

# Macronutrients

## Protein, Carbohydrate, Fat

*"All disease begins in the gut."*

-Hippocrates

In order for our body to be well, our cells need to perform at optimal function every day. In order for our cells to function optimally, they require a multitude of nutrients. These nutrients are referred to as micronutrients, because they are required in small amounts by our cells. They are derived from the macronutrients (proteins, carbohydrates and fats) we eat daily, which are required in larger amounts. But eating a nutrient rich diet is just part of the big picture.

You can spend considerable time, effort and money prioritizing a diet full of fresh, organic, properly prepared foods, but you may be passing the essential nutrients from these foods right out of your body because of improper digestion. Making proper digestion is a priority if you want to have optimal health. Many people have dysfunctional digestive systems and don't even know it, but there are many things we can do to improve digestion and optimize our health!

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## MACRONUTRIENTS

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**PROTEIN-** created by chains of amino acids, which are the building blocks of all of our cells. Dietary protein is found in animal meat, eggs, dairy, nuts, seeds and legumes. When digestion is functioning optimally, proteins are broken down by stomach acid and digestive enzymes (called proteases) into individual amino acids. Our body can use these individual amino acids to create:

TISSUES- 95% of our muscle mass, including our heart, is made up of amino acids.

HORMONES- amino acids create our peptide hormones which include: ghrelin (hunger hormone), leptin (satiety hormone), insulin (blood sugar hormone), TSH (thyroid stimulating hormone), and vasopressin (a hormone that helps control blood pressure).

NEUROTRANSMITTERS- serotonin (responsible for mood) and norepinephrine (responsible for preparing our body for action).

ANTIBODIES- a deficiency of dietary protein or amino acids has long been known to impair immune function and increase the susceptibility to infectious disease<sup>1</sup>.

ENZYMES- The amino acid histidine makes enzymes used to produce red blood cells and maintain healthy nerves.

Amino acids are also necessary for our genes to work properly, regulating RNA and DNA function.

There are 22 amino acids. Eleven of them can be made by the body, but 9 of them (essential amino acids) must come from our diet. When you consume a food that contains all 9 essential amino acids, that food is

considered a complete protein. You can take multiple foods that have incomplete proteins and consume them together to obtain all the essential amino acids in 1 meal (for example, rice and beans).

Best choices for protein:

- wild caught fish and seafood;
- organic, 100% grass-fed, pasture-raised ruminant animals, including beef, lamb, bison, buffalo, elk, goat, etc.;
- organic, 100% pasture-raised poultry and eggs, chicken, turkey, duck, etc.;
- organic, raw, full-fat, 100% grass-fed or pasture-raised milk products, cheese, cottage cheese, etc.;
- soaked nuts (such as almond, macadamia and walnut), soaked and sprouted seeds (such as pumpkin and sunflower) and soaked and sprouted legumes (such as peanuts, garbanzo and pinto).

**CARBOHYDRATES-** found in foods such as vegetables, fruits, grains, nut, seeds, legumes, and alcohol. When digestion is functioning optimally, carbohydrates are broken down by salivary amylase in the mouth, and by enzymes and bacteria in the small intestines. Carbohydrates are used for many important functions in the body, such as: fuel for the brain, energy, regulation of protein and fat metabolism, detoxification and elimination of waste, and to help fight infections. For optimal health, carbohydrates should come from unrefined sources, which exist in nature, and maintain all their natural nutritional value.

Best choices for carbohydrates are:

- vegetables including sulfur rich, colorful and leafy greens;

- tubers and squash, such as sweet potato, yam, taro, plantain, pumpkin, parsnip and rutabaga (all are considered starchy vegetables);
- grains and legumes, including: quinoa, amaranth and buckwheat.

Vegetables should be consumed from a variety of local farms that follow organic practices. Purchase and consume vegetables when they are in season to get the most nutrients (the longer the food sits on the shelf, the less nutrition it contains). Aim to consume your vegetables both raw and lightly cooked.

