


**Enzymes for a Healthy Microbiome.
- Microbial Biofilm**

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***“Eat food as if it is medicine.
Otherwise you may have to eat medicine as your food!”***

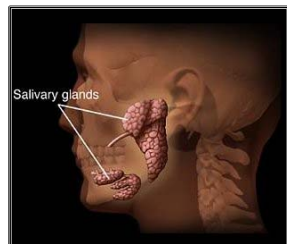
- We all have heard: ***“We are what we eat”.***
- Newer: ***“We are what we absorb”.*** (enzymes)
- Today: ***“We are what our microbes eat”.*** (postbiotics/metabolism)

"The road to good health, is paved with good intestines" ^{MBI}

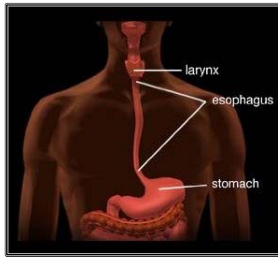
Sherry A. Rogers



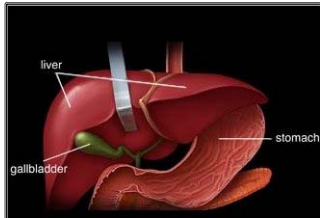
- Microbiome *begins* in the mouth. (i.e. Biofilm: plaque).
- Enzymes mix with saliva - contains Ptyalin:
- Ptyalin (amylase) dissolves food immediately and saliva provides lubrication
- We produce about a quart and a half of saliva everyday.



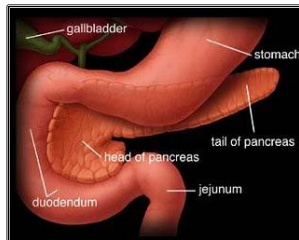
- After Ptyalin..
- Stomach - food is mixed with hydrochloric acid (HCL) and pepsin (enzyme). This is called **'chyme'**
- Chyme enters small intestines.
- All this enzyme ensures quick breakdown of food.



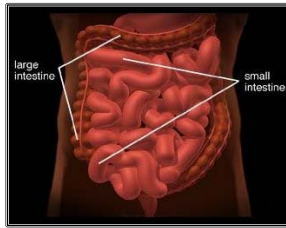
- Chyme is broken down further with help - Pancreas and Liver/Gallbladder.
- Organs attach to Duodenum by the common bile duct.
- They dump in more enzymes (catalysts) and bile salts (fats).
- All to help digest proteins, carbohydrates, and fats.



- Pancreas produces Amylase (for carbohydrates)
- Liver produces bile (fats)
- Gallbladder is a *storage* facility for extra bile



- The 3 parts of intestines together **absorb** starches, proteins, and fats.
- Chyme is then broken further down into smaller “nutrients”
- **Enzymes make all this happen, without, we would die a slow death.**



Interesting System Facts:

- More organs in your Digestive system than any other system!
- 2/3 of all your body parts (just for digestion) *need* digestive enzymes.
- Up to 2/3 of your daily enzyme supply - just to “digest and clean-house”.
- *Average American consumes 40 tons of food in a lifetime.*
- **Question becomes - How much of food is denatured or void of enzymes? What do you think?**



What are Enzymes?

- Biological catalysts (accelerate). Several thousand! Combine with co-enzymes which can form up to 100,000 chemicals.
- Nutrition cannot be explained without enzyme understanding.
- Almost ALL metabolic processes in cells need enzymes in order to occur at rates fast enough to sustain life.
- **Cellular** enzymes - are produced in tiny quantities that speed up reactions inside our cells.
- **Digestive** enzymes - are produced in large quantities and act outside the cell – lumen of digestive tract.
- **Systemic** enzymes – used for decades to help keep all systems active and have anti-aging and anti-oxidant effects. (FOCUS HERE).



