

# SCIENCE BRIEF: IMPROVED DIGESTION FOR CHILDREN WITH INNOVATIVE ENZYME NUTRITION SOLUTIONS

According to the International Foundation for Gastrointestinal Disorders, 40 to 50% of appointments with a pediatrician are due to functional GI disorders. To meet the increased demand for supplements supporting improved digestion and microbiome balance for children, Transformation™ presents Zymes 4 Kidz™, a therapeutic enzyme solution in powdered form and berry-flavored chewables.

Gastrointestinal conditions have become commonplace for infants, children, and teenagers: GERD, constipation, lactose intolerance, gluten intolerance, IBS, Celiac disease, and EoE to name a few. When guiding parents on their options, whether pharmaceutical or nutraceutical, a practitioner must trust the efficacy of their recommendations. In 2007, the National Institute of Health reported that 12% of parents used an integrative approach to their child's wellness. A later study reported one third of children and adolescents use dietary supplements. And since 2020 there has been an increased interest by parents and pediatricians looking for an integrative approach to wellbeing.

Transformation's Zymes 4 Kidz™ is the practitioner-trusted brand designed to meet the digestive needs of infants, children, and teens. With over 30 years of education and research and an advisory board of clinicians, researchers, educators, and industry leaders, Transformation Enzyme Corporation is the pioneer of enzyme nutrition. A nutritional supplement company specializing in the development of high quality enzyme, probiotic, and herbal products for the health care professional, its efforts focus on teaching the importance of nutrient acquisition as the foundation of wellness and healthy living.

***“All disease begins in the gut”***

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

A poor diet and a digestive system that fails to process food for bioavailability and absorption will undermine the body's ability to protect itself, creating 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. Many practitioners are familiar with plant enzymes such as bromelain and papain. More current research suggests mycelial enzymes from *Aspergillus oryzae* and *Aspergillus niger* as well as other microorganisms have been proven safe, effective, and oftentimes clinically superior to traditional “animal” and “plant” enzymes for digestion.

Transformation's scientific team with decades of combined experience in biochemistry, nutrition, and cellular and molecular biology has designed two unique formulas 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 children. It will also highlight the unique benefits of Transformation's Kidz Digest Powder and Kidz Digest Chewable formulas.

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

Most are not aware that a human being's digestive system is not fully developed until they are in their teenage years. For example, babies have limited digestive enzymes from birth until they are typically around 24 months old. The state of the microbiome relies heavily on how and where a child was delivered. The rise in cesarian sections, antibiotics given during pregnancy and at birth, and antibacterial soaps prior to delivery all have negative impacts on a child's microbiome. Couple that with the decrease in breast feeding and you have the perfect storm to create a generation of sick children.

While about 80% of babies are now breastfed at birth, by three months, less than 20% are exclusively breastfed. The official recommendation from the Dietary Guidelines for Americans is for babies to be exclusively breastfed, having no infant formula or solid food at all for six months. But in reality, only 1% of babies are exclusively breastfed by this point. The human digestive system does not contain the digestive capabilities for many of the compounds found in other sources of mammalian milk. For example, the casein load of human milk is 0.2 g/dl whereas the casein load in cow's milk is 2.7 g/dl – much higher than what humans should receive. The amount of lactose in human milk is ~7.3 g/dl which makes sense since we are producing lactase while in utero whereas the lactose in cow's milk is ~4.0 g/dl.

Infant formulas have provided a lifesaving solution for many babies, but that does not change the fact a child's DNA is programed to only provide the digestive enzymes needed for human milk. Mothers should be supported in choosing safe feeding options for their baby, whether it is breast, bottle, or formula feeding, and enzyme support is essential for mothers unable to breast feed or babies unable to tolerate mothers' milk.

Mothers are also being instructed to introduce solid foods to their babies much too early in life. There are various limitations on an infant and child's digestive tract, yet pediatricians are still encouraging food items such as rice cereal as early as 4 months of age. Children are not able to properly break down carbohydrates until they are much older. This is a problem. Some studies suggest that introducing solid foods too early may lead to increased risk of chronic disease such as islet

autoimmunity (the pre-clinical condition leading to type 1 diabetes), obesity, adult-onset celiac disease, and eczema.