**FATS-** created by links of fatty acids, have many important functions within the body. Dietary fats are found in foods such as animal meat, eggs, nuts, seeds, and plants (such as avocados and olives). When digestion is functioning optimally, fats are broken down by bile from the liver and gallbladder, and digestive enzymes (lipase) from the pancreas into individual fatty acids. Our body can use these fatty acids to:

- ▶ create cellular structure,
- ▶ aid in communication between cells and hormones,
- ▶ assist in the absorption of the fat soluble vitamins: A, D, E and K,
- ▶ aid the proper use of proteins,
- ▶ protective our organs by creating a lining around them,
- ▶ slow the absorption of other macronutrients for sustained energy regulation,
- ▶ make foods taste good and keeps us feeling satiated.

There are three types of fatty acids: saturated, monounsaturated, and polyunsaturated. To obtain and

maintain optimal health, it is important to have all 3 types of fatty acids in your diet, but in different proportions and from appropriate sources.

Good choices for fats:

- omega-3 (polyunsaturated) found in wild caught fish, cod liver oil, walnuts, chia seeds, flaxseeds and egg yolks;
- omega-6 (polyunsaturated) found in blackcurrant seeds, evening primrose, flaxseed oil, pistachio nuts, pumpkin seeds and sunflower seeds;
- omega-9 (monosaturated) found in olives and olive oil, avocados and avocado oil, almonds and almond oil, hazelnut and hazelnut oil, macadamia nuts and macadamia oil;
- saturated fats from pasture-raised animal meat, organic virgin coconut oil, organic palm oil and butter from grass-fed animals.



## HOW DIGESTION IS SUPPOSE TO WORK

Digestion is the mechanical and chemical breakdown of macronutrients into smaller molecules that can be absorbed and used by the cells. It is a North to South process. Meaning that digestion begins in the brain where the sight, sound and smell of food triggers digestive functions throughout the entire system. As the food continues South, down the digestive tract, each part of the digestive system has a function to breakdown the macronutrients into usable forms of micronutrients (vitamins and minerals). The digestive process ends at the most southern point, the anus.

The **brain** triggers cells and glands to start the production of fluids and enzymes required for digestion.

The **mouth** begins the mechanical and chemical breakdown of food, through chewing and salivary enzymes.

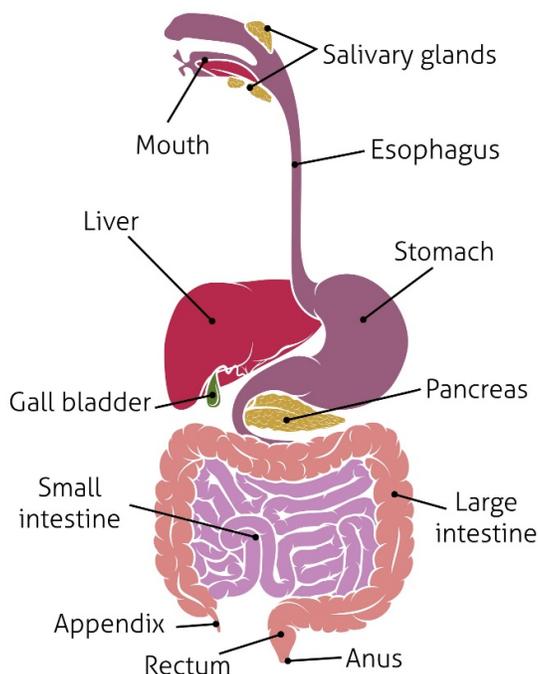
The **stomach** begins the breakdown of proteins, with excretion of hydrochloric acid.

The **pancreas** excretes bicarbonate to decrease the acidity of the food, allowing it to pass into the small intestines for absorption, and digestive enzymes to further aid in macronutrient breakdown.

