

SCIENCE BRIEF: IMPROVED DIGESTION FOR CHILDREN WITH INNOVATIVE ENZYME SOLUTIONS

The demand has never been greater for an enzyme-based dietary supplement supporting improved digestion for children. Transformation™ introduces Zymes 4 Kidz™ Digest with DPP IV.

Transformation Enzyme Corporation (TEC) is a nutritional supplement company specializing in the development of high quality enzyme-based products for the health care professional. Through clinical and observational research, our efforts focus on teaching the importance of nutrient acquisition as the foundation of wellness and healthy living.

A poor diet and a digestive system that fails to process food for bioavailability and absorption will undermine the body's

“All disease begins in the gut”

-Hippocrates (ca. 460 BC - ca. 370 BC)

ability and create conditions favorable for disease and metabolic disorders. Based on this fact, we strive to educate health care professionals worldwide on the benefits of a balanced diet and proper digestion. The primary benefits of supplementation with digestive enzymes are:

- 1. A healthy and optimally functioning digestive system**
- 2. Enhanced bioavailability of nutrients for cellular vitality and healthy immune system**
- 3. Efficient and timely removal of metabolic waste and environmental toxins**

Historically, supplemental digestive enzymes were obtained from the pancreatic juice of animals, commonly bovine and porcine. However, in the past several decades, enzymes derived from non-animal sources have gained increased recognition. Plant enzymes such as bromelain and papain are being commonly used. More current research suggests mycelial enzymes from *Aspergillus oryzae* and *Aspergillus niger* as well as other microorganisms have been proven safe and effective, and often times clinically superior to traditional “animal” and “plant” enzymes for digestion.

Transformation's scientific staff with decades of combined experience in biochemistry, nutrition, and cellular and molecular biology has designed a new formula to assist infants and children in the digestion of proteins, carbohydrates and fats. This Science Brief will review the safety of and growing need for supplemental digestive enzymes for our children. It will also highlight the unique benefits of Transformation's new Kidz Digest™ powdered and chewable digestive formulas.

The Need for Good Nutrition and, More Importantly, Optimal Digestion

The health of our children is declining at an alarming rate. Autism now affects 1 in 63 girls and 1 in 38 boys (Hertz-Picciotto and Delwiche 2009). Allergies are reported at a rate of 1 in 4 children, asthma 1 in 11, and ADHD is now present in 1 out of every 3 children. Furthermore, the incidence of adult lifestyle diseases such as GERD, obesity, diabetes, and cancer are also on the rise in the younger populations.

These increases can be attributed to factors such as poor diet (specifically in the form of processed foods, commercial formulas, and Genetically Modified Organisms / GMO's), improper digestion, and the prevalence of toxins in the environment. While genetics may play a part, there is more and more evidence pointing to the fact that the vast majority of all disease can be traced back to poor diet, mal-digestion, and the inability of the gut to function properly.

In our clinical practices, we are seeing more and more food-related immune responses. These food intolerances or sensitivities arise from undigested food molecules. These unrecognized “chemicals” 1) damage the cells in the lining of the small intestines, 2) increase the permeability of the gut wall allowing undigested food molecules to “leak” into the blood, and 3) trigger the immune cells to respond to these “chemicals” as antigens. This immune response may manifest anywhere in the body and in many different forms, and that is what brings the patient to seek help.

While traditional medicine treats the symptoms with immunosuppressive drugs, the more natural approach is to heal the intestinal lining with probiotics, L-Glutamine, and various nutritional supplements. But isn't the root of the problem diet and undigested food molecules? Shouldn't the first line of defense be to improve food choices and support digestion, especially those allergy-prone foods found in so many of the processed and convenience foods that are available to our children today?

Let's focus on the two variables we can have an immediate and positive impact on: food choices and digestion. These can be addressed easily by paying attention to what we feed our families and by supplementing with digestive enzymes. Choosing organic, non-GMO, fresh, whole foods and avoiding fast/convenience foods laden with chemicals, preservatives, and sugar is the first place to start.