The guts of infants are nearly sterile at birth, but they become a community of trillions of microbial cells, known as the microbiome, by the time they reach adulthood. It is assumed for infants who are breastfed, their health is off to a solid start with milk that provides nutrients for good bacteria that fight off pathogens. The dominance of fecal Bifidobacterium and, specifically, *B. infantis* in the gut of breastfed infants has declined in recent decades in resource-rich nations, resulting in an increase in potential gut pathogens and immune dysfunction. The reduction in Bifidobacterium and increase in potential pathogens in the infant gut microbiome are likely a result of the unintended consequences of antibiotic use, infant formula feeding, and cesarean section deliveries, all of which have been implicated in the increased risk for allergic and autoimmune diseases prevalent in resource-rich nations. Colonization of a dysfunctional gut microbiome in early infancy during the critical window of immune system development is reported to increase the risk for the development of immune disease later in life.

It is no wonder that colic, constipation, eczema, GERD, etc is becoming common terminology in those working with infants. Sadly, the impact of poor digestion does not stop there. The health of children is declining at an alarming rate. Autism now affects 1 in 36 children. 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 continue to rise in the younger populations. According to the



## “Tummy Troubles”

There truly is no substitute for breastfeeding. However, there are sometimes circumstances that can prevent someone from breastfeeding. Why is enzyme supplementation especially important for formula-fed babies? The ingredients in most formulas are synthetic 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). You can see right away why an infant would have tummy troubles with all those hard-to-digest proteins, bad fats, and GMO's.

You also won't find “sugar” listed on the label either, but according to an investigative article NBC Chicago News 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!