The **liver** creates bile and passes it to the **gallbladder** where it is excreted, aiding in digestion of fats and elimination of toxins.

The **small intestine** is where the majority of nutrients are absorbed.

The **large intestine** takes toxins, dead and living bacteria, undigested food residue (fiber), waste material from food, cellular linings, salts, and substances released from the liver and intestines (such as mucus) and eliminates it as feces.



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## HOW DIGESTION CAN GO WRONG

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The Southern end of the digestive process can experience symptoms from dysfunction from a Northern process.

If you do not stop and allow your body to move from the sympathetic system (“fight or flight”) into the parasympathetic system (“rest and digest”), the **brain** does not trigger the proper digestive processes to begin.

If you do not take the time to properly chew your food in your **mouth**, the mechanical breakdown of food is not completed. Additionally, saliva, which is full of digestive enzymes, is not properly mixed with the food, leaving larger molecules of starches to pass into the digestive system.

The **stomach** is all about acid. Stress, excess carbohydrate consumption, nutrient deficiencies, allergies and excess alcohol consumption can all reduce your ability to produce enough hydrochloric acid. Without hydrochloric acid, you are not able to defend yourself from yeast, prions, bacteria, viruses, parasites, etc. Additionally, a lack of stomach acid will cause carbohydrates to ferment, proteins to putrefy and fats to rancidify, which can cause Gastroesophageal Reflux Disease.

Proteins left undigested, cause a deficiency in essential amino acids that can lead to chronic depression, anxiety and insomnia. The undigested proteins can then escape the digestive tract and end up in the blood stream. The blood does not recognize this form of protein and the body begins to respond as if a foreign invader is attacking the system. This then causes an immune response, leading to food sensitivities.

Low stomach acid production, reduces the amount of access to the nutrients our bodies need. Without these nutrients, health issues arise. Stomach acid decreases while we age potentially leading to asthma, bacteria overgrowth, gas, constipation, diarrhea and susceptible to fatal infections such as cholera and Salmonella, anemia, stomach cancer, skin diseases, acne, dermatitis, eczema, hives, gall bladder disease, rheumatoid arthritis, lupus, Grave's disease, ulcerative colitis, chronic hepatitis, osteoporosis, Type I diabetes, and accelerated aging.

If the contents of the stomach (called chyme), does not reach the proper pH, the **pancreas** is not triggered to excrete bicarbonate. If this does not occur, the acidic chyme can lead to duodenal ulcers and intestinal problems.

Bile from the **gallbladder** is intended to flow through the common bile duct regularly. It is only triggered to be released in the presence of fat in our food. Low fat and non fat foods do not trigger the release of bile, causing it to become old and viscous. Old and viscous bile can easily form stones. If the gallbladder is triggered to squeeze in the presence of fat and a stone has formed, the stone will attempt to move through common bile duct, which is a painful action known as a "gallbladder attack."

Undigested food that reaches the **small intestine**, can damage the lining and cause a condition known as leaky gut. Leaky gut allows inappropriate proteins and fats to pass through into the blood stream, causing an immune response and can lead to autoimmune disease.

The **large intestine** is where all the leftovers end up. These undigested foods can cause inflammation,

diverticula, irritable bowel syndrome, Crohn’s disease, and colitis. The large intestine also requires a fair amount of water to properly form feces. If the body is dehydrated, feces can get stuck in the large intestines and toxins that are otherwise suppose to be removed from the body can be reabsorbed into the tissues.

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### HOW STRESS AFFECTS DIGESTION

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When we find ourselves under stressful conditions, such as lacking sleep, fighting a cold, battling inflammation, or dealing with mental, emotional or physical stress, we require *extra* nutrients to keep our body in balance. When we can’t consume the amount of food required to provide the proper amount of required nutrients, quality supplements can be helpful. Supplements, in most cases, are not intended as a permanent solution. Instead, they are intended to assist your body maintain health until you are able to manage the excess stress. Additionally, no supplement can replace a properly prepared prepared, nutrient rich diet.

