



---

# FUNCTIONAL NUTRITION

---

WHERE NUTRITION AND DIGESTIVE PHYSIOLOGY MEET

---

by Dr. Heather Manley, N.D.



Copyright © 2016 by Heather Manley, N.D.  
All rights reserved. Printed and published in the United States of America.

No part of this book may be used or reproduced  
in any form without written permission from the author.

For reproduction of any part of this book or for more information please contact:

Heather Manley, N.D. | e: [drheather@drheathernd.com](mailto:drheather@drheathernd.com)  
[www.drheathernd.com](http://www.drheathernd.com) | [www.humanbodydetectives.com](http://www.humanbodydetectives.com)

# FUNCTIONAL NUTRITION

---

<b>LESSON ONE.</b> DIGESTION ANATOMY	1
<b>LESSON TWO.</b> PHYSIOLOGY: FUNCTIONS OF THE DIGESTIVE SYSTEM	7
<b>LESSON THREE.</b> DIGESTIVE ENZYMES	12
<b>LESSON FOUR.</b> BOWEL TRANSIT TIME TESTING	16
<b>LESSON FIVE.</b> BRAIN/GUT CONNECTION: VAGUS NERVE	18
<b>LESSON SIX.</b> MACRONUTRIENTS	20
<b>LESSON SEVEN.</b> MICRONUTRIENTS	25
<b>LESSON EIGHT.</b> DIFFERENT FOOD DIETS	32
<b>LESSON NINE.</b> NUTRITION-RELATED DISEASES	37
<b>LESSON TEN.</b> BEST WAYS TO OPTIMIZE FOOD DIGESTION AND ABSORPTION	42

---

# FUNCTIONAL NUTRITION

---

## LESSON ONE DIGESTION: ANATOMY

Most of you have taken basic human anatomy; however, I am a firm believer in repetition especially from different teachers and books as it allows different views and thoughts and ultimately, solidifies the information completely.

The digestive system is also known as the alimentary canal. In this section we will go over the oral cavity, epiglottis, sphincters, stomach, intestines, pancreas, liver, gallbladder and touch on the cell component, mitochondria.

### HANDOUTS FOR THE CLASS

*Digestive System Anatomy Chart*

### VIDEOS

The Digestive System

<https://www.youtube.com/watch?v=nM5kMSjBrmw>

<https://www.youtube.com/watch?v=s06XzaKqELk>

Crash Course on Digestive System (shows the importance of surface area)

<https://www.youtube.com/watch?v=s06XzaKqELk>

# FUNCTIONAL NUTRITION

---

## ORAL CAVITY: TEETH & SALIVARY GLANDS

Most adults have 32 permanent teeth. And they all have important jobs.

- Incisors: These are the front teeth that you use to take bites of your food.
- Canines: These are your sharpest teeth and are used for ripping and tearing food apart.
- Primary molars: These are used for chewing and grinding food.



### Word Alert

Chemical digestion occurs when digestive juices and water are released from the mouth, stomach, and small intestine.



### Word Alert

Mechanical digestion is the mechanical or physical processing (for example; chewing) of food.



### Trivia

It's important to mention that starting to eat our food initiates mechanical digestion.

Salivary glands are located in your mouth and produce and secrete saliva. Saliva will initiate chemical digestion.

### Saliva is important for:

- moistening food for swallowing
- stimulating and preparing the digestive juices to be secreted
- helps protect your teeth from decay by removing food particles from them



### Word Alert

Bolus: Once food is ingested and both chemical and mechanical digestion has begun, the food is referred to a bolus, basically, a ball of food.

## EPIGLOTTIS

The epiglottis is a thin flap of tissue located at the back of the tongue. Its vital function is making sure food goes down the esophagus, not the trachea (windpipe). It closes over the trachea when food is to be swallowed.

## ESOPHAGUS



### Word Alert

Peristalsis: The rhythmic one-way motion that propels the bolus down the digestive system. It is conducted by the smooth muscle located in this system.

# FUNCTIONAL NUTRITION

---

The esophagus is a hollow muscular tube approximately 25 to 30 centimeters in length and 1 to 2 centimeters wide. It carries, via peristalsis, bolus from the mouth to the stomach. This process takes approximately 6 seconds.

## LOWER ESOPHAGEAL SPHINCTER (LES)

The lower esophageal sphincter is a bundle of muscles located at the junction between the esophagus and the stomach. When the LES is closed, stomach acid and stomach contents are prevented from traveling back into the esophagus.



### Trivia

Too much coffee, alcohol, sugar, and/or chocolate can weaken the LES and cause the LES to open at any time allowing stomach acid to enter the esophagus.

## STOMACH



### Trivia

In the abdominal region, the placement of the anatomical parts is divided into 4 quadrants: upper right, upper left, lower right, and lower left.

The stomach is a muscular pear-shaped organ located on the upper left side of the abdomen. The bolus enters the stomach through the LES. In the stomach, stomach acid and digestive juices will be secreted. With the help of the ridges of smooth muscle tissue, called rugae that line the stomach, protein digestion begins.



### Word Alert

Chyme: In the stomach, the ball of bolus is further broken down into a liquid and mushy substance, referred to as chyme.

## PYLORIC SPHINCTER

The pyloric sphincter is a muscular valve, located at the junction between the stomach and small intestine. It will open to allow food to pass from the stomach to the small intestine.

## SMALL INTESTINE

The small intestine is an approximately 20-foot-long tube that is divided into 3 parts: duodenum, jejunum, and ileum. The surface area in the small intestine is large; creating the opportunity for more enzymes and digestive secretions to attach to chyme. This allows for optimal breakdown and absorption of chyme.

# FUNCTIONAL NUTRITION

---

## DUODENUM

The duodenum is the primary area of digestion, located in the upper region of the small intestine. Pancreatic juices are here initiating the breakdown of fat. The duodenum has the biggest surface area for chyme breakdown.



### Word Alert

Villi: Villi are located in the small intestine, specifically the jejunum. They increase the surface area of tissue availability for chyme absorption.

## JEJUNUM

The jejunum has a specialized lining - villi - to help enhance the absorption of the carbohydrates and proteins. The jejunum has the biggest surface area for absorption.



### Trivia

Digestion refers to mechanical and chemical breakdown of food, whereas, absorption refers to the uptake of nutrients from the food.

## ILEUM

The ileum is the last portion of the small intestine. Vitamin B12 is absorbed here. This differs from other nutrients, as they are mostly absorbed in the jejunum.



### Word Alert

The Ileo-Cecal Valve is a muscular valve, located between the ileum and large intestine. It prevents or controls back flow of colon materials - water, waste - back into the ileum.

## LARGE INTESTINE/COLON: ASCENDING, TRANSVERSE, DESCENDING

In the large intestine, water and electrolytes - minerals: sodium, potassium, chloride - are reabsorbed into the body/bloodstream, leaving waste that the body doesn't need or want. This waste will be removed through a bowel movement/pooping.



### Trivia

The large intestine is shorter in length than the small intestine, however, it is much wider.



### Word Alert

Electrolytes: Electrolytes are the minerals sodium, potassium, and chloride. They conduct electricity in the body, which is essential for the normal function of cells and their organs.

# FUNCTIONAL NUTRITION

---

## PANCREAS

The pancreas lies behind the stomach and is approximately 18 to 25 cm long. The head of the pancreas, on the right side, is connected to the duodenum of the small intestine.

The pancreas releases many digestive juices that help with the breakdown of foods.

## LIVER

The liver is located in the upper right quadrant of the abdomen and weighs approximately 3 pounds. The liver has numerous jobs including storing nutrients, detoxification, protein synthesis and making bile.

## GALLBLADDER

The gallbladder is located on top of the liver and stores bile.

### ● Activity

- Place your hand on your belly button. Your palm is over your small intestine, which is surrounded by the large intestine. Above and to the left is your stomach and pancreas and to the right is your liver and gallbladder.

