

Probiotics to enzymes: YOU COMPLETE ME

Combining digestive enzymes with probiotics offers functional and marketing advantages. Managing editor



HANK SCHULTZ breaks down the issues.

Digestive health has been a hot category in recent years, with big gains both in the supplement and functional food realms. Most of that growth has gone to products featuring probiotics. Science news has driven some of this growth, and multimillion-dollar ad campaigns by major brands like Dannon has driven the rest.

According to *Nutrition Business Journal*, U.S. sales of gastrointestinal condition-specific supplements reached \$1.1 billion in 2009, growing 10 percent over 2008 sales. Sales of probiotics in products targeted specifically at digestive health were the main driver of category growth, climbing 22 percent to over \$400 million in 2009. Digestive enzymes were essentially flat, gaining 1.5% to \$204 million.

Total probiotics sales (including, for example, those targeting immune support or oral health) grew 24 percent to \$527 million in 2009. *NBJ's* early estimates for the U.S. market for all probiotic supplements in 2010 are for sales of about \$600 million with growth in the teens, while digestive enzymes should again see low single digit growth with sales in the low \$200 million range.

As the overall category has grown, then, probiotics have taken the steps three at a time, while digestive enzymes are climbing slowly, resting at every landing. What if they went up together? It's an idea that's attractive both from a marketing and a functional perspective, say experts. Enzymes complement, rather than compete, with probiotics.

"There's no competition in any sense. The awareness of these products is still growing. So anything we can do to promote the awareness of both probiotics and enzymes is a good thing," said Michael Shahani, director of operations for probiotics supplier Nebraska Cultures.

"Probiotics are a story of balance. Enzymes finish that story," said Tom Bohager, founder and president of Enzymedica, which owns 10 percent of the finished product market in digestive enzymes.

Manufacturers of both enzymes and probiotics use the verbiage of life to describe their products. Enzyme manufacturers speak of "growing" enzymes, and of enzymes "feeding" on other molecules. But only probiotics are actual living organisms.

Digestive enzymes, on the other hand, are specialized protein molecules that break down specific organic molecules such as proteins, fats and sugars and enable their digestion. These rapid interactions, mostly in the upper stomach, are the "feeding" process. Enzymes are actually secreted by microbes and fungi, which must be propagated in the creation of commercially available enzymes.

Thousands of types of enzymes, including the digestive variety, are also secreted by our own bodies. If we make our own, why would we need supplementation?

"As your body ages, all of its mechanics slow down," said Danielle Harrison, manager of scientific and regulatory affairs for National Enzyme Company. Your body at age 50 makes half as many enzymes as it did at its peak, Bohager said. And many North Americans now eat little raw food, which is rich in enzymes. Cooking and processing destroys enzymes, so few people actually get any in the diet any more.

Complementary bioactives

Enzymes are needed for every chemical reaction in the body, and as such are reaction-specific. In digestion, specific enzymes break bonds at specific points along the chains of large protein, lipid and other

nutritive molecules. Digestive enzymes also have specific temperature and pH ranges at which they work best.

Digestive enzymes fall into four main categories: proteases that target proteins, lipases that digest fats, amylases that interact with carbohydrates and cellulase that breaks down cellulose. These interactions are well understood and enzyme activity is characterized by a variety of units established in the Food Chemical Codex (see sidebar).

Probiotics, on the other hand, have less well-characterized activities in the body. Studies show probiotic strains can colonize the gut for only a limited time. Further studies have demonstrated the role of certain strains in supporting digestive or immune health. Their potential activity is quoted on the label (at least the labels of the better products) in terms of millions (better: billions) of colony-forming units, or CFUs.

How exactly the probiotic organisms have their beneficial effects is less well understood, however. Unlike enzymes, which literally lock into a specific reaction, probiotics are living things that have a life cycle of their own and interact with the gut environment via a myriad of chemical reactions. Yet this yin and yang of tightly focused enzymes vs diffused probiotic action and high-in-the-stomach enzymes vs low-in-the-gut probiotics action sites can offer unique benefits.

“Most of your benefit (of digestive enzymes) will be in the upper stomach,” said Harrison. “Probiotics will not start working until the lower intestines. On a pure digestive level they work together very well.”

“There is a synergistic effect with enzymes and probiotics. In fact, probiotics make a small amount of enzymes themselves,” Shahani said.

Stability issues

An enzyme-probiotic combo product would typically include a number of different enzymes to target a broad swath of digestive support. Similarly, such a product could contain a suite of probiotic strains for a similar reason. But if enzymes target specific molecules, and those molecules are present within the probiotic organisms, isn't that a recipe for trouble?

“One of the concerns with having the two together in one product is, will the enzymes attack the probiotics?” said Harrison. “We've done some studies here in house and they don't. There are a few (probiotic) strains that will be knocked back a little more if they are combined with an enzyme. But in a normal product there is no problem with combining them. And I understand it's easier to just take one pill.”

“In theory if they're adequately dry there shouldn't be any interaction,” said Prof. Robert Hutkins of the Food Science and Technology Department of the University of Nebraska at Lincoln.

Nevertheless, such a product would need more attention to shipping and storage. Digestive enzymes do not need to be refrigerated to have an adequate shelf life. But while more shelf-stable probiotics are coming on to the market, many strains still require refrigeration to remain viable in a capsule, adding a complication to the distribution of a combined product.

The near-term outlook

As stated earlier, the body makes fewer and fewer enzymes as we age, leading to less efficient digestion in the upper stomach. Downstream, the total number of gut microflora CFUs does not seem to decline with age. Yet, a variety of symptoms asso-

The enzyme market is mature in that many products have been around for years and there is little market growth to support big R&D expenditures. One area that has shown some recent activity in enzyme-only products has been in those that target gluten intolerance and lactose intolerance.

Enzymedica markets a gluten intolerance product called GlutenEase, combining protease, amylase and glucocamylase enzymes. And major ingredients supplier DSM Nutritional Products recently let on that it has a gluten enzyme in the works.

Shaklee, Enzymedica and others offer finished products that target lactose intolerance with formulations that combine lactase with other enzymes.

These products clear the efficacy bar for Prof. Hutkins of the University of Nebraska, who's not a big proponent of the whole digestive enzyme concept. “These products are targeted and specific. The issue is when you start to expect some sort of broader result when you take a whole gemic of enzymes,” he said. —HS

ciated with the lower GI tract are reported by older consumers, such as motility disorders and problems associated with the anorexia of aging. These issues, combining with the rapidly aging North American population, should bode well for the makers of digestive aid products, including enzyme-probiotic blends.

But that's not the whole story, said National Enzyme's Harrison. “We truly believe that everybody can benefit from digestive products. But sometimes they need to have a problem to convince them of it.”