#### RESULTS OF POOR DIGESTION

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Acid Reflux	Gallbladder attacks	Autoimmunity, such as:
GERD	Gallstones	Celiac
Stomach Ulcers	Leaky Gut	Chrones
Gastroenteritis	Food Allergies	Ulcerative Colitis
Constipation	Food Sensitivities	Diverticulitis
Diarrhea	Appendicitis	IBS/IBD

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## HOW TO IMPROVE DIGESTION

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### **PROPERLY PREPARE YOUR FOOD**

All living things (both plants and animals) have ways to protect themselves from predators. Animals have a brain. Plants have chemicals. These chemicals found naturally on foods have a way of wrecking havoc on our digestive system when not properly prepared.

High in vitamins, minerals, protein and healthy fats, nuts and seeds are an example of a food packed with nutrition, but also containing chemical compounds that interfere with proper digestion. Nuts and seeds contain phytic acid and large amounts of enzyme inhibitors which protect them from sprouting until they have the rain and sun they need to grow. Unfortunately, these natural chemicals can be quite hard on the stomach and even cause nutrients to be stripped away from our own tissues. To prevent this, always soak your raw nuts, seeds, grains and legumes before consumption. Refer to the sprouting chart in your module resources for more information on how long to soak each food before consumption.

### **EAT MEALS IN A RELAXED STATE**

Proper digestion can only happen when our brain is in the parasympathetic (“rest and digest”) system. When you try to consume foods when the body is in a state of stress (both real or perceived), the body does not allow the proper flow of digestive processes to begin. A few things you can do to get your brain into the proper state for optimal digestion are:

- Say grace
- Take 3 slow abdominal breaths
- Eat outside
- Avoid multitasking at mealtimes

## **CHEW YOUR FOOD**

Chewing is the process of mechanically breaking down your food into smaller pieces. Once the food leaves the mouth, the only breakdown of macronutrients is chemical. It is recommended to chew each bite 20-30 times. A suggestion to accomplish enough chewing is at the dinner table, while someone is explaining about his or her day, chew your bite of food until the story is completed.

## **INCREASE STOMACH ACID**

Stomach acid is the most important chemical for proper digestion of protein. Without acid, you are not able to breakdown protein into the amino acids, or obtain minerals, such as iron, zinc and calcium from foods. Vitamin B12 and folic acid are dependent on intrinsic factor, which is only released from the parietal cells with stomach acid. All of these nutrients are necessary for optimal health.

The content of the stomach must reach a pH of 1.2-3.0 in order for it to properly break down macronutrients. If this does not occur, the food sits in our stomach, not able to move to the small intestines. When we consume our next meal, that partially digested food is then pushed through the stomach and into the small intestines.

To improve stomach acid:

- consume 2 tbsp of raw apple cider vinegar 10-15 minutes before each meal
- consume herbal bitters before meals
- consider completing a hydrologic acid challenge  
\*see homework sheet

## **SUPPORT YOUR LIVER/GALLBLADDER HEALTH**

These two organs aid in digesting fats and eliminating toxins. Eating cruciferous vegetables helps the liver make bile for the gallbladder to excrete it. Beets are a tasty way to ensure that bile remains a consistency to flow and be excreted.

## **CONSUME FERMENTED FOODS**

Fermented foods have been used for thousands of years, especially prior to refrigeration in order to preserve foods. During the fermentation process, probiotic organisms are created, which are great benefit to our digestive system. When choosing fermented products, look for raw and unpasteurized, such as fermented vegetables, fruits, kombucha, kefir, yogurt and beet kvass. Brewing at home will provide different microbes each brew - more about brewing in the module on gut health.

## **CONSUME ENOUGH FIBER**

Fiber adds bulk to stool, which aids with elimination. It also feeds the probiotic bacteria in our guts, which provide energy for our cells within our digestive tract. Women should aim to consume 25 grams of fiber per day and men should aim to consume 38 grams of fiber per day.