## MITOCHONDRIA

I wanted to bring mitochondria into the anatomy discussion because it plays an important role in using the nutrients we eat into usable forms in the body.

The mitochondria is found in all body cells. Mitochondria organelles are known as the powerhouses of the cell: they take in nutrients, break them down, and create energy rich molecules for the cell.

When our food is broken down in the digestive system and travels through the bloodstream, it needs to be converted into energy, called ATP, that the body can use to grow, repair, and reproduce. The place this transformation occurs is located in mitochondria.

There are thousands of mitochondria in each cell and they are very busy. The mitochondria are very sensitive to damage especially with a processed food diet. This is a very good reason to feed our bodies well so our mitochondria can do its best job which ultimately effects how we feel.



### Trivia

Muscle cells need a lot of energy, therefore, have numerous cells packed with mitochondria to help keep muscles strong and functioning.

# FUNCTIONAL NUTRITION

---

We are finished our discussion on the anatomy of the digestive system. In the next class we will talk about physiology. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“let food be thy medicine

and medicine be thy food.”

Hippocrates

## LESSON TWO

### PHYSIOLOGY: FUNCTIONS OF THE DIGESTIVE SYSTEM

Now that we are familiar with the location and functions of digestive anatomy, we can move into the physiology. There are 4 main functions of the digestive system and they are important to review to understand fully how this system works.

- Cephalic Phase and Ingestion
- Digestion
- Absorption
- Excretion/Elimination

#### VIDEOS

Digestive System Physiology Overview

<https://www.youtube.com/watch?v=M008eTnvV9Y>



#### Thinking Cap!

I strongly encourage making flow charts so you can visualize how everything works together.

#### 1. CEPHALIC PHASE AND INGESTION

Before actual ingestion occurs, just the anticipation of food will alert the body to prepare for digestion, absorption, and use of nutrients in food. This is referred to as the cephalic phase. The cephalic phase is also referred to as the cephalic reflex, and is the first step in preparing the digestive system for food. This is a good reason not to go grocery shopping when you are hungry!

Ingestion is the process by which food enters into the alimentary canal/digestive system.

The minute you begin to think about, smell, and/or see food, the process of digestion begins (referred to as the cephalic phase or reflex). The digestive system begins to anticipate for the arrival of food and starts preparing. These senses trigger the brain, via the vagus nerve, to begin releasing:

- saliva from the salivary glands
- the hormone, gastrin
- hydrochloric acid ( HCL)
- pancreatic juices

# FUNCTIONAL NUTRITION

---



## Word Alert

The hypothalamus is part of the brain that has many physiologic functions, one being alerting certain cells to release chemicals.



## Thinking Cap!

Since we are discussing ingestion, I feel the need to mention food choices. As we will learn throughout this course, what we decide to eat will definitely determine how our bodies will function, in addition to being healthy for the planet. Begin or continue to make conscious efforts on your food choices: non-GMO, organic, whole colorful, and non-processed foods.

## 2. DIGESTION

Now that food has entered the body, digestion begins with the breakdown of the larger food bolus molecules into smaller ones, begins. The process of digestion occurs in 2 simultaneous ways: mechanical and chemical.

### MECHANICAL DIGESTION

The mechanical or physical movement process begins in the mouth.

1. First, with chewing the foods,
2. Next, mixing of the foods by the tongue,
3. Then, with the foods traveling down the esophagus with the help of peristalsis,
4. Finally, when the bolus is in the stomach, the mixing of the bolus.

Chewing is an essential part of digestion and ultimately the absorption of nutrients.

The importance of chewing:

- breaks down food bolus to make smaller
- mixes food bolus completely with saliva (the tongue assisting) to create a wet food bolus
- increases the surface area of the food bolus so more enzymes can attach
- chewing thoroughly can eliminate abdominal discomfort like: gas, bloating, and stomach pain



## Trivia

- Chewing is also referred to as mastication.
- Liquids—like juice and water — do not require mechanical digestion.

# FUNCTIONAL NUTRITION

---



## Trivia

This is a good time to mention the importance of muscles in the digestive system; strong jaw muscles are required for chewing and toned digestive system smooth muscle for optimal peristalsis movement. In addition, the muscles of the abdominal area aid in the churning and mixing of the chyme, so a toned core is advantageous for digestion as well.

## CHEMICAL DIGESTION

Chemical digestion is the chemical breakdown of the foods (opposite to mechanical which is the physical aspect) and occurs when digestive juices and water are released from the mouth, stomach, and small intestine.

Digestive juices and water are responsible for the breakdown of the macronutrients: fats, proteins, and carbohydrates into smaller molecules. Once these are broken down, they are readily available to be absorbed for use by body cells.

## SECRETION

Secretion is the last part of digestive function. Many substances are secreted in digestive system:

- water
- enzymes
- acids
- buffers

And these roles are:

1. Lubricate bolus
2. Protect with bicarbonate to neutralize acid that may enter the small intestine
3. Kill possible pathogens
4. Breakdown foods



## Trivia

The presence of digestive enzymes accelerates the digestion process. Absence of these enzymes slows overall digestion.

## 3. ABSORPTION (means uptake)

After the mixing and churning of the food bolus it now becomes chyme and is ready to be absorbed and assimilated into the tissues of the body. Absorption is the final stage where nutrients from chyme are absorbed into the bloodstream and transported to cells - mitochondria - to be used as fuel.

# FUNCTIONAL NUTRITION

---

As we learned in the anatomy section, the small intestine, especially the jejunum, is the main place for nutrient absorption. The small intestine lining - also referred to as the lumen - is lined with hollow finger-like projections, called \*villi, where absorption and assimilation takes place. These villi are very close together. They transport the nutrient molecules to the bloodstream in 1 of 3 ways:

1. Simple diffusion, where molecules pass through freely.
2. Facilitated diffusion, molecules will hitch a ride from a carrier (example: usually a protein).
3. Active transport, where molecules use energy to diffuse into the bloodstream.

\* the jejunum has the most villi present in the small intestine



## Thinking Cap!

Assimilation comes up many times with digestion and is often confused with absorption. Absorption is the first step in which food begins entering the cell tissues and assimilation occurs right after absorption when chyme is in the cell tissues.

## 4) EXCRETION/ELIMINATION

Elimination is when our bodies eliminate waste products— what we don't need—through the large intestine (colon) via a bowel movement.



## Thinking Cap!

Every section in the digestive system has specific jobs. Digestion is extremely important because breaking down the foods into smaller particles/molecules allows for easier movement into the bloodstream. For example, if proteins are not broken down into passable and absorbable molecules, the villi can become irritated and inflamed causing possible damage. This damage may allow larger and foreign proteins into the bloodstream alerting the immune system that there is a "foreigner" in the body leading the immune system to attack it. Therefore, it is essential that chemical and mechanical digestion are working optimally.



## Trivia

Both mechanical and chemical digestion occur simultaneously at every aspect of the alimentary canal.

## FUNCTIONAL NUTRITION

---

We are finished our discussion on the physiology of the digestive system. In the next class we will talk about digestive enzymes. I would like to end the class with an inspirational quote for you to ponder.

### INSPIRATIONAL QUOTE

“ the physiologist who succeeds in penetrating deeper and deeper into the digestive canal becomes convinced that it consists of a number of chemical laboratories and various mechanical devices.”

Ivan Pavlov

## LESSON 3

### DIGESTIVE ENZYMES

#### HANDOUTS

*Enzyme chart*

#### VIDEOS

Enzymes and Co-Factors

<https://www.khanacademy.org/test-prep/mcat/biomolecules/enzyme-structure-and-function/v/cofactors-coenzymes-and-vitamins>

#### HCL

<https://www.youtube.com/watch?v=G2cZ-MSvl0o&feature=related>  
<https://www.youtube.com/watch?v=lvSWgwKJavw>

There are 3 different types of digestive enzymes in the body; they have specific jobs to bring a body reaction in a speedy manner. For example, saliva has the digestive enzyme, amylase, that begins chemical breakdown of food into smaller particles— nutrients—that are then absorbed into the bloodstream. If we don't chew food thoroughly we may not produce enough saliva thus amylase which may hinder or slow down digestion.