Reasons to supplement with enzymes:

- Enzymes make all things happen quickly. Building blocks of life. Nothing in life functions without them.
- Fact: ***Vitamins don't work without minerals, minerals don't work without vitamins. Neither work without enzymes!***
- Supplementing enzymes may give our overworked systems a rest.
- Less gas, bloating, better bowel movements, detoxification, pH balancing, biofilm breakdown, even used with vitamin/mineral therapy can enhance *cellular* (mitochondria).
- Makes all supplements work faster and deeper. Better yet, help with breakdown of detox/biofilms.



Can enzymes improve my health?

- Yes, in many ways. They have been shown to be blood purifiers, strengthen the immune system, deliver nutrients to our cells, carry away toxins, deliver hormones, help balance cholesterol and triglyceride levels, even weight loss.
- Help breakdown biofilms (explained later) and support correct environment of the microbiome.

- Place a raw (seed) bean in boiling water (cooked).
- It will now fail to sprout.
- **Science tells us only living organisms can make enzymes.**
- Enzymes have been shown to produce a "lifeforce" which cannot be made synthetically.



Enzymes are "lifeforce"



Digestive Enzymes

- Enzymes completely digest your food and allow for complete absorption. Transportation of nutrients. Eliminating waste.
- Do we possess enough for a lifetime?
- Yes, **until** we consider modern foods are de-natured, processed, boxed, and refined.
- The Human body wasn't designed for "shelf-life" and "**cooked**" (heat destroys enzymes) foods.
- Fresh, raw, non-cooked foods contain enzymes from nature to assist us and balance out the rest.



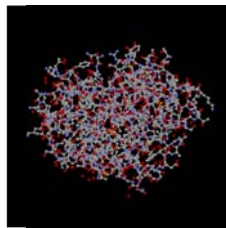
Heartburn - Should We Stop HCL Production?

- **No**, we need it. Especially after age 40.
- Poor diets, overeating, and gulping food, create "heartburn". Heartburn is: **A LACK OF HCL – NOT AN EXCESS!**
- Lack of HCL = protein malnourishment



Systemic Enzymes

- Required for detoxification.
- Help turn fat soluble toxins into water soluble toxins for easy elimination.
- **Less enzymes = more toxicity**
- **Enzymes help balance pH in our systems**
- **Help reduce overall inflammation**





Detoxification (purging the bowels)

- Dates back to 2,500 B.C. (Egypt)
- Greeks favored saline enemas
- Native American Indians pioneered herbals (like Cascara Sagrada)
- It is more important today than ever!
- Chemicals, heavy metals, pesticides, herbicides, colorings, flavorings, etc. did not exist prior to industrialization. Digestive systems weren't designed for this
- These toxins are making their way into us. Which in turn - **destroy or tie up our enzymes.**



Clean the Chimney!


- Like a chimney, we need to clean it from time to time, to avoid a fire
- Estimated the avg. American has **5-25 pounds of undigested fecal matter** in them at all times!
- Does not include chemical mixtures of our fecal matter. How toxic are we?
- The system is **overworked** from poisons, lack of fiber/enzymes/probiotics, HCL issues, hiatus, poor diets... we all need help!
- Bacteria try to survive this too by making their own environment. Secretions that are called "BIOFILM".

Biofilm

- Did you know microbes develop their own environment in and around the body?
- It is called a "biofilm". Not only on our teeth (plaque) do we find a process called - biofilm- but throughout our digestive systems as well.
- This is where enzymes can help play a key role in modulation of microbe populations. Logically: how can even an antibiotic be absorbed by pathogens (for elimination of them) when protected by a casing or bio film?
- Biofilms lead to infections especially with implanted biomedical devices. 2 million cases per year in the U.S. - Bryers J. D. (2008). "Medical biofilms". *Biotechnology and Bioengineering*. 100 (1): 1-18. doi:10.1002/bit.21838. PMC 2706312. PMID 18366134.
- Enzymes have been studied to help control these "barriers".


What is a Biofilm?