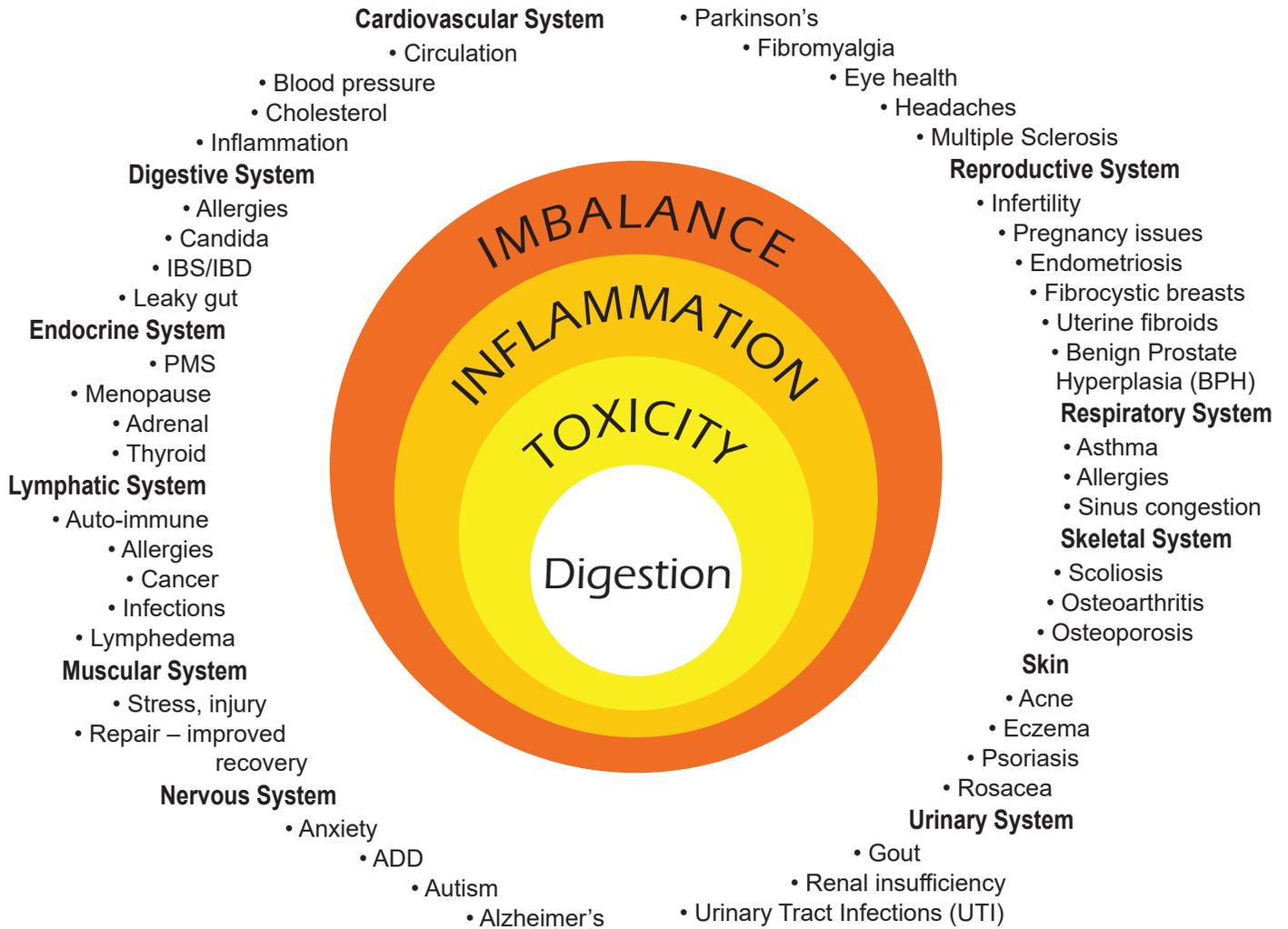


Figure 1. The Ripple Effect of Toxicity

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 children's diets, from infant formulas to cereals, sources for healthy eating have narrowed. And with the effects of daily environmental stressors, the digestive system is often too taxed to function optimally.

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, maldigestion, dysbiosis, and the inability of the gut to function properly.

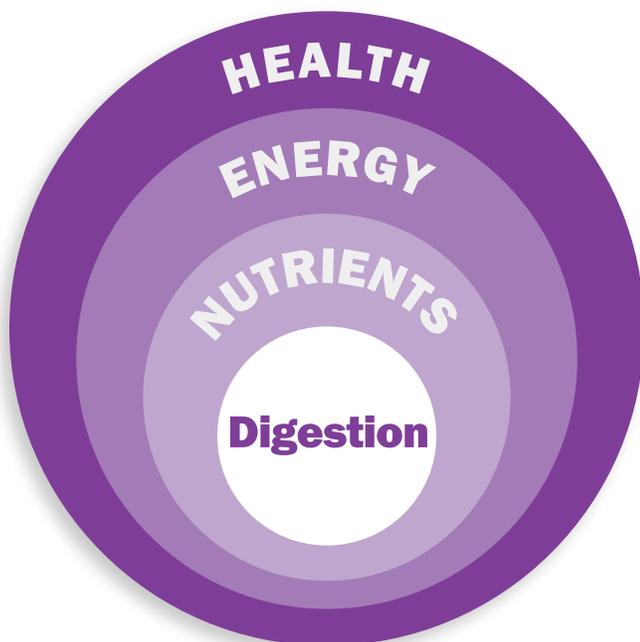
Figure 1 illustrates the ripple effect of poor digestion which can lead to disease. The outermost circle represents the presented illness and the inner circle represents where the disease began or where the problems began that led to the disease. Poor digestion will result in disease. Poorly digested carbohydrates ferment in the colon. This provides food for harmful microorganisms to consume, which results in increased gases which can overwhelm the system and contribute to more toxicity and inflammation. Poorly digested fats will turn rancid in the large intestine. These toxins in the colon are absorbed into the blood stream where they are oxidized and can become free radicals. Poorly digested proteins putrefy in the colon. Microorganisms consume this, which results in further toxicity. Supplementing with digestive enzymes allows the system to stay ahead of the waste and mitigate the toxic load on the body.

Practicing clinicians are seeing more and more food-related immune responses. These food intolerances or sensitivities

arise from undigested food molecules, where 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
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 immuno-suppressive 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** are 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** are key to all processes taking place in the body and function as 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. However, if poor digestion and gut health are ignored in infancy, toxicity and inflammation will continue to impact that child's resiliency to disease throughout their life.

According to Dr. DicQie Fuller, Transformation's Founder and the author of *The Healing Power of Enzymes*, genetically modifying foods creates changes in the protein structure of those foods. She taught that no one can be assured these protein potentials can be controlled once they are part of the system. Dr. Fuller's concern was how these “proteins” send mixed signals which can lead to the serious health issues being witnessed in children. Processed foods in a child's diet create under-nourishment due to the lack of bio-available vitamins and minerals. Children are especially susceptible because they are still developing their gut flora as well as their digestive, endocrine, and reproductive systems.