The health benefits of a healthy diet coupled with supplemental enzymes include:

- Bioavailability of valuable nutrients to the cell
 - Carbohydrates - the body's main energy source
 - Fats - supply fatty acids for energy and for building cell walls, cholesterol, and hormones
 - Proteins - supply amino acids which are the structural components for every cell, tissue, muscle, and organ and the building blocks of our immune system, neurotransmitters, and hormones
 - Vitamins and Minerals - key to all processes taking place in the body and co-factors for many biochemical reactions

- Efficient, appropriate, and healthy immune function
- Maintenance of a healthy intestinal lining
- Timely elimination of waste for decreased toxicity

When the body is completely digesting nutritious foods, the nutrients are made available to the cells, thus the opportunity for achieving true health and wellness is present.

Kidz Digest™: Formula Rationale

According to the CDC, childhood obesity has more than tripled in the past 30 years, and with obesity comes the rise in many other health concerns including diabetes, CVD, hormone imbalances, and various cancers. The CDC also lists healthy eating as one of the top preventative measures against childhood obesity. However, with the prevalence of processed and GMO-ridden foods in our children's diets, from infant formulas to cereals, our sources for healthy eating have narrowed. What's more, with daily environmental stressors we face, our digestive systems are often too taxed to function optimally.

According to Dr. DicQie Fuller-Looney, genetically modifying our foods create changes in the protein structure of that food. She teaches that no one can be assured these protein potentials can be controlled once they are part of the system. Dr. Fuller's concern is that these "proteins" can send mixed signals which can lead to the serious health issues we are witnessing in our children. Processed foods in our children's diet create under-nourishment due to the lack of bio-available vitamins and minerals in these foods. Our children are more susceptible because they are still developing their gut



"Tummy Troubles"

There truly is no substitute for breastfeeding. However, there are circumstances that can and do prevent someone from breastfeeding. The ingredients in most formulas are synthetic. The first three ingredients are protein (usually from cow's milk or soy, which we also know is from a genetically modified source 80% of the time), oil (usually a blend beginning with palm oil), and sugar (usually from corn).

It is therefore not hard to build a case for enzyme supplementation for formula fed babies. You can see right away why an infant would have tummy troubles. Hard-to-digest proteins, bad fats, and GMO corn sugar. You won't find "sugar" listed on the label either but according to an investigative article by NBC Chicago News they found anywhere from 4 to 13 grams per serving. That could look like 1 teaspoon per 5 ounces. A rule of thumb is a baby typically drinks 2.5 ounces of formula per pound of body weight each day. So if a baby weighs 10 pounds, they would consume 5 teaspoon of sugar per day.

www.nbcchicago.com/news/health/target-5-sugar-baby-formula-139339308.html

flora as well as their digestive, endocrine, and reproductive systems.

With all of these factors affecting the health of our children, it's clear the need has never been greater for Transformation's new Zymes 4 Kidz™ Children's Line to support improved digestion for the health of our children.*

Supporting more complete digestion of nutrients from breast milk, formula, or solid food not only supports proper development of our growing children but also helps alleviate symptoms of poor digestion like gas, cramping, bloating, acid indigestion, and allergies. That is why Transformation™ created Kidz Digest™ to assist with a child's complete digestion of proteins, carbohydrates, and fats.*

Our new children's digestive formula is available in two forms. The powdered formulation for infants can be given before each feeding and in between feedings if needed for systemic health. And whereas the powdered form allows for convenient delivery for infants, Kidz Digest™ is also available as a berry flavored chewable for toddlers through young adults.

Kidz Digest™: Ingredient Highlights

Kidz Digest™ contains digestive enzymes from microbial fungal sources that are safe for children, effective, and GI

tract stable (Borowitz 2012, Graham 1984, Mamadou 2005, Medhekar 2004). This means the digestive enzymes in Kidz Digest™ do not require an enteric coating to survive the environment of the stomach but rather initiate digestion in the stomach and continue the digestive process in the small intestines.

This is a key point because it allows maximum time for the supplemental enzymes to assist the endogenous enzymes to complete the breakdown of the carbohydrates and proteins that may be triggering immune reactions. Furthermore, there is no negative feedback or inhibition of the pancreas associated with taking supplemental enzymes. This is because secretion of pancreatic enzymes is regulated by the presence of hormones (secretin and cholecystikinin) and not the presence of enzymes.

Proteolytic Enzymes

One of the most common sources of allergies is protein, whether the source is from food or the environment. Incomplete digestion of proteins not only leads to allergic reactions that manifest in many ways but also compromises bio-availability of amino acids and nutrients essential for children who are still growing and developing. Dipeptidyl Peptidase IV (DPP-IV) is a proteolytic enzyme that hydrolyses the strong proline and glutamine bonds in gluten, a wheat protein.

