

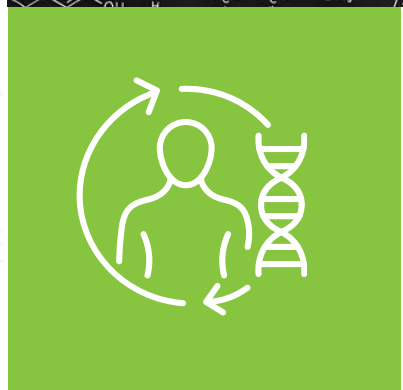
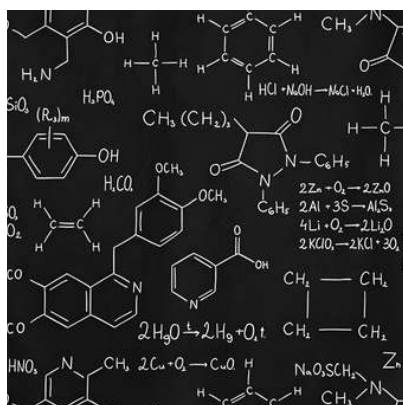
PROTEOLYTIC ENZYME SYSTEMS FOR PHARMACEUTICAL, NUTRACEUTICAL, AND BIOPROCESS APPLICATIONS

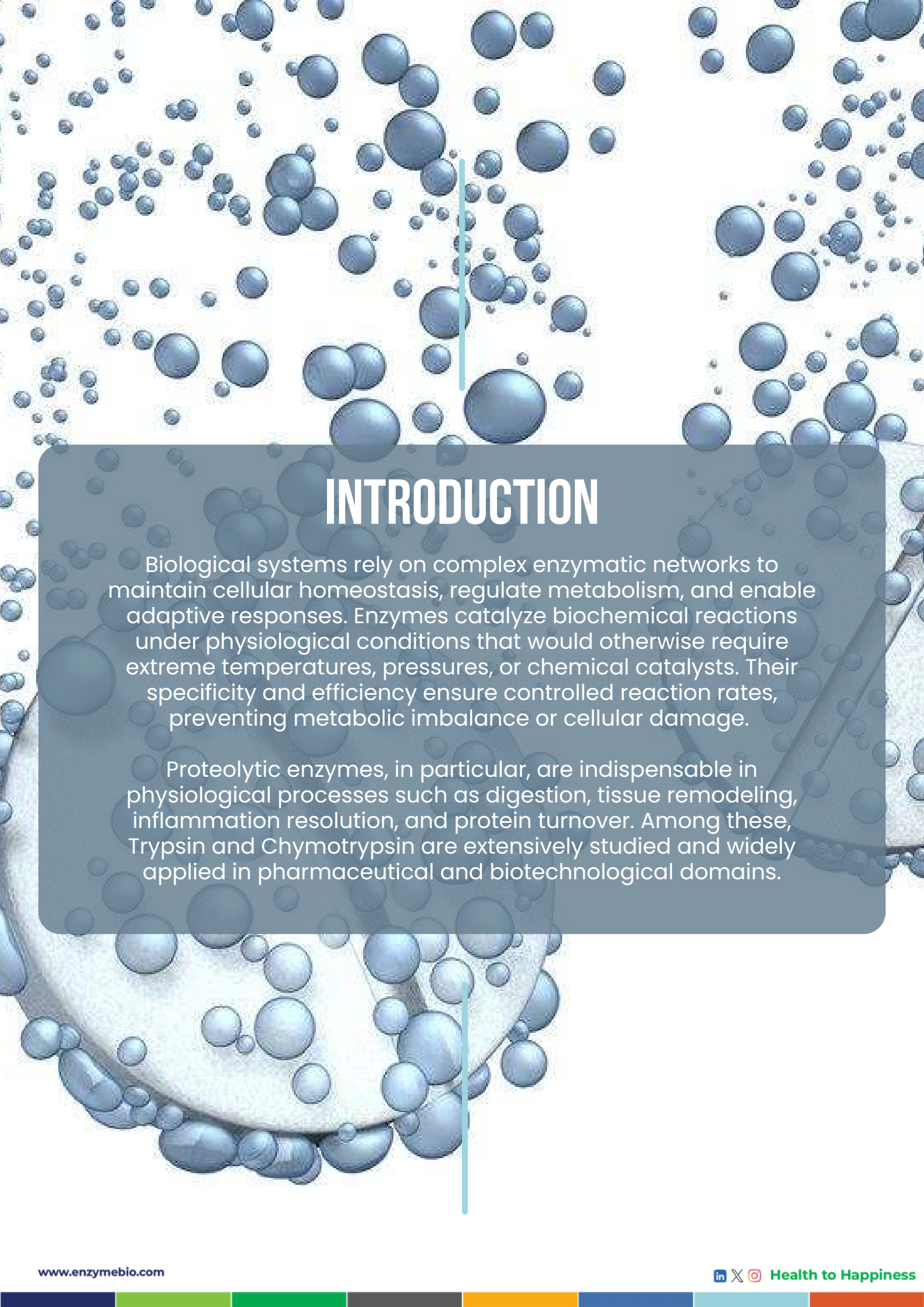
Enzymes function as the fundamental operating system of biological life, orchestrating metabolic reactions with precision, efficiency, and specificity.