Typically, enzyme terms end in ase.

**Different types of enzymes and their functions are:**

- Amylases break down carbohydrates
- Proteases break down proteins
- Lipases break down fats

### IN THE MOUTH

#### AMYLASE

Amylase is mostly secreted by the salivary glands in the mouth to chemically break down carbohydrates. In addition, the presence of saliva/amylase also trigger the stomach to begin secreting stomach acids, the hormone gastrin, and other pancreatic juices.



#### Thinking Cap!

Chewing gum: Good or bad?

# FUNCTIONAL NUTRITION

---

Mechanical digestion, chewing, alerts the digestive system that food is on the way. When you begin chewing gum, enzymes and acids are secreted. But when no food arrives in the stomach, an over-production of stomach acids and enzymes may result in bloating and abdominal pain.

## IN THE STOMACH

### HYDROCHLORIC ACID (HCL)

Hydrochloric acid or stomach acid is secreted by the stomach's parietal cells. HCL has two important jobs.

1. Protection: HCL will destroy any foreigners (germs, parasites) that have entered our bodies with our food.
2. Break down of proteins.

HCL is essential and despite what many believe, people tend to have a lower level of HCL than higher. Reasons for this might be:

- eating when upset
- stress
- diet of processed and fast foods
- lack of sufficient minerals in the daily diet
- sugar ingestion (sugar lacks any nutrients) requires many nutrients to aid in its absorption and thus depletes our bodies of them, especially the minerals.
- as we age, stomach acid production tends to decrease
- zinc deficiency \*
- B vitamin deficiency \*

\* Zinc and B- vitamins are needed to help enzyme reactions to happen, they are referred to as co-factors and/or catalysts. For the biochemists who are taking the class, watch the Khan academy video listed on the *Resource Handout*.



#### Trivia

HCL is extremely acidic and if the stomach did not produce enough mucus to protect its lining, the acid would eat it up.



#### Trivia

I tend to recommend people to ease sugar out of their diet by replacing it with nutrient rich sweetness like maple syrup, honey, or stevia

# FUNCTIONAL NUTRITION

---

## PEPSIN

Pepsin is a protease enzyme that aids in the breakdown of proteins in the stomach. It is secreted by the chief cells in the stomach.

## GASTRIN

Gastrin is a hormone that is stimulated by the vagus nerve to trigger the secretion of HCL and stimulate muscle contractions to aid in digestion. It is secreted by the cells deep in the stomach lining called, G cells.

## IN THE SMALL INTESTINE

Protein digestion begins with the presence of pepsin and HCL in the stomach; however, most protein digestion occurs by pancreatic proteases, which are secreted from the pancreas and into the small intestine. These proteases: trypsin and chymotrypsin are made in the pancreas and secreted into the small intestine. Once they enter the small intestine, they are converted into trypsinogen and chymotrypsinogen, the active forms, that will break down the food chyme.

## IN THE PANCREAS

### LIPASE

The enzyme lipase is made in the pancreas and released in the small intestine to aid in the break down of fats into fatty acids.

## IN THE LIVER

### BILE AND BILE SALTS

Bile is made in the liver, stored in the gall bladder, and secreted into the small intestine. Its primary role is to help the body digest fat. One component of bile are bile salts which further aid in the break down of fat particles. Bile salts play an active role in absorption of fat-soluble vitamins, like vitamins A, D, E, and K.



### Trivia

On an interesting side note, there are food enzymes present in the foods we eat, mostly in raw foods. It's a good reason to include some raw whole foods in your diet; they support our digestive system because when food is cooked, most enzymes are destroyed.

# FUNCTIONAL NUTRITION

---

## IN THE LARGE INTESTINE

The large intestine reabsorbs water and electrolytes and forms feces from the waste products our body does not want or need. It moves out of the body via a bowel movement.



### Thinking Cap!

Chronic stress is one of the most common reasons for digestive enzyme problems. Our body has 2 nervous system modes: sympathetic or “fight or flight,” and parasympathetic or “rest and digest.” When we are under stress we tend to be in a sympathetic mode where digestive system is not a priority. During this time enzyme activity slows along with other digestive functions.

We are finished discussing digestive enzymes. In the next class we will talk about bowel transit times and testing. I would like to end the class with an inspirational quote for you to ponder.

### INSPIRATIONAL QUOTE

“our bodies are our gardens.  
our wills are our gardeners.”

William Shakespeare

# LESSON FOUR

## BOWEL TRANSIT TIME TESTING

### HANDOUTS

*Food:Mood:Poop Diet Diary*

### VIDEOS

Bowel Transit Time

<https://www.youtube.com/watch?v=AuH18mDIh00>

Bowel transit time is the time it takes for food to travel through the entire digestive system—ingestion, digestion, absorption, and elimination. Some doctors talk about the importance of a “normal” or “standard transit time,” however, some doctors do not believe it is a necessary test. There is a range that is optimal but there are numerous factors that should be considered as they relate to the act of eating:

- what is eaten
- when it is eaten
- stress at the time of eating
- water intake
- age and gender
- medications taken

Many years ago I was reading one of Deepak Chopra’s books. In one part he spoke about optimal digestion. He compared eating a beautiful whole food, colorful meal with your worst enemies (eating under stress: sympathetic mode), versus eating a processed meal with your best of friends. People who eat with their enemies, despite a very nutritious meal, tend to have many digestive ailments: bloating, gas, aches. On the flip side, optimal digestion occurred when eating processed foods with your best friends. This is very important to remember when eating all foods: be grateful, appreciate, and take your time to fully chew your food and let your taste buds indulge in the flavors. Combining a nutrient-rich meal and a good positive state when eating, is ideal for optimal digestion.

Below are the average digestive transit times:

Stomach: Food fully leaves the stomach between 4 and 5 hours.

Small Intestine: Food fully leaves the small intestine between 3 and 6 hours.

Large intestine: Food fully leaves the large intestine between 16 and 40 hours.

Total transit time may be anywhere from 24 to 40 hours.

# FUNCTIONAL NUTRITION

---

Total transit time varies depending on what you have eaten. For example, a steak dinner may take more than 40 hours, whereas a fruit salad may take less than 24.

If one decides to do a bowel transit time test, due to curiosity or issues with constipation, I highly recommend being a good detective to get all clues and keep a food:mood:poop diet diary. As we mentioned above, stress, food eaten, and water intake, can play a large role in your transit time.

## How to do the bowel transit time test:

1. Choose a food. A few choices are:
  - Red beets: half a cup
  - Black sesame seeds: 2 to 3 teaspoons
  - Dry corn kernels (Eat with food but do not chew)
2. Get your *food:mood:poop diet diary* out and fill in everything you ate and drank, especially noting the one food you chose from the list above.
3. Remember to record the time at which you ate this food and take notice of your bowel movements in the next 12 to 50 hours. With the beets and seeds, your stool will be red or dark, almost black. If you chose corn, this will be visible in your feces.



## Trivia

- Chronic stress can increase transit time and acute stress can lessen it.
- Fats have the slowest transit times, proteins being next and finally, carbohydrates.
- Slow transit times are primarily due to a low-fiber diet and over-consumption of fats.
- Most people have a slow transit time, which results in constipation.
- Good muscle abdominal tone is essential to optimize digestion.