Despite all the technological, cultural and social advances of the last few decades, this most basic fact has been forgotten — if children eat and digest poorly, they live poorly. Lack of nutritious foods, poor digestion, and unhealthy lifestyle means damage to the lining of the GI tract, supplying the body with toxins instead of nutrients, and ultimately setting the stage for inflammatory diseases. Supporting complete digestion of nutrients from breast milk, formula, and solid food not only supports proper development of growing children but also helps alleviate symptoms of poor digestion like gas, cramping, bloating, acid indigestion, and allergies.

## Safety of Supplemental Enzymes

Transformation's digestive enzymes from microbial fungal sources are safe for infants and children, effective, and GI tract stable (Borowitz 2012, Graham 1984, Mamadou 2005, Medhekar 2004). This means the digestive enzymes 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 cholecystokinin) and not the presence of enzymes.

When it comes to dosing, enzymes are unlike vitamins, minerals, herbs, and medications. Transformation's digestive support formulas include a combination of various polysaccharolytic, lipolytic, and proteolytic enzymes to complement the nutritional intake of the individual. The dosage amount is not based on age or weight, but on the need of the individual. And unlike ingredients commonly used in nutraceuticals, enzymes do not build up and stay in the system for more than a few hours, nor do they add any toxic burden to the body since they are not metabolized by the kidney or liver.

## Ingredient Highlights

Transformation™ created Zymes for Kidz™ to assist with a child's complete digestion of proteins, carbohydrates, and fats from infancy and beyond to meet the increased demand of children coming into this world with digestive dysfunction.

### 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. 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 affective in the breakdown of proteins that are more difficult to digest. Transformation's DPP-IV is obtained from the controlled fermentation of select *Aspergillus* 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. Transformation's **Kidz Digest Powder** and **Kidz Digest Chewable** formulas include 300 DPP-IV per serving which has been found effective in clinical settings.

Additionally, Transformation's protease blend 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. Transformation's proteolytic enzymes support the digestion of proteins to help produce amino acids, which

## Hospitals Bank "Liquid Gold": Human Breast Milk

Breastfeeding, while ideal, is not always possible, and the need for support in this area is growing. Texas Children's Hospital in Houston, TX, was 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<sup>™</sup> Powder

## Supplement Facts

Serving Size 266 mg (app. 1/16 tsp or 1/2 scoop)  
Servings Per Container about 180

Amount Per Serving	% Daily Value
<b>Tzyme™ Enzyme Blend</b>	168 mg †
Amylase, Protease, Dipeptidyl Peptidase IV, Lipase, Lactase, Pectinase, Diastase, Invertase, Cellulase	
<i>Bifidobacterium infantis</i>	1 billion cfu †
Sunfiber® AG	66 mg †

† Daily Value not established

OTHER INGREDIENTS: RICE BRAN EXTRACT

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

# Kidz Digest<sup>™</sup> Chewable

## Supplement Facts

Serving Size 2 Chewable Tablets  
Servings Per Container 45/90

Amount Per Serving	% Daily Value
Total Carbohydrates	1 g <1%†
Total sugars	<1 g **
includes <1 g added sugar	<1%†
<b>TZyme® Peptidase Blend</b> (50,000 HUT and 300 DPP-IV)	114 mg †
<b>TZyme® Polysaccharolytic Blend</b>	90 mg **
Amylase, Glucoamylase, Lactase, Diastase, Alpha-Galactosidase, Pectinase, Invertase, Cellulase, Hemicellulase	
Flax Seed	30 mg **
Lipase (3,000 FIP)	11 mg **
<i>Bifidobacterium infantis</i> (100 million cfu)	2 mg **

†Percent Daily Values are based on a 2,000 calorie diet

\*\*Daily Value not established

Other Ingredients: Tapioca Dextrose, Natural Flavors (Mixed Berry, Strawberry, With Other Natural Flavors), Modified Cellulose, Magnesium Stearate, Silica, Citric Acid, Monk Fruit Extract, Malic Acid, Beet Juice Color

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 is essential to maintaining overall health as it promotes maximum nutrition from the protein consumed in a typical diet.

### Carbohydrases

Transformation's Zymes for Kidz™ formulas include a blend of carbohydrases that work synergistically for improved digestion of 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.