Among proteolytic enzymes, Trypsin and Chymotrypsin play critical roles in therapeutic enzyme formulations and bioprocessing applications due to their well-defined catalytic properties and strong regulatory acceptance.

This paper presents a detailed overview of EB-TrypZyme™ (Trypsin USP/BP) and EB-TrypChymo™ (Trypsin–Chymotrypsin 6:1), highlighting their biochemical characteristics, mechanisms of action, therapeutic relevance, regulatory compliance, and industrial applications.

◀◀◀ ABSTRACT





INTRODUCTION

Biological systems rely on complex enzymatic networks to maintain cellular homeostasis, regulate metabolism, and enable adaptive responses. Enzymes catalyze biochemical reactions under physiological conditions that would otherwise require extreme temperatures, pressures, or chemical catalysts. Their specificity and efficiency ensure controlled reaction rates, preventing metabolic imbalance or cellular damage.

Proteolytic enzymes, in particular, are indispensable in physiological processes such as digestion, tissue remodeling, inflammation resolution, and protein turnover. Among these, Trypsin and Chymotrypsin are extensively studied and widely applied in pharmaceutical and biotechnological domains.

ENZYMES AS THE OPERATING SYSTEM OF LIFE

Enzymes govern virtually all biological activity by:

- 01** Accelerating biochemical reactions
- 02** Regulating metabolic pathways
- 03** Ensuring reaction specificity and timing
- 04** Maintaining cellular equilibrium in dynamic environments

Without enzymatic catalysis, essential biochemical reactions would occur too slowly or uncontrollably, compromising biological viability. The ability of enzymes to operate efficiently under mild physiological conditions represents a model of biological optimization and functional intelligence.

TRYPSIN: A HIGHLY SPECIFIC PROTEOLYTIC ENZYME

BIOCHEMICAL CHARACTERISTICS

Trypsin is a serine protease derived from porcine pancreatic origin. It exhibits high substrate specificity by cleaving peptide bonds at the carboxyl side of basic amino acids—lysine and arginine. This property makes Trypsin an essential enzyme for controlled proteolysis in pharmaceutical, nutraceutical, and biotechnology applications.

At Enzyme Bioscience, Trypsin is supplied as:

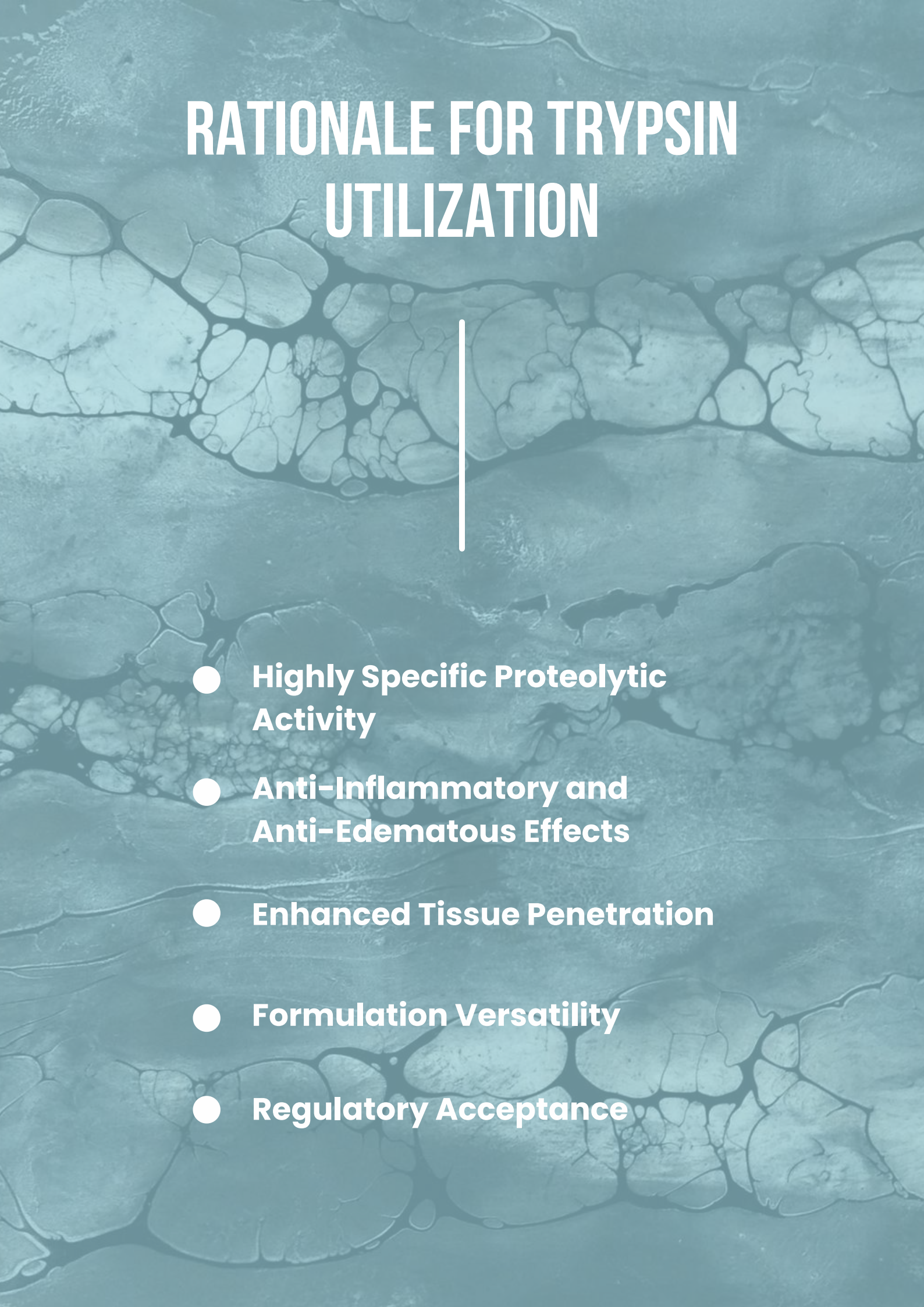


EB-TrypZyme® – Trypsin
USP/BP



EB-TrypChymo® – Trypsin–
Chymotrypsin combination (6:1)

RATIONALE FOR TRYPSIN UTILIZATION

A microscopic image of muscle tissue, showing large, rounded muscle fibers with dark, branching capillaries. A vertical white line is drawn across the center of the image, separating the title from the list of points.

