Enzymes and Food Intolerances

Devin Houston, PhD

NAA Conference
November 2014
Enzymes

- Proteins that catalyze chemical reactions
- Not changed or destroyed during the reaction
- Each enzyme has one function only
- Many thousands of different enzymes
- **Metabolic** - inside cells, difficult to affect
- **Digestive** - Breakdown proteins, carbohydrates, fats
  - Pancreatic (animal)
  - Plant-based (Fruits, fungi, bacterial)
Digestive enzymes

- Necessary to break down whole foods into absorbable form
- Found in saliva, stomach, pancreas and intestine
- Produced by probiotic bacteria in colon
- Both pancreatic and plant-based enzymes available in oral form
- Plant-derived enzymes offer advantages over pancreatic enzymes
intolerance common in autism

• Wheat (gluten protein)
• Dairy (casein protein and/or lactose sugar)
• Soy protein
• Certain carbohydrates, e.g. lactose, raffinose
• Polyphenolic compounds, oxalates, lectins
Intolerances not limited to autism

- Non-celiac gluten intolerance
- IBS
- ADHD
- Diverticulitis
- Food allergies of non-anaphylactic nature
Acid-Blocking Meds May Increase Food Allergies

- Stomach acid activates pepsin in stomach
- Pepsin initiates breakdown of proteins
- Low acid allows large proteins to enter gut
- Immune system responds aggressively to large peptides

"Antacids and dietary supplements with an influence on the gastric pH increase the risk for food sensitization”

Restoring gut health

- Provide healthy environment for probiotic bacteria
- Reduce inflammation as well as the cause
- Eliminate potential future allergen production
- Use ginger root extract for dyspepsia*

“Effects of ginger on gastric emptying and motility in healthy humans” *

Enzymes complement diets

- Many diets now incorporate oral enzyme supplements
- Enzymes often used as alternative to some diets
- Enzymes can often achieve same goals as diets
  - More specific
  - Faster
  - Less costly, more convenient
Enzyme Studies


Alvine Pharmaceuticals in Phase 2 studies with oral enzyme drug treatment for celiac disease
Anecdotal observations associated with enzyme use

- Speech starts or improves dramatically
- Better eye focus and contact
- Less stimming
- Improvements often noted by unknowing third parties
- Bowel movements improved
- Positive benefits often increased for those on diets
- Benefits are dependent upon many factors
do enzymes help?

Break down proteins differently, more thoroughly

- Prevent production of exorphin and other peptides
- Requires optimal blend of protease and peptidase enzymes
- Function in stomach, no peptide absorption occurs

Modify polyphenolic compounds

May mimic enzymes produced by probiotics?

Break down carbohydrates

Modify effect of stomach/pancreatic enzymes
Example: DPP IV peptidase

- Only known enzyme to degrade exorphin casomorphin
- Produced by cells in GI tract
- Found in commercially available protease blends (Houston, 1999)
- DPP IV combined with other proteases provides better function
Proteins: Digestive formation of casomorphin

Bovine Casein

x-x-x-x-x-x-x-x-tyr-pro-phe-pro-glu-pro-ile-x-x-x-x-x-x-x

(1) Pepsin (2) Elastase

Casomorphin
DPP IV effect on casomorphin

tyrs-pro-phe-pro-glu-pro-ile

DPP IV
in amino acid sequence affected by DPP IV

Bovine Casein

x-x-x-x- tyr-pro- phe-pro- glu-pro- ile-x-x-x-x

(1) Pepsin

DPP IV In Stomach

No casomorphin formed!
Blocked peptide formation by multiple proteases

Bovine Casein

Protease 4.5

(1) Pepsin

Protease 6.0

(2) Elastase

Casomorphin

x-x-x-x-tyr-pro-phe-pro-glu-pro-ile-x-x-x-x
Enzymes break down starches, fats in manner similar to proteins

Amylase, glucoamylase break down starches, maltodextrin, etc. into glucose and other simple sugars

Lipase breaks down triglycerides into SCFAs and glycerol

Certain enzymes convert polyphenolics to absorbable form
Polyphenolic compounds

- Very abundant in diet, several hundred identified in foods
- Chief interest is due to antioxidant potential
- Research areas mainly focus on role in oxidative stress

Plant polyphenols are produced with an attached sugar chain which makes the phenolic non-absorbable.

- Gut enzymes should remove the sugar, allowing absorption of the polyphenol. If missing, accumulation of polyphenol may occur.

  This accumulation may cause a histamine reaction: red cheeks, ears, hyperactivity.

- Missing gut enzyme may be replaced by certain cellulosic enzymes.
I can’t tolerate corn, so I must avoid maltodextrin”

- Corn contains hundreds of different compounds
- Intolerance may be to just one of those compounds
- Intolerance to corn does not equal intolerance to maltodextrin
- Do not assume that your intolerance is the same as others!
- BTW, amylase can break down maltodextrin
Enzyme facts

Enzymes are derived from fruits, bacteria, and fungi.

Fungal enzymes comprise the majority of commercial enzymes.

Fungi used: Aspergillus *niger*, *A. oryzae*, *A. melleus*, Trichoderma, Candida *rugosa* (not Candida *albicans*!!!)

Enzyme supplements are highly purified! No fungal material present.

Enzymes are not “grown on” fungi. They are secreted by the organism.

Fungal fermentation of enzymes is specialized.

Very few sources of enzyme, so most every company obtains enzymes from the same source.
Avoid bacterial enzymes

Serratia 56-kDa protease enhanced lethal effects of flu virus in mice when administered nasally

Bacterial (microbial) proteases, while enhancing vascular permeability in response through kinin generation, mediate the release of plasmin from plasminogen by plasma kallikrein, and exert an amplifying effect on the replication of influenza virus in the mouse lungs. More importantly, endogenous proteases involved in cascades such as kinin, clotting, and complement systems of hosts, which are readily activated by exogenous microbial proteases, play pathogenic roles in influenza virus pneumonia.

Takaaki Akaike and Hiroshi Maeda, in *Basic and Clinical Aspects* of *Pulmonary Fibrosis*, 1994, CRC Press
Enzyme dosing

- Experimentation encouraged, no toxicity, safe dosing
- Try taking enzymes at beginning of meal
- Base dosing on size of meal, not body weight or age
- May be taken with most medications or other supplements
- Effective with first dose for digestive results
Reasons to try enzymes

- Results often seen faster than with diet
- Inexpensive
- No special medical attention or testing required
- May be a better fit to a family’s lifestyle, less stress
- Studies are good, but not necessary to find out if helpful for your situation
Devin Houston, PhD

devin.houston@houston-enzymes.com

www.houston-enzymes.com

1-866-757-8627