



# Plant protein evolution

PEVESA's plant based protein hydrolysates and isolates are applied in Baby Food, Sports Nutrition, Weight Management, Clinical & Senior Nutrition, Weight Management and supplements meeting the EU and FDA and ISO 22.000 regulations.



Thanks to their **proprietary technology**, protein hydrolysates, protein concentrates, protein isolates and essential amino acids are obtained and cleaned in a natural enzymatic way, which makes them suitable for human, even infant nutrition with highest standards in quality.

Strict **quality control** carried out not only on the production process but as well on the raw materials used for production, **fast adaptations on new regulations** and the **possibility to control heavy metals and contaminants** level explain the interest in those products as well as the international success and partnerships with important market players, which definitely understand the importance of current **nutritional trends** related to **diary free, lactose free, Gluten free, Allergen free and vegan products**.

The mentioned protein derivatives are obtained from sources like **rice, pea, carob** and can be found in international supply chains and retail stores in nutritional applications as for **example Hypo-allergenic infant formulas, Protein shakes, protein bars, Muscle recovery products, Protein supplements, fruit gums, snacks, protein enhanced beverages, Meal replacements, vegetable meat and cheese substitutes**.

Within the Sports Nutrition sector, most of the high protein drinks and bars utilise intact protein or selected free-form amino acids to ensure the athlete replaces the essential amino acids lost during exercise. The question is, are these forms of protein the **most effective way to get those essential amino acids into the body**, not only into the gastrointestinal tract but also into the bloodstream?

It is proven that Hydrolysed Proteins, containing mostly **di- and tri-peptides**, are absorbed more rapidly than free-form amino acids and even **faster than intact proteins**. Thus it follows that intact proteins and amino acids are more difficult to digest and have slower absorption rates into the bloodstream than Protein Hydrolysates. In addition, there is recent evidence suggesting that protein hydrolysate ingestion has a **strong insulinotropic effect**.

Protein Hydrolysates are - depending on the

degree of hydrolysis - small chains of amino acids called peptides, polypeptides and amino acids cut (pre-digested) by chemical or enzymatic hydrolysis. The polypeptides and amino acids cut by enzymatic hydrolysis have the benefit that they have **faster absorption rates** which counterbalances the higher production costs. **Intolerances and allergies can be partially reduced** with Protein Hydrolysates with **targeted enzymatic hydrolysis**.

Protein Hydrolysates are applied in sports medicine because their consumption allows amino acids to be **absorbed by the body more rapidly** than intact proteins, maximising the delivery of nutrients to the muscle tissues. In the December 2013 edition of *The International Journal of Food Science and Technology*, it is argued that Hydrolysates have been shown to be **rich in Aspartic Acid** (Vitamin C), as well as the necessary minerals Manganese and Selenium. This is one of the reasons why the incorporation of Protein Hydrolysates in Sport Nutrition formulations is advantageous.

## Protein Hydrolysates in Sports Nutrition

Today, there are four ways to get amino acids into the bloodstream:

- 1) Whole Food Proteins
- 2) Intact Protein Supplements
- 3) Free Amino Acid Forms
- 4) Protein Hydrolysates (Manninen, 2002)

Protein Hydrolysates are produced from purified protein sources by heating with acid or preferably, through the addition of **proteolytic enzymes**, followed by methods of purification. Enzyme Hydrolysis is greatly preferred because the Acid Hydrolysis process oxidises Cysteine and Methionine, destroying Serine and Threonine, and converts Glutamine and Asparagine to Glutamate and Aspartate respectively, lowering protein quality and biological value (Bucci and Unlu, 2000).

The considerably greater absorption rate of amino acids from the di-peptide than from the amino acid mixture appears to be the result of uptake by a system that has a greater transport capacity than amino acid carrier system, thus minimising competition among its substrates (Di Pasquale, 1997). This is a desirable trait for **athletes who wish to maximise amino acid delivery to muscles**.

However, whether this apparent advantage over ingestion of foodstuffs has the practical effect of **faster muscle mass accretion** or