**Kidz Digest Powder** includes the enzymes amylase and diastase to support digestion of complex carbohydrates along with invertase and lactase to support digestion of sugars and pectinase and cellulase enzymes which help break down fiber. The more comprehensive **Kidz Digest Chewable** formula also includes alpha-galactosidase and glucoamylase to further support digestion of complex carbohydrates plus hemicellulase to further help break down fiber. Breaking down fiber in the diet promotes 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.

Transformation's supplemental enzymes 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 carbohydrases are acid stable and work in a wide pH range, therefore functioning throughout the gastrointestinal tract. Transformation's Zymes for Kidz™ product line is therefore the 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

The 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. **Kidz Digest Chewable** includes 3,000 FIP of lipase for complete digestion of fats, while **Kidz Digest Powder** includes an additional 200 FIP per serving due to breast milk being higher in fat.

### Probiotics

The probiotic *Bifidobacterium infantis* (strain Bi-26®) is used in both Zymes 4 Kidz™ formulas. Unlike most other bacteria in the gut microbiome, *B. infantis* is an inherited microbe, often being passed down from mother to child during childbirth. Once it takes up residence in the gut microbiome, *B. infantis* flourishes and help to cultivate an environment where other beneficial bacteria can grow. *B. infantis* is a leading probiotic to use in infants due to the vast number of studies which provide a growing body of evidence for its role in a myriad of potential health benefits. 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.

*B. infantis* produces short-chain fatty acids in the gut. These include acetic acid, which helps to nourish the cells lining the intestines. Acetic acid fights off invading pathogens such as yeast and fungus that can lead to infections. Because babies are born with open spaces between their intestinal cells, they are highly vulnerable to invading toxins and harmful bacteria. *B. infantis* has the job of signaling to the cells lining the gut and promoting the production of proteins to fill these gaps. As the baby grows, these proteins help to strengthen the gut lining and reduce permeability. Even more importantly, acetic acid functions as an energy source for the baby.

A leading probiotic to use in infants, *B. infantis* is also beneficial for toddlers, teens, and adults. “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). This study also shows that *B. infantis* 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 like *B. infantis* 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

## Should children take enzymes?

Digesting nutrient-rich foods is one of the most important functions of the body. Optimal digestion provides fuel, energy, protection, and repair. If your philosophy toward health is to prevent, protect, and be proactive, you definitely want to give a 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 the mother supplement with our foundational 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 a baby’s digestion that still needs assistance, you can easily and safely administer enzymes. Simply mix the Kidz Digest Powder in a small amount of tepid water (approximately 1cc) creating a paste and place inside the infant’s cheek or gums. The use of a syringe or medicine dropper works as well. Dose before each 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 Kidz Digest Powder 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’s licensed clinical team makes recommendations based on individual needs and has recommended Transformation™ formulas containing herbs for younger patients. However, our general philosophy for children 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 Clinical Support staff.

health and productivity. Similar results have been noted in humans.

### Prebiotics

Prebiotics nourish the “good” bacteria in the gut, keeping the bacteria in the digestive system (the gut microbiome) in balance. Prebiotics have been shown to benefit a number of gastrointestinal disorders such as occasional constipation, occasional diarrhea, or Irritable Bowel Syndrome. They can also be helpful in supporting weight management because they help keep you fuller for longer. And they are associated with supporting calcium absorption, which may benefit bone health.

Due to limitations on an infant’s digestive tract, a prebiotic fiber that is well tolerated and shown to positively support nutrient levels is used in **Kidz Digest Powder**. Sunfiber® is an innovative, clinically studied prebiotic for maintaining digestive health and microflora balance. As a fermented dietary fiber, Sunfiber® feeds and nourishes the gut’s beneficial bacteria, promoting a healthy gut microbiome and in turn supporting digestive health and overall wellness. Sunfiber® enhances the production of short-chain fatty acids, specifically the postbiotic butyrate, a signaling molecule critical for gut-organ interactions including the gut-brain and gut-skin axes. It is a

true regulating fiber and has tremendous formulation flexibility when used in foods, beverages, and dietary supplements. Sunfiber® is also certified organic, non-GMO, gluten free, low FODMAP, and considered safe for infants.