- **Highly Specific Proteolytic Activity**
- **Anti-Inflammatory and Anti-Edematous Effects**
- **Enhanced Tissue Penetration**
- **Formulation Versatility**
- **Regulatory Acceptance**

**Trypsin enables:**

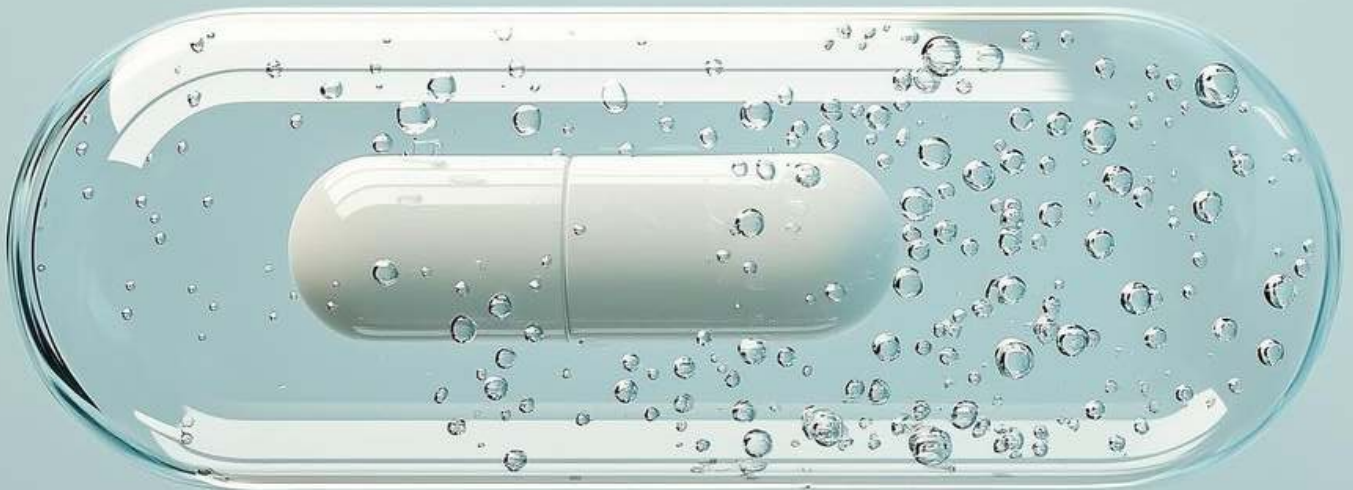
- › Predictable protein digestion
- › Minimal non-specific degradation
- › High reproducibility in formulations

These attributes make it suitable for regulated therapeutic and industrial processes.

**In systemic enzyme therapy, Trypsin contributes to the breakdown of:**

- › Inflammatory protein complexes
- › Fibrin deposits
- › Necrotic tissue debris

This supports its use in post-operative recovery, trauma management, and inflammatory conditions.



**By reducing protein barriers at inflamed sites, Trypsin:**

- › Improves tissue permeability
- › Enhances microcirculation
- › Supports faster recovery and therapeutic efficacy

**Trypsin is effective as both:**

- › A single-enzyme formulation
- › A synergistic combination with Chymotrypsin

The latter approach enhances proteolytic breadth and therapeutic outcomes.

**Porcine-origin Trypsin USP/BP is:**

- › Pharmacopoeially compliant
- › Clinically established
- › Widely accepted in regulated pharmaceutical markets

CHYMOTRYPSIN: A COMPLEMENTARY PROTEASE

Chymotrypsin is a serine protease that hydrolyzes peptide bonds at aromatic amino acid residues, including phenylalanine, tyrosine, and tryptophan. When combined with Trypsin, it provides broader substrate coverage and enhanced degradation of inflammatory proteins.

SYNERGISTIC BENEFITS

01

Enhanced anti-inflammatory activity

02

Faster reduction of edema

03

Improved tissue repair and healing

04

Optimized proteolytic balance

The 6:1 ratio in EB-TrypChymo® is specifically designed for pharmaceutical enzyme therapy.

