

Glycoprotein Cleaving Enzyme Isolated from Bifidobacteria

Tech ID: 22330 / UC Case 2012-346-0

ABSTRACT

Researchers at the University of California, Davis have developed deglycosylating enzymes that enable efficient cleavage of diverse N-glycans from glycoproteins with broad substrate specificity and heat stability for applications in food, pharmaceuticals, and biotechnology.

FULL DESCRIPTION

This technology provides novel endoglycosidase enzymes from Bifidobacteria that cleave the core pentasaccharide of N-glycans from glycoproteins. Unlike previously known enzymes, these enzymes display broad substrate specificity, being capable of cleaving high mannose, complex, and hybrid N-glycans, including those with terminal and core fucosylation and sialylation. The enzymes are heat resistant and can be recombinantly expressed in food-grade bacteria, enabling their use in various industrial, pharmaceutical, and analytical applications.

APPLICATIONS

- ▶ Food and beverage industry: inclusion in dairy, infant formula, plant-based foods to enhance protein digestibility and reduce allergenicity.
- ▶ Prebiotic and probiotic products: production and supplementation with free N-glycans to promote beneficial gut microbiota growth.
- ▶ Pharmaceuticals: formulation of deglycosylated therapeutic proteins with improved efficacy and reduced immunogenicity; immune system modulation via free glycans.
- ▶ Analytical biochemistry: streamlined glycoprotein characterization and glycomics via enzymatic deglycosylation.
- ▶ Cosmetics and personal care: addition to lotions and topical products for improved protein stability and potentially enhanced bioactivity.
- ▶ Biotechnology and industrial enzyme markets: recombinant enzyme production for broad use in glycoprotein modification and processing.
- ▶ Research reagents and kits: supplied with reagents and protocols for efficient and broad-range deglycosylation applications.

FEATURES/BENEFITS

- ▶ Covers all major N-glycan types (high mannose, complex, hybrid) with broad substrate specificity.
- ▶ Maintains activity after heat exposure up to 95°C for 5 minutes.
- ▶ Cleaves glycans with terminal or core fucosylation and sialylation.
- ▶ Uses enzymes from GRAS organisms (Bifidobacteria) to facilitate regulatory approval.

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OTHER INFORMATION

KEYWORDS

bifidobacteria,
 deglycosylating enzyme,
 food digestibility,
 glycoprotein, n-glycan,
 prebiotic, probiotic,
 recombinant enzyme,
 thermostability, yeast
 and bacterial glycan
 recognition

CATEGORIZED AS

- ▶ **Biotechnology**
 - ▶ Food
 - ▶ Proteomics
 - ▶ Medical

- ▶ Improves digestibility, reduces allergenicity, and stimulates beneficial gut bacteria in food applications.
- ▶ Modulates immune responses and therapeutic protein properties in pharmaceuticals.
- ▶ Streamlines proteomics and glycoproteomics with efficient, single-step deglycosylation.
- ▶ Provides recombinant forms for expression in multiple host cells as either transmembrane or soluble enzymes.
- ▶ Eliminates the need for multiple or sequential enzyme treatments due to limited substrate specificity.
- ▶ Increases efficiency and stability compared to commercial enzymes under high temperature or denaturing conditions.
- ▶ Reduces allergenic potential of glycoproteins in food and pharmaceuticals.
- ▶ Simplifies production of free glycans and deglycosylated proteins for research, nutrition, and therapy.
- ▶ Meets the requirement for regulatory-compliant enzymes suitable for food and medicinal products.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,633,461	04/25/2023	2012-346
United States Of America	Issued Patent	11,285,182	03/29/2022	2015-193
United States Of America	Issued Patent	11,000,576	05/11/2021	2012-346
United States Of America	Issued Patent	10,780,136	09/22/2020	2015-193
United States Of America	Issued Patent	10,688,160	06/23/2020	2012-346
United States Of America	Issued Patent	10,639,357	05/05/2020	2012-346
United States Of America	Issued Patent	10,471,134	11/12/2019	2012-346
United States Of America	Issued Patent	10,350,249	07/16/2019	2015-193
United States Of America	Issued Patent	10,165,788	01/01/2019	2013-877
United States Of America	Issued Patent	10,071,142	09/11/2018	2012-346
United States Of America	Issued Patent	9,327,016	05/03/2016	2012-346
United States Of America	Issued Patent	8,425,930	04/23/2013	2009-110

- ▶ [Disease: Digestive System](#)
- ▶ [Research Tools](#)
- ▶ [Research Tools](#)
- ▶ [Reagents](#)

RELATED CASES

2012-346-0, 2009-110-0, 2013-877-0, 2015-193-0

RELATED TECHNOLOGIES

- ▶ [Reducing Free Milk Glycan Monomers Generated by the Neonate Gut Microbiota Eliminates Colonization by Dysbiotic Microbiome Members](#)
- ▶ [Prebiotic Oligosaccharides](#)
- ▶ [Additional Glycosyl Hydrolase is Critical to Bacteria's Ability to Consume HMOs](#)

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Prebiotic Oligosaccharides](#)
- ▶ [Diagnosis and Treatment of Inflammatory Disease by Glycan Profiling of High Density Lipoprotein \(HDL\)](#)
- ▶ [Bifidobacterial Probiotics for Nursing and Weaning](#)
- ▶ [Reducing Free Milk Glycan Monomers Generated by the Neonate Gut Microbiota Eliminates Colonization by Dysbiotic Microbiome Members](#)
- ▶ [Additional Glycosyl Hydrolase is Critical to Bacteria's Ability to Consume HMOs](#)
- ▶ [Bifidobacterial Probiotic Supplements for Infants](#)
- ▶ [Increased Microorganism Alcohol Tolerance Via Transformation of its pntAB Locus](#)

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