

Enzymes and autism: Gut health, diet, and nutritional balance

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Autism and the Gut



Autism and Digestion

- ❖ Decreased carb, starch digestion and transport
- ❖ Fewer short-chain fatty acids produced
- ❖ GI problems correlated with behavioral problems
- ❖ Inefficient breakdown of food proteins

Food Intolerance or Allergy?

Allergy

- Occurs quickly with even tiny bits of food
- Occurs every time
- Involves immune system, histamine release

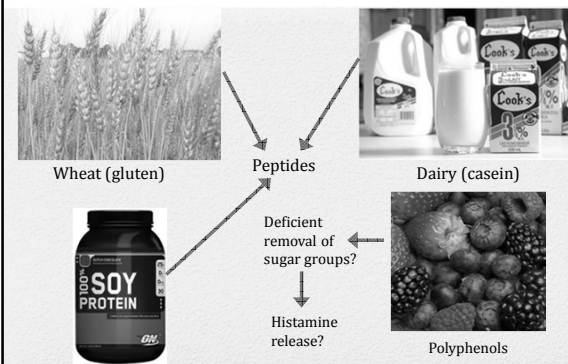
Food Intolerance

- Usually dose related
- Often due to body's reaction to food protein
- Symptoms involve mainly digestive system
- More people have food intolerances than allergies

Causes of Food Intolerance

- Absence of enzyme needed to digest food
- Irritable bowel syndrome
- Food poisoning
- Sensitivity to food additives
- Recurring stress or psychological factors
- Celiac disease

Food Intolerances in Autism



Starch and sugar intolerance



Dairy (sugars)

Lactose intolerance due to lactase enzyme deficiency

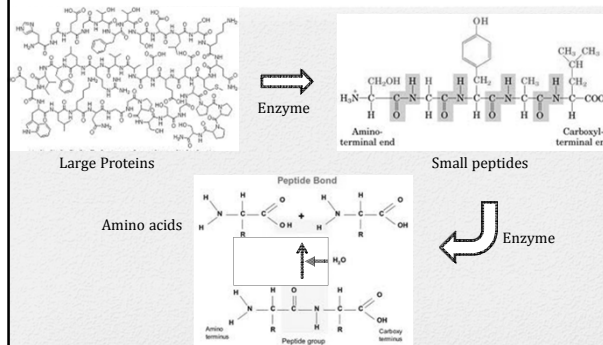
Autism diets

- Gluten-free casein-free (GFCF)
- Specific carbohydrate diet (SCD)
- Body Ecology Diet (BED)
- Low oxalate diet (LOD)
- Gut and psychology syndrome diet (GAPS)

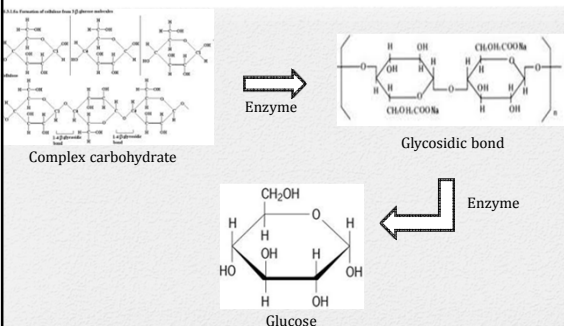
Enzyme Supplements

- Complement restrictive diets.
- Work in stomach, start digestion earlier.
- Enzyme often achieve same goals as diets with less cost, more convenience and with faster results.
- Anecdotal improvements similar with enzymes and diet, indicating similar mechanism of action.

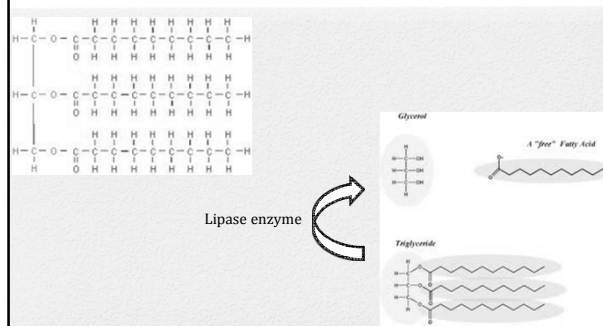
Digestion of Proteins



Starch Digestion



Triglyceride fat digestion



What Are Enzymes?

- Special proteins catalyze chemical reactions
- Unchanged during reaction
- Specific for single reaction
- Thousands of enzymes used in living systems
 - Metabolic – in cells, not replaced by oral supps
 - Digestive – Breakdown proteins, carbs, fats
 - Pancreatic (animal-based)
 - Plant-based (fruits, fungi, bacteria)

Digestive Enzymes

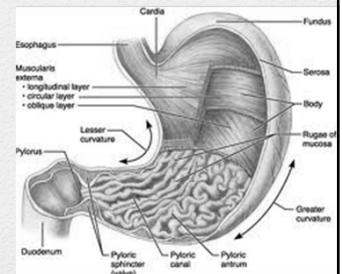
- Break down whole foods into absorbable form
- Found in saliva, stomach, pancreas and intestine
- Produced by probiotic bacteria in colon
- Both pancreatic and plant-based enzymes available in oral form
- Plant-derived enzymes are acid-stable; can work in stomach AND GI tract

How 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
- ❖ Break down starches, prevent gas and bloating
- ❖ May mimic enzymes produced by probiotics
- ❖ Modify polyphenolic compounds