We are finished discussing bowel transit times and testing. In the next class we will talk about brain/gut connection: vagus nerve. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“those who think they have no time for healthy eating,  
will sooner or later have to find time for illness.”  
Edward Stanley

# LESSON FIVE

## BRAIN/GUT CONNECTION: VAGUS NERVE

### VIDEOS

Gut-Brain Axis

<https://www.youtube.com/watch?v=Am7kr-vP0Ys>

### BOOKS

*Brain Maker: The Power of Gut Microbes to Heal and Protect Your Brain—for Life*  
by David Perlmutter

### ARTICLES

<http://www.scientificamerican.com/article/gut-second-brain/>

<http://www.medicalnewstoday.com/articles/292693.php>

Have you ever felt nervous, fearful or excited and get those twittering butterflies wing sensations in your gut? And have you heard the saying, “trust your gut?” This saying, in part, has to do with the vagus nerve and how it links the brain to the gut.

The enteric nervous system is a meshwork of nerves that resides in the lining of the gut (gastrointestinal tract). It has as many neurons as the spinal cord and therefore, is often referred to as the second brain. These 2 brains are connected by the vagus nerve. A great deal of research is being conducted on the vagus nerve; how important its role just may be in digestive health and it is fascinating.

The vagus nerve is a cranial nerve meaning it originates in the brain; it is located at the back of your neck and travels or wanders (commonly referred to as the wanderer) all the way to the abdomen; innervating, supplying organs and many different areas in the body including the heart, liver, and stomach. The vagus nerve is constantly sending the brain information about how the different body organs, and in this case, the digestive system is functioning. It has been linked to influencing mood, fear, and anxiety. It also communicates with the mind informing the gut to promote either the “rest and digest” parasympathetic nervous system response or put on alert for a “flight or fight” sympathetic nervous system response.

# FUNCTIONAL NUTRITION

---

## Vagus Nerve Functions:

- alerts when hungry
- promotes enzyme and HCL release
- stimulates gallbladder to release bile
- stimulates intestinal blood flow
- communicates which nutrients, such as carbohydrates and protein components, are present triggering the appropriate amount of digestive chemicals to be released
- slows the heart beat to allow for optimal digestion

The gut/brain communication pathway is bi-directional, meaning that messages are being sent back and forth between the two. It is very important to note that there is no separation between these and most people with digestive issues have some sort of psychological issue: from sugar cravings, to mood disorders, depression, anxiety.

As mentioned earlier, the vagus nerve promotes a parasympathetic nervous system response for eating: known as the rest and digest. Similar to what we spoke about in Deepak Chopra's book findings, it is essential to be relaxed and not stressed when eating (i.e. no eating and driving or eating with your enemies) to allow the digestive system to work optimally. Therefore, get into your parasympathetic mode of eating and enjoy each meal.



## Trivia

Serotonin is a neurotransmitter and close to 90% of it lies in the gut. Its main role is to help regulate mood, sleep, and learning and indirectly communicates with nerve cells to begin releasing digestive juices. The reason I bring serotonin into the discussion is how it is significantly linked to mood and thus, a low serotonin in the body may lead to depression, and other mood disorders. Another strong reason to keep the health of your digestive system strong and healthy.

To learn more, check out Dr. David Perlmutter book and articles listed in the *Resource Page*.

We are finished discussing the vagus nerve. In the next class we will talk about macronutrients. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“the doctor of the future will no longer treat  
the human frame with drugs.  
but rather will cure and prevent disease with nutrition.”  
Thomas Edison

## LESSON SIX MACRONUTRIENTS

### VIDEOS

Cookie Recipe

<http://www.humanbodydetectives.com/the-good-cookie/>

Carbs, Fats, Protein Review

<https://www.youtube.com/watch?v=H8WJ2KENIK0>

Nutrients are substances that provide energy for the body. They can be divided up into 2 categories: macronutrients and micronutrients. This class we will talk about macronutrients.

The 3 macronutrients include: proteins, carbohydrates, and fats. These macronutrients nourish, support growth, and repair in the body.



### Thinking Cap!

All broken down macronutrients are absorbed in the small intestine then into the bloodstream, and ultimately through the cell membrane and into the cell's mitochondria.

### 1. PROTEINS

Twenty percent of the human body is made up of protein. Protein plays a crucial role in almost all biological processes.

#### What are Amino Acids?

Amino acids are referred to as the building blocks of proteins. They are found in protein foods we eat. Once a protein food is ingested, it is broken down into amino acids that the body can use.

There are 20 amino acids with 8 of those being essential for humans; meaning the body cannot produce them. These essential amino acids include: isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

# FUNCTIONAL NUTRITION

---

## Protein Functions:

Proteins are major constituent of most cells; they have many important functions, including:

- proteins are used to produce new tissues for growth and tissue repair (especially in the muscles, bones, skin and hair)
- regulate and maintain body functions
- enzymes used for digestion, protection, and immunity are made of protein
- essential hormones used for body regulation require protein
- proteins may be used as a source of energy when carbohydrates are not available

## Protein Food Sources:

Protein is found in meats, poultry, fish, meat substitutes, cheese, milk, nuts, legumes, and in smaller quantities: starchy foods and vegetables. People who consume a vegetarian diet can get plenty of protein if they keep a balanced diet.

## 2. CARBOHYDRATES

Carbohydrates are the main source of energy that the body needs, therefore, they are the body's main source of energy. At this time, the USDA recommends that adults get 45-65% of their daily meals from carbohydrates.

## Carbohydrate Functions:

- carbohydrates are used as the body's main fuel source
- all of our bodily tissues have the ability to use the carbohydrate as energy
- the brain, kidneys, muscles and heart all need carbohydrates to function properly
- carbohydrates aid in the synthesis of certain amino acids
- fats can only be properly metabolized when carbohydrates are present
- indigestible carbohydrates, in the form of fiber, are necessary for intestinal health

There are 2 types of carbohydrates: simple and complex. The difference is in their chemical makeup is: simple having 1 molecule strand and complex having many.

## SIMPLE CARBOHYDRATES

Simple carbohydrates are referred to as simple sugars and are metabolized quickly, which means they provide the quickest form of energy the body can use right away. Because of this they tend to raise blood sugar rapidly, commonly referred to as a sugar high, followed by a rapid drop; or a sugar low. The high makes you feel great, temporarily, but the low leaves

# FUNCTIONAL NUTRITION

---

you tired. This can create a vicious cycle because when you feel tired, you then crave more simple carbohydrates to make you feel good again. However, in the long-term this may lead to illness and disease. In addition, generally, simple carbohydrates contain no nutrients - vitamins or minerals, just sugar -plus, since they are void of nutritional value they often rob the body of nutrients for their conversion into energy.

Simple carbohydrates are commonly found in sugary foods and many processed foods. A few exceptions are milk and fruits which are considered simple carbohydrates that do offer nutrient value for the body.

Simple carbohydrates to avoid:

- pop/soda
- fruit drinks (juice)
- sugar
- processed foods
- white foods (rice, white bread, white pasta)

Eating balanced meals is always the key and if you are craving a cookie or other baked good, try to make them yourself because you have complete control of the ingredients being used. In the **Resource Page**, there is a link to a great base cookie recipe that you can add nuts or seeds to add more nutrients and fiber.



## Thinking Cap!

Eating a sugary meal on an empty stomach is not ideal as it can create a hyperglycemia state leaving you dizzy, thirsty and sometimes even fatigued. If you indulge in a sugary treat, eat it after a meal or with a protein food to help balance the sugar.



## Trivia

When we eat sugar or simple carbohydrates, our bodies, especially the pancreas, secretes the hormone insulin. Insulin helps the body absorb sugar and then stores it in the liver, muscles, and fat tissues. When we eat too much, the pancreas secretes an abundance of insulin leading to an excess storage of sugar which in turn will convert to fat. At this point, the blood sugar will drop and you will begin to crave more sugar creating a cycle; a very unhealthy cycle leading to diabetes when the pancreas gets too tired to release insulin.