## **DRINK ENOUGH WATER**

Water plays a crucial role in bodily function, especially digestion. Water helps create the digestive juices required to break down our macronutrients. Once broken down, water is used to deliver the nutrients throughout the body. It also aids in nutrient absorption, helping carry minerals and vitamins into the tissues and cells. It is recommended to drink at least half your body weight in ounces, daily.

*“Eating grains to get more fiber is like eating carrot cake to get more vegetables.”*

*Sarah Ballantyne*

## REFERENCES

- 1- Br J Nutr. 2007 Aug;98(2): 237-52. Epub 2007 Apr 3. Amino acids and immune function. Li P, Yin YL, Li D, Kim SW, Wu G.

# Homework

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## Part 1: Tracking

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Start using an online tracker to track your macronutrient intake. This will become an important part of discovering your own personalized way of eating for longer term health.

There are many online food tracking programs to choose from, and many of them are free. The 2 most popular programs available now are [www.MyFitnessPal.com](http://www.MyFitnessPal.com) and [www.Cronometer.com](http://www.Cronometer.com). Both programs are free and can provide you with macronutrient tracking.

To get started, set up an account (if you don't already have one). When you log in, you will want to make some setting changes to look more like this:

Calories- unless you have a recent DEXA scan, you will need to estimate your daily caloric intake. Use the website [www.exrx.net/Calculators/CalRequire](http://www.exrx.net/Calculators/CalRequire) to estimate your daily caloric need. If you have a DXA scan, start with your RMR and add 20%.

Macronutrients- for now, change the percentages to reflect these recommendations:

Carbohydrates 5-25%

Protein 20-30%

Fat 50-75%

Fiber- Men 38g and Women 25g

Sugar- Men <36g and Women <20g

*See the helpful tips video for making setting adjustments in the resources link on the members log-in page on the website.*

Now, start tracking!

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## Part 2: Hydrochloric Acid Challenge

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Begin by taking one HCl supplement (150mg) capsule/tablet per meal per day and increase by one capsule/tablet per meal per day until a feeling of warmth or burning sensation (heartburn) in the stomach occurs within 5 minutes of ingesting the supplement. Quell the burning sensation by sipping a solution of 1 tsp. baking soda in 4 oz. room temperature water, by chewing 2–3 tablets of a calcium supplement followed by swallowing a small amount of water, or by using an over the counter antacid remedy like Tums. The last dosage which was comfortable to you will be the initial per meal dose of supplemental HCL.

### FOR EXAMPLE:

Day1 – 1 per meal  
Day2 – 2 per meal  
Day3 – 3 per meal  
Day4 – 4 per meal

If a warming or burning sensation occurs at 4, then your recommended dose is 3 per meal.

### **\*NOTE\***

When determining the proper HCL supplement dosage:

- If the burning sensation occurs *1/2 hour or more after the meal*, then you **HAVEN'T TAKEN ENOUGH HYDROCHLORIC ACID; increase dose by 1 per meal to enhance digestion.**
- If burning occurs *within 5 minutes* of ingesting the acid, then you have **TAKEN TOO MUCH HYDROCHLORIC ACID; reduce dose by 1 per meal.** Eat a few bites to utilize the HCL and to reduce discomfort.

**\*\*If a burning sensation occurs within 5 minutes after taking JUST ONE tablet/capsule, a gut healing protocol may be indicated before completing the HCL challenge again.**

**\*\*\*If you take 7 of the high dose capsules (700mg per cap) and still feel no warming or burning sensation, additional digestive aid nutrients such as enzymes may be indicated.**



Beets are a superfood and can be used to test digestive health. Stomach acid and gut flora aid in breaking down the pigment in foods. If stomach acid and gut health are low or compromised, you may experience beeturia (red or pink urine), and this is an indication that a gut healing protocol can help improve your digestive health.