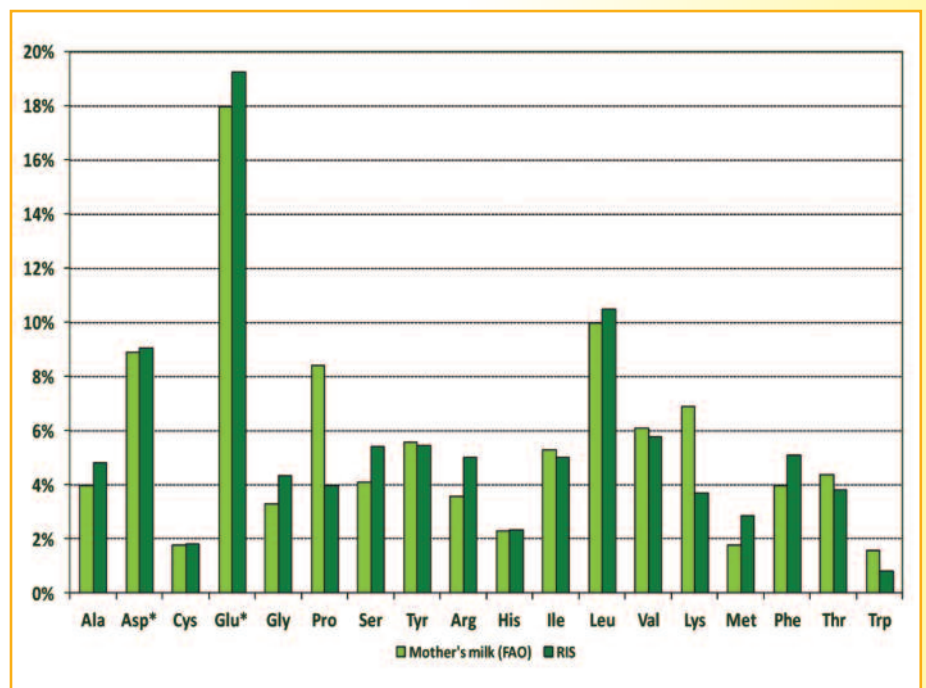


Figure 1:

improved recovery from exercise has not been adequately studied in exercising individuals. Nevertheless, documented advantages, such as **faster uptake of amino acids, higher biological value, etc.**, remain attractive to consumers. Thus, this article examines the science behind Protein Hydrolysates, when applied to sports and exercise.

### Rice

Rice Protein Hydrolysates are an **excellent choice in sport nutrition** due to their amino acid profile which is **extremely near to human milk**, molecular weight distribution, organoleptic characteristics, hypo-allergenicity, and matrix compatibility.

Rice is well known for its **hypo-allergenicity**, and Protein Hydrolysates are less allergenic than its original protein. They are among the most hypo-allergenic protein sources to be used. Its vegetal origin also make it **suitable for strict vegans**, and it can be also grown and produced to **organic, Kosher and Halal standards**.

The amino acid profile of Rice has a **high content in branched chain amino acids** (BCAA 17,7%), **sulphured amino acids** (3,9%), and **aromatic amino acids** (12,4%). This means that muscles will be easily supplied with this protein, something that cannot be matched by single amino acids formulas.

Regarding Organoleptic, Rice Protein Hydrolysates have a characteristic taste and cereal flavour which makes them very suitable for inclusion in matrices compatibles with these notes. The main issue with hydrolysates has traditionally been the bitter taste. Nowadays, it is possible to produce **low bitterness Protein Hydrolysates**, making matrix compatibility much wider. Examples of these matrices are **protein water, isotonic drinks, infant formulas, hyperproteic shakes, bars, smoothies, and meal replacements**.

The molecular weight distribution and subsequent absorption speed allow the hydrolysates to be utilised in a wide variety of applications and methods of delivery. By adjusting the **degree of hydrolysis anywhere between 5% - 25%**, it gives the producer the option for direct use of the protein or as part of a blend to obtain a defined proportion of high and low molecular weight, **matching the specific nutritional needs of the consumer**.

For diet supplementation, a single protein may match the requirements. But for specific products



like **isotonic drinks, protein water or muscle recovery protein mixes, Protein Hydrolysates** have no match.

### Absorption Speed

During digestion, proteins are broken down initially by pepsins in the stomach. After that, they are processed with Trypsin, Chymotrypsin, Elastase, and other enzymes in the stomach and small intestine in a long process that involves the stomach, pancreas, liver, gall bladder and the intestines. This is a sequential process, with the molecular size decreasing until tri-peptides, di-peptides and amino acids are left. In this process, **the smaller the molecular size is, the less processing is required by the body**. So it is concluded that **low weight proteic molecules are absorbed quicker and with less effort** by the body than high weight molecules.

In a simulation study of body absorption speeds using membranes to simulate the small intestine, it can be concluded that Rice Protein Hydrolysates can be produced with broad molecular distribution profiles so that they may be processed and absorbed almost as fast as free amino acids. Specifically, the **HydroRice** range from Pevesa covers the entire spectrum of behaviour and benefits between free amino acids

and intact protein.

### Optimum Post-Exercise Recovery

During exercise, a consumption of energy is required, which is then followed by an increase in body temperature. The body temperature is controlled mainly by sweating, so there is a direct loss of energy, water and minerals. **When there is a demand for energy above the usual state of the body, the muscles react by activating the protein catabolic paths**. Furthermore, there is a direct destruction of muscle tissue and fibre during exercise which must be repaired, **resulting in the loss in protein**.

It has been studied that when the protein is ingested directly after exercise, it is **more efficiently used by the muscle; between 3 - 6g of protein**, consumed after exercise is enough to stimulate a muscle recovery effect. It is suggested that Vitamin B1 and B6 should be consumed along with the source of protein to assist with the recovery process.

There is a **synergistic effect between protein and carbohydrates** during this process. In light of this, formulas should have a composition that contains a source of carbohydrate that can be rapidly metabolised in order to recover energy and have the synergistic proteic effect, the amount of protein that is required for the optimum recovery process and water for re-hydrating in a solution with ions. The nearest product to this is an isotonic drink, such as Protein Water with Rice Hydrolysates.