# FUNCTIONAL NUTRITION

---

## COMPLEX CARBOHYDRATES

Complex carbohydrates are also referred to as starches and their chemical make-up contains many sugar molecules strand together, thus the name complex. This chemical make-up slows down the metabolism, creating more long-term sustained energy. In addition, they are packed with nutrients and fiber. Fiber aids in slowing down the metabolism which is good for sustaining you longer (giving a sense of fullness, avoiding overeating). Complex carbohydrates are found in plant-based foods and whole grains.

### Complex carbohydrates to eat:

- whole grains
- peas, legumes
- green vegetables

## 3. FATS

Fats are very important in the body. The brain is made up of 60 to 70 percent fat and all cell membranes are made of fat; there are 60 to 100 billion cells in the body that have a cell membrane. Nutrition is forming in all of the cells (mitochondria) and what we eat plays an important role in determining how our cells/mitochondria and, ultimately, our bodies function.

When the body is given an optimal, high-quality fat source, it allows the cell membrane to be flexible, which enables a greater absorption of nutrients and oxygen into the cell (plus letting waste out).

In addition, fats help with neural transmission (the speed of messages being transmitted to and from the brain). Fats help build the myelin sheaths, which aid in faster neural transmission on neurons, therefore, in a diet deficient in optimal fats, we may see changes in motor skills and affect and recognition and memory.

### Myths about Fat

**myth** Fat-free means healthy.

**Truth** • Many fat-free food options are simple carbohydrates which we have learned are mostly void of nutrients and may cause long-term diseases.

**myth** A low-fat diet helps you to lose weight.

**Truth** • Healthy fats help make you feel full, which reduces the tendency to overeat.

**myth** All fats are equal.

**Truth** • All fats are not equal. Trans fats, mostly from processed foods like commercially baked goods, margarine, and fried foods, are not good for your body and may create long-term diseases.

# FUNCTIONAL NUTRITION

---

## Great fats to bring into your diet:

- chia, flax and hemp seeds
- olives
- extra virgin coconut and olive oil
- cold-water fish
- nuts – walnuts, almonds

## Fats to eat in moderation:

avocados, butter, pasture-raised meats and eggs

## Fats to avoid:

Trans fats, mostly present in processed baked foods – cookies and crackers, hydrogenated oils

We are finished discussing macronutrients. In the next class we will talk about micronutrients. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“things sweet in taste prove in digestion sour.”

William Shakespeare

# LESSON SEVEN

## MICRONUTRIENTS

### ARTICLE

*Gut Bacteria and Mood*

[http://www.nytimes.com/2015/06/28/magazine/can-the-bacteria-in-your-gut-explain-your-mood.html?\\_r=0](http://www.nytimes.com/2015/06/28/magazine/can-the-bacteria-in-your-gut-explain-your-mood.html?_r=0)

Micronutrients are chemical substances - like vitamins and minerals - that are required in trace amounts for growth and metabolism.

There are many nutrients that we could talk about so you might want to do your own research. In this class, I plan to focus on a few plus fiber, essential fatty acids and probiotics.

As we spoke about in the enzyme section, at times enzymes need a little assistance and this is an example of where vitamins and minerals help out in the body. These nutrients are referred to as co-factors.



### Reminder!

It is always essential to speak with your physician before taking any supplements.

### MINERALS

#### IRON

Iron is a critical component in the blood and in particular, hemoglobin. Hemoglobin has an important job of carrying oxygen to our cells to produce energy.

Iron begins its absorption process in the stomach. When iron-rich foods enter the stomach, HCL breaks down the ferric acid from iron-rich food into ferrous iron; this is what is absorbable in the small intestine.

We have spoken about the importance of HCL many times in the last few lessons and with iron, it plays a role in its absorption. If we have low HCL, which many people do, iron can not be transformed into its usable or active form and not be absorbed in the body.



### Trivia

Optimal calcium absorption also requires HCL

#### Iron-rich foods to eat:

Many people think they need to eat red meat to get a good dose of iron, but there are many other options: leafy greens, beans (chickpeas), nuts and seeds. In addition, vitamin C helps increase or optimize iron absorption, therefore, eating vitamin C-rich foods along with iron-rich foods is helpful.

# FUNCTIONAL NUTRITION

---

## ZINC

Zinc is a mineral that is found throughout the body cells and is stored in the muscles, spleen, bone marrow, and liver. You can also find high concentrations of zinc in red and white blood cells, skin, and the macula of the eye.

### Zinc functions:

- zinc aids in the synthesis (process of producing) of cholesterol, protein, and fats and regulates the release of vitamin A from the liver
- required for vision
- insulin requires zinc (consider in diabetics or people who have problems with blood sugar balancing)
- immune system requires zinc

### Possible deficiency symptoms:

- decreased taste sensation (may lead to loss of appetite)
- delayed wound healing
- hang nails and white spots on finger nails
- red bumps on the back of arm and/or leg
- impaired glucose intolerance
- inflammatory bowel disease
- acne
- eczema

### Zinc foods to eat:

Brown rice, oysters, beef, dark turkey, swiss chard, sesame and pumpkin seeds

### Taste perception test

Many people who have a zinc deficiency have little to no taste perception, meaning they have difficulty distinguishing taste or have a loss of taste. In addition, amylase production can be disrupted by a zinc deficiency.

There is a simple home taste that you can do to see if you have a zinc deficiency.

1. It is best not to drink or eat 1 hour before you perform the test.
2. Place approximately 1 tsp of liquid zinc\* in a glass.
3. Rinse it in your mouth for 5 to 10 seconds.
4. Swallow or spit it out.

\* Designs for Health Zinc Challenge is a good liquid zinc

# FUNCTIONAL NUTRITION

---

Generally, 4 different tastes will occur in your mouth:

## **Tastes that indicate zinc deficiency:**

- 1) No taste (similar to water)
- 2) Initially no taste, but then a dry, mineral taste or a sweet taste maybe sensed

## **Tastes that indicate no zinc deficiency:**

- 3) An immediate strong taste that is not unpleasant
- 4) An unpleasant taste is registered immediately

## **Why is zinc deficiency linked to decreased taste sensation?**

Zinc must be attached to a very small protein, gustin which is found in saliva, in order for our sense of taste to function properly. If zinc is not available, then an impaired sense of taste will occur.

## **MAGNESIUM**

Magnesium is one of the most abundant minerals in the body; half of magnesium is found in the bones and the other half is found inside body tissues and organs.

## **Magnesium functions:**

- maintains normal muscle and nerve function
- maintains normal heart rhythm
- reduces inflammation
- boosts our immune system
- regulates blood sugar
- responsible for more than 350 biochemical reactions in the body
- helps prevent osteoporosis

## **Possible magnesium deficiency symptoms:**

- fatigue
- insomnia
- anxiety and panic attacks
- muscle cramps

## **Magnesium foods to eat:**

Dark green leafy vegetables like broccoli, spinach and Swiss chard. Nuts and seeds like almonds, cashews, pumpkin seeds and sunflower seeds will also help add more magnesium to your diet, as well as certain fish like halibut and mackerel. Some dairy products like Greek yogurt can give you a good boost of magnesium.

# FUNCTIONAL NUTRITION

---

## VITAMIN B12

Most Vitamin B12 is found in meat. Once the meat makes its way to the stomach, HCL and pepsin will cleave the B12 from the meats. Once free, B12 will bind to intrinsic factor, and together they will travel to the small intestine to be absorbed. If there is no intrinsic factor with the B12, B12 will not be absorbed.



### Reminder!

Do you remember where B12 is absorbed in the small intestine? The ileum.



### Word Alert

Intrinsic factor is a glycoprotein produced in the stomach by the parietal cells. It is essential component needed for the absorption of B12.

### Where does intrinsic factor come from?

The stomach. The stomach lining is thick with mucous. This mucous lining has a few different jobs:

1. Protect the lining from the acidic environment.
2. Holds the parietal cells that secrete intrinsic factor (plus pepsin).