- Biofilm: any group of microbes in which cells stick together and adhere to a surface. In a matrix of extracellular polymeric substance.
- Fungus, parasites, bacteria, and viruses, are made up of proteins. Many have a "shell" or protein coating that protects them (self biofilm).
- Theory suggests "protease" helps breakdown proteins and these matrix substances. It makes sense that in turn, this may help denature the pathogens themselves as well as the breakup of biofilm. Even abnormal proteins in blood: known contributors to food allergies.



BIOFILM

- AKA: "Cities of Microbes".
- Formed for many reasons by microbes. They can float, swim, and be an organized coordinated community/nursery.
- Can attach anywhere such as teeth, intestines, floating masses even on liquids, etc.
- Helps share nutrients, shelter from toxins, antibiotics, and even the body's immune system.
- It all starts with one....in the case where these microbes are pathogenic, becomes a chronic infection. *i.e. Candida Albicans*. Makes the yeast more resistant to antifungals.




BIOFILM – only concerned with infectious

- Some biofilms contain not only proteins in matrix, but cellulose. Sometimes strong enough to become fossilized.
- Enzyme breakdown of this matrix releases the microbes for possible destruction.
- Not all biofilms are bad. The appendix is now thought to help produce biofilms for the large intestine to help reinoculate the gut with good gut flora.

• Jakubovics NS, Shields RC, Rajarajan N, Burgess JG (December 2013). "Life after death: the critical role of extracellular DNA in microbial biofilms".

• Bollinger, Randall, Barbas, Andrew, Bush, Errol; Lin, Shu, Parker, William (24 June 2007). "Biofilms in the large bowel suggest an apparent function of the human vermiform appendix" (PDF). *Journal of Theoretical Biology*. 249 (4): 826–832. doi:10.1016/j.jtbi.2007.08.032. PMID 17936308.



Example of an enzyme study

- One key to addressing Alzheimer's? Researchers have found an enzyme that clears away mis-folded proteins in nerves. A hallmark of this disease.
- Key: Is to help stop protein buildup in brain. Enzymes may help stop this build up, by breaking apart misfolded proteins. (Neurology 9/20/2011)



Enzymatic Relief in General/Digestion

- A multi full spectrum enzymatic formula (plant based) should contain:
- **Pepsin** (HCL) – protein – Important for those over age 40 and metabolic syndromes.
- **Pancreatin**
- **Mycozyme** (Protease enzyme system)
- **Papain**
- **Bromelain**
- **Bile Salts**
- **Lipase**

Targeted choice - Assist with digestion, maximize nutrient absorption, detoxification - powerful, yet gentle.

- **Lipase** for complete fat breakdown. i.e. If missing a gallbladder, helpful for life.
- **Lactase** Milk sugar imbalance. Dairy sensitive. Great for dairy allergies.
- **Nattokinase** (Type of Protease Enzyme) Natural blood quality adjuster. *"A Natto a day, helps keep the cardiologist away."*
- **Protein Digestive Aid.** For additional protein absorption. Great to add to protein smoothies.
- **Advanced Full Spectrum Enzyme Formula** - (No HCL) vegetarian formula, great for changing ph. Usually for those under age 40.
- **Protease** - Garbage collector. Great if taken in between meals to provide support of breaking down stubborn biofilms that are composed of yeast or gram negative bacteria. Even viruses make biofilms called a "virome".

The case for Protease!

- Proteases digest protein at a rate of 300 grams per hour.
- Research: Largely responsible for keeping the intestines free from parasites, bad bacteria, protozoa, and yeast overgrowth.
- Constant demands to manufacture protein enzymes can cause an enzyme deficiency, giving pathogens a “leg up”.

• Cichoke DC - *Enzymes and Enzyme Therapy*, 2nd Ed. 2000

Enzyme supplementation

- Used for overeating, poor digestion, too much cooked foods, sticky toxins and biofilms.
- Accelerates detoxification and positive modulation of the microbiome.
- i.e. Protease in between meals, effective for fungal (yeast) colony breakdown of biofilms.
- Mucus can be a friend or enemy. Stubborn sinus problems, mucus acts like a biofilm. 80% of chronic sinusitis sufferers show biofilm present when removed. Use of Advanced Full Spectrum Enzyme in-between meals makes sense.