Did You Know?

- According to the Centers for Disease Control and Prevention, if 4 million children are born in the United States every year, approximately 36,500 children will eventually be diagnosed with an Autism Spectrum Disorder. Assuming the prevalence rate has been constant over the past two decades, we can estimate that about 730,000 individuals between the ages of 0 to 21 have an ASD. (www.cdc.gov/ncbddd/autism/data)
- Dr. James Braly, allergist and immunologist, estimates the incidence of gluten sensitivity to be around 30% of the U.S. population. Dr. Fine of Enterolab, based on results of IgA antibody tests and gene tests from his laboratory, estimates 30-40%. However, as some people have no symptoms, so are never tested, some commentators feel that the actual number is closer to 50%.
- Celiac disease is an autoimmune digestive disease that damages the villi of the small intestine and interferes with absorption of nutrients from food. An estimated 2.8 million Americans are diagnosed with celiac disease while an additional 95% of celiacs are undiagnosed. The celiac disease diagnosis rate may reach 50-60% by 2019. (www.celiaccentral.org)



Casein is another protein similar to gluten, found in human milk (25-40%) and cow's milk (80%). Incomplete digestion of proteins found in foods containing wheat and dairy are linked to food intolerances.

DPP-IV is considered an exo-protease, meaning it cleaves mainly the terminal bonds on an amino acid chain. It is this "exo" property that assists our endogenous enzymes and makes DPP-IV especially effective in the breakdown of proteins that are more difficult to digest.

The DPP-IV in Kidz Digest™ is obtained from the controlled fermentation of select *Asperigillus* species and is effective in a pH of 2.0-8.0 making it ideal to support protein digestion in the stomach and small intestines. This product contains 300 DPP-IV per serving which has been found effective in clinical settings.

Additionally, the protease blend in Kidz Digest™ includes acid, neutral, alkaline endo and exo peptidases. This comprehensive proteolytic enzyme blend assists in the digestion of all dietary proteins. The proteases work in a broad pH range making them effective for digestion in the stomach and small intestines.

Complete protein digestion is important for everyone, not just those suffering from food intolerances. The proteolytic enzymes in this formula support the digestion of proteins

to help produce amino acids, which are important building blocks in the human body. These amino acids are used to build muscles, metabolic enzymes, neurotransmitters, and many other essential biochemicals. Proteolytic enzyme supplementation can therefore be essential to maintaining overall health as it promotes maximum nutrition from the protein consumed in a typical diet.



Carbohydrases

Kidz Digest™ contains a comprehensive blend of carbohydrases that work synergistically for maximum digestion of all carbohydrates – starch, fiber, and sugar.* This is ideal for those children who may have been given formula, cereal, or commercially prepared baby food before their GI tracts were fully developed and capable of handling these carbohydrates.

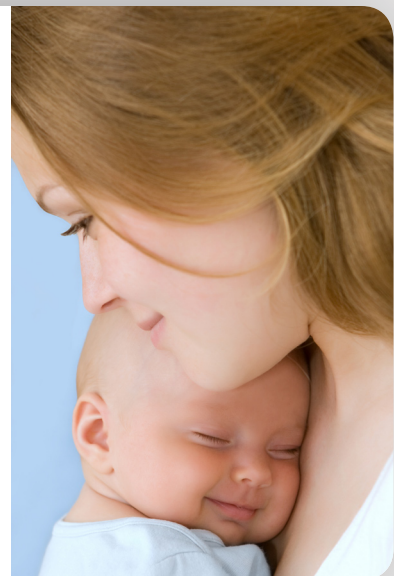
Specifically, the enzymes alpha-galactosidase, glucoamylase, amylase, and diastase support digestion of complex carbohydrates. Invertase and lactase support digestion of sugars. In addition, the enzymes pectinase, phytase, cellulase, and hemicellulase break down fiber and promote the release of vital nutrients often "locked" within these chemical structures. This does not, however, negatively impact or diminish the presence of fiber necessary for proper elimination of wastes. All of the enzymes in

Hospitals Bank "Liquid Gold": Human Breast Milk

Breast feeding, while ideal, is not always possible, and the need for support in this area is growing. Texas Children's Hospital in Houston, TX, is the first to offer an actual donor milk bank to support infants. "The science is pretty strong that human milk is best for human babies," said Neonatologist Dr. Michael Speer, Professor of Pediatrics at Baylor College of Medicine.