HCL, pepsin, and especially intrinsic factor are all necessary parts of B12 absorption.

## OMEGA 3 FATTY ACIDS

As we mentioned in the macronutrient class, the brain is made up of 60-70 percent fat and cell membranes are made of fat. Eating good quality fat is important as this allows cell membranes to become flexible allowing for nutrient absorption into the cell.

### The different types of omega-3s:

ALA (alpha-linolenic acid)

DHA (docosahexaenoic acid)

EPA (eicosapentaenoic acid)

Omega 3 fatty acids can be obtained from either marine and land-based animals or plant-based foods. Once eaten, the marine based fatty acids are already in an active form with DHA and EPA, whereas, the plant base tends to require more conversion: ALA to DHA and EPA.

**Marine and land based:** cold water fish: salmon, halibut, pasture raised meats and eggs

**Plant based:** flax seeds, chia seeds, walnuts, hemp seeds

# FUNCTIONAL NUTRITION

---

DHA and EPA are responsible for proper cognitive development in children plus eye function, immune system support, and has been shown to increase learning ability. In adults, they have an anti-inflammatory effect and have been shown to help with depression and cardiovascular disease.



## Trivia

Our bodies cannot do an effective job of converting ALA into EPA and DHA without certain nutrients: vitamin B3, vitamin B6, vitamin C, and the minerals zinc and magnesium.

## PROBIOTICS

“Pro” means “good,” and “biotics” means life thus probiotics are referred to as, the friendly bacterial gut flora species in the gut. They have many functions in the body:

- aid in protecting the digestive system from an overgrowth of germs
- stimulates the growth of the intestinal lining
- boosting the immune system
- improving vitamin and mineral absorption
- aiding in manufacturing B vitamins and vitamin K
- protects the mucous lining of the intestines ( important for intrinsic factor)

Most gut flora is found in the colon and there are approximately 500 bacterial species in the gut.

### What is butyrate acid and its relationship to gut flora?

Butyrate acid is a byproduct of dietary fiber after it has been broken down by the gut flora; the gut flora is the biggest producer of butyrate acid. Butyrate acid has been shown to maintain and promote gut lining health, and has anti-inflammatory effects. This in turn stimulates the growth and integrity of the intestinal lining.

### What decreases the amount of probiotics in the diet?

Stress, allergies, poor eating habits, and antibiotic use may decrease the good bacteria levels so keeping the balance in check is vital.

### Probiotic foods to eat:

fermented foods: tempeh, miso, Sauerkraut, Kimchi; kefir, some yogurt

# FUNCTIONAL NUTRITION

---

## FIBER

Fiber plays an important role in the digestion and absorption of nutrients. It also has a few other:

- makes stool soft and bulky
- optimizes colon health
- reduces both diarrhea and constipation
- speeds bowel transit time
- helps remove/eliminate unwanted things - toxins, cholesterol - from the body
- stabilizes blood sugar
- makes us feel full, therefore less chance of over eating
- better absorption of nutrients

Many people do not get enough fiber in their diets and that is why it is important to talk about it. The average American eats about 8 to 12 grams per day; an optimal range would be 28 to 50 grams.

**There are 2 types:**

1. soluble (dissolve in water): beans, apples, carrots
2. non-soluble (do not dissolve in water): most vegetables

With most people, it is not so important to focus on whether a fiber is soluble or not, it is much more important to incorporate whole grains, beans, vegetables, and fruits in your daily diet. Challenge yourself to add fiber to each meal and even add fiber on top on fiber. For example, add chopped up apples, nuts and a sprinkle of cinnamon to some whole grain cereal.

## WATER

Water has an integral part of the digestive system. Saliva, which is made up of water, is secreted into the mouth, and farther down in the stomach, water aids in the production of HCL. It is also secreted to help liquefy the bolus and it is the major constituent, along with sodium bicarbonate, of mucous that protects the stomach lining from HCL.

**A few more functions of water:**

- moistens the tissues throughout the body
- helps to regulate body temperature
- water keeps the body tissues moist (especially important for joints, nostrils and eyes)
- prevents constipation (helps dissolve fiber to make stools well-formed and soft)
- lessens the burden on the kidneys and liver, flushing toxins out of the body
- lubricates your joints
- dissolves minerals and other nutrients, making them more accessible to the cells

# FUNCTIONAL NUTRITION

---

Lack of water in not only your digestive system but your entire body can lead to many health issues, for example: ulcers, indigestion, heartburn, fatigue, weakness, brain fog, memory loss, partial digestion, and constipation.

## How much should you drink?

How much water you should drink really depends on many factors: the climate you live in, how physically active you are, your age weight, and whether you're experiencing any health issues. I find that when people feel thirsty, they are already dehydrated.

I recommend carrying a water bottle with you at all times, sip throughout the day and aim for drinking half your body weight; for example, if you weigh 100 pounds, drink 50 ozs in water. If you are exercising, then drink more.



## Thinking Cap!

If you don't like plain water, infuse it with sliced citrus fruit, herbs (lemon and mint are nice) and/or make an herbal iced tea.



## Trivia

- One way to determine if you are dehydrated is to check out your urine: if it's clear you are fine, if it's dark, you are in need of water.
- Water constitutes 60% of the weight of your body.

## Water myth:

myth

Drinking too much water will dilute your digestive juices.

**Truth** • Water actually helps in breaking down foods.

We are finished discussing micronutrients. In the next class we will talk about different food diets. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“don't eat anything your great great grandmother wouldn't recognize as food. there are a great many food-like items in the supermarket your ancestors wouldn't recognize as food... stay away from these.”

Michael Pollan

## LESSON EIGHT DIFFERENT FOOD DIETS

### BOOKS

*The Body Ecology Book* by Donna Gates

*Eat Right 4 Your Type* by Peter J. D'Adamo, N.D.

Of my many years talking to patients, friends, and family members, one thing almost always rings true: people want easy answers to complicated questions and want a simple course of action. There are hundreds of diet books on the market today plus media, claiming an easy solution to this and that. I do believe all these book authors and media reporters have good intentions and offer some solid suggestions; however, when people begin to believe a certain food is bad for them, it may contribute to some long-term health problems—like eating disorders and vitamin and mineral deficiencies—or the extreme weight loss and gain that many dieters experience. This can bring up a fear of some foods.

The word “diet” is derived from the Latin word *dieta* meaning, “a daily food allowance.” The definition brings on a sense of restriction rather than an awareness to food. And with what we have learned in the previous 7 lessons about the digestive system and nutrition, my main goal is for you have a self awareness between what you eat and how you feel plus, the below:



**1. Don't eat out of fear**

It's important to stop worrying about food and focus on how you are eating - eating in that parasympathetic mode of rest and digest.

**2. Trust your gut and do the basics**

Eat whole, non-processed foods, be aware of how your body reacts to food, and enjoy your meal.

**3. And most importantly, someone else's eating habits may or may not be ideal for you. Again, trust your gut, be aware of how foods make you feel.**

Since there are so many diets or ways to eat (lifestyle eating), it is important to find which way of eating is best for you. Remember that your body will tell you, therefore be aware and in tune with what your body tells you when changing ways of eating.

I have listed a few of them.

# FUNCTIONAL NUTRITION

---

## VEGETARIAN

To make things a bit more complicated, there are variations within a vegetarian diet:

- Lacto-vegetarian: they consume dairy products, but no eggs. Most do consume honey.
- Lacto-ovo-vegetarian: they consume eggs, but no dairy. Most do consume honey.
- Ovo-vegetarian: they consume eggs and dairy. Most do consume honey.

Most vegetarians fall into the category of lacto-vegetarian.

Vegetarianism way of eating is predominantly a desire not to harm animals; in India, where many people practice vegetarian lifestyle, there is a important peace towards animals that is reflected in their religion.