In place of Sunfiber®, **Kidz Digest Chewable** uses flax seed as a prebiotic due to its high fiber and phenolic antioxidants. Flax seed is also a good source of protein, omega-3 fatty acids, thiamine, and copper, important nutrients in the growth and development of a child. In addition, flax seed has traditionally been used for colon conditions, gastritis, bladder problems, and inflammation. Due to the maturation of the digestive system at this stage in development, flax seed is appropriate for children ages 2 and up.

### Other Ingredients

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 would not otherwise take enzymes.

## 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 under the age of 21 have an ASD. ([www.cdc.gov/ncbddd/autism/data](http://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](http://www.celiaccentral.org))



## When to Select Powder vs Chewable

Transformation's Zymes 4 Kidz™ product line consists of two options to provide complete digestion for all ages. **Kidz Digest Powder** is designed for infants since they are unable to chew and need higher amounts of the probiotic *B. infantis*. However, it is also safe and effective for toddlers, teens, and adults looking for a combination of digestive and probiotic support in one formula.

Children who can safely chew and are consuming mainly solids to meet their nutritional needs can benefit greatly from **Kidz Digest Chewable**. This tart berry-flavored tablet includes a smaller amount of probiotics to allow for a more complex enzyme blend needed for digestive health, regularity, and microflora balance past infancy. Flax seed is also used in this formula instead of Sunfiber® due to its nutritional diversity which is needed in toddler years vs infancy.

Although it includes a small amount of *B. infantis*, the **Kidz Digest Chewable** formula is not designed as a two-in-one enzyme and probiotic option. Instead, a multi-strain probiotic such as Transformation's Professional Protocol™ Probiotic should be used in conjunction with **Kidz Digest Chewable** for adequate inoculation of the more matured gut microbiome as a child approaches 24 months of age.

The human digestive system continues to change and develop until the teenage years. Weaning from breast milk and consuming more solid foods changes the dynamic of a child's microbiome, and the introduction of new dietary fibers and other food components shifts the gut microbiome toward a more mature adult-like gut community. This can involve increased levels of bacteria other than SCFA-producing Bifidobacterium. It also means the amount and type of needed enzyme and probiotic support will change. It is therefore recommended that one should transition to including a multi-strain probiotic formula such as Transformation's Professional Protocol™ **Probiotic** at bedtime in addition to a digestive enzyme formula with meals once the majority of nutrition comes from real foods.

## Summary

Since 1991, Transformation™ has worked closely with health professionals to provide high quality enzyme-based supplements that support the effective acquisition of essential nutrients through improved digestion. All Transformation Enzyme® formulas are carefully prepared to assure maximum quality and nutritional

effectiveness. Our formulators draw from over thirty years of specialized clinical experience observing and working with individuals with many digestive concerns.

An advocate of breastfeeding as the optimum source of nutrition for infants, Transformation™ believes breast milk is the best source of nutrition for a child's healthy growth and development. **Kidz Digest Powder** was created because we understand breast milk may sometimes be difficult to digest, and there are also circumstances that prevent breastfeeding. Whether breast fed or formula fed, this formulation assists with digestion to alleviate symptoms of digestive discomfort and allergies. **Kidz Digest Chewable** was created in tablet form to assist children of all ages with maximum digestion of proteins, carbohydrates, and fats. This tart berry-flavored chewable supports the assimilation of nutrients which helps to promote overall health and wellbeing.

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** and **Plantadophilus** from Transformation's Genesis of Good Health® line or Transformation's Professional Protocol™ **Protease** and **Probiotic**.\*

## Recommended Usage

### Kidz Digest Powder:

- For newborns and infants begin with 1/16 tsp (1/2 scoop) three times daily mixed in a spoon of tepid water or placed on the tongue before feeding formula or breast milk. 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.



- As baby food is introduced at 12-18 months, increase dosage to 1/8 tsp (1 scoop) for 6 months.
- Once the toddler is eating finger and table foods, increase dosage to 1/4 tsp (2 scoops) with each meal.
- Dosage for children, teens, and adults is 1/2 tsp (4 scoops) with each meal.

#### **Kidz Digest Chewable:**

- Two (2) tablets with every meal or as directed by a health care professional.

#### **AUTISM & GMO'S**

Hertz-Picciotto I, Delwiche L. "The Rise in Autism and the Role of Age at Diagnosis." *Epidemiology*. Jan 2009;20(1):84-90.