Transformation™ agrees with Dr. Speer and is excited to see the development of such programs, but this alone is not enough to reach every child that may not be getting the nutritional support breast milk supplies. That is why supplementing with digestive enzymes and probiotics is so vital, especially for infants living on a formula diet.

<http://www.npr.org/blogs/health/2012/08/23/159925707/hospitals-bank-liquid-gold-human-breast-milk>



Kidz Digest™ Powder

Supplement Facts

Serving Size 332.7 mg (app 1/8 tsp)
Servings Per Container about 125

| Amount Per Serving | % Daily Value |
|---|---------------|
| Polysaccharolytic Blend Amylase, glucoamylase, alpha-galctosidase, invertase, lactase, pectinase, diastase, phytase, cellulase, hemicellulase | 131 mg † |
| Peptidase Blend (50,000 HUT and 300 DPP-IV) | 119 mg † |
| Lipase (3,000 FIP) | 53 mg † |
| Flax Seed | 30 mg † |
| Bifidobacterium infantis | 1 mg † |

† Daily Value not established

**THIS PRODUCT HAS NO ADDED SUGAR
OR ARTIFICIAL COLORS**

Kidz Digest™ Chewable

Supplement Facts

Serving Size 2 Chewable Tablets
Servings Per Container 15/90

| Amount Per Serving | % Daily Value |
|--|---------------|
| Total Carbohydrates | <1 g <1%† |
| Sugar | <1 g ** |
| Sugar alcohols | <1 g ** |
| Peptidase Blend (50,000 HUT and 300 DPP-IV) | 114 mg ** |
| Polysaccharolytic Blend Amylase, glucoamylase, lactase, alpha-galctosidase, pectinase, diastase, invertase, cellulase, hemicellulase | 90 mg ** |
| Flax Seed | 30 mg ** |
| Lipase (3,000 FIP) | 11 mg ** |
| Bifidobacterium infantis | 2 mg ** |

† Based on a 2,000 calorie diet

**Daily Value not established

OTHER INGREDIENTS: FRUCTOSE, XYLITOL, NATURAL MIXED BERRY FLAVOR, NATURAL STRAWBERRY FLAVOR, MAGNESIUM STEARATE, SILICA

Kidz Digest™ work synergistically with endogenous enzymes and are vital for children suffering from allergies or digestive discomfort such as gas, cramping, bloating, reflux, constipation, or diarrhea.

The proprietary carbohydrase blend is acid stable and works in a wide pH range, therefore functioning throughout the gastrointestinal tract. Kidz Digest™ is a perfect solution for those babies who must be fed commercial formulas as well as the toddler as he or she begins receiving solid foods.

Lipase

Kidz Digest™ also contains 3,000 FIP (lipase units) for complete digestion of fats.* Breast milk is high in fat to support the babies energy and developmental needs. Proper digestion and assimilation of fats, essential fatty acids, and fat soluble vitamins is crucial for the development of the brain, nervous system, and cellular membrane integrity.

Probiotics

Kidz Digest™ contains the probiotic *Bifidobacterium infantis* (strain ATCC 15697). They were first identified over 100 years ago from human feces and were quickly associated with a healthy gastrointestinal tract due to their numerical dominance in breast fed infants compared to bottle fed infants. “In the neonate their numerical advantage confers a substantial health benefit by hindering pathogen colonization through competitive exclusion. It is important for establishing and maintaining homeostasis of the intestinal ecosystem to allow for normal digestion” (Haros et al, 2007). *B. Infantis* is a leading probiotic due to the vast number of studies which provide a growing body of evidence for its role in a myriad potential health benefits.

In the 2007 study referenced above, it was shown that *B. infantis* ATCC 15697 contributed to the hydrolysis of phytic acid which is a component in carbohydrates often found difficult to digest, thus supporting those who are challenged with the digestion of wheat and other grains. Additionally, probiotic organisms produce digestive enzymes which act to support the endogenous enzymes of the host. Probiotic bacteria are known to produce lactases, proteases, amylases, and sucrases.

Animal studies show that the enzymes produced by probiotics play important roles in the digestive tracts of mammals. Laboratory animals lacking a healthy colony of flora in their gut ecology have significantly reduced intestinal activities of these essential enzymes, and as a result do not show the same health and productivity as animals with normal gut flora. Studies show that supplementation of probiotic organisms can improve these enzyme activities as well as the animal’s health and productivity. Similar results have been noted in humans.