(To learn more about how religious beliefs reflect our way of eating, read, *The Gluten Lie* by Alan Levinovitz, PhD. )

Much research indicates that people who eat plant-based foods live a life with less disease and have a longer life expectancy.

### Any concerns?

As we learned in earlier lesson, B12 and iron, are mostly obtained from animal-based foods such as eggs, milk, meat, and fish, but there are some plant-based foods which contain a good amount however, not always a source in which the body can utilize; therefore, supplementation needs to happen.

## VEGAN

Veganism is a way of life that is not solely based on possible health benefits, but for environmental and ethical reasons. They are firm believers in animal rights and protecting the planet.

Vegans firmly believe that present farming methods do not positively respect our land and are not sustainable in the long run. Their philosophy indicates that not only would people be healthier, the planet, animals would be as well.

### Any concerns?

The concerns are the same as with the vegetarian but I must add that with both vegetarian and vegans, many tend to eat a heavy complex carbohydrate diet - mostly grains - therefore, people who eat this way do need to pay attention to every meal to make sure they are receiving all nutrients.

# FUNCTIONAL NUTRITION

---

## PALEO

Eating Paleo began millions of years ago before agriculture became a prominent way of farming. Diets moved from a Paleo way to an grain-based. People who eat a Paleo diet believe that we have shifted from eating whole plant and animal diet to a high carbohydrate, processed food diet and that is why we are chronically sick and obese.

People who eat a Paleo based diet follow a few basic guidelines (see below). Generally people begin eating this way, immediately feel better and it then becomes their way of eating (food awareness in your body!). It follows closely to the Type O Blood Type diet from Dr. D'Amomo.

### Guidelines:

1. High in fat, moderate in animal protein and low in carbohydrates.
2. Fats include: coconut oil, butter, clarified butter (ghee), avocado, macadamia nut and olive oil
3. Animal protein: This includes red meat, poultry, pork, eggs organs, wild caught fish. Ideally all animal sources come from conscious farmers that are grass-fed, pasture raised, organic animals .
4. Eat generous amounts of vegetables, moderate amounts of fruits and nuts and cut out grains and legumes.
5. No sugar, no dairy.

Eating Paleo is a balanced diet that pays attention to both health and the environment. But always remember, every body is different, thus it is best to be aware of how your body feels with eating certain foods.

If you decide to eat meat in your diet it is very important to select high quality meats; that are free of added ingredients, like antibiotics and hormones, eat their natural diet and live in a natural way, and have an array of nutrients we need: omega 3s, iron, B12, for example. A few terms are listed below:

### USDA certified organic:

The animal was not treated with antibiotics or hormones and have had some outdoor time.

### Cage-free:

This means the animal was not in a cage; however, it does not guarantee that it live a stress-free life. It may have been in a factory farm with many animals in close counters.

# FUNCTIONAL NUTRITION

---

## **Free Range:**

This means the animal was given outdoor time yet it may be only 5 minutes!

## **Pasture-raised:**

This indicates that the animal has lived outdoors in pastures for at least 120 days during the grazing season but they probably were given supplemental foods like corn, soy, barley.

## **Grass-fed:**

Grass-fed animals are raised on a natural pasture environment: grass, hay. They may be given supplements when needed, but they will never be given grain rations.

## **GLUTEN-FREE**

Eating a gluten-free diet is eliminating all grains (wheat, oats, barley, rye, spelt, couscous, barley - basically all grains except for rice ) from the diet. It stems from the rise in awareness due to the higher diagnosis in celiac disease, where people can not eat gluten products as it destroy the villi in the jejunum leading to almost no nutrient absorption.

One big question many people ask, is why do we all of a sudden have so much gluten sensitivity? Many researchers suggest it is due to the hybridization of wheat that occurred in the 20th century This hybridization was done to to increase yield and create much more hardier plant

Gluten products are difficult to absorb and many non-celiac people who experience digestive issues - stomach cramps, bloating, fatigue - have decided to try a gluten-free diet which resulted in no negative digestive symptoms. It is a simple experiment for people to try; eliminating gluten grains for 21 days and then re introduce and see if they feel any unpleasant symptoms.

## **FOOD COMBINING**

Donna Gates really coined this term from writing her captivating book, *The Body Ecology Diet*. The main focus, or who this works for the best, are people who have a candida (yeast) overload in their gut. The principles are that you intentionally eat certain foods with other foods. The philosophy behind this is that certain foods have different bowel transit times in the body and need enzymes and digestive juices at different times, therefore, eating foods with the same transit times optimizes digestion.

This is a great book to take out from your local library and read. In the book you can learn the rules of food combining.

# FUNCTIONAL NUTRITION

---

## BLOOD TYPE DIET

The blood type diet philosophy believes that knowing one's blood type can indicate your susceptibility for certain diseases. In addition, people with different blood types have a tendency to react to stress differently, which in turn can effect the functioning of the digestive system. Understanding this tendencies allow you to be aware and make better food and lifestyle choices.

There are many layers to this way of eating but the first step in knowing your blood type and reading the book by Peter J. D'Adamo, N.D., book Eat Right 4 Your Type. It's a fascinating read and in my practice, I have seen amazing results in people eating this way. But again, the key is the awareness and connection between what you are eating and how it makes you feel.

For those who are interested in the different types of diets, these ones are also interesting in their philosophy: GAPS, FODMAP, Ketogenic diet, Weston Price

We are finished discussing different food diets. In the next class we will talk about nutrition-related diseases. I would like to end the class with an inspirational quote for you to ponder.

## INSPIRATIONAL QUOTE

“it's bizarre that the produce manager is more important  
to my children's health than the pediatrician.”

Meryl Streep

# LESSON NINE

## NUTRITION-RELATED DISEASES

### BOOKS

*The Body Ecology Diet* by Donna Gates

### ARTICLE

*Zonulin*

[http://www.medscape.com/viewarticle/738936\\_14](http://www.medscape.com/viewarticle/738936_14)

<http://physrev.physiology.org/content/91/1/151>

*Ige-Mediated Food Allergy in Children*

[http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(13\)60309-8/abstract](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(13)60309-8/abstract)

### EXPERTS

Dr. Tom O'Bryan

Gluten/Celiac Disease Expert

<http://thedr.com>

Most diseases stem from the digestive system and that is one of the main reasons I always talk about the digestive system with nutrition. However, it is also important to talk about the immune system. Not only is the immune system outside the digestive system, in the lymphatic system and thymus, for example, but up to 70% of the immune system is found inside the digestive system, specifically in the small intestine. This indicates that the gut does play a major role as one of the first lines of defense for the body.

Below are a few diseases that are directly affected by the health of the gut and nutrient absorption and bacteria imbalances.

### LEAKY GUT

Leaky gut is the gateway to many diseases, primarily, chronic autoimmune diseases. Let's step back for a moment and talk about autoimmune disease.

Our immune system is designed to protect the body from both disease and foreigners like: bacteria, viruses, fungus, parasites. Our immune system protects us in many ways. One way is through the gut with HCL in the stomach. However, sometimes, the immune system will get confused and attack healthy cells in the body believing it to be foreign or harmful to the

# FUNCTIONAL NUTRITION

---

body, triggering inflammation. This can lead, if untreated, to a category of diseases called, autoimmune diseases. The first symptoms people may feel are fatigue, muscle aches, and low fever.

There are close to 80 different types of autoimmune diseases including: arthritis, multiple sclerosis, psoriasis, irritable bowel syndrome, and celiac disease.

Back to a leaky gut. As mentioned earlier, villi in the jejunum are very close together and form tight-gap junctions. These tight-gap junctions create a barrier, not allowing bacteria, larger foods or undigested foods to flow through (absorbed and assimilated); however, in a leaky gut scenario the villi are damaged and these junctions do not work optimally allowing bigger molecules, proteins, or foods that are not broken down thoroughly to travel into the bloodstream. The immune system thinks of these particles as foreigners and will begin to attack them creating what is known as a self attack or an autoimmunity.



