and probiotics provide support to the gastrointestinal barrier when traveling
- Zinc (lozenges or syrup) is especially beneficial when taken immediately



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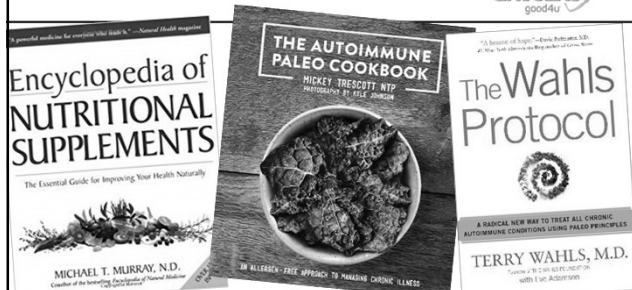
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**Resources**



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