Dietary Ingredients

When delivering supplemental enzymes in a powdered form, a “de-dusting” agent such as maltodextrin is often used. However, maltodextrin can be problematic, especially for those with digestive concerns. Transformation™ has chosen to use a small amount of flax seed, a more nutritious ingredient, to serve as the de-dusting agent in our powdered formula. Flax seed is a balanced source of omega fatty acids and has traditionally been used for colon conditions, gastritis, bladder problems, and inflammation.

Transformation has always stood firm on the use of no “binders, fillers, or excipients” and takes pride in having the purest enzyme products on the market. When delivering enzymes in a chewable form additional ingredients are necessary. In the chewable tablets we use the smallest amount of ingredients necessary in order to provide a high quality enzyme product to children who otherwise will not take enzymes.™

Summary

Since 1991, Transformation™ has worked closely with health professionals to provide high quality enzyme-based supplements designed to support more effective acquisition of essential nutrients through improved digestion. Transformation’s founder and principal formulator, Dr. DicQie Fuller-Looney, has over thirty years of specialized clinical experience observing and working with individuals with many digestive concerns.

Transformation™ advocates breastfeeding as the optimum source of nutrition for infants. We believe breast milk is the best source of nutrition for a child’s healthy growth and development. Transformation™ created powdered Kidz Digest™ because we understand breast milk may sometimes be difficult to digest, but also there are circumstances that prevent breastfeeding.

Should children take enzymes?

In order to make sure your child gets proper nutrient acquisition, you will want to promote optimal digestion, a healthy immune system, and a healthy GI tract with proper elimination. Therefore, if your general philosophy towards health is to prevent and be proactive, you should definitely give your child enzymes. Transformation’s clinic has also successfully applied enzyme protocols with various digestive disorders such as diarrhea, constipation, colic, reflux, allergies, eczema, asthma, cystic fibrosis, and autism, to name just a few.

How do I give the digestive enzymes to a baby?

When breastfeeding, we first suggest that the mother take the basic enzyme protocol – a digestive formula, a proteolytic formula, and a probiotic – to ensure that her digestion is optimal. Many times this calms the baby’s digestive system as well. To support the baby’s digestion still needs assistance, you can easily and safely administer enzymes. Simply mix the powder in a small amount of tepid water (approximately 1cc) and, using a syringe or medicine dropper, give it to the baby before the normal feeding. At times, it may be difficult to give the enzymes prior to feeding. If this is the case, you may give the enzymes to the baby after breastfeeding.

If the baby is being formula-fed, the enzymes should be mixed with 1cc of tepid water and given just before feeding, as described above. Do not mix the enzymes with formula in the bottle, as it will begin digesting the formula immediately. If it is difficult to give the enzymes prior to feeding, the enzymes may be given after feeding.

Are herbs recommended for children?

Transformation™ does have licensed health care professionals who choose to give several other Transformation™ products to their younger patients, i.e., those formulations containing herbs. However, our general philosophy is to keep it simple with the basic protocol of enzymes and probiotics only. If you have a question about any specific ingredients, please contact our Technical Support staff.

Whether breast fed or formula fed, this formulation assists with digestion to alleviate symptoms of digestive discomfort and allergies.*

Kidz Digest™ in chewable tablet form was created to assist children of all ages with maximum digestion of nutrients.* This berry-flavored chewable will assist your child's digestion of proteins, carbohydrates, and fats.* Supporting complete digestion and assimilation of nutrients helps to promote overall health and wellbeing. All Transformation™ formulas are carefully prepared to assure maximum quality and nutritional effectiveness.*

When food intolerances have gone undetected for a time, inflammatory conditions may persist in the GI tract and/or systemically throughout the body. Synergistic formulas that may be considered are PureZyme™ / TPP Protease™ and Plantadophilus™ / TPP Probiotic™.

Recommended Usage

Kidz Digest™ Powder: 1/8 tsp (1/2 scoop) mixed in a spoon of tepid water or placed on the tongue or as directed by your healthcare professional. Do not add to a bottle of baby formula or mix in baby food because it will break down the food in the container making it less palatable.

Kidz Digest™ Chewable: Two (2) tablets with every meal or as directed by your healthcare professional.

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