### Baby Food: Vegetal Proteins Hydrolysates.

Breastfeeding provides the best nutrition for babies, but for many different reasons it's not always possible for all mums to breastfeed.

**PEVESA Vegetal Proteins** are highly pure rice that provides **high levels of nutrition and functionality**.

- high comfort digestibility
- lactose free
- hypoallergenic
- help soothe the symptoms of colic and constipation
- high tolerance
- gluten free

Rice Protein Hydrolysates are an excellent choice in special baby food formulas due to their **high quality amino acid profile, hypoallergenicity and matrix compatibility**.

Rice is well known for its hypoallergenicity and Protein Hydrolysates are less allergenic than its

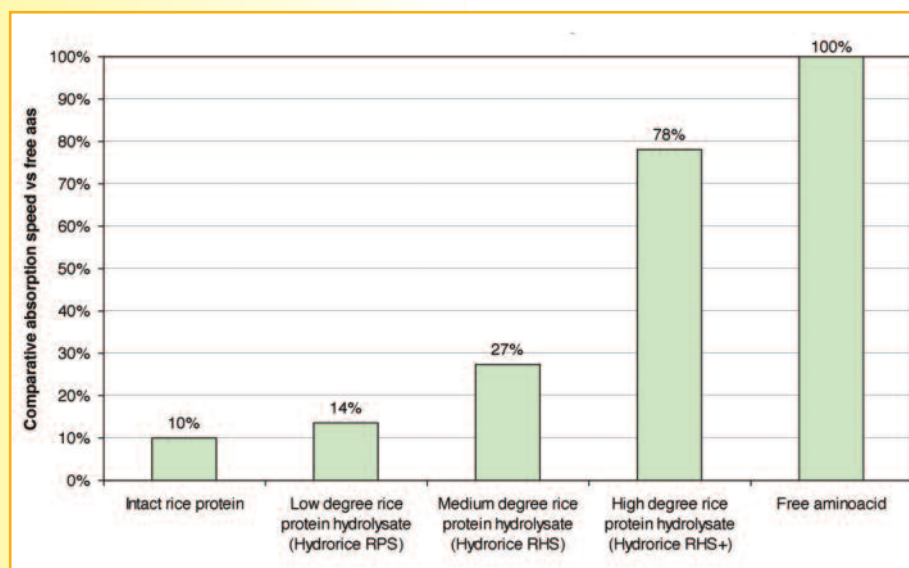


Figure 2:

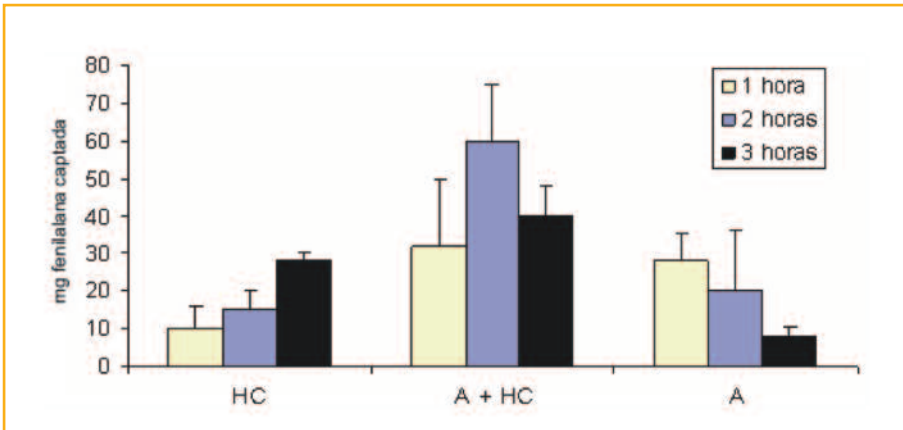


Figure 3:

original protein. They are the most hypo-allergenic protein sources to be used.

Hydrolysed Proteins, containing mostly di- and tri-peptides, are absorbed faster than free-form amino acids and intact proteins. In addition protein hydrolysate ingestion has a strong insulinotropic effect.

The polypeptides and amino acids cut by enzymatic hydrolysis generate faster absorption rates. Intolerances and allergies can be reduced

with Protein Hydrolysates with targeted enzymatic hydrolysis.

The molecular weight distribution and subsequent absorption speed allow the hydrolysates to be utilised in a wide variety of applications.

Low weight proteic molecules are absorbed quicker and with less effort by the body than high weight molecules.

HydroRice range from Pevesa Biotech covers the entire spectrum of behaviour

between free amino acids and intact protein.

We produce Baby food grade protein hydrolysates for hypoallergenic infant formulas under strict quality control as we are very conscious of the responsibility and the role we play in making one of the main and essential ingredient for the infant formula which mothers give to their babies all over the world. Our rice protein hydrolysates are used in allergy free, lactose free infant formulas and are in the position not only to guarantee lowest levels of heavy metals, contaminants and microbiology but also to adapt rapidly to the continuously modifying legal regulations and requirements.

#### Baby Food

- Anti-colic Milks
- Hypoallergenic Milks
- Nutritional Supplements
- Protein enriched rice Pap's
- Protein enriched fruit juice and pulps

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