Understanding the Stomach

- “Safe” place for foods
- Keeps food for 2 – 5 hours
- Minimal food breakdown
- Supplemental enzymes shift digestion to stomach



Enzyme Supplements

- Can address enzyme “deficiency”
- Shifts digestion from gut to stomach, a “safer” place to break down problem foods
- Are very safe, no toxicity at any dose
- Can provide benefits to anyone

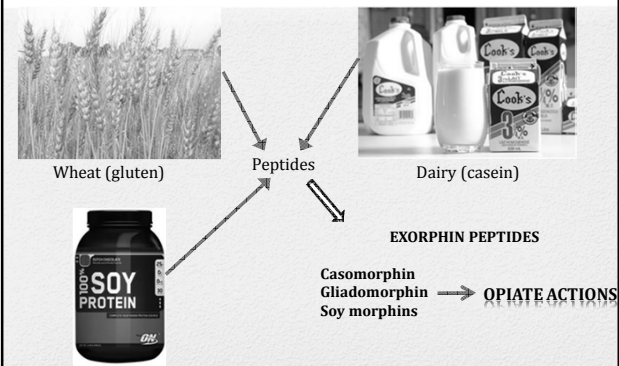
Structure determines Function

- Just like letters make up words, amino acids make up proteins.
- Function dependent on composition and sequence of amino acids.
- Change the structure, change the function.

Structure determines Function



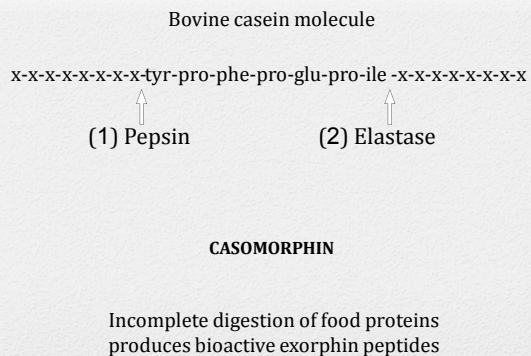
Food Intolerances in Autism



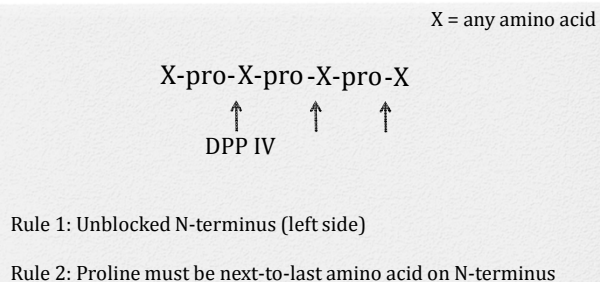
DPP IV: Dipeptidyl Peptidase IV

- Only known enzyme to breakdown exorphins
- Produced by cells lining the GI tract
- Found in commercially available protease enzyme blends (Houston, DB; 1999)

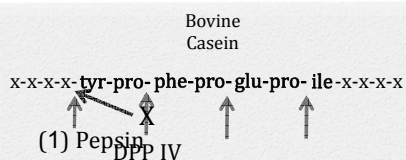
“Normal” digestion of casein in stomach and duodenum



DPP IV effect on exorphins

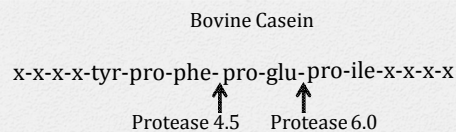


Casein amino acid sequence affected by DPP IV in stomach



No casomorphin formed!

Using multiple proteases to prevent peptide formation



Multiple proteases necessary for complete protein breakdown

- Relying on DPP IV alone not sufficient
- Add other proteases with different peptide bond preferences to insure complete breakdown
- Studies of similar enzyme cocktails used in celiac trials, possible FDA approved treatment in future

Carbohydrase enzymes for starches and carbs

- Studies indicate some children with autism may be low in disaccharidases
- Bacteria and yeast prefer to feed on undigested carbs in gut
- Cause of bloating, gas, loose stools when not broken down sufficiently
- Amylase, glucoamylase, lactase

Enzymes for Polyphenolic Foods

- Highly colored fruits & veggies: good nutrition but not tolerated by some
- Raw veggies may be hard on GI tract
- Enzymes such as xylanase, cellulase, glucanase can help solubilize fiber
- Prevent "flushing" effect seen with certain foods and wines?

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

Avoid This Product!

Supplement Facts

Serving Size: 3 Capsules
Servings Per Container: 40

"Super-Duper" enzyme blend	505mg
Vegetal Analog of Pancreatin	286 mg
Acid Stable Protease	12 mg
Amylase	52 mg
Amyloglucosidase	12 mg
Cellulase	5 mg
Lactase	5 mg
Cellulase	5 mg
Hemicellulase	3 mg
Lipase	125 mg

*Daily Value not established

Values listed are based on serving size, be sure to check

Milligram units are useless for enzymes

Make sure "proprietary blends" are listed on label

Better Product

Supplement Facts

Serving Size: 1 Capsule
Servings Per Container: 120

Peptidase	50,000 HUT
Xylanase	16,000 XU
Protease 800	65,000 HUT
Amylase	12,000 DU
Protease 6.0	25,000 HUT
Glucoamylase	25 AGU
Lactase	1,500 ALU
Alpha-galactosidase	200 GalU
Beta-glucanase	30 BGU
Lipase	200 FIP

*Daily Value not established

Activity units guarantee active product

No "Proprietary Blend" hiding ingredients

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