[www.cdc.gov/ncbddd/autism/data](http://www.cdc.gov/ncbddd/autism/data)

[www.celiaccentral.org](http://www.celiaccentral.org)

[www.huffingtonpost.com/birgitta-lauren/how-safe-are-infant-formu\\_b\\_171512.html](http://www.huffingtonpost.com/birgitta-lauren/how-safe-are-infant-formu_b_171512.html)

[www.ucsdnutritionlink.org/articles/archives/fastfood.pdf](http://www.ucsdnutritionlink.org/articles/archives/fastfood.pdf)

#### **BREASTFEEDING**

Arenz S, von Kries R. Protective effect of breastfeeding against obesity in childhood: "Can a meta-analysis of observational studies help to validate the hypothesis?" *Adv Exp Med Biol*. 2005;569:40-48.

Henrick BM, Hutton AA, Palumbo MC, Casaburi G, Mitchell RD, Underwood MA, Smilowitz JT, Frese SA. "Elevated fecal pH indicates a profound change in the breastfed infant gut microbiome due to reduction of Bifidobacterium over the past century." *mSphere*. 2018 Mar-Apr; 3(2): e00041-18.

Maenner MJ, et al. "Prevalence and Characteristics of Autism Spectrum Disorder Among Children Aged 8 Years — Autism and Developmental Disabilities Monitoring Network, 11 Sites, United States, 2020." *MMWR Surveill Summ*. 2023 Mar 24; 72(2):1–14.

[www.nbcchicago.com/news/health/target-5-sugar-baby-formula-139339308.html](http://www.nbcchicago.com/news/health/target-5-sugar-baby-formula-139339308.html)

[www.npr.org/blogs/health/2012/08/23/159925707/hospitals-bank-liquid-gold-human-breast-milk](http://www.npr.org/blogs/health/2012/08/23/159925707/hospitals-bank-liquid-gold-human-breast-milk)

#### **ENZYME EFFICACY & STABILITY**

Borowitz D, et al. "Liprotamase Long-term Safety and Support of Nutritional Status in Pancreatic-insufficient Cystic Fibrosis." *Journal of Pediatric Gastroenterology & Nutrition*. Feb 2012;54(2):248-257.

Graham D. "Ins and outs of pancreatic enzymes and adjuvant therapies." *Ped Gast and Nut*. 1984;3(suppl 1):S120.

Mamadou M, Marr S, Paydon K, Medhekar R. "Stability and Activity of Supplemental Digestive Enzymes in Simulated Gastric Fluid" presented at the Scripps Conference in San Diego, January 7-9, 2005.

Medhekar, R. "The First Quantitative Evidence Proving the Efficacy Of Supplemental Enzymes." National Enzyme Company.

2004.

#### **PROTEASE**

Buford TW, Cooke MB, Redd LL, Hudson GM, Shelmadine BD, Willoughby DS. "Protease supplementation improves muscle function after eccentric exercise." *Med Sci Sports Exerc*. Oct 2009;41(10):1908.

#### **DDP-IV**

Hausch F, Shan L, Santiago NA, Gray GM, Khosla C. "Intestinal digestive resistance of immunodominant gliadin peptides." *Am J Physiol Gastrointest Liver Physiol*. Oct 2002;283(4):G996-G1003.

Koch S, Anthonsen D, Skovbjerg H, Sjöström H. "On the role of dipeptidyl peptidase IV in the digestion of an immunodominant epitope in celiac disease." *Adv Exp Med Biol*. 2003;524:181-7.

Stepniak D, Spaenij-Dekking L, Mitea C, Moester M, de Ru A, Baak-Pablo R, van Veelen P, Edens L, Koning F. "Highly efficient gluten degradation with a newly identified prolyl endoprotease: implications for celiac disease." *Am J Physiol Gastrointest Liver Physiol*. Oct 2006;291(4):G621-9.

#### **PROBIOTICS**

Brown, D. "Bifidobacterium infantis effectively treats IBS symptoms in adults." *Original Internist*. Sep 2005.