MECHANISM OF ACTION

Trypsin and Chymotrypsin function via serine protease catalysis, targeting distinct peptide bonds:

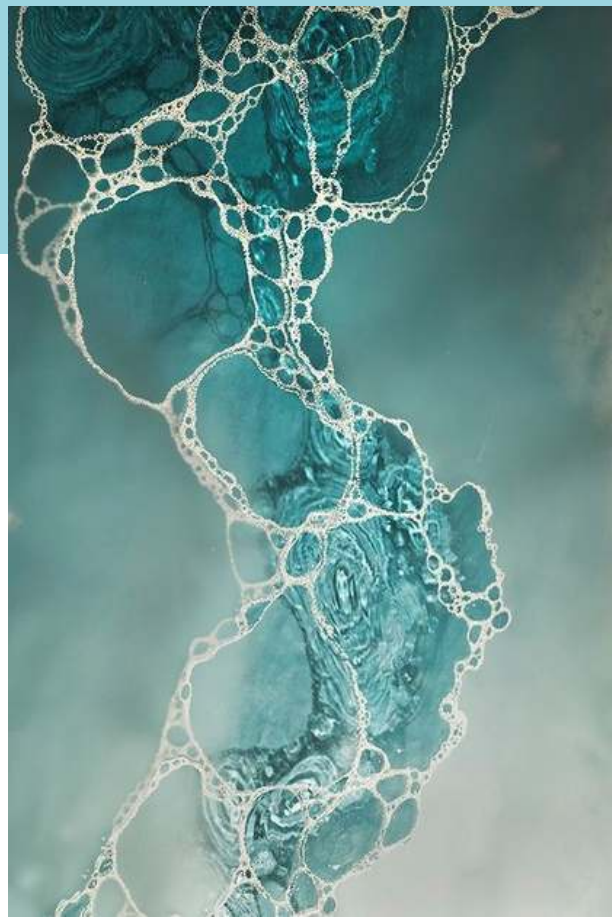
- › Trypsin: Lysine and arginine residues
- › Chymotrypsin: Aromatic amino acid residues

Together, they provide:

- › Targeted and controlled proteolysis
- › Anti-edematous activity through fibrin degradation
- › Synergistic enzymatic performance



APPLICATIONS



PHARMACEUTICAL INDUSTRY

- › Anti-inflammatory enzyme therapy
- › Post-surgical and trauma recovery formulations
- › Trypsin Chymotrypsin combination products



NUTRACEUTICALS

- › Systemic enzyme supplements
- › Mobility and recovery support formulations



BIOTECHNOLOGY AND RESEARCH

- › Cell culture processing
- › Protein digestion and analytical studies
- › Enzymatic sample preparation



MANUFACTURING AND BIOPROCESSING

- › Controlled protein hydrolysis
- › Formulation development and optimization

PHARMACEUTICAL INDUSTRY

NUTRACEUTICALS

BIOTECHNOLOGY AND RESEARCH

MANUFACTURING AND BIOPROCESSING

TECHNICAL SPECIFICATIONS

Product Types

- › Trypsin USP
- › Trypsin BP
- › Trypsin Chymotrypsin Mix (6:1)



Shelf Life

- › 3.5 years from date of manufacture



Quality Parameters



Test Specification

Appearance White to whitish powder
Loss on Drying NMT 5.0%
Assay NLT 2800 U/mg / 2800 USP U/mg / NLT 0.5 μ Kat
E. coli Absent / g
Salmonella Absent / 10 g



Note: Specifications may vary depending on grade.

QUALITY, SAFETY, AND COMPLIANCE

EB-TrypZyme™ and EB-TrypChymo™ are manufactured under stringent GMP conditions with robust quality control systems. Each batch undergoes comprehensive testing for:



Enzymatic activity



Purity



Microbial limits



Pharmacopoeial compliance

小红书号: 942

HANDLING, STORAGE, AND PACKAGING



> Store in a cool, dry place away from heat, light, and moisture



> Avoid inhalation of enzyme dust



> Follow standard enzyme handling precautions



> Standard: 25 kg drum.
> Custom packaging available upon request

CONCLUSION

EB-TrypZyme™ and EB-TrypChymo™ represent scientifically validated, regulatory-compliant proteolytic enzyme solutions designed for pharmaceutical, nutraceutical, and industrial applications. Their precision, synergistic performance, and established clinical trust position them as reliable components in advanced enzyme therapy and bioprocess systems.