## Thinking Cap!

How does the villi become damaged? Chronic states of eating poorly, being stressed, medication, an imbalance of gut bacteria, and yeast overgrowth.



## Trivia

Gluten (grains) and casein (dairy) are two proteins that are common foods that will make their way through the leaky gut and cause a cascade of problems in the body.

## FOOD ALLERGIES AND FOOD SENSITIVITIES

Many people believe that these 2 terms are the same. Though they do overlap in many ways, the difference between them is important, especially in diagnosing.

Any food allergy or sensitivity is an over-reaction of the immune system where it is in full gear trying to defend its territory. As I mention to all my patients, the body does not want to be sick, and will use every resource it possibly can: diarrhea, vomiting, through the skin, to relieve itself.

### Symptoms of food allergies:

- rashes, hives
- stomach pain
- diarrhea, itchy skin, eczema
- swelling of airways (immediate and life-threatening)
- anaphylaxis (immediate and life-threatening)

# FUNCTIONAL NUTRITION

---

## Symptoms of food sensitivities:

- fatigue
- itchy skin
- brain fog
- muscle and/or joint pain
- headaches
- sneezing and/or runny nose

The main differences between these 2 are how quickly they occur and what part of the immune system reacts.

1. Food allergies are immediate and trigger an immunoglobulin E (IgE) response; they are extremely aggressive and act fast.
2. Food sensitivities are delayed (up to hours) and trigger an immunoglobulin G (IgG) response.

For those who are intrigued and want to learn more, start by reading the *Lancet article* listed in the **Resource Handout**.

When people are tested for allergies, doctors usually look for these 2 immunoglobulins to determine what the person is allergic to. However, one of the best ways to test if you have a food sensitivity is with an Elimination Diet.

## How to do an elimination diet:

1. Choose a food (top sensitivity foods are: grains (gluten), dairy, soy, corn, potatoes).
2. Completely eliminate that food for 21 days.
3. On day 22, eat that food all day long.
4. Note how you feel in the next 72 hours. If you experience, fatigue, headaches, joint pain, runny nose, your body may be sensitive to that food.

## CELIAC DISEASE

Celiac disease (CD) occurs when the small intestine becomes hypersensitive to gluten, creating a damaged villi leading to a malabsorption of nutrients. The long-term effects of celiac disease can lead to a host of autoimmune diseases due to the fact that the body is not receiving the nutrients it needs to function optimally. Testing is essential, especially if you have a family member already diagnosed, never feeling well despite eating a balance diet, not getting better from an illness or disease despite being treated. One thing to note; false negatives do occur as positive results tend to show up after a great deal of damage has already been done to the villi.

# FUNCTIONAL NUTRITION

---

## Consequences of CD:

Autoimmune disease, acute gastrointestinal pain, skin rashes to increased risk of certain diseases, infertility and neurological diseases.



## Trivia

Non-celiac gluten sensitivity is a term referring to a sensitivity to gluten with symptoms varying from joint pain, foggy brain, numbness in extremities, and fatigue.

To learn more about celiac disease and gluten, look for the article *Zonulin*, a protein that enhances the intestinal permeability. Also, Dr. Tom O'Bryan is an expert in gluten issues. His website is posted on the *Resource Handout*

## IRRITABLE BOWEL SYNDROME AND CROHN'S DISEASE AND ULCERATIVE COLITIS

Irritable bowel syndrome (IBS) is an umbrella term for crohn's disease (CD) and ulcerative colitis (UC). IBS symptoms include: abdominal pain, diarrhea or constipation and is often associated with people under a great deal of stress, depression, anxiety (remember the connection vagus nerve and the gut). There maybe an underlying bacterial infection.

Leaky gut and the immune system play major contributing factors in IBS. The key difference of the CD and UC are where the intestines are effected:

- CD in the upper part of the digestive system. It also may effect other parts of the body like the skin, eyes, joints and liver.
- UC is in the colon.

## CANDIDA

Candida is a fungus and is present in the digestive system, in small amounts. It has an important job aiding in the absorption of nutrients. When candida becomes out of balance it can do a great deal of harm: breaking down the intestinal lining creating leaky gut, putting the immune system on alert, and malabsorption of nutrients; all of which may lead to other diseases.

## How does this over growth occur?

- eating a high simple carbohydrate diet
- sugar
- high stressed lifestyle
- too much alcohol
- over use of antibiotics

## FUNCTIONAL NUTRITION

---

To learn more, I recommend reading Donna Gates, an expert in candida overgrowth, book: *Body Ecology Diet*, or visiting her website. Both are listed on the **Resource Handout**.

### ? Trivia

The small intestinal lining replaces it self (the body does not want to be sick) every 3 to 5 days. The villi take a bit longer.

We are finished discussing nutrition-related diseases. In the next class we will talk about best ways to optimize for digestion and absorption. I would like to end the class with an inspirational quote for you to ponder.

### INSPIRATIONAL QUOTE

“those who think they have no time for healthy eating,  
will sooner or later have to find time for illness.”  
Edward Stanley

# LESSON TEN

## BEST WAYS TO OPTIMIZE FOOD DIGESTION AND ABSORPTION



### 1. CHOOSE FOOD WISELY

Eliminate processed, simple carbohydrates and sugar from your diet. Eat more fiber rich foods to help bulk up stools, keep you regular and to help the gut bacteria produce butyric acid. It's important to be gentle and slow to achieve long term results.

### 2. SET THE MOOD

The digestive system runs on the parasympathetic nervous system - rest and digest and not the sympathetic nervous system which is fight or flight. When you eat on the run or in a stressful situation, you are in a sympathetic nervous system mode giving digestion low priority (digestive juices are not secreting optimally) and not a good time to digest foods.

### 3. CHEW YOUR FOOD

Indulge those taste buds.

### 4. EXERCISE

Not only will exercise increase blood circulation (getting those absorbed nutrients to where the body needs them) but toned muscle action is required for digestion: propelling the food down and churning and mixing the food in the stomach.

### 5. HYDRATE

Dehydration may result in lower HCL in the stomach which as we have learned, creates a myriad of digestive issues. Water also maintains the integrity of the stomach lining.

# FUNCTIONAL NUTRITION

---

## A FEW AT-HOME REMEDIES

### GET THE DIGESTIVE JUICING FLOWING

Add lemon juice or apple cider vinegar to water and drink before your meals.

### HYDROTHERAPY

Castor oil packs can help stimulate the muscles and get you out of a constipation state or achy digestion system quickly. See the handout for instructions.

### YOGA

All twisting movements are fabulous for the gut. Check out the Resource Handout for links to online sites to learn these poses.

### BREATHING

This helps bring balance and presence into the moment and good to do if under some stress especially if before a meal. Try this:

#### THE ONE-MINUTE BREATH

Breathe in for 5 seconds

Hold your breath for 5 seconds

Release for 5 seconds

Hold for 5 seconds

Repeat

### MOST IMPORTANT

Be grateful for your food and your body!

### INSPIRATIONAL QUOTE

“because of media hype and woefully inadequate information, too many people nowadays are deathly afraid of their food. and what does fear of food do to the digestive system? i am sure that an unhappy or suspicious stomach, constricted and uneasy with worry, cannot digest properly.”

Julia Child



Congratulations on completing the Human Body Detectives Functional Nutrition course!

I am very appreciative of you taking the time to learn more about this topic; its essential information and the more people who are educated in Functional Medicine, the healthier we will all be!

My hope, is that I have inspired you to not only make healthy shifts in your everyday life but also excited you to dive a little deeper into health and wellness, perhaps, making it a career!

Thank you so much.

I am grateful!

A handwritten signature in black ink, appearing to read 'Dr. Heather Manley'.

Dr. Heather Manley