Casaburi G, Duar RM, Brown H, et al. "Metagenomic insights of the infant microbiome community structure and function across multiple sites in the United States." *Sci Rep*. 2021;11(1):1472

Chichlowski M, Shah N, Wampler JL, Wu SS, Vanderhoof JA. "Bifidobacterium longum Subspecies infantis (B. infantis) in Pediatric Nutrition: Current State of Knowledge." *Nutrients*. 2020 Jun; 12(6): 1581.

Haros M, Bielecka M, Honke, J, Sanz Y. "Myo-inositol hexakisphosphate degradation by Bifidobacterium infantis ATCC 15697." *Int J Food Microbiol* 117(1):76-84 (2007)

Swiss Institute of Bioinformatics. "HAMAP: Bifidobacterium longum subsp. infantis (strain ATCC 15697 / DSM 20088 / NCTC 11817 / S12) complete proteome." <http://expasy.org/sprot/hamap/BIFLS.html>

#### **SUNFIBER®**

Alam NH, Ashraf H, Kamruzzaman M, Ahmed T, Islam S, Olesen MK, Gyr N, Meier R. Efficacy of partially hydrolyzed guar gum (PHGG) supplemented modified oral rehydration solution in the treatment of severely malnourished children with watery diarrhoea: a randomised double-blind controlled trial. *J Health Popul Nutr*. 2015;34:3.

Alam NH, Meier R, Schneider H, Sarker SA, Bardhan PK, Mahalanabis D, Fuchs GJ, Gyr N. Partially hydrolyzed guar gum-supplemented oral rehydration solution in the treatment of acute diarrhea in children. *J Pediatr Gastroenterol Nutr*. 2000 Nov;31(5):503-7.

Furnari M, Parodi A, Gemignani L, Giannini EG, Marengo S, Savarino E, Assandri L, Fazio V, Bonfanti D, Inferrera S, Savarino V. Clinical trial: the combination of rifaximin with partially hydrolysed guar gum is more effective than rifaximin

along in eradicating small intestinal bacterial overgrowth. *Aliment Pharmacol Ther.* 2010 Oct;32(8):1000-6.

Gibson GR, Hutkins R, Sanders ME, Prescott SL, Reimer RA, Salminen SJ, Scott K, Stanton C, Swanson KS, Cani PD, Verbeke K, Reid G. Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. *Nat Rev Gastroenterol Hepatol.* 2017 Aug;14(8):491-502.

Gibson GR, Roberfroid MB. Dietary modulation of the human colonic microbiota: introducing the concept of prebiotics. *J Nutr.* 1995;125(6):1401-12.

Ohashi Y, Sumitani K, Tokunaga M, Ishihara N, Okubo T, Fujisawa T. Consumption of partially hydrolysed guar gum stimulates *Bifidobacteria* and butyrate-producing bacteria in the human large intestine. *Benef Microbes.* 2015;6(4):451-5.

Okubo T, Ishihara N, Takahashi H, Fujisawa T, Kim M, Yamamoto T, Mitsuoka T. Effects of partially hydrolyzed guar gum intake on human intestinal microflora and its metabolism. *Biosci Biotech*

*Biochem* 1994;58:1364-1369.

Romano C, Comito D, Famiani A, Calamarà S, Loddo I. Partially hydrolyzed guar gum in pediatric functional abdominal pain. *World J Gastroenterol.* 2013 Jan 14;19(2):235-240.

Takahashi H, Wako N, Okubo T, Ishihara N, Yamanaka J, Yamamoto T. Influence of partially hydrolyzed guar gum on constipation in women. *J Nutr Sci Vitaminol* 1994;20:251-259.

Üstündağ G, Kuloğlu Z, Kirbaş N, Kansu A. Can partially hydrolyzed guar gum be an alternative to lactulose in treatment of childhood constipation? *Turk J Gastroenterol* 2010;21(4):360-364.

Yasukawa Z, Inoue R, Ozeki M, Okubo T, Takagi T, Honda A, Naito Y. Effect of repeated consumption of partially hydrolyzed guar gum on fecal characteristics and gut microbiota: a randomized, double-blind, placebo-controlled, and parallel-group clinical trial. *Nutrients.* 2019 Sep 10;11(9):2170.

Copyright © Transformation Enzyme Corporation

Questions? 1-800-777-1474  
email [moreinfo@tecenzymes.com](mailto:moreinfo@tecenzymes.com)  
[www.transformationenzymes.com](http://www.transformationenzymes.com)



**\*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.**