

Technology Offer

CSIC/XA/013

Gluten degrading protein for the prevention of celiac disease



A recombinant gluten degrading protein that may have application as an agent or food additive for the prevention of gluten-mediated conditions, as well as in the food industry for the manufacturing of gluten-free products.

Intellectual Property

PCT application filed

Stage of development

In vivo proof of concept

Intended Collaboration

Licensing and/or co-development

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Market need

Celiac disease is a chronic autoimmune disorder that affects individuals with sensitization to dietary gluten. It is caused by partially degraded gluten peptides, which are immunogenic. These peptides resist further cleavage by digestive peptidases, and they cross the mucosal epithelium of the small intestine and trigger a severe pro-inflammatory autoimmune response. Currently, there is no treatment and patients must adhere to a lifelong strict gluten-free diet. However, gluten-free diets do not provide balanced nutrition, and many celiacs suffer intestinal symptoms even with adherence to such dietary restrictions. Overall, this has created a demand for an effective therapy.



Proposed solution

The recombinant protein, that cleaves the immunogenic gluten peptides for oral enzyme therapy, was assayed with a mouse model for celiac disease and in a dynamic gastrointestinal simulator, which mimics the human gut. In all series of assays, the protein drastically reduced the amount of toxic peptides at low enzyme-to-substrate molar ratios. Also, it was assayed in comparison to another endopeptidase that shows glutenase activity, and it performed significantly better in gliadin degradation assays.

Competitive advantages

- The protein remains stable and active in the acidic gastric environment and resists the digestive enzymes.
- Low doses of protein efficiently digest gliadin and the immunogenic gluten peptides when combined with pepsin under gastric conditions.
- An efficient recombinant production system has been established, which produces high yields of pure protein.