• Sanclément J, Webster P, Thomas J, Ramadan H (2005). "Bacterial biofilms in surgical specimens of patients with chronic rhinosinusitis". *The Laryngoscope*. 115 (4): 578–82. doi:10.1097/01.lmg.0000161346.30752.18. PMID 15805862.

Natto – A Protease Enzyme System

- Many enzymes in the protease system category are produced from *Aspergillus* species such as *niger*, *oryzae*, and *melleus*. Although a fungus species, it is only the enzyme end product (free of mycotoxins) we are discussing, not the fungus. Advised: if allergic to fungus best to avoid this type of enzyme.
- Some are produced from soy, which contain vitamin K which may be contraindicated in blood thinner therapies. Using *Aspergillus*, this is less of a concern but still contraindicated.
- For example: Catalase (*Aspergillus*) is an antioxidant enzyme breaking bonds of H₂O₂ to water. As fast as 5–40 million bonds broke per second! A free radical fighter found in most enzyme blends.

Enzymes are also antioxidants.

- Catalase is a free radical fighter - has no counter indications or downsides, but the health benefits may prove astounding.
- Article - *The Scientist Magazine*, Dr. David Sinclair, of Harvard Medical School, states: **"there is proof the catalase enzyme prevents free radical damage and can extend our life span. Because of it's free radical fighting ability, it may also help in the war against other degenerative diseases."**
- University of Washington in Seattle performed a study on rats and the enhancement of natural catalase in their bodies. Their research showed that by **supplementing increased catalase to the rats, the life span of the subjects increased by near 20%. This is comparable to about 25 human years.**

• (<https://www.britannica.com/science/catalase> 2. [Global Healing Center](https://www.globalhealingcenter.com/natural-health/catalase/) - <https://www.globalhealingcenter.com/natural-health/catalase/> [PDB](https://pubs101.rcsb.org/motm/57) - [http://pubs101.rcsb.org/motm/57](https://pubs101.rcsb.org/motm/57) [Pub Med](https://www.ncbi.nlm.nih.gov/pubmed/16563232) - <https://www.ncbi.nlm.nih.gov/pubmed/16563232>)

Oil that is Essential?

- Love a blend of Ginger, Anise, Peppermint, and Lemongrass. Which can provide a lot of relief in stomach/digestive upset.
- Apply topically with a carrier to the abdomen during digestive stress.
- Great for travel and car trip nausea.

Conclusion

- Digestive system: 2/3 of all your organs, maintains energy, cells, tissues, and keeps you functioning.
- Each day processes 2.5 gallons of food, liquids, and bodily secretions into 12 ounces of waste. Very efficient indeed! But denatured food slowly kills us.
- Systemic: body is affected by enzyme function. Supplementing w enzymes is cheap health insurance! Improves programs and helps clear stubborn health issues.
- Start today to help maintain your enzymes....***the road to good health, is paved with good intestines!***

Q&A

- *“Can you over do?”*: No. research from over a 100 years shows not one report of side effect. Plant enzymes are food.
- *“What will I feel from supplementing enzymes?”* Not magic, but some find a dramatic result of other supplements and dietary changes. Others more subtle or gradual.
- *“I thought that I produce all the enzymes I need?”* Cooked, processed, refined, preservative, additives, toxins all contribute to the fact: modern living has stressed our natural supply. As long as we live in this toxic and enzyme deficient world, logic dictates some form daily.

Q&A continued:

- *“Can’t I just raw juice my way out of this?”* No. Raw food only provides enough enzymes to help digest that particular food itself. Bacterial contamination also stops us from eating more raw foods in general. Also FIBER is digested by probiotics and cellulase.
- *“What about medications?”* Always follow your Doctors instructions. Plant enzymes are classified by the FDA as food.
